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DETERMINANTS OF BUSINESS TAX EVASION IN TRANSITION ECONOMIES

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ABSTRACT

Tax evasion represents one of the major problems facing transition and developing economies. It imposes several economic costs: it slows down economic growth; it diverts resources to unproductive activities; it provides an incentive for firms to remain small and invisible; and it generates inequity between the evaders and the honest taxpayers.

The aim of this thesis is to investigate the determinants of business tax evasion for transition economies. We do so by adapting the individual theory to the case of businesses; that is by assuming that the behaviour of businesses is similar to the behaviour of individuals, and that the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. More specifically, beyond theoretical and empirical review of the tax evasion literature, this thesis provides three related empirical investigations: a panel investigation of tax evasion at the country level; a pooled-cross section investigation of firm-level behaviour across the transition economies and a cross-section investigation of business tax evasion and tax morale in Kosovo. For the firm-level investigation we use the BEEPS data for the years 1999, 2002 and 2005; and, for the investigation of business tax evasion in Kosovo, we generate primary data by developing a questionnaire and conducting a survey of businesses in Kosovo. Our econometric findings suggest that, first, regardless of the theoretical and previous empirical ambiguity, when it comes to transition economies the relationship between tax rate and tax evasion is positive; second, the macroeconomic environment has only minor effects on business tax evasion, suggesting that the decision to evade or not must depend on other non-economic factors; third, even if a country is performing well in general economic terms, the presence of negative institutional phenomena exert a dominant and immediate influence on the relationship between businesses and government; fourth, business tax morale, as is the case with individuals, has a strong and negative relationship with tax evasion; fifth, moreover, given that the same considerations on morality apply to both individuals and businesses, policies in the individual context apply also to businesses; sixth, lower corruption, higher trust and better treatment of business taxpayers improves significantly both tax morale and tax compliance; and, seventh, because levels of tax evasion vary across firm characteristics, audit strategies should be set accordingly. Finally this thesis provides a set of corresponding policy recommendations intended to reduce either the possibility and/or the inclination to evade.

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TABLE OF CONTENT

CHAPTER I
General Introduction

CHAPTER II
Theory of Tax Evasion

CHAPTER III

Review of Empirical Literature

CHAPTER IV

Business Tax Evasion in Transition Economies: A Cross-Country Panel Investigation

CHAPTER V
Firm Level Determinants of Tax Evasion in Transition Economies

CHAPTER VI
Understanding Business Tax Morale: The Case of Kosovo

CHAPTER VII

Conclusions and Policy Implications

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AME	Average Marginal Effects
BEEPS	Business Environment and Enterprise Performance Survey
CCI	Control of Corruption Index
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
CIT	Corporate Income Tax
CLRM	Classical Linear Regression Model
CPI	Consumers Price Index
EBRD	European Bank for Reconstruction and Development
EU	European Union
EVS	European Values Survey
FE	Fixed Effects
FEVD	Fixed Effects Vector Decomposition
FIML	Full Information Maximum Likelihood
GDP	Gross Domestic Production
IMF	International Monetary Fund
IMR	Inverse Mills Ratio
IRS	Internal Revenue Service
HMRC	Her Majesty's Revenue and Customs
MC	Marginal Costs
ME	Marginal Effects
MU	Marginal Utility
MLE	Maximum Likelihood Estimation
MR	Marginal Revenue
MTI	Ministry of Trade and Industry of Kosovo
NATO	North Atlantic Treaty Organization
OLS	Ordinary Least Squares
RE	Random Effects
SE	Standard Errors
SMEs	Small and Medium Size Enterprises
SOK	Statistical Office of Kosovo
SSC	Social Security Contributions
TAK	Tax Administration of Kosovo
TCMP	Taxpayer Compliance Measurement Program
TE	Transition Economies
UK	United Kingdom
UNMIK	United Nation Mission in Kosovo
US	United States
VAT	Value Added Tax
WB	World Bank
WDI	World Development Indicators
WGI	World Governance Indicators
WVS	World Values Survey

Chapter ONE

General Introduction

TABLE OF CONTENTS

Introduction

Tax, from the Latin word *taxo*, meaning "rate", is a fee that is charged by a government on a product, income or activity. Through taxes government finances its expenditures and uses them for purpose of stabilization, distribution and allocation. Evasion on the other side, from the Latin word *evadere*, meaning "escape", is an illegal action which entails the refusal of individuals and businesses to comply with tax requirements.

Taxes and evasion have coexisted from ancient world to the modern times. From the *corvée* and the *tithe* - the earliest and most widespread forms of taxation - to the very modern taxes on cars, tobacco and other luxury goods, mankind was inclined to resist, hide and underreport wealth. Conversely, from the *scribes* – the Egyptian Pharaonic tax collectors – to the contemporary collecting mechanisms, governments and tax administrations have tried to prevent them from doing so. As the fight goes on, perhaps endlessly, tax evasion remains one of the most commonly found problems in the developed and developing countries. Recent estimates in 2013 show that the direct financial costs of tax evasion worldwide surpassed 5% of the world's Gross Domestic Product (GDP); while the indirect costs remain unaccountable given the extensive impact of tax evasion on economic growth, provision of public goods and/or research and development (Murphy, 2013).

The purpose of this chapter is to provide a general introduction to the topic of tax evasion, its definition, history and the costs it entails. In addition, through this chapter we define the scope and objectives of this research. We do so in order to set the platform for the following chapters of this thesis, which provide a theoretical and empirical discussion of business tax evasion in transition economies.

This chapter is organized as follows. *Section 1* provides a discussion on the definition of tax evasion and its relationship with three closely related topics. *Section 2* discusses the evolution of taxes and tax evasion throughout the history of mankind. *Section 3* discusses tax evasion in the context of transition economies; while *Section 4* highlights the main objectives of this study. *The last section* concludes.

1.1 Definition

Taxation is a central topic in the field of public finance. Tax evasion however, is studied through a combination of the social sciences and the economics of crime. The Oxford Dictionary defines tax evasion as "*the illegal non-payment or underpayment of tax*". Her Majesty's Revenue and Customs (HMRC), the United Kingdom's (UK) non-ministerial department responsible for tax collection, provides a similar definition; it considers tax evasion as "*a deliberate underreporting of tax obligations*".

The broad tax literature addresses the need to differentiate between evasion and three closely related topics; that of tax avoidance, informality and criminal activities. These boundaries are summarized by Cowell (1990); hence are referred to here as Cowell's boundaries.

The first boundary, evasion versus avoidance, is the most misinterpreted relationship amongst non-researchers of tax evasion. A former British Chancellor of the Exchequer, Denis Healey said: "*The difference between tax avoidance and tax evasion is the thickness of a prison wall*"; however, both terms and the actions that each entail are unquestionably not the same. The classic distinction between avoidance and evasion is made by Holmes (1916, p.240), who wrote:

> *When the law draws a line, a case is on one side of it or the other, and if on the safe side is none the worse legally that a party has availed himself to the full of what the law permits. When an act is condemned as evasion, what is meant is that it is on the wrong side of the line...*

A general understanding of this interpretation is that the difference between evasion and avoidance is rather on legal consequences that each act entails separately, with the latter being arguably non-punishable. Kay (1980, p.136) offers the following definitions for evasion and avoidance:

> *Evasion is concerned with concealing or misrepresenting the nature of a transaction; when avoidance takes place the facts of the transaction are admitted but they have been arranged in such a way that the resulting tax treatment differs from that intended by the relevant legislation.*

Sandmo (2004) argues that when the taxpayer abstains from reporting income which is in principle taxable, he engages in an illegal activity that makes him accountable to administrative or legal action from the authorities. Tax avoidance, on the other hand, is within the legal framework of the tax law. It consists in “exploiting loopholes” in the tax law in order to reduce the taxpayer’s tax liability. The principal difference is that whilst taking the first action the taxpayer is worried about being caught, whereas while undertaking the second action he has no worry, or quite the contrary, because “it is often imperative that he makes a detailed statement about his transactions in order to ensure that he gets the tax reduction that he desires”. Cowell (1985) goes beyond legal definitional differences by making the distinction in terms of the agent’s perceived budget constraint when the decision to evade/avoid is made. He argues that avoidance implies certainty of taxpayers while making the decision to report, while evasion implies activities that are taken under uncertainty; assumptions over certainty/uncertainty affect the risk behaviour of individuals which, in turn, affects the amount to be evaded/avoided. At the same time, he argues that the difference can be concluded only after the final outcome of each decision is known. In other words, if the law “effectively turns a blind eye” to tax evasion then from the taxpayer’s perspective there is no difference between evasion and avoidance; in both cases taxpayers will maximise non-reporting. Equally if avoidance is subject to legal doubt, or liable to penalty, then as far as economic consequences are concerned (to the taxpayer) the final outcome is similar to tax evasion.

While one can also look at the Slemrod (2007) sarcastic perspective where “*the poor evade and the rich avoid*”, we note the importance of distinguishing between tax evasion and tax avoidance. This distinction has mainly to do with the illegitimate and punishable nature of evasion; as compared to avoidance. The Oxford English Dictionary defines tax avoidance as "*the arrangement of one's financial affairs so that one only pays the minimum amount of tax required by law*". By definition, paying the minimum amount required by law is within the law. It is always legal. However, as far as the economic function is concerned these occurrences have very strong similarities and very often they can hardly be distinguished (Feldman and Kay, 1981; McBarnet, 1992; Franzoni 1999). Moreover, from the moral point of view the outcome of both actions is the same. Some even argue that for the purposes of analysis evasion and avoidance should be treated as the same.

The second boundary relates to the relationship between evasion and informality; with two groups of views largely defining this relationship. The first group enforces beliefs that both evasion and informality move in the same directions, hence in terms of determinants, what defines one should also define the other. After all, one would not normally expect an informal business to report tax liabilities (Schneider 2012). The second view argues that informality is a much broader topic than tax evasion, and as such should be treated separately. Informality after all includes also illegal activities (for instance prostitution or drugs) which would normally cease to exist if detected (through audit) and thus would generate zero tax revenues (Fuest and Riedel 2009). Moreover, informality also includes noncompliance with labour regulations, production standards, or other legal (non tax) requirements which go beyond tax evasion. Cowell (1985) argues that the boundary between evasion and informality does not generate any new obstacles for the analysis of the economic behaviour beyond those raised in evasion versus avoidance discussion.

The last boundary emphasises the relationship between evasion and other criminal activities. The association of tax evasion to the economics of crime is widely studied (Anderson, 1976; Heinke, 1978; Pyle 1983; Karlinsky et. al, 2004). The question made here, is whether we should isolate the issue of evasion as a special case of the economics of crime. Cowell (1990) argues in favour of treating tax evaders as a special case of the rational economic behaviour of criminals for two reasons. First, because tax evasion is a fraud that is committed against a very special economic agent: government. Government is a special agent as it can set the *"rules of the game"* by which economic relationships are supposed to abide; as well as structure and tax rates. Above all, government has ultimate control over mechanisms to track wrongdoers. On the other side, in any given crime, let's say theft or business fraud, companies and individuals do not normally have any of the resources that government has. Second, in some cases the decision between tax compliance and tax evasion clearly involves the contents of a report to the tax authorities, a feature that is not present in other forms of crimes. This means that the filed report can be used by examiners as a useful signal of *"what may be going unseen"*. The third reason is linked with the special relationship between evasion and other core topics of public economics; and, hence, the necessity to differentiate this topic from the standard economics of crime. Contrary to other illegal activities, evasion is related to fiscal control that the government tries to use in execution of its economic policy. Thus the search for effective public policies towards taxation makes the topic of evasion interesting in its own right.

Reflecting on the discussion above, tax evasion is defined as an intentional underreporting of taxable liabilities to tax authorities; an act with apparent boundaries separating it from avoidance, informality and other criminal activities. Further, tax evasion is a decision that includes incorrect reporting and non-timely reporting of taxable income, as well as underreporting due to non-mistakes in filing taxes. If taxpayers fail to provide their correct taxable liability to the tax authorities, then they are assumed to be evaders; if taxpayers fail to report on time, then they are assumed to be evaders; and if taxpayers' underreporting is not made due to mistakes in filing taxes (such as miscalculations or overestimation of deductions) then they are assumed to be evaders.

1.2 Evolution of Taxes and Evasion

Although regarded as a necessary evil, taxes have existed since the earliest days of civilisations. Burg (2004) dates the history of taxation in ancient Egypt from around the years 3000-2800 BC, in the first dynasty of the *Old Kingdom* where two forms of taxes were commonly found: *corvée* and *tithe*. *Corvée* was a state imposed forced labour on rural inhabitants too poor to pay other forms of taxes. Indeed, according to Webber and Wildavsky (1986), in the ancient Egypt language, the word "labour" was actually a synonym for these taxes. *Tithe* on the other side was a contribution of one tenth of the amount of something being taxed. Today the most advanced form of *tithe* is the income tax.

According to Adams (2006), the earliest records of regulated tax systems, as well as anti-evasion apparatuses, date too from the Egyptian culture where the *Pharaohs* established a tax collecting mechanism at the core of which were the highly paid tax collectors known as *scribes*. At some period of Pharaonic ruling, a tax on cooking oil was introduced. In order to ensure compliance, scribes audited households to verify the amount of cooking oil being consumed and that households were not using leavings generated by the other cooking processes as a substitute for the taxed oil.

Indeed, the evidence on audits carried out by scribes proves the coexistence of tax evasion ever since the birth of taxes. Punishments for tax evasion on the other side were ruthless as they included even death penalties. Death sentences were not a common form of punishment in ancient Egypt; suggesting that the treatment of tax evasion back then was considered as greatly important. According to the ancient Greek historian *Herodotus*, whose works are considered today as the founding works of history in the Western literature, *Amasis I*, the Pharaoh of Egypt around the year 1500 BC, established a law that every year each Egyptian should declare to the ruler of his district from what source he received his livelihood. And, by the written request of *Amasis I*, if someone did not make the declaration of an honest way of living "*...he should be punished by death*". Babylonians on the other side applied a more sophisticated approach. According to Webber and Wildavsky (1986), in case of noncompliance in ancient Babylon, tax collectors would send the following notice: "*Why have you not sent to Babylon the 30 lambs as* *your tax? Are you not ashamed of such behaviour?*" Indeed, notices as such might be the first evidence of non-deterrent tax collection mechanisms. Slemrod (2007) argues that similar patriotic appeals to induce citizens to comply are common in recent times.

Burg (2004) considers written records which reveal that grain was first taxed in *Ch'in*, an early Chinese state, in the year 408 BC. According to him, this is a hint of a considerable shift from peasants providing labour services (the corvée) for overlords to instead paying them land taxes. Earlier than that, in 594 BC, in the Chinese state of Lu, new forms of taxation, apparently peasants making payments in kind to their overlords were introduced. Burg (2004) further argues that such records suggest that taxation has been a part of human history in both the East and the West for at least 2500 years.

Around the year 500 BC, in the Persian Empire, the emperor *Darius I the Great* introduced a more advanced system of taxation, which obliged each Persian province (known as *Satrapies)* to contribute according to their potentials. This could be, perhaps, the introduction of the first progressive tax principle. For instance, *Babylon* was known for its richness in commodities, hence was obliged to contribute with silver and four months supply of food for the army; India was known for gold, and supplied gold in turn; Egypt was known for crops and hence provided a preassigned amount of them.[1] In each *Satrapies* were *Satrapa*s, or provincial governors, who were entitled to a certain percentage of the collected goods as a reward for their collecting efforts. Rewarding, as an incentive to increase tax collection, was applied to tackle specifically tax evasion and increase tax compliance.

Adams (2006) mentions ancient Greece as another example of tax evolution and sophistication. There, in times of war, the Athenians imposed an emergency tax on property and wealth known as *eisphora*; no one was exempt from compliance and evaders were punished with unprecedented harshness – including death. He further argues that Greek civilisation is amongst the few that managed to rescind the tax once the emergency was over. Indeed, most of the

[1] On a separate note, the *Rosetta Stone*, one of the most famous ancient Egyptian stones, is a tax concession issued by *King Ptolemy V* in year 196 BC, which led to the world's most important decipherment of hieroglyphics; given that it was written in three ancient languages.

modern taxes today have their origins in times of war; inability and/or unwillingness of respective governments to rescind them made these taxes permanent.

Further on in history, in the Roman Empire, the earliest taxes were custom duties on imports and exports known as *portoria*. Two emperors are distinguished as great tax strategists throughout the glorious Roman era; *Ceasar Augustus* and *Julius Ceasar*. While the former is remembered for the introduction of inheritance tax, which today is referred as the *Augustus Tax* by both English and Dutch modern governments; the latter is remembered for imposing the one percent sales tax; today perhaps most commonly known as Value Added Tax (VAT). According to Bartlett (1994), the latter taxes included a modest contribution on all forms of wealth, including land, houses, slaves, animals, money and personal belongings. Although the basic rate was symbolic, roughly 0.01 percent, tax evasion was a notable problem in the Roman Empire. Slemrod (2007) cites works that have identified tax evasion around the third century, when Romans buried their jewellery or gold coins to evade the luxury tax.[2]

In England, the first tax assessement was during the occupation by the Roman Empire. Following the fall of the Romans, the Saxon kings were the one that inherited the right for tax enforcement. Kings introduced, amongst many of them, the tax on land and property known as the *danegeld* (Green, 1981). The end of the medieval era was characterized by enforcement of progressive taxes by the *Crown* and, hence, a shifting of the tax burden from poor to the rich. According to Adams (2006), the 1377 poll tax noted that the tax on the Duke of Lancester, for instance, was more than five hundred times the tax levied on the common peasant. With the breakdown of medieval structure and decline of the monasteries, Parliament took a more prominent role in setting tax policies. In 1628, for instance, the *Petition of Right* was passed which, amongst many measures, prohibited the *Crown* from creating and imposing arbitrary

[2] Different types of taxes were also applied by religious institutions throughout history. These institutions indeed, at times, have rivalled or even surpassed the political ones in regards to the material obligations. Christians for instance applied (similar to the ancient Egyptians) the *tithe*, or the one tenth of what the faithful produces. Muslims on the other side applied the *khum*s or one twentieth of their wealth; they even today consider giving the small percentage of one’s income for charity as *zakat*, or one of the five main religious pillars. Orthodox Jews continue to contribute for charity with *ma’aser kesafim*, or one tenth of earnings. Both Hindus and Buddhists sustain similar practices today.

taxes without the preliminary approval of Parliament (Boynton, 1964). Under the Kingdom of Great Britain, in 1798, in preparation for the *Napoleonic Wars*, income tax was introduced for the first time, with a rate of only 2 pence in the pound (Cooper, 1982). Subsequent tax evolution is a modern history with variations in tax rates and groups of individuals being taxed according to political views and beliefs enacted in place.

In the United States (US), following the war against the British of 1775–1783 which, after all, began because of taxes, the new government was reluctant to levy taxes on very specific goods, such as liquor, tobacco or sugar. Subsequent taxes were set mainly because of the needs to finance wars; as Forbes would later put it, “War is Hell, but Taxes Last Longer”.[3] Contrary to the ancient Athenians, who rescinded taxes after the war, a war with France in 1790 enforced property taxes until the present time. Similarly, following the American Civil War in 1872, in the aftermath of major devastations and disastrous events, Congress passed the Revenue Act of 1861, which not only introduced the Internal Revenue Service (IRS) and, hence, today’s most advanced tax enforcing mechanism, but has also served as a core foundation for the current modern tax system in the US.

1.2.1 From necessity to resistance

So why do we need taxes? Perhaps the best way to answer this question is by going back to 1941, when the economist William Beveridge published a report for the British Government. In this report he recommended that the government should find ways to fight the five “Giant Evils”; i.e. those of “Want”, “Disease”, “Ignorance”, “Squalor” and “Idleness”. The “Want” evil was a synonym for the standard of living; “Disease” signified the importance of health; Ignorance of education; “Squalor” of poverty; and “Idleness” of employment. According to Beveridge, in order to cure these “Giant Evils” government needs sustainable financing, which can be generated only through taxes. With another touch of class argumentation, a US famous judge Holmes, in 1904 described taxes as “*a price we pay for a civilized society*”.

[3] http://www.forbes.com/2010/04/14/tax-history-law-personal-finance-tax-law-changes.html

So, why would individuals continuously evade? How is it that governments have had to fight tax evasion ever since the times of Persia, Egypt, Greece, and Rome right up to modern times? Why the resistance and why evasion?

Frederick the Great, the 18th century King of Prussia, once said: "*No government can exist without taxation. This money must necessarily be levied on the people; and the grand art consists of levying so as not to oppress*."[4] The "*grand art*", however, often lacked grandeur in practice. Governments sometimes "*oppressed*", and sparked resistance by "*the oppressed people*". Indeed, resistance towards taxes was often the basis for social movements and even revolutions for freedom.

Adams (2006) argues that historically excessive taxation led not only to evasion, corruption, bribery, inefficiency; but also, in some cases, it led to war or conflict, sometimes even to revolutionary changes. For instance, according to Ralph (2003) a combination of high taxes with unsuccessful wars led to the rebellion of English feudal barons against *King John of England* and the creation of the *Magna Carta Libertatum* or The Great Charter of the Liberties of England; an important part of the historical process that led towards *constitutional law*. Similar movements arising from dissatisfaction with heavy tax burdens occurred also in France, during the *Great French Revolution*, and in North America in 1773 during the *Boston Tea Party* uprisings. Burg (2004), in a quite thorough review of historical tax uprisings, summarises cases of reaction against excessive and cruel taxation/enforcement dating from the *Hamurabi* era in Babylon (1792-1750 BC), to the *Later Han* dynasty in Asia (AD 25 – AD 220), and to the Roman Empire (27BC- AD 337) in Europe. He argues that taxation often provides the ostensible reason for resistance, especially since taxes afford a ubiquitous, detested and identifiable target of opposition.

The tax burden might be one reason behind resistance and/or tax evasion, but so also can be the perceived fairness of the system, treatment by governments, or even moralistic views of individuals in regards to both taxes and tax evasion. In regards to the relationship between taxpayers and institutions, Hanousek and Palda (2004) examined tax evasion as a form of legitimate protest by citizens against negative phenomena within governments. Tirole (1996)

[4] This quote was taken from the IRS web site: http://www.irs.gov/uac/Tax-Quotes

explains that when taxpayers see their government as corrupt and irresponsible, evasion is seen as a "vote of dissent". Morality on the other side relates to the ethics of individuals in regards to taxes in general and tax evasion in particular. At times, driven by individual opportunism, egoism or other non-altruistic values, tax evasion is and will always be relentless.

For others, tax resistance, similar to tax evasion, has been seen as a fair opposition of government policies; a form of civil disobedience. Rothbard (1982, p.3), for instance, when discussing the moral status of relations to the state, argued that taxation is theft and that tax resistance is therefore legitimate: "*Just as no one is morally required to answer a robber truthfully when he asks if there are any valuables in one's house, so no one can be morally required to answer truthfully similar questions asked by the State, e.g., when filling out income tax returns".* Similar views are shared by other well-known individuals. Indeed, Gross (2008), summarizes a list of taxation opposers, which included violent revolutionaries such as John Adams and pacifists such as John Woolman; communists such as Karl Marx and capitalists such as Vivien Kellems; solitary anti-war activists such as Ammon Hennacy and leaders of independence movements such as Mahatma Gandhi.

In short, there are many sources of evasion and resistance to tax compliance, and each of these sources has been effective in their own way ever since the existence of taxes; hence the ongoing fight of institutions to tackle one of the oldest economic crimes in human history. The individual views and reasons for evasion, in turn, make it difficult to classify, from the moral point of view at least, tax evasion as either an always justifiable or unjustifiable act. But regardless of its justifiability or not, tax evasion entails several economic costs which damage, in turn, the core of each system worldwide. The costs and current levels of tax evasion are discussed in the following section.

1.2.2 Current levels and costs of evasion

Benjamin Franklin once wrote that "*nothing is certain in this world except death and taxes*"; yet throughout the history of taxation mankind has been inclined to resist and evade taxes. Indeed, much to Benjamin Franklin's displeasure, today one can fairly argue that tax evasion is simply inevitable. As Cowell (1990) would put it in one of the most prolific reviews of tax evasion behaviour, only the most fanciful thoughts can dream of a world whose citizens inspired by altruism, pride or even religious passion and beliefs are willing to fully comply without the need for institutional enforcements.

Evasion today is a global disease. In 2013, the British accountant Richard Murphy by comparing World Bank data to Heritage Foundation data estimated global tax evasion to be around 5% of the world GDP, or roughly around 3.100.000.000.000 (3.1 trillion) US dollars (Murphy, 2013)`. The report uses data for more than 98% of the world's GDP and over the 92% of the world's population. It first estimates the absolute size of a country's shadow economy (from the World Bank), then it the calculates tax share to GDP for each country (from the Heritage Foundation) and, finally, it applies the same share to the shadow economy in order to reveal the estimates of lost taxes by each country. The assumption made in this study is that all the economic activity in the shadow economy is subject to tax evading. We note here, however, the importance of distinguishing between "lawful" and "unlawful" activities within the shadow economy; with the latter representing zero potential tax income if detected given their "unlawful" nature (such as prostitution, gun trafficking and/or drugs). Their detection, at best, cannot yield any additional income in taxes; it will rather just terminate them. Unfortunately, this distinction is not taken into the account in the Murphy (2013) report. Still the estimates provide a good indication that tax evasion costs are substantial.

Murphy (2013) found that the USA (337.3 billion $; or 8.6% of GDP), Brazil (280.1 billion $ or 39% of GDP), Italy (238.7 billion or 27% of GDP) are the top three countries with the largest levels of evasion worldwide. These figures are even higher in transition countries, with tax evasion ranging from 30% to 60% of country's GDP (Johnson et al, 2000; Cobham, 2005; La Porta and Shleifer, 2008; Shneider, 2012). Further Murphy (2013) argues that more than one dollar in every six in the world is not subject to tax, because their respective earners successfully hide it from the world's tax authorities. This ratio is even higher in Europe, with one in five dollars being hidden, while in countries such as Greece and Italy, where the recent economic crisis was felt more, the ratio is one in four.

In May 2013, given the alarming levels of tax evasion worldwide and particularly in Europe, the Council of the European Union (EU) held a meeting in which individual Member States were urged to take effective steps to fight tax evasion. Given the current debt crisis around the European countries, the fight against evasion –as a source for additional governmental revenues - became even more important.

The presence of tax evasion imposes several economic costs. First, tax evasion is more likely to slow down economic growth as the government's ability to provide adequate public goods, market supporting institutions, infrastructure, human capital development, or research and development will be weakened (Johnson et al. 2000). Second, tax evasion diverts resources to unproductive activities such as establishing financial subsidiaries to cover-up evasion (Slemrod, 2007). Third, it causes inefficiencies in firms' production as they tend to stay small and invisible to facilitate evasion and also miss growth-enhancing opportunities from the formal economy (Nur-tegin, 2008). Fourth, tax evasion causes inequity between evaders and the honest taxpayers by shifting the burden to the latter group and, thereby, creating an incentive for further evasion (Feinstein, 1991).

1.3 The Context of Transition Countries

A transition economy (TE) is an economy undergoing transformation from central planning to free markets. According to the International Monetary IMF (2009) there are four components of the transition process. The first component includes the *liberalisation* of the market; a process which, contrary to the controlled economies, allows most prices to be determined in free markets and correspondingly lowers trade barriers that had shut off contact with the price structure of the world's market economies. The second component is *macroeconomic stabilization*, primarily a process of fiscal and monetary discipline through which inflation is brought under control and lowered over time, after the initial burst of high inflation that follows from liberalization and the release of pent-up demand. The third component is *restructuring and privatisation*, which includes creation of a viable financial sector and reforms of the state owned enterprises; most notably the transfer of their ownership into private hands. The last component is *legal and institutional reform*, which largely covers the rule of law aspects. The transition process has been undertaken in the Communist bloc countries of Europe, the former Soviet Union, as well in many third world countries. According to IMF classifications, in Europe, the TE countries are considered to be the following: Albania, Bulgaria, Croatia, the Czech Republic, Hungary, Kosovo, Macedonia FYR, Montenegro, Poland, Romania, Serbia, the Slovak Republic and Slovenia – known as the Central and Eastern Europe countries (CEE); Estonia, Latvia and Lithuania – known as the Baltic Countries; and Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan – known as the Commonwealth of Independent States (CIS).

Tax evasion becomes an important subject to study in TEs given that these countries face enormous institutional, behavioural and cultural changes during the transition process. These changes, in turn, affect compliance levels and, hence, the tax revenues that constitute the main source of finance for the respective governments. In something of a vicious circle, restricted ability to raise tax revenue across these countries undermines the financial support for public institutions and deterrence mechanisms, the performance of which ultimately affect tax evasion.

Moving from a central planned to a market economy involves the accomplishment of numerous yet unique tasks in many areas of the economy as well as in the way of life. Centralised economies were characterized by a system where the state made decisions over production and consumption of goods and services. These economies provided social services and benefits (education, health, etc) by using the resources generated by the profits and taxes of state owned enterprises. The State's full control of economic activities ensured that tax collection was not a problem. Given the relatively small number of taxpayers, the tax administration could conduct an audit rate of 100% and, hence, ensure zero evasion (Kodrzycki and Zolt, 1994). Indeed, the auditing process during centralised governments was just a routine. Bakes (1991) argues that most planned economies in Europe had similar tax systems to the Soviet Union; apart from the "reforming socialist" countries - namely Poland and Hungary - which during the 1980s used taxes as a tool for economic development rather than for managing cash flows and fulfilling the budget plan. Indeed, according to Martinez-Vazques and McNab (2000), taxes in TEs were often adjusted retroactively in order to meet perceived expenditure needs. Moreover, in most of the cases in these countries, the final tax liability of an enterprise was more dependent upon its ability to negotiate with the financial administration than on the tax law. Martinez-Vazques and McNab (2000) further argue that private activity was taxed at very high rates, while citizens were commonly unaware of taxation. On the other side, tax administration, as a collecting force, was marginalised by the central role of the government in the economy and the control over the payment system.

Moving towards a market economy was in general a challenging task as TEs had to build new institutions from scratch, change the legal and the juridical system, regain trust in state institutions, or secure market mechanisms that support individual freedom. For the same economies, the need to provide social services and benefits remained present while the resources to finance these went continuously down as the state itself was no longer the owner of enterprises and the controller of the market. The profits were kept by private owners while tax collection was no longer guaranteed, as it was based fully on voluntary compliance, which understandably was low.

There are several reasons behind high levels of tax evasion in TEs. Perhaps, Alm et al. (2004) summarize best the context of tax evasion in TEs, by introducing four main arguments. They cite

Kornai (1990) to develop the first argument: namely, that the major reason behind undutiful behaviour characteristic of transition societies can be found in citizens' lack of experience in paying taxes at the onset of the transition process. In the vein of transformations from centralised to market economies and, consequently, massive changes in policies, it is understandable that individuals have reacted evasively to unfamiliar demands for taxes. This perhaps relates to Martinez-Vazques and McNab (2000) argument that pre-transition, individuals were simply not aware of tax requirements.

The second argument relates to the relationship of individuals with institutions. Alm et al. (2004) argue that the connection between tax payments and the supply of public goods was largely disproportional in transition countries, which might have reduced the identification with the state and thus the willingness to pay taxes. This has consequently led to the rejection of most state systems. By the time the institutions improved their performance the undutiful behaviour had become a common social norm; the undoing of which presented one of the greatest challenges for transition governments. As North (1994) argues, institutions may change overnight yet social norms change gradually. Kornai (1990, p. 118), while foreseeing the future processes in TEs, argues:

> *People in general consider it a laudable act, rather than something to be ashamed of, if someone defrauds the state, appropriates its wealth, or shuns its obligations. Those who refrain from this kind of behaviour are seen as dupes ... Consequently, when we contemplate budget revenues we should be prepared to face the fact that many citizens will try hard to dodge taxes.*

Indeed, Kornai (1990) introduces risk from the negative peer influences in TEs, which eventually evolve into social norms. The role and impact of social norms in tax evasion is further discussed under Chapter III of this thesis. From there we understand that the caution and prediction cited above has been proved to be absolutely to the point.

The third argument relates to the collapse of deterrence structures during the transition process. As Kasper and Streit (1999) argue, in TEs there was a complete lack of a "rule of law" tradition. In most of the TEs, the deterrence mechanisms against tax evasion were simply inadequate or, even worse, non-existent. Essentially, in newly created market economies, there was no infrastructure in place to monitor the private sector, with tax administration being fragile and eventually corrupt; according to Levin and Satarov (2000), the level of corruption in the early years of the Russian transition exceeded the total expenditures on science, education, health care, culture, and art. On top of everything, with cash being the main mean of exchange no one had a real track of actual tax liabilities (Martinez-Vazquez and McNab, 2000; Tanzi and Zee, 2000; Lorie, 2003; Stepanyan, 2003). Pirttila (1999) reminds us that in TEs the tax system had to be build up from scratch, and given the uncertainties arising around this built up, the process was rather learning by doing and therefore long and difficult. In addition, given that communist style taxation was based mainly on direct extraction of resources from state owned enterprises – which are largely considered to be non-tax revenues – a post-communist tax administration essentially was required to shift from collecting non-tax revenues to raising tax revenues. Martinez-Vazques and Wallace (1999) argue that prior to transition taxpayers were "large in size and small in number", while during the transition period the transformation of the taxpayer structure happened fast, with tax payers becoming large in number and small in size. Institutions and their deterrence capacities on the other hand were unable to parallel these changes. Shifting to a market system required the creation of new tax institutions and new approaches to collecting revenue.

The last argument relates to the rise of social costs as well as worsening of income inequality and poverty in times of transition this, in turn, increased evasive behaviour by taxpayers; as Stiglitz (1999) points out, over the decade beginning in 1989 Russia's GDP almost halved. Similarly, Katz and Owen (2011) argue that all economies in transition suffered immediate drops in output, with real GDP falling in all of these countries up until 1994. Moreover, only Poland, Slovenia and Slovakia had equal or higher real GDP in 1999 than they did a decade before that, in 1989.

So far we have elaborated the definition, birth and evolution of tax evasion, as well as its particular nature under transition. Its size, proportion, trend and consequences have highlighted the importance of treating, through research at least, the subject of tax evasion. In the next section we provide a brief overview of what we know about the topic, as well as the general objectives of this thesis.

1.4 Objectives of the thesis

Although tax evasion has been present ever since the first day of taxes and regardless of its devastating consequences across the world - especially to less developed and developing countries - only during the past forty years has it attracted the attention of researchers. At the beginning of the 1970s, taxation was a prominent area of interest amid theoretical economists. Inspired by suggestions of the Mirrlees (1971) work on taxation and risk taking, Michael G. Allingham and Agnar Sandmo considered the economics of tax evasion. In what later would became the *magnum opus* of tax evasion literature - the standard model - their work combines studies in the economics of criminal activity (Becker, 1968; Tulkens and Jacquemin, 1971) and studies in the area of optimal portfolio and insurance policies in the economics of uncertainty (Mossin, 1968; Arrow, 1970) in order to provide a model of the decision of the taxpayer to comply. The model, put simply, portrays the decision of the rational taxpayer to comply as depending on tax rates, penalty rates and the probability of audit, in a world of uncertainty. It shows that the level of evasion of income tax depends on the level of punishment provided by law, the probability of audit by tax examiners, and the tax rate set by governments – although the impact of the tax rate was argued to be ambiguous. Business modelling has given rise to comparative static analysis similar to that of the individual traditional model; namely, the firm evades less with higher probability of detection and larger fines, while the impact of tax rates is ambiguous (see Marelli, 1984; Marelli and Martina, 1988; Virmani, 1989; Sandmo, 2004; Crocker and Slemrod, 2005).

The traditional model was often criticized for its simplicity. Subsequent analysis has extended models in a number of dimensions; mainly relating to inclusion of numerous factors beyond the standard model that relate to institutions, individual characteristics, morality, ethics, culture and social stigma. These extensions tried to solve, as Torgler (2007a) puts it, "*the puzzle of tax compliance*"; a condition where levels of tax compliance do not correspond to the levels of enforcements that the traditional model of Allingham and Sandmo (1972) would predict.

The literature on the factors shaping tax evasion is fairly well developed (reviews include: Jackson and Milliron, 1986; Cowell, 1990; Andreoni, et.al, 1998; Franzoni, 2008; Torgler 2011).

However, most of it relates to individuals. As Torgler (2011) argues, *"...business tax evasion in general, has received very little attention. Work in this area is therefore highly relevant (p.6)"*. The lack of research on tax evasion by businesses is unfortunate, especially given the fact that in most countries the bulk of taxes is paid by firms and firms account for the bulk of tax evasion too (McCaffery and Slemrod, 2004; Crocker and Slemrod, 2005; Chang and Lai, 2004; Nur-tegin, 2008). Arias (2005, *p.2*) argues that the interest of researchers in individual tax evasion as opposed to business tax evasion has been predominant because:

> *... in a micro level analysis, any economic agent (such as a firm paying taxes) could be reduced to an individual, the only decision makers that we could think off, and therefore, the direct (individual) tax evasion could be applied easily to an entrepreneur.*

Three additional neglected issues are associated with the lack of business research on tax evasion. First, the context of business compliance for transition economies has received very limited attention (Nur-tegin, 2008). This is perhaps due to the lack of data for these countries. Second, cross-country investigations (of both business and individual tax evasion) are even less common. In one of the most insightful reviews of tax evasion, Andreoni et al. (1998, p.855), while concluding and providing directions for future research, argue that "*...a broadening of the empirical database will improve the power of statistical tests of theoretical models, and spur comparative analysis across countries"*. Third, though the context of tax morale – or the intrinsic motivation of individuals to comply – has been substantially developed for individuals, and consequently accepted as an important determinant of tax evasion, it has been completely neglected for businesses. As Torgler (2011, p.55) argues:

> *In general, in most of the studies on tax morale and tax compliance, research has focused on personal income tax. Business tax evasion has received very little attention. This is a surprise taking into account the economic importance of the business sector and the importance of business taxation for tax administrations. Work in this area is therefore highly relevant for transition economies ...*

In a very recent attempt to provide some evidence on whether values, social norms and attitudes have measurable effects on the economic behaviour of firms, most notably on tax compliance, Alm and McClellan (2012, p.6), while stating that up to their work there was "no evidence on tax morale of firms", argue that:

> *The potential importance of firm tax morale has been ignored, perhaps because of the absence of firm level information that would allow a firm's tax morale to be measured.*

The aim of this thesis is to fill this gap by providing empirical research on the determinants of business tax evasion for transition economies. In this thesis we investigate the business, cross-country and transition contexts of tax evasion, as well as the impact of tax morale in business tax evasion for the case of Kosovo. We do so by making use of BEEPS (Business Environment and Enterprise Performance Survey), an EBRD and World Bank dataset, which provides firm-level data on a broad range of issues about the business environment and the performance of firms.[5] In addition, we collect primary data for Kosovo (with a sample of 600 SMEs) in order to investigate the relationship of business tax morale with tax evasion, as well as the determinants that shape business tax morale.

The starting assumption in our work is similar to the assumption made generally in the current literature on the tax behaviour of businesses, which is that the behaviour of businesses is similar to the behaviour of individuals, and that – as a corollary - the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. As Slemrod (2007, p.36) points out, the literature on business tax evasion "*adapts the theory of tax evasion, which for the most part concerns individual decision makers, to the tax compliance decisions made by businesses*".

In addition, we argue that this is particularly true of Small and Medium Sized Enterprises (SMEs) in which the decision making entrepreneur makes compliance decisions as both an individual and as a manager. Decision making by managers in large firms, including decisions on tax reporting, is far more complicated – because it is subject to formal, bureaucratic processes – and, consequently, entails potentially different outcomes from decision making by managers in

5 The Business Environment and Enterprise Performance Survey (BEEPS) is part of the ongoing work of the EBRD and the World Bank to investigate the extent to which government policies and public services facilitate or impede the environment for investment and business development in Central and Eastern Europe (CEE) (including Turkey) and the Commonwealth of Independent States (CIS).

SME's. Thus the decision to evade, amongst others, could be quite complex in large firms (formal and bureaucratic) but much simpler in SME's (informal and individual).[6] Additionally, it may also be different as managers in larger firms have different risk behaviour attitudes compared to managers/owners of SME's. This could be significant because, as we argue later in this thesis, the differences in risk assumptions may imply different evasive behaviours.

We note that the data used in this thesis are largely representative of SMEs. The BEEPS data for 1999, 2002 and 2005 on average have 91% of their respondents as SMEs. In the case of Kosovo, moreover, our survey was completely focused on SMEs. Accordingly, the overwhelming representation of SMEs in the survey data used in our study is consistent with the assumption that findings from the literature on individual tax evasion can be adapted to our analysis of business tax evasion in transition economies. While the topic of possible differences in the evasion/compliance behaviour of SMEs and large firms is not pursued in depth in this thesis, firm size does figure as a control variable in our analysis.

Beyond the necessity to focus on general business tax evasion, the motives to concentrate on TEs are threefold. First, the alarming levels of tax evasion worldwide, as well as economic costs it entails – especially for TEs – deserve ongoing research and contribution from researchers. Second, this specific group of countries has been largely neglected by the current tax literature; hence, our contribution to knowledge and literature can be more evident by making use of available data to analyse evasive patterns of businesses in TEs. Third, the focus on TEs can provide us with results and findings that are not only valid in the context of transition, but can be generalized to other countries and/or groups of countries with similar characteristics, and which too suffer from tax evasion.

In addition, the focus on Kosovo is threefold. First, such focus contributes substantially to knowledge by targeting a country with little or no similar research. Second, by being the last country to enter the transition process and, arguably, by being still in the early transition process,

[6] This is even true for the process of data collection. From our own experience, collecting primary data from banks, for instance, requires fulfilment of a set of very complicated procedures, in order to secure only access for an interview; let alone answers on more sensitive issues (perceptions for instance). For SME's, on the other hand, the access decision simplifies to the will and readiness of the owner/manager.

for a specific group of determinants (such as tax morale) the data collected at present are the only available data from an actual and ongoing transition process. Third, the ability to construct the questionnaire (and consequently conduct the survey) according to the needs of this research, enables us to investigate the most recent theoretical considerations in the business tax evasion (and tax morale) context.

This thesis is organized in seven chapters (the first being this general introduction). In Chapter II we provide a general theoretical discussion of the tax evasion traditional model as well as subsequent extensions that built upon it. The theoretical discussion in Chapter II enables us to summarize in a model specification and, hence, empirically investigate in subsequent chapters the determinants of business tax evasion.

In Chapter III we provide a detailed review of current empirical literature on the determinants of tax evasion. We include studies making use of actual tax programmes, laboratory experiments as well as surveys, in order to inform hypotheses in regards to the potential determinants of business tax evasion. The next three chapters are empirical investigations.

In Chapter IV we conduct a cross-country investigation of business tax evasion. We make use of the BEEPS data for the years 1999, 2002 and 2005 in 25 transition economies. We build initially upon the pioneering work of Riahl-Belkaoiu (2004) and Richardson (2006) who analyzed individual tax evasion in, respectively, 30 and 45 countries.

In Chapter V we focus on micro level determinants of business tax evasion. This is done in order to capture firm related determinants of tax compliance that cannot be captured in the macro investigation in Chapter IV. Again, we make use of BEEPS firm level data, covering 16,321 firms, in 26 transition economies for the years 2002 and 2005. Throughout this chapter we built on two, and to our knowledge the only, works on the micro determinants of business tax compliance for TEs, those of Nur-tegin (2008) and Joulfaian (2009). By combining determinants and estimation methodology used in one but not the other paper, we set out to improve both model specification and empirical strategy.

In Chapter VI we focus on tax morale. Frey (1997) defines tax morale as the "intrinsic motivation" of tax compliance, which due to "civic virtue" makes taxpayers comply; as opposed to “extrinsic motivation”, known also as deterrence impact, in which taxpayers pay because they fear punishment. Motivated by recommendations from the very recent and leading literature on tax evasion and tax morale we developed a questionnaire and conducted a survey with 600 SMEs in Kosovo – the last country to enter the transition process. Collection of primary data enables us to construct our models and conduct our estimations according to very recent recommendations.

Finally, Chapter VII of this thesis provides an overall summary of the research and findings derived from this thesis. It ends by providing a set of policy recommendations to help tackle tax evasion in transition (and similar) countries, as well as directions for future research.

Conclusion

In this chapter we provide a general introduction to the topic of tax evasion as well as the aim and objectives of this thesis. We start by discussing the definitional issues in regards to tax evasion as well as the need to differentiate tax evasion from tax avoidance, informality and other forms of crimes. We then commence by portraying the coexistence of taxes with evasion since the early civilizations. The perpetual efforts of individuals to conceal their taxes, alongside persistent efforts of institutions to detect wrongdoers, have characterized human society from ancient Egyptian times to the present day.

Today tax evasion represents a global disease, threatening the integrity of every tax system worldwide. The alarming levels of tax evasion have increased the attention of policymakers to produce and coordinate policies that will tackle one of the oldest unlawful habits.

Though much research on individual tax evasion has been conducted worldwide, the business context has been surprisingly neglected. The aim and purpose of this thesis is to contribute to knowledge by conducting a thorough empirical investigation of the determinants of business tax evasion in transition economies. The starting assumption in our work is similar to assumptions made in the current literature on the tax behaviour of businesses, which presumes that the behaviour of businesses is similar to the behaviour of individuals, and that the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. We further make use of aggregate and firm level data for transition economies and collect primary data to observe business tax evasion and tax morale in Kosovo.

This thesis is organized in seven chapters. Following the general introduction in this chapter, the second and third chapters provide a theoretical and empirical review of the tax evasion literature. This is done in order to set a framework for our own empirical investigations for transition economies in the fourth chapter (cross-country investigation) and in the fifth chapter (firm level investigation); as well as a particular empirical investigation for Kosovo in Chapter 6. The last chapter concludes by providing a summary of findings as well as a set of policy recommendations to help combat tax evasion.

Chapter TWO

The Theory of Tax Evasion

TABLE OF CONTENTS

Introduction

Tax evasion is inevitable. Only most fanciful thoughts can dream of a world whose citizens inspired by altruism, pride or even religious passion and beliefs are willing to fully comply without the need for institutional enforcement (Cowell, 1990). The perpetual survival of evasion throughout the history of taxation, as well as the economic consequences it causes, are the main reasons why this sub-branch of public finance has always fascinated the world of researchers and academics. This fascination however, for more than four decades of research, failed to fully answer why people pay or do not pay taxes. Answers provided illustrate both the difficulties and weaknesses of studying and understanding tax evasion.

We have already argued that the presence of tax evasion imposes several economic costs. First, tax evasion is more likely to slow down economic growth as the government's ability to provide adequate public goods, market supporting institutions, infrastructure, human capital development, or research and development will be weakened (Johnson et al. 2000). Second, tax evasion diverts resources to unproductive activities such as establishing financial subsidiaries to cover-up evasion (Slemrod, 2007). Third, it causes inefficiencies in firms' production as they tend to stay small and invisible to facilitate evasion and also miss the opportunities from the formal economy (Nur-tegin, 2008). Fourth, tax evasion causes inequity between evaders and the honest taxpayers by shifting the burden to the latter group, and by that creating an incentive for further evasion (Feinstein, 1991).

The need to understand determinants of tax evasion remains as important as ever with tax evasion being a globally spread disease that threatens the integrity of every tax system particularly of those that are more fragile. In 2013, the British accountant Richard Murphy by comparing a World Bank Report to a Heritage Foundation report estimated global tax evasion to be at 5% of the global economy. Moreover he found that the USA (337.3 billion $; or 8.6% of GDP), Brazil (280.1 billion $ or 39% of GDP), Italy (238.7 billion or 27% of GDP) are the top three countries with the largest levels of evasion worldwide. These figures are even higher in transition countries, with tax evasion ranging from 30% to 60% of country's GDP (Johnson et al, 1997; Shneider, 2002; Cobham, 2005; La Porta and Shleifer, 2008).

While, as argued in Chapter I, the individual tax evasion studies have dominated the theoretical modelling, business studies were less common. This was perhaps because the decision on evasion is made by individual managers or entrepreneurs who, in essence, act as individuals (Arias, 2005). As Slemrod (2007, p.36) points out, the literature on business tax evasion "*adapts the theory of tax evasion, which for the most part concerns individual decision makers, to the tax compliance decisions made by businesses*". In this chapter, we start by assuming that the behaviour of businesses is similar to the behaviour of individuals, and that the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households.

We begin by portraying the theoretical modelling of tax evasion which was introduced in 1972, when Allingham and Sandmo adapted Becker's (1968) economics of crime methodology to the field of tax evasion. Their *magnum opus* model portrays the decision of the rational taxpayer to comply as depending on three determinants: tax rates, penalty rates and the probability of audit. The traditional model was often criticized for its simplicity. Subsequent analysis has extended models in a number of dimensions. Two extensions are particularly important for the focus of this thesis. The first one relates to the adaption of the traditional model to the sphere of business tax evasion, which largely leads to similar comparative statics for the traditional determinants (tax, audit and fine rate). The second extension, relates to inclusion of numerous factors beyond the standard model of economics of crime that relate to institutions, individual characteristics, morality, ethics, culture and social stigma.

The aim of this chapter is to provide a theoretical background for the subject of tax evasion in order to set the necessary background for the empirical investigation in the later chapters. This chapter is organized as follows. *Section 1* provides an overview of the basic model of tax evasion. *Section 2* expands on the traditional business modelling; while *Section 3* provides an overview of theoretical modelling incorporating morality, relationship, fairness, social norms and culture. The *last section* concludes.

2.1 The Traditional Model

At the beginning of 1970s, taxation was a forefront area of interest amid theoretical economists. Inspired by suggestions of Mirrlees (1971) work on taxation and risk taking, Michael G. Allingham and Agnar Sandmo considered the economics of tax evasion just the right topic for research. In what later would became the *magnum opus* of tax evasion literature, their work combines studies in the economics of criminal activity (Becker, 1968; Tulkens and Jacquemin, 1971) and studies in the area of optimal portfolio and insurance policies in the economics of uncertainty (Mosin, 1968; Arrow, 1970) in order to provide a model that portrays the decision of the taxpayer to comply. The model itself is built upon numerous assumptions that simplify the model to the point where the taxpayer makes his decision to comply or evade living in a *Robinson Crusoe* type of world. Although this simplicity has been widely criticized in the past four decades, the Allingham and Sandmo (1972) model remains the cornerstone of the income tax evasion literature. In the following we discuss the main attributes of this model.

2.1.1 Core Assumptions

The tax declaration choice is a decision under uncertainty. The reason for this is that failure to report one's full income to the tax authorities does not automatically provoke a reaction in the form of a penalty. The taxpayer has the choice between two main strategies: he may declare his actual income or he may declare less than his actual income. If he chooses the second he faces only two possible outcomes: completely successful or unsuccessful tax evasion. Either the taxpayer escapes detection and enjoys an after tax income greater than honest declaration or he is caught, convicted, and punished in which case the after tax income is smaller than in the case of honest declaration.

According to the traditional model, we start by analysing the choice problem of a *rational taxpayer* who is *inclined to dishonesty*. We say *rational* in order to signify that the choice of how, why and how much to evade is made in the same manner as the rational consumer choice; consequently we say *inclined to dishonesty* in order to rule out environmental impact, relationship to state and community, regrets, guilt or shame (hence the simplicity of the model).

We assume that the taxpayer would evade if he thinks that doing so is financially beneficial. We shall also assume that the taxpayer's behaviour conforms to the Von Neumann-Morgenstern axioms for behaviour under uncertainty; i.e in the presence of risky outcomes, a decision maker could use the expected value criterion as a rule of choice: higher expected value investments are simply the preferred ones. His cardinal utility function has income as its only argument and rules out the presence of other forms of wealth. In other words, the taxpayer's initial resources and all gains and losses can be measured in terms of a single consumption good, which can be interpreted as income. We also assume that this utility is concave, which consecutively rules out the phenomenon of the risk lover, or someone who would accept unfair gambles. Marginal utility will be assumed to be everywhere positive and strictly decreasing, so that the taxpayer is risk averse.

The model focuses on only one type of tax, which is income tax and ignores other types of taxes. Moreover, no account is made of the taxpayer's *"real"* decisions such as his labour supply and, therefore, his gross earnings are taken as given, and the same is true for his income from capital (Sandmo 2004). The tax rate is not progressive but proportional; real taxable income is known only to the taxpayer but not to the tax authority, unless the latter spends some time and trouble finding out for itself; there is a probability of audit that is unaffected by the taxpayers' reporting behaviour (exogenous probability of detection); there is a single penalty based only on the amount of income underreported; the taxpayer has zero compliance costs; and no intermediates agents or advisers are assumed to exist. Above all, time is compressed into a single period within which the taxpayer has to decide.

Elffers (2000) in an attempt to describe an individual's process of making a decision to evade, defines three steps that each potential evader needs to go through before making the final verdict. In the first step the individual must have a will to evade. Once there is a will, ability to transform will into action is needed (second step). Finally, with will and the ability in place, individual must have the opportunity to execute the action (third step). The standard theory of tax evasion assumes that taxpayer has the will, ability and opportunity. Similar restrictive assumptions are very common in the pioneering work of Allingham and Sandmo (1972).

2.1.2 Possible Outcomes

Allingham and Sandmo (1972) start their theoretical analysis by assuming that a rationale taxpayer has an actual exogenous income which is known only to the taxpayer but not to the tax administration. The tax administration on the other side, has a constant fine rate at its disposal, which would be enforced in case of occurrence of undutiful activity and detection of such activity. The detection of evasion can occur under some probability that the taxpayer will be subjected to audit. Such a presentation of the taxpayer's choice situation, as acknowledged by Allingham and Sandmo (1972), implies simplification of the real world situation with respect to three main parameters: fixed tax rate **t**; fixed probability of audit **p**; and a fixed fine rate **F**.

Under such simplification, the taxpayer is required to declare his true income **Y** to the tax agency and pay a constant income tax rate **t**. If the taxpayer is honest he will fully comply with this requirements, report amount **Y** and pay taxes **t**. In this case his after tax (net) income, which we will refer to as after tax consumption **Ca** will be:

$$\mathbf{Ca = Y(1\text{-}t)} \tag{1}$$

where,

Ca = after tax consumption

Y = income reported

t = tax rate

However , the taxpayer may cheat and report an amount which is less than his true income **Y**. Let **Z** be the amount evaded. His after tax consumption will be subject to uncertainty as he may either be audited or not. In the case he is not audited, then he will have an after tax consumption **Cb,** where:

$$\mathbf{Cb = Y(1\text{-}t) + tZ} \tag{2}$$

where,

Cb = after tax consumption if not audited

Z = the amount of income not reported

However, if audited and assuming post audit the **Z** will be discovered, the tax payer will have to pay a fine **F** proportional to the amount of income evaded **Z**. That makes his after tax consumption $Cc_1 = Y(1\text{-}t) - FZ$.

For the sake of sustainable explanation throughout the chapter, we introduce here the modification made by Yitzhaki (1974) who assumed that fine rate **F** is set actually proportional to tax evaded **tZ** rather than income evaded **Z**. Having that in mind, in the case of audit, the taxpayer's consumption **Cc** will be:

$$\mathbf{Cc = Y(1\text{-}t) - FtZ} \qquad \textbf{(3)}$$

where,

Cc = after tax consumption if audited

F = fixed fine rate

We will explain the implication of Yitzhaki (1974) modification later in this chapter. For now we note that a generalized form of the after tax consumption can be expressed also as:

$$\mathbf{C = Y(1\text{-}t) + rtZ} \qquad \textbf{(4)}$$

where,

C = after tax consumption, depending on Z and audit

r **=** the rate of return from tax evaded with values **1** or **–F**, depending on audit.

The after tax consumptions alternatives and all potential outcomes from general Equation (4), are shown on Fig.2.1 where declared income is measured along the horizontal axis while the consumption in two states (caught and not caught) is measured along the vertical axis. If the taxpayer decides to declare all the declarable income, then the final consumption will be at point **Ca**. Alternatively, for every pound underreported he faces a risk of occurrence of audit and consequently fine rate, which in turn determines new consumption points and hence the 'blue' and 'red' lines.

Our intention in this section is to explain how the decision to evade is made and how does it vary with the changes of parameters. In order to do so we first use Fig.1 to construct the taxpayer's *budget set* which consist of all feasible outcomes given the taxpayers income Y and other parameters, namely the tax rate, audit probability and fine rate (Fig.2.2).

Figure 2.1 Possible outcomes

Consider a situation where taxpayer prior to reporting has three choices. He can fully comply by reporting **Y** and thus have after tax consumption of **Ca**; or he can evade amount **Z** and declare income **Y'=Y-Z** and have after tax consumption of **Cc** or **Cb** depending on whether he is caught or not. If the taxpayer is completely dishonest and reports **Y''**, or zero income, then he faces the after tax consumption of either **Cb'=Y** or **Cc'=Y(1-t)-FtY**, depending on audit.

Source: Cowell (1990)

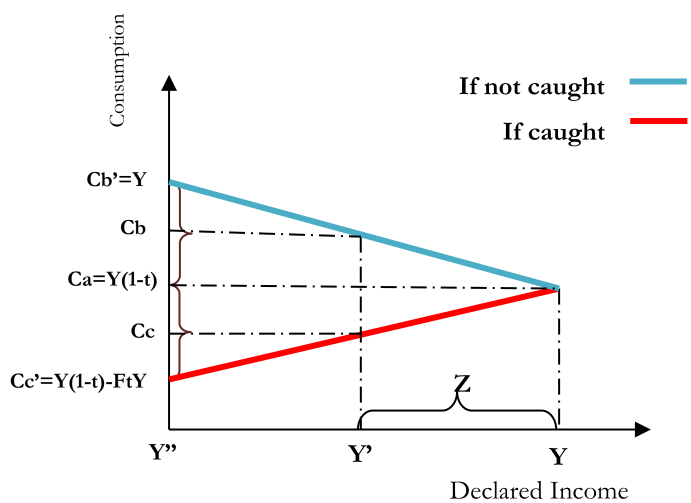
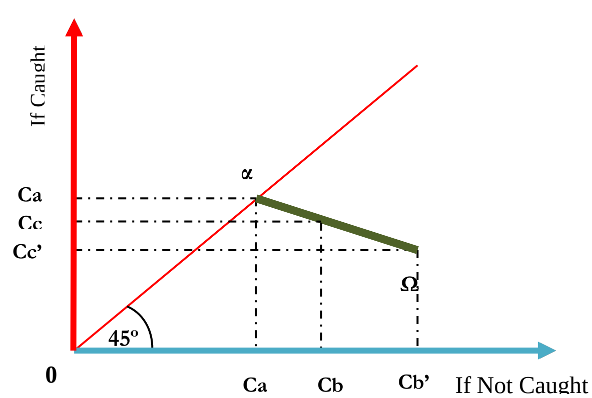


Figure 2.2 Budget set

The area **0,α,Ω,Cc'** represents the budget set. Point alpha α with coordinates {(Y(1-t); Y(1-t)} represents absolute honesty. Point omega Ω with coordinates {(Y; Y(1-t)-FtY)}, represents the absolute dishonesty. Each of the points on budget line **α – Ω** represent the payoffs in the two states corresponding to different amounts of income reported.

Source: Cowell (1990)



On the horizontal axis we place all the possible outcomes under the assumption of "if not caught" while on the vertical axis we set the net income "if caught". Assuming that the taxpayer hides his true income and declares zero income (Y”) and escapes the punishment then his after tax consumption is **Cb’=Y**. But if the tax authority observes the evasion then we assume immediate punishment to occur which reduces his consumption to **Cc’=Y(1-t)-FtY**. These two situations indicate the coordinates of omega **Ω** in the graph. For every pound reported we move gradually to the other extreme or the point of full compliance alpha **α**. The alpha-omega line is the linear boundary of an opportunity set showing the achievable allocations of income between the two states.

2.1.3 The Optimal Choice

Once the budget set is constructed, the utility function is introduced. This allows us to analyze the taxpayer’s optimal evasion decision given his preferences and the constraints from the budget set. Assuming the alternatives of reporting and non-reporting, a taxpayer must choose the amount to declare by weighting the probability **P** of each outcome that might occur once the underreporting is done, and maximise the expected utility (Hindriks and Myles, 2006)[7]:

$$\max EU = (1-P)U[Y(1-t)+tZ] + PU[Y(1-t) - FtZ]$$
$$\max EU = (1-P)\,U(Cb) + P\,U(Cc) \qquad \textbf{(5)}$$

Seeking to maximize his expected utility, the taxpayer will choose to underreport the actual income (i.e. evade) if the expected utility from doing so exceeds the expected utility from truthful declaration (i.e. full compliance). This would be the case if the potential gain (in expected utility terms) from underreporting exceeds the potential loss (in expected utility terms).
Yaniv (2009) provides a summary of taxpayer’s considerations on the gain and loss from underreporting the actual income by one monetary unit (let it be pound). Assuming that cheating is successful, the gain of **t** pounds from the amount evaded **Z,** will increase taxpayers utility by

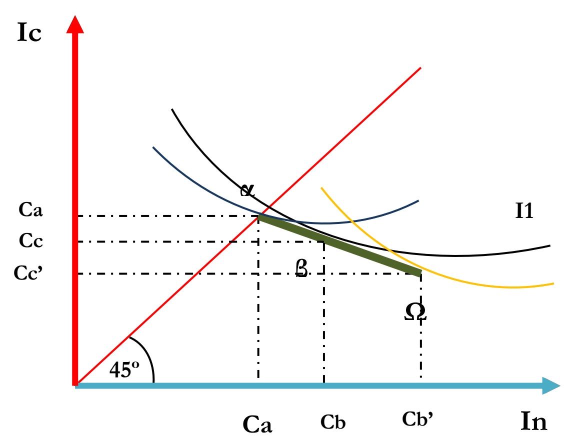
[7] Expected Utility Theory (EUT) states that the decision maker chooses between risky or uncertain prospects by comparing their expected utility values, i.e., the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities.

tZMU(Ca) units and will increase his expected utility for the next pound by (1-P)tZMU(Ca). Accordingly, if the taxpayer is audited - thus cheating is unsuccessful - he has to return the evaded tax and in addition pay a net penalty **F** on concealed amount of tax **tZ**. That will decrease his utility by (FtZ)MUCa and will decrease his expected utility by P(FtZ)MU(Ca). Let's consider an additional pound underreported. After evading the first pound, the expected utility gain from evading the second pound would be (1-p)tZMU(Cb) while expected utility loss would be P(FtZ)MU(Cc). Note that for every additional pound evaded the expected utility gain increases while the expected utility loss decreases. Additionally, the marginal utility from Cb decreases with increasing marginal utility from Cc. The taxpayer will cheat if and only if the expected payoff of his gambling decision exceeds the expected loss, or if (1-p)t>P(FtZ). Eventually, the tax payer will reach the optimum amount to declare when (1-p)tZMU(Cb) equals P(FtZ)MU(Cc). In that optimum, the taxpayer will make his final decision over the amount to report. This is known as the taxpayer's optimum condition, and states that the optimal level of underreporting is that for which the expected-utility gain from the last pound concealed is just equal to the expected-utility loss from concealing that pound.

Figure 2.3 The Optimal Choice

This figure shows the optimal decision made by the taxpayer. Given all of the above assumptions in this section, the taxpayer will decide to declare the income at point β which represents the point where the indifference curve is tangent with the budget line.

Source: Cowell (1990)



The solution to this choice problem can also be derived graphically. From the utility function we derive a set of indifference curves where the points on an indifference curve represent the income levels in the two states that give the same level of expected utility. Including the indifference curves of the utility function completes the diagram and allows us to portray the taxpayer's choice. The taxpayer whose preference **I1** is shown in Fig. 2.3 chooses to locate at the point **beta**. This is an interior point with **0<β<Y** some tax is evaded but some income is declared. There are also two other *"extreme solutions"* each being tangent either on **α** or **Ω** and suggesting full or zero compliance.

2.1.4 The Comparative Statics

The next step is to explain how the decision to evade changes with changes in parameters. These parameters, as argued already, are audit, fine and tax rate. In order to observe the changes in optimal levels of tax evasion, one has to observe how the changes in parameters change either indifference curves or the budget set and, hence, the optimal choice of taxpayer. And in order to understand changes in indifference curves and budget set, one has to understand their respective slopes.

From Equation (5) we understand that the slope of indifference curve I1 from Fig.2.3 (which acts as the base figure for the comparative statics hereafter) is the ratio between expected value of probability of not getting caught with the expected value of probability of getting caught:

$$\mathrm{Si} = -\frac{1-\mathrm{p}}{\mathrm{p}} \tag{6}$$

This also means that all the indifference curves when crossing the 45° line have similar slope. Again, from the Fig.3 we observe that the slope of budget set is:

$$\mathrm{Sb} = \frac{\mathrm{Cc}}{\mathrm{Cb}} = \frac{\mathrm{Y}(1-\mathrm{t}) - \mathrm{FtZ}}{\mathrm{Y}(1-\mathrm{t}) + \mathrm{tZ}}$$

$$\mathrm{Sb} = -\frac{\mathrm{FtZ}}{\mathrm{tZ}} \tag{7}$$

$$\mathrm{Sb} = -\mathrm{F}$$

In other words the slope of the budget set is the amount of fine paid (where F equals the range from 0-1). Given the slope of the indifference curves and of the budget set we can now derive relevant comparative statics (the following section is based on Cowell, 1990 and Hindriks and Myles, 2006).

First we analyze the impact of a change in **probability of audit** in tax evasion levels (Fig.2.4a). Note that model assumes a fixed probability of audit. An increase in the probability of audit does not affect the budget set (Equation 7); however, it does affect the utility function and thus preferences (Equation 6) by making them flatter where they are tangent to the budget set. Note that with higher audit probabilities, the full reporting alternative becomes more attractive than non-reporting. The new optimal choice moves closer to full compliance **α**. This is not surprising as an increase in the probability of audit makes the decision to evade more risky. Under the assumption of a risk-averse individual it means that increasing the audit rate increases compliance.

Figure 2.4 Changes in the 'Probability of Audit' and 'Fine Rate'

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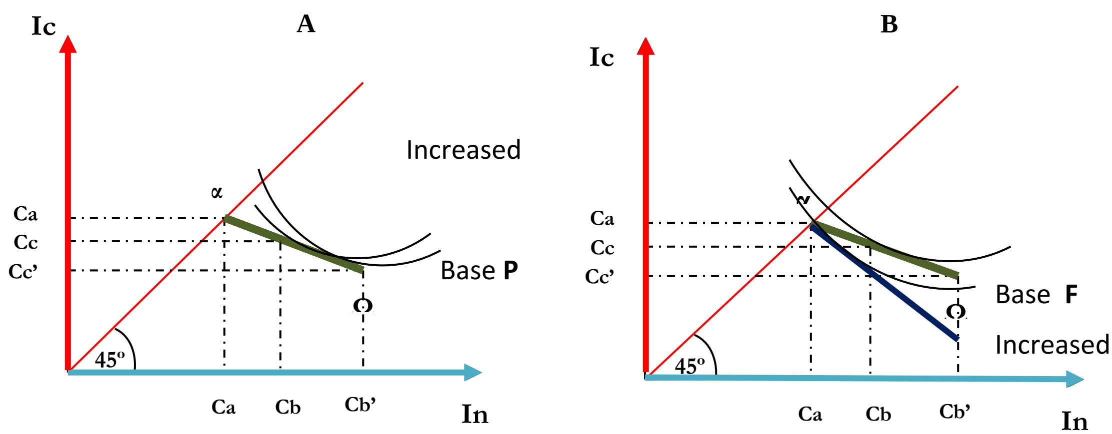


The left side graph (A) shows how changes in probability of audit makes the indifference curves flatter thus shifting the optimal choice closer to full compliance. The left right sided graph (B) shows how an increase in F makes the budget line steeper and with the utility function remaining same the compliance rises.

Source: Cowell (1990)

Second we observe changes in **penalties** and the impact they have in compliance levels (Fig.2.4b). The Allingham and Sandmo (1972) model argues that an increase in the penalty rate increases compliance as it gives rise to the same change, in effect, as the probability of audit i.e.

making evasion more costly. An increase in **F** does not affect the indifference curves (as was the case with the probability of audit) but it does however, affect the budget set by making it rotate around **α,** thereby becoming steeper. Therefore an increase in fine rates leads to a new optimum point which is again closer to the full compliance point **α**.

The final parameter is the **tax rate**. This part of the literature has received much of the attention as several controversial conclusions have been established according to the assumptions made. According to Allingham and Sandmo (1972), increasing **t** has both an *income effect* and a *substitution effect*.

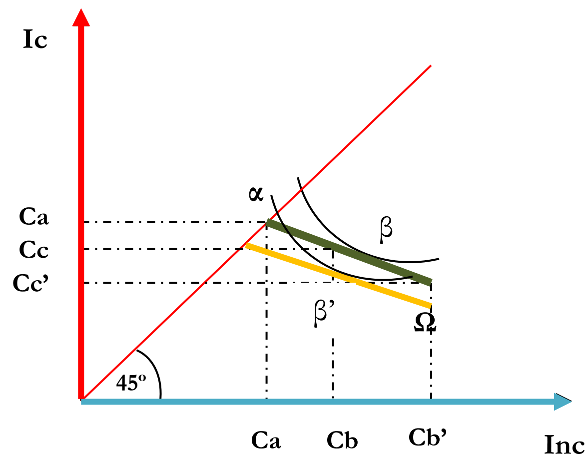
The *income effect* caused by a rise in the tax rate means that the taxpayer becomes poorer, given that the new after tax income is lower as compared to the base case. Changes in income, however, are also linked with the assumptions on decreasing absolute risk aversion underlined in subsection 2.1.1 of this Chapter. What absolute risk aversion measures is the willingness to engage in small bets of fixed size. Given the assumption of decreasing absolute risk aversion, an individual who holds a mixed portfolio of safe and risky assets would increase his share of the risky asset if his endowment were to rise (see Arrow-Pratt measurement of risk aversion[8]), and would decrease them if they were to fall. In other words, wealthier individuals are more prone to engage in small bets, while poorer ones are less likely to do so. Hence, with decreasing absolute risk aversion, a rise in tax causes a fall in income, making the taxpayer poorer, which in turn decreases the absolute amount of tax evasion.

Graphically speaking (Fig.2.5) this would mean that an increase on tax rate moves the budget set inwards with the slope unchanged (-F) and with unchanged Ω coordinates on the assumption of not getting caught. Assuming that the original solution to the optimization was at point **β**, then under the assumption of diminishing absolute risk aversion optimal choice (from the *income*

[8] There are two standard measures of risk aversion that are considered in expected utility theory. One is absolute risk aversion *A(I)*, equal to *-U''(I)/U'(I)*. The second is relative risk aversion *R(I)/-IU''(I)/U'(I)*. It is typically assumed that *A(I)* decreases with income, while *R(I)* increases with income. Note that the Arrow-Pratt measure of risk-aversion implies a relationship between the degree of concavity of the utility function and the degree of risk-aversion. In the space of random variables, this implies that there is a relationship between the degree of convexity of indifference curves and the degree of risk-aversion - with more risk-averse agents having more convex indifference curves and vice versa.

effect) should be at a point **β'** in new budget set, such as β' is to the left of β. The optimal choice moves closer to full compliance with an increase in the tax rate.

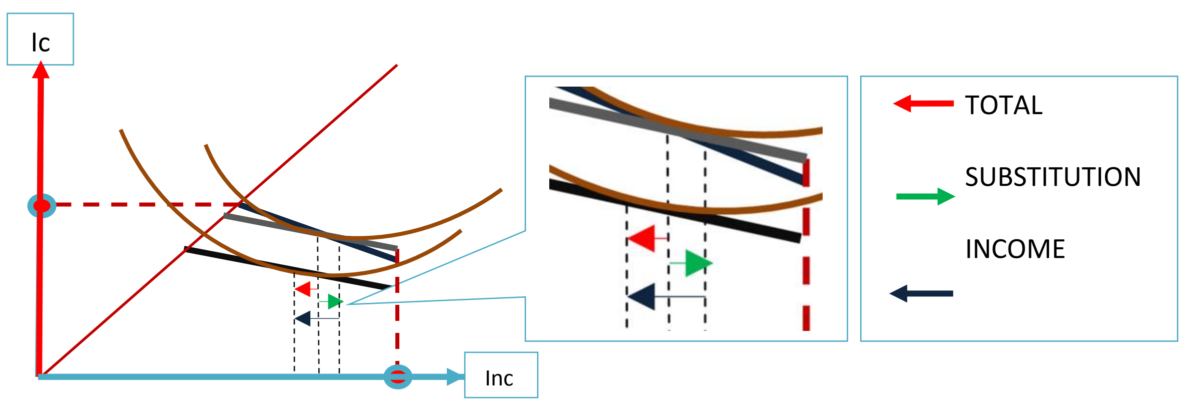
Figure 2.5 Tax Rate



This graph how an increase tax rate affects the optimal decision by shifting the budget line inwards (i.e. to the left). The model predicts that an increase in tax rate will reduce evasion. This result has received much discussion as it is contrary to what seems reasonable.

Source: Cowell (1990)

Figure 2.6 Income and Substitution Effect Illustrated



Under Allingham and Sandmo (1972) Model, with both income and substitution effect occurring, the budget line moves both inwards and changes the slope. For the purpose of elaboration, in the example above *income effect* is assumed to be higher than the *substitution effect*

The *substitution effect* has a contrary effect. As **t** increases, the return to cheating goes up as the relative price of consumption in the audited state of the world has increased; moreover, if the individual cheats and escapes the punishment the return from such action is much bigger as opposed to any state of the world with a lower tax rate. Under such assumptions, a rise on the tax rate increases also tax evasion. Graphically speaking (Fig.2.6), this means that as **t** rises the relative value of the fine paid falls, therefore the budget line would not only move inwards (from the income effect) but it would also become flatter (from the substitution effect). The presence of both *income* and *substitution* effects means that the amount of taxes evaded cannot be determined according to the occurrence of each effect independently; hence the *net effect* is *ambiguous*.

In 1974, Shlomo Yitzhaki, made a minor yet distinctive change. Starting from tax systems in the US and Israel, he argued that ambiguity was a result of an unrealistic assumption over the fine imposed **F**; which, according to Allingham and Sandmo (1972), is assumed to be on the amount of income evaded **Z**. This in turn gave rise to the wrongly assumed *substitution effect* and hence wrongly assumed ambiguity. If instead the fine rate was imposed on the evaded tax **tZ**, the *substitution effect* would disappear; consequently, there would remain only the *income effect* and a negative (though surprising) relationship between tax rate and tax evasion. It will be so as increasing a tax rate does not necessarily increase the return from evading. With the fine **F** being set on amount of taxes evaded **tZ** instead of just **Z**, the expected penalty from getting caught increases proportionally too; offsetting thus the return from evading.

In other words, since in Allingham and Sandmo (1972) the fine is assumed to be imposed on the amount of income evaded rather than on the tax evaded, then the penalties are not affected by tax changes. An increase in the tax rate increases only the return from evasion, while the cost of evasion remains the same as in the pre-increase period. Take for instance a taxpayer who faces a tax rate of 10%, and a fine rate **F** on the amount of income evaded **Z**. Assuming that the amount evaded is £100 – and consequently the "earned" tax from evasion is £10 – then the fine paid if caught is determined upon the concealed amount of income 100£. Now assume that the tax rate increases from 10 to 20%. From the taxpayers perspective the return from evasion has doubled if £100 (same amount) are concealed, as the "earned" tax from evasion is now £20, instead of £10. The penalty however, remains the same, as in both cases the amount of income concealed is the same (£100). This in turn means that a tax rate increase will increase only the return from evasion. Hence the *substitution effect* – i.e. from reporting income (compliance) to non-reporting (evasion). In the Yitzhaki (1974) modification, however, the fine rate **F** is assumed to be imposed on the amount of tax evaded. So, for instance, if a taxpayer conceals £100, under a tax rate of 10%, he “earns” £10 but risks losing **F** pounds determined by the 10% of tax evaded. Assuming that tax rate increases from 10 to 20% then the returns from evasion increase proportionally (if the same amount of income, £100, is concealed). This, however, means that the fine rate **F** has too doubled as it is now determined from the new tax rate, which is twice that of the previous one. This in turn means that a tax rate increase will increase not only the return from evasion but also the cost of evasion. Hence, there is no longer any *substation effect*.

In a retrospective view, more than three decades after introducing the traditional model, Sandmo (2004, p.8) argues that though non-ambiguity “*in theoretical models is often considered to be a good thing*” there is a paradox involved in the Yitzhaki (1974) analysis. This paradox goes directly against most people’s intuition about the relationship between tax rate and tax evasion, that the higher tax rates would incline agents towards more evasion (given the returns)[9]. He further argues that:

[9] The relationship between tax rate and tax evasion – consequently income collected – is implied by the Laffer Curve. Considered to be one of the main theoretical constructs of supply-side economics, Laffer Curve was invented by economist Arthur Laffer, and is a quadratic relationship between tax rate and the income generated by the government. The Laffer Curve postulates that zero tax income will be generated at the extreme tax rates of 0% and 100%; and that there must be at least one point where the tax rate dictates the optimal level of income generated. The Laffer Curve is typically presented through a rather simple graph, with tax rate set on the horizontal axes and income generated on the vertical one. The curve starts from the zero income, if the tax rate is set at 0%, reaches its peak at a certain t* rate – which is considered to be the optimal tax rate – then falls again to zero revenue at a 100% tax rate. The Curve predicts that at the rate of 100%, all people would choose not to work as everything they earned would go to the government. The interpretation of the Laffer Curve is that there is a positive relationship between tax rate and tax income, up until a certain point; however, increasing tax burden beyond this certain point will be counter-productive for raising further tax income, hence a negative relationship between tax rate and tax income will be observed. The theory of tax evasion, notably the findings from the traditional Allingham and Sandmo (1972) model, largely overlook the relationship established in the Laffer Curve. Indeed, the principal conclusion of traditional model – as well as other major expansions – is that higher tax rates, contrary to intuition and expectation, are associated with lower levels of tax evasion (because of the prevalence of the income effect over the substitution effect). Alternatively, in case that income effect prevails the over the substitution effect, then a positive relationship between tax rate and evasion (that is a negative effect between tax rate and income) is concluded. Such a linear positive relationship between tax rate and tax evasion at the micro level would provide a foundation for the macro quadratic relationship between tax rate and income generated, which is established in the Laffer Curve.

> *It is worth noting that this substitution effect would be present under the more general but weaker assumption that the penalty rate increases less than proportionately with the tax rate. Perhaps the theoretical ambiguity in this case is more representative of popular beliefs and possibly even of actual tax systems.*

We also note that the impact of the tax rate on tax evasion also depends upon risk assumptions. Changing such assumptions provides various results, which in turn give again raise to ambiguous tax rate comparative statics. Related to this Allingham and Sandmo (1972, p.329) conclude that:

> *… when actual income varies, the fraction declared increases, stays constant* or *decreases according as relative risk aversion is an increasing, constant or decreasing function of income. It is not easy to select one of these hypotheses about the relative risk aversion function as the most realistic one. We shall therefore be content with adding this result to those of a similar nature that already exist in the economics of uncertainty. However, it is of some interest in itself to observe that even a model as simple as the present one does not generate any simple result concerning the relationship between income and tax evasion.*

Variations in risk assumptions are not the only variations that provide far from simple results. Indeed, the traditional model has assumed that the audit probability is exogenous to tax reporting; that is the rate of audit is set independently from tax reports submitted by taxpayers. In the real world we observe much more efficient techniques than just random auditing. These techniques make audit probability endogenous to tax reporting.

The considerable advantage of the traditional model is the fact that it does not take into consideration the relationship between tax rate, fine rate and audit rate. In the real world the tax rates are set by governments, audit probability by tax administration, while fine rates are set by courts – within parameters set by legislation. In most cases these institutions pursue independent objectives from each other and these objectives are most likely not part of a common strategy; which in turn affects taxpayer's perception about the impact of each parameter.

While exercises involving variations in assumptions may lead to ambiguous results, and given that these results are very sensitive, the empirical investigation in tax evasion literature becomes highly important. But in order to establish the theoretical ground for empirical investigation, we summarize the theoretical predictions of tax evasion as following: higher audit probabilities and higher fine rates are more likely to reduce tax evasion; while the impact of tax rate in tax evasion could be either positive or negative depending on the occurrence and intensity of income and substitution effects.

While the vast majority of tax evasion theoretical research has treated the decision to evade through the expected utility theory, there are alternative theories, amongst which we note *the prospect theory* and *the principal-agent* problem, which can be used in this context.

The prospect theory is a behavioural economic theory which describes the decision of individuals amongst the probabilistic alternatives that involve risk, but where the probabilities of the outcomes are known. For a reminder, one of the core assumptions of traditional tax evasion model (as underlined in page 30) is that the tax declaration choice is a decision under uncertainty; and the decision on the amount evaded is made under such conditions. According to the prospect theory, developed by Daniel Kahneman – which later won a Nobel Prize in Economics for the work – individuals make decision based on the potential value of losses and gains rather than the final outcome. Moreover, individuals will evaluate losses and gains using certain heuristics certainties. Heuristics certainties in psychology are considered to be simple and efficient rules used by individuals to form judgements and make decisions (Lewis, 2008). They involve simplification of complex problems and, consequently, focusing on one aspect of the problem by ignoring everything else; hence often deviating from the rational choice theory (again, rationality is one of the core assumptions in traditional tax evasion model). The standard model of the prospect theory tried to elaborate real life choices rather than optimal decisions; in an attempt to provide more accurate description of decision making compared to the expected utility theory. It did so by dividing the decision process in two main stages, that of editing and evaluation. In the first stage, individuals order outcomes of a decision according to a certain heuristic; in particularly the individual chooses a specific outcome (considered to be the most comparable) as a reference point and then compares other outcomes to it in terms of lesser or greater gains. In the second stage, evaluation, the individual computes a utility based on the potential outcomes and their probabilities; and thus chooses the outcome with higher utility.

The principal-agent problem concerns the situation where two parties have different interests and in the vein of asymmetric information the principal cannot directly ensure that the agent is always acting on its (the principal's) best interest. In cases as such, conflicts of interest and moral hazards issues arise. In the economic theory, the moral hazard presents a case where agent is willing to take risks because the costs that could incur will not be felt by agent itself; more likely, the potential costs or burdens related to the risk taken will be borne completely (or in part) by others. There are various mechanisms that may be used to align the interest of the agent to those of the principal, but most of them relate to the creation of incentives by the principal for the agent. While common examples of principal-agent problem have usually involved the relationship between owners and managers, its application has also been discussed in various non-business contexts. For the topic of tax evasion, a good example of principal-agent problem would be the relationship between tax agency and taxpayer. Tax administration, acting as a principal, and taxpayer, acting as agent, have different sets of information in regards to the taxable liability of the agent. Having said that, taxpayer – in our case firm – will tend to take the risk of underreporting by engaging itself on undutiful activities; knowing that any disposal of its actual tax liability would require additional costs from the principal. The principal, in this case the tax administration, can reduce asymmetry of information by increasing the audit rate i.e inspections. Alternatively, tax agency and government can also provide incentives for compliance by improving their performance and by improving the treatment towards taxpayers.

So far we have summarized the theoretical implications of the traditional model. These results, however, arise from a theoretical analysis of individual behaviour. The next section provides a review of the business context.

2.2 Business Extension

The traditional model has been often criticized for its simplicity. After all, the decision to evade or not is made in a complex world. Subsequent analysis has extended the model in a number of dimensions such as analyzing tax evasion jointly with labour supply (Weiss, 1976; Andersen, 1977; Pencavel, 1979; Cowell, 1985); how individuals respond to greater uncertainty concerning income tax policies - i.e. other sources of uncertainty (Alm, 1988; Scotchmer and Slemrod, 1989); or, although to a lesser extent, risk allocation where taxpayers face more complex "portfolio" set-ups offering other risky activities and alternative forms of evasion (Alm and McCallin, 1990; Landskroner et al. 1990; Yaniv, 1990; Lin and Yang, 2001). Since such extensions are beyond the scope and interest of this thesis, we choose not to elaborate them further.

Of special interest however, is adoption of the traditional model for the businesses context. To start with, we argue that the core assumption of the business theoretical background is that the decision on evasion, or compliance, is made by individual managers or entrepreneurs who, in essence, act as individuals (Arias, 2005); hence the theoretical understanding within the traditional model, should apply to businesses as well. As Slemrod (2007, p.36) points out, the literature on business tax compliance:

> *...adapts the theory of tax evasion, which for the most part concerns individual decision makers, to the tax compliance decisions made by businesses.*

This was perhaps the reason why the business modelling has received lesser attention compared to the individual one. Arias (2005, p.2) argues that the interest of researchers in individual tax compliance business tax compliance has been predominant because:

> *... in a micro level analysis, any economic agent (such as a firm paying indirect taxes) could be reduced to an individual, the only decision makers that we could think off, and therefore, the direct tax evasion could be applied easily to an entrepreneur.*

This is particularly true of small and medium sized enterprises (SMEs) where the decision making entrepreneur makes compliance decisions as both an individual and a manager.[10] The adaption of individual modelling to businesses is one of the strongest assumptions made throughout this thesis.

Regardless of similarities, some other studies while building on the Allingham and Sandmo (1972) individual model, have considered business modelling separated for two main reasons. One reason is the nature of internal organizations with separation of ownership and control and hence variations in risk assumptions, which in turn affect important aspects of business external activity including tax reporting. The other reason is found in the nature of firm external activities in the market, in particular in the relationship between output of the firm and tax evasion.

Figure 2.7 Predicted outcomes and variations in assumptions made

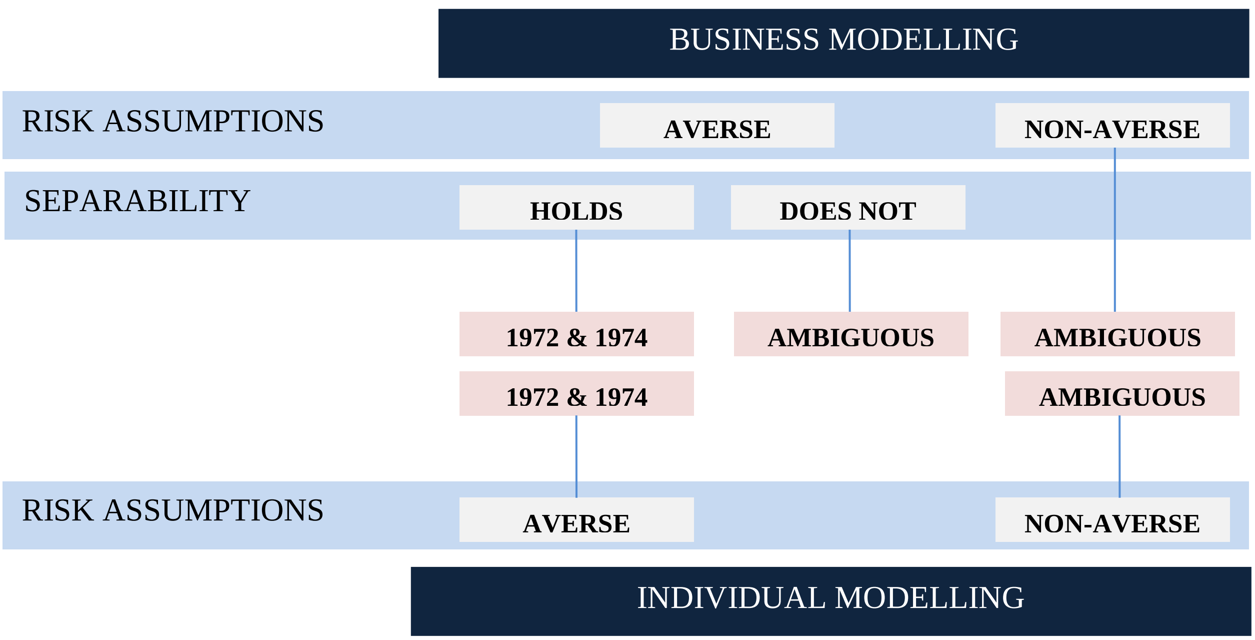


Fig.2.7 presents potential outcomes as assumptions change; as well as similarities/differences between individual and business modelling following such changes. While variations on risk

[10] This may be different for large public companies where the compliance decision is made by one of the directors who is likely to be risk-neutral when it comes to tax compliance decisions (whereas the individuals are generally assumed to be risk averse). The directors' compliance decisions also depend on whether their remuneration is linked to the after tax profit of the company.

assumptions derive similar static results for the tax rate, audit probability and fine rates similar to the case of variations for risk assumptions for individual taxpayers, that is ambiguity, the second feature of business tax compliance is far more complicated. If the level of the firm's output is not determined by the decision to evade or not, that is, the decisions are made independently, then we say that separability holds; and vice versa. If separability holds then in the case of a risk averse firm static analysis provides similar results to the Allingham and Sandmo (1972) individual model for tax, fine and audit rate. It also provides similar but ambiguous static analysis to individual modelling if the assumptions on risk behaviour change. However, if separability does not hold, then the static analysis provides different results compared to those from the individual modelling; that is an ambiguous relationship of tax, audit and fine rate with tax evasion.

In this chapter we review some of the most important works on business modelling to understand the comparative statics established in such studies, and whether or not they differ from those obtained from individual modelling. But before we do so, let us first elaborate the topic of separability.

2.2.1 Separability

Wide tax compliance literature (for formal modelling, see Cowell, 2002) argues that opportunity for tax evasion does not influence the firm's output decision or pricing policy (tax shifting), hence the business extension of comparative statics established in Allingham and Sandmo (1972) and Yitzhaki (1974) does not provide any additional information.

It suggests so, because in equilibrium the expected Marginal Revenue (MR) as the benefit from tax evasion equals the expected Marginal Costs (MC) in terms of the utility loss caused by the penalty if caught. According to this, marginal revenues (from evasive gain) just offset marginal production costs (from penalty loss). This condition for the firm's optimal output is the same as the respective requirement in the absence of tax evasion (MR=MC); hence, opportunity to evade does not impact the firm's output, i.e there is separation between evasion and output.

Let us consider a profit-maximisation firm that sets a level of output at Q*, once:

$$MR = MC \tag{8}$$

A decision to evade taxes increases potentially (if not caught) the firm's real revenues, hence:

$$MR_2 = MR + MR_{evasion} \tag{9}$$

where $MR_{evasion}$ is marginal revenue from taxes evaded. At this condition the previous profit maximisation point becomes:

$$MR_2 > MC \tag{10}$$

suggesting that the profit maximisation conditionality is not fulfilled and there is another output level that optimizes profit-maximisation. Hence, because of gains from evasion, our firm will increase its output and set a new output Q**, where Q**>Q*, only when $MR_2 = MC_2$. Under these assumptions, separability does not hold as the firms' decision to evade impacts the output level. Assuming however, that the MU (marginal utility) from the amount of taxes evaded is exactly offset by the perceived risk of being caught, then potential increase of MR will be offset by the perceived risk of penalty. In other words, considering the risk of being caught:

$$MC_2 = MC + MC_{Penalty} \tag{11}$$

where $MC_{penalty}$ is the perceived marginal cost from penalties if being caught. Under this assumption the profit maximisation point remains unchanged, as in Equation (8), where $MR = MC$ and new output, set at Q** equals the previous one, Q*. In this case separability holds and the decision to evade does not impact the level of output. In the presence of separability, the comparative statics of tax rate, audit and fine rate are similar to those of the Allingham and Sandmo (1972) model; the penalty rate and the probability of detection reduce the optimal level of tax evasion, while the impact of tax rate is ambiguous or negative; depending on whether we are referring to the Allingham and Sandmo (1972) or to the Yitzhaki (1974) interpretations.[11]

[11] Given the separability of firms output and tax evasion, Sandmo (2004) concluded that if the tax rate has been set with the aim of achieving some specific policy objective, like for instance to reduce the consumption of a good with

2.2.2 Business Modelling

To our understanding, Marelli (1984) was the first who studied in a theoretical framework the subject of firms and tax compliance by extending the Allingham and Sandmo (1972) income tax compliance model to the case of a risk-averse monopolistic firm subject to ad valorem and profit taxes. The monopolistic nature of the firm allowed Marelli (1984) to examine the relationship between output and evasion, both when probability of audit was fixed and variable. When probability was taken as fixed, he found that there is separability between the monopoly's output and tax evasion; in other words, tax evasion has no influence on the output, and, therefore, the after-tax marginal conditions for profit maximization are the same as those taking place in the absence of any evasion. Marelli (1984) established comparative statics similar in nature to those of the traditional model of Allingham and Sandmo (1972); the firm evades less with higher probability of detection and larger fines, while the impact of tax rates is ambiguous. In a further extension of same analysis, probability of audit was considered to be a function of the tax base declared, i.e. is endogeneus. The function was assumed to be increasing, meaning that the higher the base declared, the higher the probability of detection. Under this assumption, tax evasion and output lose their autonomy while the profit maximising output depends on the optimal interior rate of tax declaration; a monopolist will produce and declare less than it will under a fixed probability of detection. If the function assumed to be decreasing, however, the results are more efficient as the monopolist will both produce and declare more compared to a fixed probability.

Wang and Conant (1988), also study a risk averse monopolistic firm that can evade profit tax liability by overstating costs. They reach the conclusion of separability holding and that the fine rates, the probability of detection and profit tax rate all reduce the evasion levels (as in Yitzhaki 1974 model).

Marelli and Martina (1988) are the first to extend the analysis to non-monopolistic markets, by analysing an oligopolistic market with strategic interaction between firms. Their findings show

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negative external effects, the optimal tax rate is unaffected by the opportunities for evasion. Separability, according to Arias (2005), means that since evasion has no effect on output, inefficiency (caused by evasion) implied when firms with higher production costs than average remain in the market because of sales concealment, is inexistent. From that perspective, the pure economic regress derived from evasion is revenue lost by government.

that separability is even stronger than in the case of monopoly and that with the assumption of decreasing absolute risk aversion, the effect of profit tax rates on evasion is negative and may also be negatively related for the sales tax (ad volorem tax) and unit tax (as predicted in the Yitzhaki 1974 modifications). Here again, standard expectations that increased probability of detection and higher penalties reduce evasion are confirmed.

Contrary to Marelli and Martina (1988), Goerke and Runkel (2006) argue in favour of non-separability under oligopoly with endogenous market structure. They argue that prior to the decision about the level and the amount of evasion on profit tax, firms make choices regarding their entry in the market. Tax evasion increases the expected payoff from production; hence more firms find it profitable to enter the market. Under such circumstances, aggregate supply in the whole market rises since the increase in output by the number of new firms entering the market more than compensates the reduction in output by other firms.

We note at this point that although business modelling across various types of markets might add robustness to the traditional model, some of the cases (such as monopolistic and oligopolistic markets) are less relevant for SMEs; which largely operate in the competitive markets.

Another treated area of business tax compliance is that of the withholding tax system.[12] Yaniv (1988) in his model considers a competitive and risk averse employer who should report the proportion of total wage payments, considering the presence of profit tax, i.e. understatement of the wage bill means overpayment of the profit tax bill. The main results established here suggest that the optimal employment level is separate from evasion as long as the latter is optimal; i.e. separability holds. Further, increasing deterrence parameters discourage tax evasion, as expected. In his later work Yaniv (1995) presents a general model of the risk averse firm that is applicable to any type of tax. The model comes to similar findings such as the activity decision of the firm is independent from evasion (separability holds) and that an increase in the tax rate will always increase tax evasion under the assumption of decreasing absolute risk aversion (as in the Allingham and Sandmo, 1972 model).

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[12] Where employers are required to withhold a portion of each employee's income and pay it directly to the tax authority

Virmani (1989) models the decision of risk neutral entrepreneurs in a much complex world with an ad valorem tax system, competitive market, free entry and 'U' shaped average cost curves; under the assumption that the probability of detection depends on firms output and that evasion costs depend on the proportion of sales declared. Due to these assumptions, the static comparative analysis is different from previous studies. Here, evasion is related to production inefficiency thus separability does not hold. Virmani (1989) argues that evasion may increase with a rise in penalties and it may be positively and production negatively related to tax rates. In addition, he argues that evasion will always occur if such it holds low costs, regardless of tax rates. These non-conventional results are established mainly because of the assumption of risk neutrality, which in turn affects separability and the comparative statics. Sandmo (2004) argues that the assumption of risk neutrality may not always be applicable for firms having individual taxpayer characteristics; which includes largely SMEs.

Arias (2005) does an extension of the compliance model of the firm for various types of markets and draws conclusions that support separability only under the assumption of fixed probability of detection. He further argues that a key feature of separability in the tax evasion literature is that results are very divergent according to the assumptions made. Indeed, some assumptions are not always explicit and it is not clear what would happen with results under different key assumptions; many questions would arise and one could think of many different theoretical exercises.

Table 2.1 Traditional Determinants in Business Modelling

Model	Tax Rate	Audit Rate	Fine Rate
Marelli (1984)	Ambiguous	Negative	Negative
Wang and Conant (1988)	Negative	Negative	Negative
Marelli and Marina (1988)	Negative	Negative	Negative
Virmani (1989)	Positive	Positive	Positive
Yaniv (1995)	Positive	Negative	Negative
Cowell (2003)	Positive	Negative	Negative
Arias (2005)	Ambiguous	Ambiguous	Ambiguous
Expectations	**Ambiguous**	**Negative**	**Negative**

Table 2.1 provides a summary of the comparative results established in the reviewed business works. We note that regardless the divergences in assumptions to separability and risk behaviour, there is general affinity that supports the theoretical results as established in individual modelling.

To sum up, we argue that that the tax evasion literature has adapted individual behaviour models to the business context. Some, however, have treated the business context separately in order to observe whether changes in separation between either ownership and management or output and evasion affect the comparative statics established by Allingham and Sandmo (1972). Following a review of works in this area we argue that for even if business modelling is treated separately from the individual context, the implications for the three traditional determinants (tax, audit and fine rate) remain largely similar. Firstly, the variations on risk assumptions drive similar comparative statics as obtained for individuals when risk assumptions vary. Secondly, because the vast majority of businesses models have established separation between output and evasion, suggesting thus again similar comparative statics as in the case of the individual traditional model.

2.3 Beyond the Traditional Model

Following the introduction of the traditional model of tax compliance by Allingham and Sandmo (1972), consequent tax research has identified and brought forward various extensions in an attempt to solve, as Torgler (2007a) puts it, "*the puzzle of tax compliance*" (the term was initially introduced by Andreoni et al, 1998). The puzzle itself refers to a condition where levels of tax compliance do not correspond to the levels of enforcements. As Torgler, (2011, p.12) argues, the issue of tackling tax evasion is *"not simply a matter of applying penalties and/or increasing the frequency of audits*".

Instead, different levels of deterrence factors have produced two very different types of outcomes. First, when audits and fines rates were set at high extremes, low levels of compliance were observed. This was mainly because oppressive tax enforcement and harassment of taxpayers through unremitting audits and visits decreased individual perceptions of institutional legitimacy and so increased voluntary resistance to payment. Extreme penalties on the other side provided the basis for the corruption of tax officials, hence causing generally low levels of tax compliance. In such cases, questions as to "*why people evade taxes?*" were raised. Second, when audit and fine rates were set at low extremes, contrary to intuitive expectations, high levels of voluntary compliance were observed, hence questions as to "*why people pay taxes?*" were counter-raised.

Feld and Frey (2007) discuss studies that defend the traditional model. These studies contend that the gap between theory and compliance/evasive evidence might be closed by assuming sufficiently high risk aversion of taxpayers, which is largely driven by an overestimation of actual audit and fine rates. Feld and Frey (2007), however, argue that such claims are not convincing as the risk aversion that is required in order to raise compatibility is not supported by the observed rates of compliance/evasion in the US in studies conducted by Alm et al. (1992) and Graetz and Wilde (1985).

Almost three decades from the introduction of the Allingham and Sandmo (1972) model, Sandmo (2004) argues that explanation based on the taxpayer's subjective probability, which is not necessarily equal to the frequency of actual audit rates, is not entirely convincing to describe the puzzle between empirical investigation and theoretical predication. He further argues (p.11) that:

> *Common sense and everyday observations tell us that people refrain from tax evasion - as well as from speeding, shoplifting and polluting the environment - not only from their estimates of the expected penalty, but for reasons that have to do with social and moral considerations.*

Frey and Feld (2002) argue that tax evasion/compliance is driven by a psychological tax contract between citizens and tax authorities and that, in order for the contract to be upheld, incentives such as rewards or punishment need to be provided; in addition loyalties and emotional ties that go well beyond transactional exchanges must be taken into account. In order to explain the puzzle of tax evasion/compliance Frey (1997) argues about the importance of "intrinsic motivation" of tax compliance, which due to "civic virtue", makes taxpayers comply; as opposed to "extrinsic motivation", known also as deterrence impact, in which taxpayers pay because they fear the punishment. This "intrinsic motivation" is known today as tax morale.

The role of tax morale in tax compliance has been the subject of research since the 1990s. Yet the pioneering work in this field was done much earlier, by the Cologne School of Tax Psychology back in the 1960s, who tried to link the concept of taxation as an economic sub discipline to social psychology (see Strümpel, 1969 and Torgler, 2007a for more). This linkage had subsequent consequences on the necessity of inclusion of other factors that shape the compliance decisions of taxpayers, beyond the tax, audit and fine rates. Spicer and Ludstedt (1976) argue that the taxpayer's choice is not made solely on the grounds of penalties and fines but also on the grounds of attitudes, values and norms. Long and Swinger (1991) have argued that it is natural to expect cases when taxpayers are simply predisposed not to evade; hence they are predisposed to not even search for ways to cheat on taxes.

In one of the most prominent tax evasion reviews, Andreoni et al. (1998, p.850) have argued in favour of incorporation of morals and social dynamics, beyond the traditional determinants:

> *...it has been suggested that factors such as a moral obligation to be truthful, or the social consequences of being a known cheater, may add further enforcement incentives that are not accounted for in our models*.

Further they elaborated three main groups of factors that are important when treating tax evasive models that are beyond the traditional determinants. The first group involves moral rules and sentiments that directly guide and impact decisions to comply or not. Morality in tax compliance has attracted the attention of tax researchers quite recently (for an extensive review see Torgler 2007a). Torgler et al. (2010) when discussing moral rules and sentiments summarize also a set of views that take into account even an altruistic approach; such an individual's behaviour that is interested not only about his/her own welfare but also in the general welfare. Other views are related to a 'Kantian' morality approach, and they see taxpayers as having anxiety, guilt or even inferiority if their share of taxes paid is lower than what is defined as fair.

Within the moral rules and sentiments, a few other studies have argued in favour of incorporation of socio-cultural factors (Benjamini and Maital, 1985; Gordon, 1989; Myles and Naylor, 1996; Kim, 2003). Grasmick and Scott (1982) and Chau and Leung (2009) indicate that respondents with peers involved in unlawful activities are more likely to be non-compliant. Franzoni (1999) argues that when most people evade, the stigma effect is small and evasion is not in fact discouraged; however when few evade the stigma effect is great and evasion is discouraged. The change from one equilibrium to the other takes the form of a "non-compliance epidemic" such that if more people start to cheat then the social stigma decreases and evasion spreads to an ever larger fraction of the population. Cummings et al. (2005) and Chan et al. (2000) see peer influence as part of the cultural characteristics of specific groups of individuals or nations; i.e. as social norms.

The second group proposed by Andreoni et al. (1998) relates to the fairness of the tax system, enforcement of which affects extensively individuals' willingness to comply (Cowell, 1990; Bordignon, 1993; and Falkinger 1995). Jackson and Milliron (1986, p.137) argued that tax fairness consists of at least two different dimensions: "*One dimension appears to involve the equity of the trade - the benefits received for the tax dollars given...*" as defined by effectiveness,

"...the other dimension appears to involve the equity of the taxpayers' burden in reference to that of other individuals".

Last, the third group, includes taxpayer's evaluations of government within the standards of performance, corruption and transparency. Tyler (1997) argues that the way people are treated by the authorities affects their evaluations of authorities and their willingness to co-operate. Frey (2003) recognizes the importance of transparency and treatment by the fiscal authorities towards citizens. If individuals feel as partners then honesty among them will be higher compared to the case when they feel inferior. Torgler (2007a) on the relationship between taxpayers and institutions argues that those governments that pre-commit themselves with direct democratic rules themselves impose restraints on their own power and thus send a signal that taxpayers are seen as responsible persons. These signals may create a social capital stock since the citizens understand their role in society and their influence on government through votes. Hanousek and Palda (2004) looked at tax evasion as a form of legitimate protest by citizens against their governments; perception towards which were negative. Tirole (1996) explains that when taxpayers see their government as corrupt and irresponsible, evasion is seen as a "vote of dissent" on the government.

Inclusion of non-traditional factors in tax evasion knowledge completes also the theoretical framework of this thesis. Beyond tax, audit and fine rate there are a set of other factors that shape both individual and business compliance decision. Accounting for a combination of both traditional and non-traditional factors is a necessity in the quest of understanding why people pay or evade taxes.

Conclusion

Through this chapter we provide a theoretical foundation for investigating the factors that shape tax evasion. This is done in order to better understand and better direct both empirical literature review as well as our own empirical investigation in the following chapters.

We start by providing an overview of the traditional model introduced by Allingham and Sandmo (1972), its core assumptions, outcomes as well as comparative statics of tax, audit and fine rate. In the traditional model the level of income tax evasion is negatively related to the level of punishment imposed by law and the probability of audit by tax examiners. When analysing the impact of tax rates on evasion, the model predicts an ambiguous effect with the occurrence of both an income effect (as tax rates rise, people become poorer and, in the presence of decreasing absolute risk aversion, they evade less) and a substitution effect (rising taxes means that the return from evasion is higher, thus the taxpayer prefers the risky choice to the safer one). However, Yitzhaki (1974) argued that the ambiguity was a result of an unrealistic assumption of the model that the penalty is imposed on the amount of income not reported; if instead it is imposed on the evaded tax the substitution effect disappears and thus a tax rise will reduce evasion.

Next we review the adaption of the traditional model to the business context, as well as further non-traditional extensions provided to both the individual and the business theory of tax evasion. The most important finding of this chapter is that the adaption of individual tax behaviour to the case of businesses is a common and reasonable practice. The determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. The decision on evasion, or compliance, is made by individual managers or entrepreneurs who, in essence, act as individuals (Arias, 2005). Such assumptions are sufficiently enforced by business modelling. For even if business modelling is treated separately from the individual context, the final implications on three traditional determinants (tax, audit and fine rate) remain similar. Firstly, because the variations on risk assumptions drive similar comparative statics as for individuals when risk assumptions vary. Secondly, because the vast majority of businesses models have established separation between output and evasion, suggesting thus similar comparative statics as those yielded by the individual traditional model.

While exercises involving variations in assumptions may lead to ambiguous results, and given that these results are very sensitive to the assumptions, empirical investigations in the tax evasion literature become particularly important. But in order to provide initial orientation for investigating the empirical literature, we conclude our review of the theory as follows: the theoretical predictions of tax evasion suggest that higher audit probabilities and higher fine rates are more likely to reduce tax evasion; while the impact of tax rate in tax evasion could be either positive or negative depending on the occurrence and intensity of income and substitution effects.

We also review other non-traditional factors influencing tax evasion. Given that different levels of deterrence factors have produced two very different types of outcomes, most notably when set at high extremes low levels of compliance were observed; and vice versa, when set at low extremes high levels of compliance were observed, subsequent theoretical research on tax evasion has argued in favour of incorporation of "intrinsic motivation" for tax compliance. This "intrinsic motivation", known as tax morale, due to "civic virtue", inclines taxpayers to comply as opposed to "extrinsic motivation", known also as deterrence impact, in which taxpayers pay because they fear punishment.

Inclusion of non-traditional factors in tax evasion knowledge, additional to traditional determinants from the Allingham and Sandmo (1972) model, completes also the theoretical framework of this thesis. Beyond tax, audit and fine rate there are a set of other factors that shape both individual and business compliance decisions and, according at least to the leading literature review of individual tax evasion, these non-traditional determinants are grouped in three main categories: moral rules and sentiments; fairness of the tax system; and the relationship between taxpayers and institutions. Accounting for a combination of both traditional and non-traditional factors is a necessity in the quest for understanding why firms – especially SMEs - pay or evade taxes.

Chapter THREE

Review of Empirical Literature

TABLE OF CONTENTS

Introduction

Following the theoretical set up introduced by the Allingham and Sandmo (1972) model and its subsequent extension, empirical investigation begun to thrive. Research, while still deficient, has provided empirical evidence for both traditional and non-traditional determinants of tax evasion. Notably the vast majority of the empirical research has dealt with individual tax evasion, while the business and cross-country context was less common. The investigation of these aspects was suggested frequently by most prominent authors in the field of tax evasion. For instance, Andreoni et al. (1998, p.855) in one of the most profound tax evasion reviews, while concluding and providing directions for future research, argue that "*...a broadening of the empirical database will improve the power of statistical tests of theoretical models, and spur comparative analysis across countries* ". Torgler (2011, p.6) on the other side suggests that *"...business tax evasion in general, has received very little attention. Work in this area is therefore highly relevant".*

As argued in Chapter I, the purpose of this thesis is to fill the gap on the business, cross-country and transition contexts of tax evasion. In Chapter II we argued that this will be done by adapting the theory of tax evasion of individuals to businesses (Slemrod, 2007). Consequently, in this chapter, we review the empirical investigation conducted so far. This review is largely focused on individual studies, given that the bulk of research is in this area. Under the assumption that that the behaviour of businesses is similar to the behaviour of individuals, the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. Having said that, the empirical findings for individuals reviewed in this chapter may indicate potential determinants for the business context that we intend to investigate in Chapters IV, V and VI. Reviewing the empirical literature on individual tax evasion enables us to set hypothesis and expectations for these chapters.

Today there are several reviews of the individual tax evasion literature, amongst which we note the ones from Jackson and Milliron (1984), Cowell (1990), Andreoni et al. (1998), Franzoni (1999) and Torgler (2007a). The common feature of these reviews is the lack of consensus on grouping the determinants of tax evasion investigated throughout 40 years of research. This is perhaps in line with Cowell's (2003) observation that there is no specific and generalized modelling of either individual or business tax evasion developed so far. The review conducted in this thesis has identified determinants that are most commonly found across the literature. These determinants are then grouped into five main categories, which are: traditional; institutional; socio-cultural; macroeconomic; and firm-characteristics.

The first category includes the pioneering determinants of tax evasion, namely the tax rate, the audit probability and the fine rate. These determinants are commonly found in early studies post Allingham and Sandmo (1972) theoretical model. Notably the audit and fine rate are less observable in non-US studies given the lack of actual tax administration data apart from US. The second category includes the institutional determinants of tax evasion. Amongst many, proxies and variables determining trust towards institutions, perception about the level of corruption and compliance costs of taxpayers are most commonly found and investigated across the literature. These determinants capture also aspects of the fairness, performance, transparency and accountability of institutions; as underlined under Andreoni et al. (1998) and elaborated under *Section 2.4* of Chapter II. We group and name these determinants as institutional given that their scope and magnitude is related exclusively to the behaviour of institutions. The third category includes socio-cultural determinants of tax evasion. Within this group we capture individual social, economic, demographic and behavioural characteristics of taxpayers. Age, gender, education, social norms, income level, income source, marital status or/and religiosity are the most commonly observed determinants in the literature. Some of these determinants are less important and/or less observable for business and cross-country context. The fourth category includes macroeconomic determinants of tax evasion, usually found in cross-country (though rare) or within country time-series investigations of tax evasion. These determinants include per capita income, inflation, unemployment and/or other macro environment proxies. Finally, the last category includes firm-related characteristics, such as size, legal status and sectoral activities. These determinants, as elaborated already in Chapter I, are rare and found only in a small number of studies (hence the motivation for this thesis). We elaborate more on previous business investigation for transition economies in Chapter V of this thesis.

The aim of this chapter is to provide a review of the empirical literature on tax evasion as the platform for further research in Chapters IV, V and VI. The empirical review conducted in this chapter is related accordingly to the theoretical structure elaborated in the Chapter II. We start by recapitulating the main techniques applied to measure and analyse the level of tax evasion and its determinants; then we proceed by reviewing the determinants of tax evasion investigated so far for both the individual and the business context.

This chapter is organized as follows. S*ection 1* discusses advantages and disadvantages of three most commonly applied techniques to estimate and analyze tax evasion. *Section 2* reviews the empirical findings of the traditional determinant (tax rate, the audit probability and the fine rate); while *Section 3* and *4* summarize findings related to institutional (trust, corruption and compliance costs) respectively socio-cultural (age, gender, education, social norms and other individual characteristics) determinants of tax evasion. *Section 5* and *6* review less commonly studied determinants of tax evasion, namely macroeconomic determinants and firm-level characteristics. The *last section* concludes.

3.1 Methodological Considerations

A major obstacle to analyzing tax evasion is the nature of evasion itself. Individuals and businesses are simply predisposed not to disclose cheating behaviour given the punishable consequences from the confession. Researchers and governments on the other side had to come up with ways and techniques that enabled them to estimate and analyze tax evasion; regardless of its nature. To date the literature recognizes three main approaches that capture the level of tax evasion as well as determinants that shape it. These include: tax measurement programmes – or actual audit data collected and provided by tax authorities; laboratory experiments – or controlled and simulative economic environments; and surveys – or qualitative information obtained through (usually indirect) interviewing.

To date the most careful and comprehensive estimates of tax evasion anywhere in the world have been made for US federal income tax. The IRS in an attempt to measure the tax gap (how much tax should be paid voluntarily in a timely way), established a special audit programme for the years 1963-1998 known as the TCMP (Taxpayer Compliance Measurement Program). The programme measured what taxpayers report and compared it with what examiners found while auditing randomly selected tax reports. Although the programme was shut down by Congress in 1995 due to its heavy costs (and perhaps this was the reason why we do not find similar programmes outside US), the database created throughout the years has served as a solid base for many researchers who have produced the greatest body of empirical findings in the field of tax evasion and its determinants. The advantage in using TCMP data is the opportunity to observe personal tax-reporting behaviour rather than having to rely on indirect measures of self-reported compliance behaviour. The major drawback however, lies in the limitations provided in accounting for other non-deterrence elements of the decision to comply; particularly when the importance of such elements has been acknowledged by non-traditional theory (Chapter II). One finds it impossible to derive the behavioural characteristics of taxpayers by simply looking at the information found in such or similar tax forms. Scepticism also rises on the TCMP inability to reflect information on taxpayers who did not file returns at all. Based on IRS data, non filers accounted for an estimated 36% of unreported income in 1976, thus it is fair to believe that much of the substance of evasion is not even observed with TCMP data.

Considering pros and cons of actual audit programmes, tax researchers have applied other alternatives that in general act as close substitutes or complementary to tax records. Laboratory experiments are amongst such alternatives. Experiments involve a technique that would simulate an environment where people – experimental subjects – make choices in a repeated dynamic world. They allow researchers to have accurate and unambiguous measures and these measures are also derived in a setting that controls explicitly for extraneous influences on individual taxpayer behaviour (Alm et al. 1992). Basic experimental design is as follows: subjects receive income, voluntarily pay taxes on income received, face probability of audit known to them and pay a penalty if they are caught cheating. They also receive a public good that depends on aggregate tax payment in order to capture the relationship aspects of the decision to comply or not. Then changes across various variables occur and compliance is compared in a variety of scenarios. There are however, some serious reasons for caution in the use of and especially generalization from these estimates. They are based upon somewhat artificial behaviour, they are derived from students, they are generated from small samples and the effects on compliance of the various policy variables are often not large. Experiments after all face some constraints in their inability to simulate proper socio-behaviour determinants. In order to tackle a few of these disadvantages, recently some researchers (Feld et al. 2006) have applied field experiments, which compared to laboratory experiments involve real tax authorities and real taxpayers. This technique helps to better test the effects of various instruments in the real situation of filling out the tax form and paying their taxes (for more on field experiments see Harrison and List, 2004).

The third, and perhaps most commonly used alternative in studying tax evasion, is the survey approach. Through interviewing a representative sample of respondents, tax researchers can observe both traditional and non-traditional determinants of tax evasion; hence investigate a rich set of hypotheses associated with non-traditional determinants. Surveys often include many socioeconomic, demographic and attitudinal variables that cannot be observed from tax returns or audit data (Andreoni et. al. 1998). Surveys however, have many methodological problems that make findings very suspect (Gërxhani, 2006). Surveys of tax evasion are even more complicated, because tax evasion is perceived to be a criminal activity and socially stigmatized thus making individuals quite reluctant to admit any illegal behaviour. In addition, there is a fear from threat of penalties and other sanctions which, in turn, induces respondents to either provide untruthful answers about their compliance behaviour or refuse to answer at all. Moreover, data provided in surveys related to tax evasion are based on perceptions of individuals therefore the outcomes are subjective and subject to measurement errors. Response and non-response biases in a survey sometime affect the validity and usage of survey results. Hellman et al. (2000) argue, for instance, that often respondents have a tendency to either complain or show pride, which again sheds some doubt in the truthfulness of answers provided. Vogel (1974) while discussing survey techniques on tax evasion brings into the picture the social-psychological balance theory where the individual often reorders his attitudes and appraisal of a given situation in order to conform to the behaviour pattern chosen. In addition, he argues that the conduct of the individual is different with respect to the moment of choice between deviant and conformist taxpayer compliance behaviour compared to the moment of answering the questionnaire, thus resulting in potentially different answers.

Some of the survey weaknesses are tackled through avoiding direct questions. Non-direct questioning increases the likelihood of having fearless and honest answers. They have been most commonly used in the tax evasion literature (for more on how to conduct survey questionnaires for tax evasion see Hanousek and Palda, 2004 and Gërxhani, 2006). World Bank (WB), European Bank for Reconstruction and Development (EBRD) and other prestigious institutions/reports (such as IMD World Competitiveness Yearbook and World Economic Forum Outlook) have all applied indirect questions on tax evasion. According to Gerxhani (2006) direct questions such as "*Did you pay taxes, last year?*" may intimidate the respondents who in turn may provide untruthful answers (or no answers at all).

While there are substantial difficulties in collecting meaningful compliance information through surveys, this type of data does have some unique advantages (Witte and Tauchen, 1987). First of all, the data collected from surveys provide additional information on taxpayer's characteristics, socio-economic attributes and other relevant institutional surroundings, a feature clearly ignored by other forms. Second, survey data compared to actual audit reports reflect only on intentional evasion. The likes of TCMP data combine noncompliance reflecting intentional behaviour with noncompliance arising from mistake or ignorance. For most of the countries complying with tax laws is quite a difficult procedure in terms of documentation requirements and other paperwork. In addition to that, there is a lack of information by individuals on deductible expenses, leading to their exaggeration while tax reporting. For economic aspects of tax evasion differentiation between two types of underreporting (intentional vs. mistakes) is essential as the factors determining them may be quite different and, therefore, they should be treated separately. Third, perceptions provided in surveys sometimes do represent a more reliable picture of evasion, particularly in developing countries where audit reports are unreliable due to considerable involvement of tax administrators in corruptive habits.

Alternative sources of information on tax evasion are data collected from tax amnesties. The measures obtained by self-reporting amnestied individuals represent perhaps the most complete and most accurate information one can obtain in the field of evasion. An obvious difficulty with such data, however, is sample selection. Andreoni et al. (1997, p.854) argue that "*only a subset of all evaders is likely to participate in tax amnesty, and this subset may not be representative of the overall population*". In addition, tax amnesties are rare and the data provided for research are even rarer. A less commonly used approach is a combination of various indirect measures of evasion, such as the discrepancy between income reported on tax returns and actual income in the national income accounts. Unfortunately such measures are aggregate and approximate, leaving no room for taxpayer related findings; clearly a strong disadvantage in understanding the determinants of tax evasion. The discrepancy approach serves, however, as a strong tool in measuring the scale of tax evasion.

So far we have reviewed the techniques applied to estimate and analyse tax evasion. Next, we review the most important determinants of tax evasion investigated through these techniques. We group these determinants into five main categories:

- Traditional (*tax, audit* and *fine rate*);
- Institutional (*trust, corruption* and *compliance costs*);
- Socio-cultural (*age, gender, education, social norms* and *other characteristics*);
- Macroeconomic (*per capita, unemployment* and *inflation*); and
- Firm characteristics (*size, ownership* and *sector*)

3.2 Traditional Determinants

The first group of determinants consists of parameters involved in the traditional model by Allingham and Sandmo (1972) and subsequent extensions. These parameters are: tax rate, audit rate and fine rate. Under theoretical investigation in Chapter II we argued that the impact of audit and fine rate in tax evasion is negative; though non-traditional considerations of tax evasion argued that oppressive tax enforcement and extreme penalties can sometimes backfire and produce counter effects. In the theoretical roundup we noted that the impact of tax rate is unclear as depending on assumptions on how fines were imposed (whether on the tax evaded or the amount of income evaded) one could establish negative, positive or ambiguous effect on tax evasion. Indeed, similar variations on assumptions in regards to risk behaviour and separability produce generally ambiguous results (Chapter II). Having that in mind, the empirical investigation of traditional determinants of tax evasion becomes highly important. In this section we review the most important works on tax, audit and fine rate.

3.2.1 Tax Rate

In Chapter II we argued that the standard economic model of tax evasion provided two counteracting effects: income and substitution effects; both connected with the increased risk aversion and increased incentive for gambling, which together produce ambiguity on the question as to whether higher tax rates decrease or increase tax evasion. As with the theory, the empirical evidence on the impact of tax rates is quite controversial.

Clotfelter (1983) appears as the first author to make use of TCMP data (the sample included around 47,000 individual tax returns for the year 1969) to investigate how evasion responds to changes in the environment. Using a standard Tobit model, his work specifically looks at the relationship between marginal tax rates and tax evasion. The information gathered on each declarer represented the difference between what was originally stated and what was deemed as correct reporting by the tax authority. His empirical analysis produced positive and significant coefficients on both the after-tax income and marginal tax rate variables with tax evasion; in other words, a 10% increase in tax rate would result in an expected 5-8% increase in evasion. These results were consistent with the theoretical considerations established in Allingham and Sandmo (1972), but inconsistent with the Yitzhaki (1974) modifications, which, as argued in Chapter II, represent the non-ambiguous theoretical consideration on the relationship between the tax rate and compliance. The study by Clotfelter (1983) is amongst the most cited works in the tax evasion literature.

Pommerehne and Weck-Hannemann (1996) use an unbiased estimate of tax evasion: the discrepancy between income measures derived from tax return data and those derived from national income accounts, and look at the impact of tax rates on tax evasion in Switzerland. Their result of the pooled cross-section/time series analysis for the absolute amount of income concealed showed that there is a strong and positive relation between marginal tax rate and tax evasion.

Alm et al. (1992) support a similar finding while using data from laboratory experiments to estimate individual responses to tax rates, penalty and audit rate changes, as well as to changes in government expenditures.[13] During several sessions of the experiment, tax policy changes were introduced, including a change of tax rate (10%, 30%, and 50%). The results showed that when the tax rate increased the participants' compliance decreased i.e. evasion increased. Similar results were reported by Friedland et al. (1978) from an experiment where tax rate varied amongst subjects (from 25% to 50%); and by Collins and Plumlee (1991) while changing tax rates from 30% to 60%. Moser et al. (1995) however, found that increasing tax rates reduces compliance only for those who view the tax system as unfair.

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[13] The basic design is simple: subjects receive income, they voluntarily pay taxes on income received, face a probability of audit known to them and pay a penalty if they are caught cheating. They also receive a public good that depends on aggregate tax payment. Then various policy changes occur and compliance is compared in the absence and in the presence of policy. Seven sessions are developed. In the first session (basic) there is a tax rate of 30%, probability of audit 0.04 and penalty rate of 2$ (amount that subjects receive before sessions varies from 2 to 3$). Session two introduces a public good, that is a proportional share amongst subjects of surplus funds gained from session one. In session three, tax rates are reduced to 10%; and increased to 50% in session four. In session five and six, the fine rate equals 1 and 3 and in the seventh session the audit rate is reduced to 0.02, and increased to 0.06 in the last session.

Caroll (1998) uses a panel consisting of annual tax returns that spans a period when tax rates increased during the 1990 and 1993 US Tax Acts.[14] His findings show that a tax rate increase in both years resulted in lower reported incomes of taxpayers facing the higher rates. Similar results were found in Sillamaa and Veall (2000) while estimating the response of gross reported income to a significant change in marginal tax rates that occurred in Canada in 1988 (due to the Canadian Tax Act of 1988). Fisman and Wei (2004) by examining the relationship in China between the tariff schedule and the 'evasion gap' - which they define as the difference between Hong Kong's reported exports to China at the product level and China's reported imports from Hong Kong - find that an increase in the tax rate is associated with an increase in tax evasion. Chiarini et al. (2008) by using official time series of the Italian evaded Value Added Tax (VAT) base for the period 1980-2004 investigate empirically the long-run characteristics of tax evasion and the relationship with the tax burden; the results show a positive relation between evasion and tax rate. Trehub and Krasnikova (2006) develop a methodology that uses microeconomic data from the Russian Longitudinal Monitoring Survey (2000-2002) of households to explore tax evasion patterns in Russia. Their findings show that *ceteris paribus* a tax rate cut and other measures undertaken in compliance with the personal income tax reform have led to the situation where households began to report more than they had done before the reform and tax cuts. Gorodnichenko et al. (2009) use micro-level survey data to examine the effect of Russia's largest tax reform, namely the introduction of the flat tax. Their work uses the gap between household expenditures and reported earnings as a proxy for tax evasion using data from a household panel for the period 1998-2004. Their innovative methodology in tax evasion research (difference-in-difference and the regression-discontinuity-type approach) finds large, significant and negative changes in evasion following the flat tax reform; i.e reduction of the tax burden through tax rates caused lower levels of tax evasion in Russia.

The same positive relationship between tax evasion and tax rates is observed in Mason and Calvin (1984), Pommerehne and Frey (1992), Christian and Gupta (1992), Alm et al. (1992) and in most studies related to developing countries (see Torgler, 2007a).

[14] Focusing on a period of rising tax rates is important because it avoids the criticism that the observed changes in taxpayer incomes are merely the result of long-term trends of increasing income inequality that have little to do with changes in tax rates.

Contrary to the above findings, a negative relation of tax rates and evasion, as concluded by Yitzhaki (1974), is less often reported. Perhaps the biggest challenge to Clotfelter (1983) comes from Feinstein (1991) using the same data source (TCMP), pooled data for the years 1982 and 1985, in times of tax rate changes in the US. He did so in order to address also one of the main critiques against Clotfelter (1983) at the time, i.e the inability to separate the joint effect of the marginal tax rate and income level. When a pooled model was run over both years by Feinstein (1991), the two effects could be separated because two filers with identical incomes filing in the different years faced different marginal tax rates. In the pooled model, income exerted a very small and insignificant effect on tax evasion, while the marginal tax rate exerted a substantial negative effect, i.e. the negative relation between tax rates and tax evasion was established.

Alm et al. (1995) apply experimental techniques to explore the major factors that affect tax evasion in Spain. The subjects were faced with three different levels of proportional tax rate (10%, 30% and 50%). Their results show that higher tax rates lead to somewhat greater levels compliance (respectively, 14%, 24% and 31%). Similar negative results were found in Alm et.al (1990) for Jamaican taxpayers.

Kamdar (1995) uses micro data from individual tax returns audited during the 1971 cycle of TCMP to find that evasion decreases as the marginal tax rate increases. One must note that his result must be interpreted with caution as the 1971 sample did not include high-income taxpayers who face a higher tax rate and consequently higher tax burden.

To make the empirical investigation of the impact of tax rate on evasion even more ambiguous, no effect of the tax rate on tax evasion was found in an experiment by Baldry (1987) and in a study by Porcano (1988). Joulfaian and Rider (1996) also find that misreported income is not affected by tax rates.

Table 3.1 provides a summary of studies investigating the relationship of tax rate and tax evasion. To sum up, most of the empirical evidence supports a positive relationship between the tax rate and tax evasion, although there are also a considerable number of studies that establish a negative relationship. Perhaps a Meta Regression Analysis on the impact of tax rate on evasion would provide clearer insights to the ambiguity of the tax rate effect. However, this suggestion is not pursued in this thesis.

Table 3.1 Tax Rate and Tax Evasion

Determinant	Theory	Empirics	Reference
Tax Rate	**AMBIGUOUS** Increasing taxes has both an *income effect* and, possibly, a *substitution effect*; hence ambiguity (Allingham and Sandmo, 1972). If penalty is imposed on the evaded tax the ambiguity will fade away leaving only the income effect, i.e. a tax raise will decrease tax evasion (Yitzhaki, 1974).	POSITIVE	Clotfelter (1983) Masson and Calvin (1984) Alm et al. (1992) Pommehrene and Frey (1992) Christian and Gupta (1992) Alm et al. (1993) Pommerehne and Weck (1996) Caroll (1998) Sillamaa and Veall (2000) Fisman and Wei (2004) Trehub and Krasnikova (2006) Torgler (2006) Chiarini et al. (2008) Gorodnichenko et al. (2009) Nur-tegin (2008) Bernasconi et al. (2013)
		NEGATIVE	Alm et al. (1990) Feinstein (1991) Christian and Gupta (1993) Alm et al. (1995) Kamdor (1995) Joulfaian (2009)
		NO EFFECT	Baldry (1987) Porcano (1988) Joulfaian and Rider (1996)

3.2.2 Probability of Audit

The second traditional determinant of tax evasion is the probability of detection, or the likelihood that the tax collecting agency will discover a taxpayer's noncompliance (Jackson and Milliron, 1986). As already discussed in Chapter II, an increase in the probability of audit, or the audit rate, makes the decision to evade riskier. Under the assumption of risk-averse taxpayers this means that increasing the audit rate reduces tax evasion. There is general consensus amongst most studies (for a review see Fischer et al. 1992) that detection probability has a strong, negative and significant relationship with evasion; although the critical question of to what extent raising the probability of detection will increase compliance remains unanswered (Andreoni et al. 1998).

Witte and Woodbury (1985) analyze TCMP data from the year 1969 and find out that evasion is inversely related to the probability of being audited. Crane and Nourzad (1986) use the percentage of total tax returns audited as a measure of the probability of detection. Their analysis found that increases in the detection probability, on average, leads to lower underreporting of income. Dubin et al. (1987) analyzed time series data to further test the hypothesis regarding the effect of detection probability. They too concluded that higher probabilities were associated with increased levels of tax reporting. Pommerehne and Weck-Hannemann (1996) compared data from Swiss cantons and reported that compliance was higher in cantons where more audits occurred in the given observed period. Spicer and Hero (1985) through an experimental approach argue that individuals who have been audited previously will perceive the probability of detection as higher and, consequently, will become more compliant in post-audited periods. Chang et al. (1987) establish a positive relationship while experimenting on the compliance behaviour under various levels of detection probabilities. Similar results are found by Beck et al. (1991). Alm et al. (1995) in their experiment change the audit rates (5%, 30% and 60%) to observe the corresponding change in compliance, while Trivedi et al. (2004) apply a two scale audit probability (0 and 25%); both studies established a negative and significant relationship between audit rate and tax evasion. Feld et al. (2007) report a negative significant relationship of audit probability on German tax evasion.

Tax audits are also considered to have dual effects on compliance: first with deterrent effect on the taxpayers actually audited; and second with indirect deterrent effect on those who do not receive audit, yet perceive its rate to be higher than it actually is. The increased perception of audit rates can be achieved either due to asymmetric information between tax agencies and individuals with the latter perceiving the rate much too highly; or through individual perceptions caused by the audits on the certain group, part of which is that individual.

Slemrod et al. (2001) observe increased compliance in 1700 randomly selected Minnesota taxpayers, who were only informed by letter that the tax returns they were about to file would be "*closely examined*". Kleven et al. (2010) analyze a randomized tax enforcement experiment in Denmark. In the base year, a stratified and representative sample of over 40,000 individual income tax filers was selected for the experiment. Half of the tax filers were randomly selected to be thoroughly audited, while the rest were deliberately not audited. The following year, "*threat-of-audit*" letters were randomly assigned and sent to tax filers in both groups. Using comprehensive administrative tax data, they find that prior audits substantially increase self-reported income, implying that individuals update their beliefs about detection probability based on experiencing an audit. In addition, "*threat-of-audit*" letters also have a significant effect on self-reported income, and the size of this effect depends positively on the audit probability expressed in the letter. Guala and Mittone (2005) suggest that the occurrence of detection induces a learning process for evaluating audit probabilities. Participants on their experiment, prone to audits in the initial stages, recorded higher compliance rates in future periods.

There were cases, mainly in tax experiments, when compliance decreased weakly soon after the audit was conducted (Mittone, 2006) suggesting thus (though surprising), a positive relationship between tax evasion and audit rate. Kastlunger et al. (2009) suggest that the decrease of compliance found after an audit is most likely caused by misperception of chance, while loss-repair tendencies are of moderate relevance.

Lastly, no effect was observed in Schram and Gërxhani (2006) while conducting experiments in Albania and in the Netherlands. Participants in Albania were not affected by audit rates (16.6% and 50%), but Dutch participants evaded more when audit probability was low. In addition, Falsetta et al. (2010) find that the audit probability only influences taxpayer compliance decisions when there is support for the government's use of tax money. When taxpayers do not support government programs, their compliance is lower regardless of the audit probability.

Table 3.2 provides a summary of empirical studies treating the relationship between the audit rate and tax evasion. These studies overwhelmingly support the hypothesis set under theoretical consideration in Chapter II that higher audit rates increase compliance.

Table 3.2 Audit Rate and Tax Evasion

Determinant	Theory	Empirics	Reference
Audit Rate	**NEGATIVE** An increase in the probability of audit makes the decision to evade more risky. Under the assumption of a risk-averse taxpayer it means that increasing the audit rate reduces tax evasion	POSITIVE	Mittone (2006)
		NEGATIVE	Witte and Woodbury (1985) Spicer and Hero (1985) Crane and Nourzad (1986) Chang et al. (1987) Dubin et al. (1987) Beck et al. (1991) Alm et al. (1995) Pommerehne and Weck (1996) Slemrod et al. (2001) Trivedi et al. (2004) Kleven et al. (2010)
		NO EFFECT	Gërxhani and Schram (2006) Falseta et al. (2010)

In addition, these studies also suggest that uncertainty does lead to taxpayers' overestimation of the probability of being caught which, in turn, increases compliance. Perhaps this is one of the main reasons why compliance level in most of the countries is higher than expected with applied audit rates.

3.2.3 Fine Rate

The basic model, while it provides a fairly sophisticated description of taxpayers' evasion decisions, leaves very little scope for enforcement policy. The latter is essentially reduced to two parameters: the penalty rate and the audit rate. Generally, these two parameters are seen as close substitutes. The Allingham and Sandmo (1972) model argues that an increase in the penalty rate increases compliance as it has the same change in effect as the probability of audit i.e. making evasion more costly. In support to the traditional model, Witte and Woodbury (1985) report a significant negative relationship between the harshness of criminal sanctions and tax evasion. Similarly, Crane and Nourzad (1986) found that increases in the fine rate, on average, lead to lower underreporting of income, as do Tittle (1980) and Grasmick and Scott (1982) who also suggest that respondents prone to evasion are more likely to become more compliant given harsher penalties.

Alm et al. (1992) in their experiment found a positive yet weak effect of fines on compliance. The experimental studies performed by Hasseldine et al. (2007), Friedland et al. (1978), and by Park and Hyun (2003) also show that severity of sanctions has significant effects on tax evasion. However, Alm et al. (1995) point out that fines reach their optimum effectiveness only combined with detection probability. Similar results are obtained by Becker et al. (1987) and Beck et al. (1991).

Contrary to intuition, increasing the fines can have the opposite effect by initiating tax evasion among other taxpayers. Fjeldstad and Semboja (2001) report a positive relationship from a survey study they conducted in Tanzania, where oppressive tax enforcement and harassment of taxpayers increased resistance to pay taxes.

Quite a few studies failed to establish any kind of support for the deterring nature of fine rates on individuals' decisions. For instance, Ali et al. (2001) while looking at US taxpaying behaviour between 1980 and 1995 found that although the penalties had increased considerably their impact was arguably irrelevant on the levels of tax evasion; though, the reaction to fines by groups of taxpayers according to the level of income was notable with high-income earners improving slightly their dutiful behaviour. Pommerehne and Weck- Hannemann (1996) found also no impact of the penalty rate in their comparison of tax evasion in different Swiss cantons. Baldry (1987) and Webley et al. (1991) in their experiments found also that evasion was unaffected by the penalty rate.

Table 3.3 summarizes studies investigating the relationship between fine rate and tax evasion. These studies show that the fine rate as described by the conventional theory has a clear positive effect on compliance; though in cases harsh treatment of taxpayers can provide quite contrary results.

Table 3.3 Fine Rate and Tax Evasion

Determinant	Theory	Empirics	Reference
Fine Rate	**NEGATIVE** An increase in the penalty rate reduces tax evasion as it makes noncompliance more costly	POSITIVE	Fjeldstad and Semboja (2001)
		NEGATIVE	Friedland et al.(1978) Tittle (1980) Grasmick and Scott (1982) Witte and Woodbury (1985) Crane and Nourzad (1986) Becker et al. (1987) Beck et al. (1991) Alm et al. (1992) Alm et al. (1995) Park and Hyun (2003) Hasseldine et al. (2007)
		NO EFFECT	Webley et al. (1991) Baldry (1987) Pommerehne and Weck (1996) Ali et al. (2001)

Of special interest remains the interaction between the fine and the audit rate. The more complex empirical investigations could provide further evidence on this regards. Alm et al. (1992) in one of the most reliable tax experiments find that when these two variables are set at levels consistent with those from the real world, their deterrent effect is symbolic. This again relates to the need to understand the optimum level of fines and audit rates. However, this task is beyond the scope of this thesis.

3.3 Institutional Determinants

In Chapter II we introduced theoretical considerations that favoured inclusion of non-traditional determinants. As Frey and Feld (2002) argue, tax evasion/compliance is driven by a psychological tax contract between citizens and tax authorities and, in order for the contract to be upheld, incentives such as rewards or punishment need to be provided. In addition, loyalties and emotional ties that go well beyond transactional exchanges must be taken into account.

In this section we review some of the most important studies that have empirically investigated institutional aspects of tax evasion. We group these studies into three categories, namely trust, corruption and costs of compliance. Such categorization is commonly found across the literature and with these we capture the fairness, performance, transparency and accountability of institutions, which are highlighted by Andreoni et al. (1998).

At this point we note that most studies treating the impact of trust or corruption on evasion or, for that matter, treating the impact of other institutional variables on tax evasion, have focused on tax morale or the intrinsic motivation to comply as the *dependent* variable. In contrast, we argue that although tax morale is closely linked to tax evasion, they do not equate to each other. They are different given that tax morale is attitude while compliance is behaviour (Torgler, 2007a). Tax morale is a measure of the extent that citizens consider compliance as their moral obligation. Considering it as a moral duty in other words means that there are justified reasons to pay taxes besides the legalistic ones introduced in the traditional model (Kirchgassner, 2010).

Indeed, though the concept of morality in tax evasion was introduced during the 1960s, the empirical investigation of such a relationship began quite late, notably since the year 2000 and onwards, following a decade of intensive theoretical suggestions during the 1990s (see for instance Long and Swinger, 1991; Erard and Feinstein, 1994; Frey, 1997; Andreoni et al. 1998; Frey and Feld, 2002). These studies have continuously suggested that moral obligations to be truthful as well as the social consequences of being undutiful may add further incentives to compliance/noncompliance and hence improve the understanding of decision to evade. These factors in turn would solve, the puzzle of tax compliance, or a condition where levels of tax compliance do not correspond with the levels of enforcements.

The pioneering empirical work on tax morale (such as Torgler, 2007a; and McGee, 2005) has treated tax morale as a close substitute for tax evasion. This was done mainly because of the difficulties in measuring tax evasion given the individual incentives to conceal cheating. The assumption was that, at least qualitatively, the determinants of tax morale could produce relevant results for tax evasion; and what could explain tax morale could in fact explain the levels of tax evasion. The estimations with tax morale as the dependent variable had both traditional and non-traditional determinants as independent variables; quite similarly as for tax evasion modelling applied, for instance, in Frey and Feld (2002).

Quite recently however, tax morale has been used an *independent* determinant of tax evasion. We argue that this treatment occurred given the availability of new data to proxy both tax evasion and tax morale separately, and hence estimation of tax morale as an independent variable in models of of tax evasion. Note that, usually through surveys, tax morale is proxied by "justifiability" of taxpayers towards evasion, while tax evasion is measured through perception of concealed sales by other firms/individuals.

In two very recent studies by Torgler et al. (2010) and Alm and McClellan (2012) – arguably the leading authors in the field of tax morale – tax morale was treated as an independent variable of tax evasion. In Torgler et al. (2010) the research was divided into two stages. In the first stage, a model estimating tax evasion as the dependent variable was introduced. Here traditional determinants and tax morale were used as independent variables (a similar approach was applied in Alm and McClellan, 2012). In this case tax morale acted as a "*catch all concept*", reflecting and aggregating the linked effects of trust, corruption and other institutional factors. Accordingly, given the inclusion of tax morale in the model, other institutional determinants were not included. The second stage in Torgler et al. (2010) introduced a model with tax morale as the dependent variable, in order to investigate the characteristics that shape the morality of compliance. The independent determinants of tax morale were proxies capturing the quality and performance of institutions as well as individual characteristics of taxpayers.

In our empirical investigation for transition economies (Chapter IV and V) the estimated models have tax evasion as the dependent variable, while the institutional proxies are introduced as independent variables. Tax morale, on its own or as an explanatory variable of tax evasion is not observed in these chapters given the data limitations. In Chapter VI however, we follow the same strategy as suggested by the very recent literature. Collection of primary data for Kosovo enables us to construct a questionnaire that measure both tax evasion and tax morale; and hence to investigate both the relationship between tax morale and tax evasion as well as between tax morale and its determinants.

In this section, given the close relationship between tax morale and tax evasion, we review also studies that have treated the impact of institutional determinants on tax morale; which ultimately impacts tax evasion. By doing so, we enrich our understanding with respect to institutional influences on compliance levels.

3.3.1 Trust

Torgler (2011) argues that taxpayers perceive their relationship with institutions not only as coercive, but also as a necessity for exchange. In case that the exchange does not occur, then taxpayers will consider themselves as cheated. If however, taxpayers perceive the way their taxes are being spent as efficient, their interests as being represented properly, and the public goods they receive as sufficient, then both their identification with the state (national pride) and tax morale (voluntarily compliance levels) will increase. This in turn reduces significantly tax evasion. Other authors (Jackson and Milliron, 1986; Eriksen and Fallan, 1996; Frey, 1997; and Torgler, 2003) have introduced fairness, transparency, fiscal knowledge and treatment as relevant factors in establishing trusty relationship between taxpayers and institutions.

Kucher and Gotte (1998) using Swiss data found that trust does significantly raise the ratio of reported tax declarations. Similarly, Frey and Feld (2002) in their empirical analysis for Switzerland show that respectful treatment by the tax administrations reduces tax evasion.

Alm et al. (2005) examine Russian attitudes toward paying taxes. A special feature of their work is that it studies tax morale before (1991) during (1995) and after the (1999) transition using data from World Values Survey (WVS) and the European Values Survey (EWS). The dynamic changes in Russia offer an excellent opportunity to examine the ways in which the attitudes are affected by/reflected in changes in government policies and institutions. They find that all trust proxies have a positive and a statistically significant impact on tax morale. An increase in trust in government and an increase in trust in the legal system had considerable marginal effects on tax morale.

Torgler et. al (2008) report that positive attitudes towards tax authorities in Turkey improve significantly tax morale. Similar results on the relationship between trust and tax morale are found in in Torgler (2003) for Transition Economies; Torgler and Murphy (2004) for Australia; Torgler (2005a) and Gavira (2007) for Latin America; Torgler (2007b) in Central and Eastern European Countries; Torgler (2011) for Europe; Torgler (2005b) investigating the relationship between tax morale and direct democracy; Torgler and Schaltegger (2005) investigating the relationship between tax morale and fiscal policy; Torgler (2007a) investigating the relationship between tax morale and tax compliance; Torgler and Shneider (2007a) investigating determinants of tax morale; Torgler and Shneider (2007b) investigating the relationship between tax morale, shadow economy, governance and institutions; Torgler et al. (2010) investigating the relationship between compliance, morale and governance; Daude and Melguizo (2010) investigating links between representation and compliance; and Alm and McClellan (2012) investigating business tax morale.

Jackson and Milliron (1986, p.137) on the other side recognize the importance of fairness in creating a sustainable relationship between taxpayers and institutions. They further argue that tax fairness consists of at least two different dimensions: "*One dimension appears to involve the equity of the trade - the benefits received for the tax dollars given. The other dimension appears to involve the equity of the taxpayer's burden in reference to that of other individuals*". Spicer and Becker (1980) in an experiment with around 60 US students found that the percentage of taxes evaded was the highest among those who were told that their tax rates were higher than average, and lowest among those told their tax rates were lower than average (this relates to the "*equity in reference to others*" as predicted by Jackson and Milliron, 1986). Similarly, Verboon and van Dijke (2011) while looking at the relation between fairness considerations and tax evasion attitudes using data from a large panel survey among small business owners in Netherlands, found that the equally distributive fairness positively affects both compliance attitudes (tax evasion) and intentions to comply among entrepreneurs with relatively low personal norms (tax morale). Torgler and Murphy (2004) on the other side report a strong increase in tax morale in Austria during the 1990s, as compared to the early 1980s when government faced numerous complaints about the existing unfair burden of tax system compared to the benefits received (this relates to the "*equity of the trade*" from Jackson and Milliron, 1986). A number of other survey research studies have also reported positive correlations between perceptions of fiscal inequity and tax evasion (Spicer, 1974; Song and Yarbrough, 1978). Grasmick and Scott (1982), Spicer and Lundstedt (1976) and Alm et al. (2005) also indicate that respondents who believe that the tax system is fair are more likely to commit to compliant behaviours.

Eriksen and Fallan (1996) introduce the importance of fiscal knowledge. They reveal that more fiscal knowledge tends to increase perceptions of the fairness of tax systems; hence shrink evasive behaviour. The importance of fiscal knowledge for perceived fairness was also reported by Okada (2002) when investigating tax evasion in Japan.

Torgler (2003) on the other side introduces treatment as an important factor in trust relationships and evasive behaviour. He argues that those governments that pre-commit with direct democratic rules impose restraints on their own power and thus send a signal that taxpayers are seen as responsible persons. Studies in this regards (Alm et al.,1999; Feld and Tyran, 2002; Torgler and Schaltegger, 2005) have highlighted the importance of voting on tax issues and, consequently, for improvements in levels of tax evasion. Similarly, Frey and Eichenberger (1999) argue in favour of decentralization as a political tool towards reaching citizens' needs and improving the relationship between both agents. Hug and Sporri (2011) even argue in favour of allowing for referendums in order to strengthen the link between trust and tax morale, hence institutions and tax compliance.

Table 3.4 provides a summary of studies treating the relationship between trust and tax evasion and/or tax morale; with all of them revealing that the perceived fairness, treatment, transparency and accountability all impact the trust of individuals and businesses towards institutions, which in turn influences both tax evasion and tax morale.

Table 3.4 Trust and Tax Evasion

Determinant	Theory	Empirics	Reference
Trust	**NEGATIVE** An efficient and fair system will spawn trust; and trust will in turn spawn compliance.	NEGATIVE	Bordignon (1993) Eriksen and Fallan (1996) Kucher and Gotte (1998) Alm et al.(1999) Frey and Eichenberger (1999) Feld and Frey (2002) Feld and Tyran, 2002 Okada (2002) Frey (2003) Torgler (2003) Torgler (2004) Torgler and Murphy (2004) Torgler (2005a) Torgler (2005b) Torgler and Schaltegger (2005) Alm et al. (2005) Hanousek and Palda (2006) Alm et al. (2006) Richardson (2006) Gavira (2007) Torgler (2007a) Torgler and Schaffner (2007) Torgler and Shneider (2007a) Torgler and Shneider (2007b) Nur-tegin (2008) Torgler et. al (2008) Verboon et. al (2010) Torgler et al. (2010) Daude and Melguizo (2010) Hug and Sporri (2011) Torgler (2011) Alm and McClellan (2012)

3.3.2 Corruption

According to Adams (2006), the relationship between corruption and tax evasion dates since the existence of taxes themselves. Thousands of years ago, Egyptian pharaohs introduced *scribes* - or highly paid tax collectors - in a hope to provide disincentives for bribes and reduce thus opportunities for evasion. Even more, a group of special and even highly paid scribes was assigned to monitor and control the ordinary scribes working in the field.

The impact of corruption on tax evasion is twofold; first, if it is related specifically to tax administration, it provides more opportunities for taxpayers to exert their noncompliant behaviour given the corruptive intention of tax officials. Second, if widespread, corruption affects the perception of individuals towards the institutions which, in turn, increases evasive behaviour. Tirole (1996) explains that taxpayers that see their government as corrupted see evasion as a “vote of dissent”.

Corruption may arise from both tax payers and tax administration. Gaddy and Ickes (1998) on the one hand argue that in some cases taxpayers may opt for developing their “*relationship*” capital with tax the authorities. Hindriks et al. (1999) on the other, argue that corrupt examiners may also extort the taxpayers by overstating their real tax liability. In such cases, taxpayers can only verify their true liability through very costly (time and monetary) appeals; instead they opt for providing bribes.

The general consensus across the studies is that corruption is positively related to tax evasion. Torgler (2003) while investigating the relationship between tax morale and corruption for TEs concludes that higher corruption leads to lower levels of tax morale, consequently higher evasive rates.

Similar results on the relationship between corruption and tax morale are found in Torgler (2004) for Asia; Torgler and Murphy (2004) for Australia; Torgler (2005a) for Latin America; Torgler (2007b) for Central and Eastern European Countries; Torgler et al. (2008) for Turkey; Torgler (2011) for Europe; Torgler (2005b) investigating the relationship between tax morale and direct democracy; Torgler and Schaltagger (2005) investigating the relationship between tax morale and fiscal policy; Torgler (2007a) investigating the relationship between tax morale and tax compliance; Torgler and Shneider (2007a) investigating determinants of tax morale; Torgler and Shneider (2007b) investigating the relationship between tax morale, shadow economy, governance and institutions; Torgler et al. (2010) investigating the relationship between compliance, morale and governance; and Alm and McClellan (2012) investigating business tax morale.

According to Tanzi and Davoodi (2001), economies characterized by higher perceived levels of corruption are also characterized by higher levels of noncompliant behaviour. Picur and Riahi-Blekaoui (2006) find that tax evasion internationally is positively related to the levels of institutional bureaucracy and negatively related to the successful control of corruption. A similar relationship is found in Pashev (2005) while studying Bulgarian tax evasion and corruption opportunities. Joulfaian (2009) while investigating the relationship between corruption and 26 transition economies argues that business evasion rises with the frequency of tax related bribes; moreover evasion rises with bribes to tax officials. Lopez-Claros and Alexoshenko (1998) while explaining the problems of the Russian tax system emphasize that the corruption of the Russian tax system provides fertile ground for noncompliance. Chattopadhyay and Gupta (2002) while studying the income tax compliance of Indian corporations, find also a strong and significant influence of corruption.

Imam and Jacobs (2007) study the impact of corruption on the revenue generating capacity for different taxes in the Middle East. They find that countries with the low revenue collection as a share of GDP are usually those that have high rates of corruption. Another interesting finding in their work is that certain taxes are more affected by corruption than others. Taxes requiring frequent interactions between the tax authority and individuals, such as taxes on international trade, seem to be prone more to corruption than most other forms of taxation.

A strong, positive and significant relationship between corruption and evasion is found also in Bowles (1999), Sanyal et al. (2000), Fjelsdad (2006), Richardson (2006), McGee and Maranjyan (2006), Nur-tegin (2008) and Riahi-Belkaoui (2009). Sanyal (2002) investigates the impact of alternative reward schemes on the behavior of corrupt tax officials and the level of corruption, concluding that such rewards reduce substantially the level of corruption within tax inspectors.

Table 3.5 provides a summary of studies on the relationship between the corruption and tax evasion and/or tax morale. Obviously the studies conducted so far support without any doubt the theoretical considerations, that higher corruption levels are associated with higher tax evasion.

Table 3.5 Corruption and Tax Evasion

Determinant	Theory	Empirics	Reference
Corruption	**POSITIVE** Provides more opportunities for taxpayers to exert their noncompliant behaviour as well as affects the perception of individuals towards the institutions	POSIITVE	Tirole (1996) Coddy and Ickes (1998) Hindriks et al. (1999) Lopez and Alexoshenko (1998) Bowles (1999) Sanyal et al. (2000) Tanzi and Davoodi (2001) Chattopadhayay and Gupta (2002) Sanyal (2002) Torgler (2003) Torgler (2004) Torgler and Murphy (2004) Torgler (2005a) Torgler (2005b) Pashev (2005) Picur and Blekaoui (2005) Fjelsdad (2006) Richardson (2006) Anderson (2006) Fjelsdad (2006) Mc Gee and Maranjyan (2006) Torgler (2007a) Torgler (2007b) Torgler and Schaffner (2007) Torgler and Shneider (2007a) Torgler and Shneider (2007b) Imam and Jacobs (2007) Nur-tegin (2008) Torgler et al. (2010) Belkaoui (2009) Joulfain (2009) Torgler et al. (2010) Torgler (2011) Alm and McClellan (2012)

3.3.3 Compliance costs

Arthur Laffer, the author of the Laffer Curve, in a very recent publication Laffer et al. (2011) argues that the complexity of the tax code in the US has increased substantially compliance costs given that businesses, large and small, hire teams of accountants, lawyers and tax professionals to track, measure and pay taxes. This in turn causes individuals and businesses to change their behaviour in response to tax policies, starting from the composition of their income, location, timing, volume and eventually reporting i.e. evasion. Besides complexity, there are of course other sources of compliance costs. For instance, in transition and /or developing countries, the bureaucracy of public administration, specifically of tax administration, also makes compliance costly. Franzoni (2008) argues that high compliance costs not only tilt the cost-benefit analysis towards evasion, but they may also generate antipathy, distort taxpayers moral considerations towards evasion or even make them respond with evasion as a form of punishment for the tax administration. Further he argues that when taxpayers turn to tax experts, their attitudes towards evasion can be influenced given the superior knowledge of enforcement patterns by such experts. Slemrod (1985) argues that taxpayers may eliminate compliance costs (in the short run) by simply not filing returns. Krause (2000) argues that tax complexity also undermines the ability of tax collectors to distinguish between intentional evasion, honest misinterpretation of the tax code and legitimate tax avoidance; hence increasing audit costs too. In this regards, Gale and Holtzblatt (2000) elaborate a broader concept of compliance costs, which accounts not only for costs related to the taxpayer's reporting but also for institutional and societal costs. Andreoni et al. (1998) on the other side, underline the difficulty in setting the optimal cost of compliance (note, no compliance has zero cost). If the tax laws are vague and ambiguous taxpayers find it difficult to comply intentionally or non-intentionally; similarly if the laws are detailed and precise to the point of being unwieldy and difficult to learn, taxpayers incur additional costs in time or money.

The empirical investigation on the relationship of the complexity and costs of the tax system to compliance is scarce, although the vast majority of studies have supported the theoretical expectation that higher compliance costs increase evasive incentives. Clotfelter (1983) is amongst the first to empirically reveal that the complexity of the tax system is associated with greater underreporting of tax in US. Klepper and Nagin (1989) have found that in the US tax assistants, present given the complexity, encourage compliance with regards to clear items but discourage it with regards to ambiguous ones. Potas (1993) suggests that the simplification of Australian tax laws would result in a more efficient tax collection system. Sklenar and Burger (2006) while investigating the implications of Slovak tax reforms oriented towards simplification of the tax system, find significant improvements on the level of tax evasion. Richardson (2006) in a cross country investigation of the determinants of tax evasion finds that complexity was the most important determinant of tax evasion and that the lower the level of complexity the higher the compliance. Nur-tegin (2008) while investigating the determinants of business tax evasion in transition economies finds that the complexity of the tax system, or the cost of compliance, confirms general expectations although the size of the effect is very small. A positive relationship between compliance costs and tax evasion is found in Milliron (1985), Milliron and Toy (1988) and Collins et al. (1992).

Contrary to intuition and theoretical background, Christie and Holzner (2006) while investigating tax evasion in 29 European countries find that complexity is negatively related with tax evasion for personal income tax. They reach such results by comparing compliance levels in two Baltic states that have adopted less complex taxes i.e. a flat tax, with two Western Europe states that apply more complex systems. Table 3.6 provides a summary of studies investigating the relationship between compliance costs and tax evasion. Again, the vast majority of investigations support the theoretical considerations.

Table 3.6 Compliance Costs and Tax Evasion

Determinant	Theory	Empirics	Reference
Compliance Costs	**NEGATIVE** Compliance costs tilt the cost-benefit analysis towards evasion, and may also generate resentment, distort taxpayers moral considerations towards evasion	POSITIVE	Christie and Holzner (2006)
		NEGATIVE	Clotfelter (1983) Milliron (1985) Milliron and Toy (1988) Klepper and Nagin (1989) Collins et al. (1992) Potas (1993) Franzoni (1999) Richardson (2006) Sklenar and Burger (2006) Nur-tegin (2008)

3.4 Socio-Cultural Determinants

The third group of determinants consists of social, cultural, demographic and individual characteristics of taxpayers. The importance and the relationship of individual characteristics on compliant behaviour has been acknowledged and developed mainly by social psychologists (Torgler and Schaltegger, 2005). These studies have argued that social stakes vary according to individual characteristics and with them varies also the compliant behaviour; taxpayers with higher stakes in social capital tend to be more compliant (Title, 1980). In this section we review studies that have considered the impact of age, gender, education, social norms and other individual characteristics (such as income, religion and marital status) in the context of tax evasion. As argued so far, the vast majority of empirical investigation relates to individual tax evasion; however, evidence on individual characteristics can be adapted to the business context. We argue that this adaptation is particularly appropriate both for our source of data (responses to questionnaires) and for SMEs (accounting for most of the respondents in Chapters IV and V and all of the respondents in Chapter VI). SME owners and/or managers are after all individuals and, in the absence of research evidence to the contrary, we assume that they respond in similar ways to questions on business taxation as they would to questions on individual taxation.

3.4.1 Age

Amongst the most common findings in the tax evasion literature relates to the impact of the taxpayer's age on compliance; the older the taxpayer, lower the evasion. Torgler and Schaltegger (2005, p.12) suggest that elderly people "*have acquired greater social stakes over the years of property or social status, and thus show a stronger dependency on the reactions from others, so that the potential costs of sanctions increase*". Social scientists underline the fact that usually older members of society are more risk averse and are strongly attached to community (Tittle, 1980). We recall that risk characteristics of taxpayers are essential in assessing compliance behaviour.

The empirical investigation so far has supported the theoretical set up that people become more ethical and less inclined to be risk takers as they get older (see Vogel, 1974; Friedland et al., 1978; Tittle, 1980; Aitken and Bonneville, 1980; Groenland and van Veldhoven, 1983; Kaplan and Reckers, 1985; Witte and Woodbury, 1985; Baldry, 1987; Dubin and Wilde, 1988; Feinstein, 1991; Grasmick et al., 1991; Alm, et. al. 1992; Hanno and Violette, 1996; Pommerehne and Weck- Hannemann, 1996). Ruegger and King (1992) found that ethical differences are present within various age groups. McGee and Tyler (2007) found that people become more opposed to tax evasion as they get older. The same conclusion was reached by Alm and Torgler (2004). Devos (2005) using a survey of 470 tertiary taxation students finds a statistically significant and negative relationship between age and tax evasion. Ritsema et al. (2003) based on the 1997 Arkansas tax penalty amnesty programme also find that age is a factor for intentional evaders, with younger taxpayers being less complaint. Ipek et al. (2012) in their study of Turkish taxpayers report similar results.

The empirical investigation on the relationship between age and tax morale has also concluded similar relationship: in Torgler (2004) for Asian Countries; Torgler and Murphy (2004) for Australia, Torgler (2005a); Gavira (2007) and Daude and Melguizo (2010) for Latin America; Torgler (2007b) for Central and Eastern European Countries; Torgler et al. (2008) for Turkey; Hug and Spori (2011) for Eastern Europe; Torgler (2005b) investigating the relationship between tax morale and direct democracy; Torgler and Schalteger (2005) investigating the relationship between tax morale and fiscal policy; Torgler (2007a) investigating the relationship between tax morale and tax compliance; Torgler and Shneider (2007a) investigating determinants of tax morale; and Torgler et al. (2010) investigating the relationship between compliance, morale and governance.

Contrary to the common findings, Clotfelter (1983) found a curvilinear relationship between age and compliance. His empirical investigation using data from TCMP in US suggested that the youngest and the oldest had the highest degrees of compliance, with the middle age group being most evasive. Jackson and Milliron (1986) question the representativeness of the database used by Clotefelter (1983). Their argument is that young taxpayers who are not subject of withholdings are less likely to file taxes. If so, then this group was underrepresented in the IRS database.

Table 3.7 Age and Tax Evasion

Determinant	Theory	Empirics	Reference
Age	**NEGATIVE** People become more ethical and less risk takers as they get old, hence evade less	NEGATIVE	Vogel, (1974) Friedland et al. (1978) Aitken and Bonneville (1980) Groenland and Veldhoven (1983) Kaplan and Reckers (1985) Witte and Woodbury (1985) Baldry (1987) Dubin and Wilde (1988) Feinstein (1991) Grasmick et al. (1991) Alm, et. al. (1992) Ruegger and King (1992) Hanno and Violette (1996) Pommerehne and Weck (1996) Ritsema et al. (2003) Torgler (2004) Torgler and Murphy (2004) Devos (2005) Torgler and Schaltegger (2005) Torgler (2005a) Torgler (2005b) Gaviria (2007) McGee and Tyler (2007) Torgler (2007a) Torgler and Schaffner (2007) Torgler and Shneider (2007a) Torgler and Shneider (2007b) Torgler et. al (2008) Ipek et al. (2009) Torgler et al. (2010) Daude and Melguizo (2011) Torgler (2011)
		CURVLINEAR	Clotfeter (1983)
		NO EFFECT	Spicer (1974) Minor (1978) Song and Yarbrough (1978) Spicer and Becker (1980) Yankelovich and White (1984) Jackson and Jones (1985) Mason and Calvin (1984)

There are a few studies that report no influence of age on tax compliance (for survey results, see Spicer, 1974; Minor, 1978; Song and Yarbrough, 1978; Yankelovich and White 1984; Mason and Calvin, 1984; for experiments, see Spicer and Becker, 1980; Jackson and Jones, 1985). Tabke 3.7 provides a summary of studies treating the impact of age on evasion; with vast majority supporting a negative relationship.

3.4.2 Gender

In addition to economic, legal, philosophical, political, psychological, sociological, anthropological, and historic perspectives, gender differences have been studied specifically also in regards to tax evasion (Mc Gee, 2012). The argument with respect to gender differences is similar to the one related to the age; with female taxpayers being more risk averse and having higher social considerations. Tittle (1980) argues that "*women are less self-reliant*" and more averse to risks, hence tend to show higher levels of compliance. Gilligan (1993) on the other hand suggests that men and women may differ in moral development, with the former having higher levels.

Wide tax research provides a strong support for gender differences in tax compliance (for survey studies see, e.g., Vogel 1974, Mason and Calvin 1978, Minor 1978, Aitken and Bonneville 1980, Tittle 1980; for experiments, Spicer and Becker 1980, Spicer and Hero 1985, Baldry 1987). Torgler and Valev (2006) while analysing the WVS for the period 1981-1984, established strong gender differences with women being significantly less likely to agree that corruption and cheating on taxes can be justified. In particular, a comprehensive study conducted by Oxley (1993) in New Zealand reported that women were more often compliers in comparison with men and less often tax evaders. In a survey of American taxpayers Hite (1997) focused on the interaction between gender and education. Female respondents with college degrees tended to be more tolerant of evasion than females without college degrees. In contrast, males tended to be less tolerant of non-compliance as their education levels increased.

Jackson and Jaouen (1989) through their experiments compared the effect of communicating either a sanction threat or a conscience appeal to prospective jurors' tax compliance attitudes.

They found that females were more responsive to conscience appeals than to sanction threats; and within the conscience appeal group, females were significantly more responsive than males. Friendly persuasion, in contrast to deterrent measures like tax audits and penalties on underreported taxes, is also found to be more significant amongst female respondents in Chung and Trivedi (2003). Women in the friendly persuasion group reported significantly higher income compared to men in the same group.

Sour (2009) using experimental evidence show that gender is the most significant socio-demographic variable that explains evasion of personal income tax in Mexico.

Kastlunger et al. (2010) used decision-making experiments to investigate the tax evasion of women. In 60 experimental periods, participants were endowed with a certain amount of money representing income upon which they had to pay taxes. They were audited with a certain probability and fined in the case of detected evasion. Both demographic sex and gender-role orientation were significantly related to tax evasion. Women and "less male-typical individuals" were more compliant than men and "more male-typical individuals". Women and men also differed regarding their taxpaying strategies. Whereas for men audits increased subsequent evasion, women's tax payments were less affected by prior audits. Traditionally females have been identified with conforming rates, moral restrictions and more conservative life patterns.

Glosser (1984) offered empirical evidence that indicated that a new generation of independent non-traditional woman may be closing the compliance gap with men. Today, findings support the idea of a very narrow gap between man and woman taxpayers, although this can be less true for transition countries. Some studies even report the opposite. The study by Houston and Tran (2001) indicates a higher proportion of tax evasion committed by women than men. Ahmad et al. (2010) on the other side, studying Malaysian taxpayers, found that gender is not a factor that influences tax compliance behaviours. Both genders in their approach showed a high level of compliance. They argue that when women make up a major portion of the community, they become more self-confident, which turns attitudes that are used to be labelled as passive into attitudes that are usually possessed by men.

A positive relationship between male (as compared to female) respondents and tax morale is established in: Torgler (2004) for Asian Countries; Torgler and Murphy (2004) for Australia;

Gerxhani and Kuiper (2004); Torgler (2005a) for Latin America; Torgler (2011) for Europe; Torgler (2007b) in Central and Eastern European Countries; McGee and Bose (2008) in Egypt, Iran and Jordan; Torgler and Schaltegger (2005) investigating the relationship between tax morale and fiscal policy; Torgler (2007a) investigating the relationship between tax morale and tax compliance; Torgler et al. (2008) investigating tax morale in Turkey; Torgler et al. (2010) investigating the relationship between compliance, morale and governance; and Daude and Melguizo (2010) investigating links between representation and compliance.

Table 3.8 Gender and Tax Evasion

Determinant	Theory	Empirics	Reference
Female	**NEGATIVE** Female taxpayers have higher rates of risk averseness and higher social considerations, henc evade less	NEGATIVE	Spicer and Becker (1980) Glosser (1984) Spicer and Hero (1985) Baldry (1987) Jackson and Jaouen (1989) Hite (1997) Chung and Trivedi (2003) Torgler (2004) Torgler and Murphy (2004) Gerxhani and Kuiper (2004) Torgler (2005a) Torgler and Valev (2006) Mc Gee and Preobragenskaya (2007) Torgler (2007a) Torgler (2007b) Torgler and Schaffner (2007) Torgler et al. (2008) McGee and Bose (2008) Sour (2009) Kastlunger et al. (2010) Torgler et al. (2010) Daude and Melguizo (2010) Torgler (2011) McGee (2012)
		POSITIVE	Houston and Tran (2001)
		SAME	Ahmad et al. (2010)

As can be seen from the Table 3.8, where a summary of studies treating the relationship between gender differences and tax evasion is presented, the overwhelming support is on the side of a negative relationship between female taxpayers and the decision to evade.

3.4.3 Education

Amongst many factors, the tax evasion literature relates taxpayers' ability to comprehend and comply with tax laws to education. Two opposing effects are observed commonly. On the one hand, fiscal knowledge may positively influence the practice of evasion, as more educated people may tend to better understand more compliance benefits. On the other hand, more educated people understand the importance of taxes better, which increases their level of voluntary compliance (Groenland and van Veldhoven, 1983). The level of education is particularly important at the firm level. As Vogel (1974) indicated, less educated taxpayers need more assistance, which in turn increases costs of compliance and thus evasive behaviour. Lewis (1982) also implied that well educated people know more about taxes, regulations and other government obligations, but at the same time they recognize more the importance of the benefits and services that government supplies hence have higher compliant rates. Conversely, Eriksen and Fallan (1996) argue in favour of the possibility that people with lower education, due to the lower opportunity cost of their time, have acquired a higher degree of knowledge related to taxation.

The evidence on the relationship between education and tax evasion is mixed. Dubin and Wilde (1988) found a significant negative relation between evasion and educational level; and so did Eriksen and Fallan (1996). In their experiment, Song and Yarbrough (1978) included education as a background variable. They find that those taxpayers with more fiscal knowledge had more positive tax ethics scores than those with lower fiscal knowledge. The study conducted by Chan et al. (2000) reveal that higher education is directly linked to an increased likelihood of compliance. Houston and Tran (2001) also find that Australians without tertiary education tend to have higher evasive behaviour than their counterparts with tertiary education. Richardson (2006) in his cross country investigation of tax evasion reports a strong and negative relationship of education with evasion. A positive relationship between education and tax morale, hence a negative relationship with tax evasion, is found, amongst others, in Torgler (2005b), Torgler and Schaltegger (2005) Frey and Torgler (2007), and Torgler (2007a).

In contrast to these findings, research by Wallschutzky (1984) and Witte and Woodbury (1985) show a significant and positive relationship between education and evasion, arguing that educated individuals can also respond by evading if they feel tax treatment to be unfair. Their findings were supported by Beron et al. (1992) and Ritsema et al. (2003). Knowledge helps also tackle the problem of better understanding complex tax systems. Scholz and Pinney (1993) argue that less educated taxpayers find the complexity of tax system more difficult than others, hence are more likely to evade.

To make the relationship even more ambiguous, some findings have found no correlation between levels of education and tax evasion (Dubin et al. 1987; Dubin et al. 1990; Wilson and Sheffrin, 2005). Torgler and Schaltegger (2005) conclude that "based on the opposing arguments, it is not surprising that the results show an ambivalent picture". This can also be seen from a summary of studies treating tax evasion and education in Table 3.9 below; with no clear consensus being established so far.

Table 3.9 Education and Tax Evasion

Determinant	Theory	Empirics	Reference
Education	**AMBIGUOUS** On the one hand, fiscal knowledge may positively influence the practice of evasion, as more educated people may tend to better understand the opportunities for evading tax obligations. On the other hand, more educated people understand the importance of taxes better, which increases their level of voluntary compliance	POSITIVE	Wallschurzky (1984) Witte and Woodbury (1985) Beron et al. (1992) Ritsema et al. (2003) Scholz and Pinney (1993)
		NEGATIVE	Dubin and Wilde (1988) Eriksen and Fallan (1996) Song and Yarbrough (1978) Chan et al. (2000) Houston and Tran (2001) Richardson (2006) Torgler (2005b) Frey and Torgler (2007) Torgler (2007a) Torgler (2007b) Torgler and Schaffner (2007)
		NO EFFECT	Dubin et al. (1987) Dubin et al. (1990) Wilson and Sheffirin (2005)

3.4.4 Social Norms

Andreoni (et al. (1998) in one of the most comprehensive tax evasion theoretical reviews, highlight the importance of psychological theories that are closely related to tax evasion. They cite Erard and Feinstein (1994) who introduce the concepts of guilt and shame into the context of tax compliance. They define social norms as shared understandings about actions that are obligatory, permitted or forbidden. Cullis et al. (2011) while citing Torgler (2003) argue that social norms can be mediated in two ways: one is the intrinsic value derived by being true to oneself; and the other one is the extrinsic value derived by conformation to others. In fact, conformation to others has been acknowledged by Cowell (1990) who argues that when people evade, there is a social stigma. The stigma effect is small if most evade and evasion is not in fact discouraged (first equilibrium); however, when few evade the stigma effect is great and evasion is discouraged (second equilibrium). Franzoni (1999) argues that the change from one equilibrium to the other takes the form of a "non-compliance epidemic" as, if more people start to cheat, the social stigma decreases and evasion spreads to an ever larger fraction of the population.

The stigma effect, in fact, is closely related to peer influence. Jackson and Milliron (1986) argue that peers are usually taxpayers' close associates and include friends, relatives and colleagues. Grasmick and Scott (1982) indicate that respondents with peers involved in non lawful activities are more likely to be non compliant. Torgler (2003) finds that compliance is greater in societies with a stronger sense of social cohesion. Andvig and Moene (1990) argue in their model that it is individually more costly to be honest in a country where unlawful activity is common. Supporting empirical evidence is found in Chau and Lung (2009), where cross-country behavioural and cultural differences in regards to tax evasion are also studied; and in Alm and Torgler (2006) when cultural differences between Europe and USA are considered for tax morale. Hofstede (1991) has found significant differences between US and Chinese citizens in terms of social values and behaviour towards tax evasion. Cummings et al. (2005) combine experimental and survey data from the US, Botswana, and South Africa to investigate whether cross-cultural differences can explain tax compliance behaviour across these countries. Their results indicate that the cultural differences observed in these three countries have a strong and significant impact on tax evasion.

On the other side Chan et al. (2000) indicate that the culture of the taxpayers has no impact on taxpayer compliance efforts. Experimental findings of Brandts et al. (1997) on voluntary compliance in countries like Japan, Netherlands, Spain, and the United States fail also to establish any cultural differences.

Table 3.10 provides a summary of few studies that controlled for the impact of social norms on tax evasion.

Table 3.10 Social Norms and Tax Evasion

Determinant	Theory	Empirics	Reference
Social Norms	When people evade, there is a social stigma. The stigma effect is small if most evade and evasion is not in fact discouraged; however when few evade the stigma effect is great and evasion is discouraged.	EFFECT	Andvig and Moene (1990) Hofstede (1991) Torgler (2003) Cummings et al. (2004) Cummings et al. (2005) Alm and Torgler (2006) Chau and Lung (2009)
		NO EFFECT	Brandts et al. (1997) Chan et al. (2000)

3.4.5 Other socio-cultural and individual characteristics

Income level ~ Studies on individual tax evasion have, in cases, focused also on the relationship between taxpayer's income level and the level of tax evasion. This relationship however, received much lessen attention by researchers since, at least theoretically, it was not expected to yield any novel relationship beyond the one established within the framework of the tax rate and tax evasion. After all, variations on tax rates have similar impact as variations on taxpayer's income; both tax rate and income level impact the wealth of individuals in similar direction and with that risk behaviour and attitudes towards tax evasion. Slemrod et al. (2001) argues that rich people can simply afford much easily the fine imposed compared to other income groups; this in turn means that they are less risk averse and more evasive. In addition, they argue that individuals from high income groups face higher earnings per one unit of income if they decide to evade, although at some point the economic utility from undertaking such action declines.

Most empirical investigations in this regard have observed higher evasion rates amongst higher income earners. A positive relationship between the taxpayer's income level and tax evasion was found in Slemrod (1985) analysis of the US Treasury Tax File for the year 1977; in Crane and Nourzad (1985) analysing US aggregate time series data for the period 1947 to 1981; the Crane and Nourzad (1990) analysis of amnesty data for the state of California; in the Clotfelter (1983) TCMP analysis for the year 1969; in Ali et al. (2001) analysing US time series for the period 1980-1995; in Lang et al. (1997) for 33 000 West German households' data in 1983; and in experimental studies by Baldry (1987) and Anderhub et al. (2001). In contrast, a negative relationship was found in Christian (1990), the Alm et al. (1992) experiment, Fishlow and Friedman (1994), Dubin et al. (1990) and Richardson and Sawyer (2001). No effect was found in Togler and Schreider (2007a) using WVS for Belgium, Spain and Switzerland; the Feinstein (1991) TCMP study for US; or in the Park and Hyun (2003) laboratory experiment for South Korea. Few studies have established quite interesting relationships. For instance Witte and Woodbury (1983) using TCMP 1969 data suggest that tax evasion is related to income in a non-linear way, with non-compliance at its greatest at very low and very high income levels. Similar nonlinear results are reported by Mason and Lowry (1981). All these studies digest the inconsistent evidence on the link between income level and evasive behaviour; similar to the one between tax rate and tax evasion.

Income source ~ is another common determinant found amongst tax compliance researchers. As Groves (1958) argues in one of the earliest tax studies, greater evasive opportunity mainly arises from self-employment and other income sources not subject to withholding taxes. Slemrod (2007) argues that income subject to withholding and to a lesser extent, income subject to information reporting has the highest compliance ratios. Similar findings were reported by Pissarides and Webber (1989) for the United Kingdom (UK). Vogel's (1974) survey in Sweden reports that self-employed taxpayers are more likely to doubt the purpose of taxpaying. Surveys by Aitken and Bonneville (1980) and Groenland and Voldhoven (1983) find that taxpayers who are self-employed are more likely to commit various forms of tax evasion. Houston and Tran (2001) and Richardson (2006) also report that income source is significantly related to the tax evasion. Fjeldstad and Semboja (2001) while analyzing tax evasion on Tanzania find that the self-employed have more opportunities to hide their income compared to individuals subject to withholding. Self-employed, independent traders and farmers count for the groups of lowest compliance ratios based from the studies of Boumeister (1982) and Wallschutzky (1984).

Religion ~ Wide tax literature has also investigated the religious beliefs of tax payers. Anderson (1988) cites Adam Smith (1759) in the "Theory of Moral Sentiments", where religiosity is considered to be internal moral enforcement mechanism. Torgler (2007a) on the other side cites Freud (1927) who sees religion as non-rational or even irrational and hence irrelevant for shaping moral considerations. McGee and Smith (2007) refer to studies that have linked ethical consideration of tax evasion in various religions. They cite Murtaza and Ghazanfar (1998), McGee (1998a) and McGee (1999) for Islamic literarure; Cohn (1998) and Tamari (1998) for Jewish literature; Gronbacher (1998), Schansberg (1998), McGee (1994) and McGee (1998b) for Christian literature; and Smith and Kimball (1998) for the Mormon perspective. To date empirical investigation, though rare, of religiosity and tax evasion has found evidence to consider religiosity as a relevant factor on tax morale and consequently on tax evasion. Torgler (2007a) used the WVS (1995–1997) covering more than 30 countries found a positive relationship between compliance and religiosity. Strong effects have been observed especially for those people who had a religious education and for those who are actively involved in religious organizations. Similar results were observed in Grasmick et al. (1991) for the US.

Marital Status ~ Another predominant factor investigated within the group of tax evasion determinants is the marital status of taxpayer, which similarly to age and gender is believed to cause higher social capital and higher risk averseness (see Tittle 1980; Torgler and Schaltegger 2005). Yet the strongest evidence comes from two US studies making use of TCMP data, Clotfelter (1983) and Feinstein (1991), who found that noncompliance is more common and of greater magnitude among married taxpayers.

We note that some of these characteristics are common only for individual tax evasion research as in case of business investigation they rather become less relevant. For instance, the *source of income* or the *level of income* do not provide any relevant information when treating business tax evasion; they are important, however, when investigating individual tax compliance.

3.5 Macroeconomic Determinants

In addition to the conventional, institutional, socio-cultural and demographic determinants, cross-country and within country time-series estimations (for both individual and business tax evasion) have also controlled for the impact of macroeconomic determinants on tax evasion. We note, however, that given the lack of time series and/or cross country data, aggregate-level investigations of business and individual tax evasion are scarce. Considering the intention of this thesis to conduct, amongst others, a cross country investigation on tax evasion, we will provide a brief summary of the most relevant studies that have controlled for GDP per capita, unemployment and inflation; as the three most important and most commonly studied macroeconomic determinants.

GDP per capita ~ Most of the studies indicate that increasing income at national level increases also the overall economic development of a country and, with that, also compliance levels. Chelliah (1971) argues that higher per capita income reflects a higher level of development which, in turn, means not only a greater willingness to pay taxes but also a greater capacity to collect taxes. Other studies suggested that those taxpayers who have better living standards tend to create stronger bonds with compliant attitudes towards social systems (Hinrichs, 1966, Tanzi 1987, Ghura, 1998). Frey and Weck-Hanneman (1984), moreover, argue that in countries with low per capita income people tend to hold more than just one job, yet tax reporting is more likely to be related only to the first job. Boame (2009) further argues that lower levels of per capita income involve reduction in cash flows which, in turn, may give rise to tax payment and collection problems. Sookram and Watson (2005) using data from Trinidad and Tobago for the period 1960-2000 found that per capita income had a negative relationship with tax evasion in the short run. However, in the long run this variable was not statistically significant and even had a positive relationship with tax evasion. Contrary to these findings, Feige and Cebula (2009), studying US taxpayers' attitudes towards compliance for the period 1960-2008, find a positive relationship between GDP per capita and tax evasion, suggesting, contrary to the intuition, that a rise in per capita income increases evasion.

Unemployment rate ~ It is widely believed that an increase in unemployment is usually associated with reduced income that, consequently, increases levels of tax evasion. Furthermore, an increase in cash payments caused by an increase in unemployment (as individuals may switch to the "hidden" economy) may give rise to problems related to tax collection. Alm and Yunus (2009) while empirically investigating US data for the years 1979 to 1997 find a statistically significant and positive relationship between unemployment and the level of evasion; suggesting that the evasion increases in times of economic recession. They further argue that in periods with high unemployment rates individuals work in the underground economy for cash payments, which are usually not reported to tax authorities. Similar results are found in Dubin et al. (1987), investigating US IRS data for the years 1977 through 1985; in Jou (1992), analysing US state-level data for the period 1976-1989; and in Cebula and Feige (2009), investigating also IRS data for the period 1960-2008. Contrary to expectations, Boame (2009), using aggregate macroeconomic time-series data from 1987 to 2003 for Canadian taxpayers, found that an increase in unemployment rate has a negative and statistically significant effect on tax evasion.

Inflation ~ Views of the impact of inflation on tax evasion are summarised in two opposing groups. Fishburn (1981), amongst many, argues that inflation has a positive relationship with tax evasion, as the decision to evade can be affected by the attempt of taxpayers to restore their purchasing power. Tanzi (1980) on the other side argues that taxpayers' have an incentive to delay tax payments for future high inflation periods, suggesting thus a negative relationship between inflation and tax evasion. Crane and Nourzad (1986), investigating the relationship between inflation and aggregate income tax evasion in US for the period 1947-1981, found that an increase in the inflation rate by one percentage point increases the underreported amount of income by more than half a billion dollars. They further argue that tax authorities should increase their efforts during inflationary periods. Fishlow and Friedman (1994), investigating the cases of Argentina, Brazil and Chile, also establish a significant and positive relationship between inflation and tax evasion. Das-Gupta, et al. (1995) on the other side found a negative and significant effect of inflation on tax evasion while empirically investigating income tax evasion in India.

3.6 Firm Characteristics

We have already argued that business characteristics are the least observed determinants in the tax evasion literature. The lack of research on business tax evasion is unfortunate, especially given the fact that in most countries the bulk of taxes is paid by firms and firms account for the bulk of tax evasion too (McCaffery and Slemrod, 2004; Crocker and Slemrod, 2005; Chang and Lai, 2004; Nur-tegin, 2008). The purpose of this thesis is to fill this gap by investigating determinants of business tax evasion in transition economies. We conduct a more thorough review of studies investigating business tax evasion in TEs in Chapter V of this thesis. At this point we review the few studies that have conducted similar investigation so far in other countries as well. We focus on size, legal status and sectoral activities.

Size ~ Wallace (2002) argues that smaller firms tend to be more evasive; even if small start-up firms act in good faith, compliance with a complex tax system might be too expensive for them. Slemrod (2007) while investigating businesses within the TCMP of the US provides evidence suggesting that the noncompliance rate for corporations relative to their size is “U-shaped”, with medium-sized businesses among the set of large companies having the lowest rate of evasion. Rice (1992) on the other side did not find any association between firm size and tax evasion in the US; however, he concluded that managers of corporations whose profit performance is below its industry norm may utilize tax evasion as a strategy to cut costs. In contrast, high-profit companies may take advantage of their greater ability to underreport income without being audited. Nur-tegin (2008), investigating business tax evasion in transition economies for the year 2002, provides empirical findings that support the idea that smaller firms tend to comply with taxes to a lesser degree. The coefficient on the dummy for smaller firms in his study is positive, sizable in magnitude, and statistically significant at the one percent level. This result reflects the belief that it is easier for small firms to become “invisible” vis-à-vis tax authorities. Joulfaian (2009) while using the same dataset fails to find any significant relationship between size (measured by amount of sales instead of number of employees) and tax evasion. Perhaps the information used to proxy firm’s size is the main reason behind this discrepancy.

Legal status ~ To our understanding, legal status as a determinant of business tax compliance is studied only in two papers; Nur-tegin (2008) and Joulfaian (2009). Both studies argue that compared to individual/family owners, i.e. sole proprietorships, less evasion is reported by corporate owners and partnerships. The findings suggest that organizational choices are important for observing evasive behaviour. According to Joulfaian (2009) corporations, particularly those listed on an exchange or of foreign nationality, conceal less of their activities than do other forms of businesses. A more compliant behaviour from foreign firms is also observed in Nur-tegin (2008) regardless of legal status.

Sectoral activities ~ In one of the most important reviews of tax compliance, Andreoni et al. (1998) cite the TCMP report of 1985, which has indicated that amongst sole proprietors, those who engaged in sales from fixed locations, such as automobile dealers, stores or restaurants, tend to understate tax liability considerably more than those in transportation, communication, utilities or retail sales. The last noncompliance group consists of business filers in finance, agriculture and trade. Differences across sectors are also established in a World Bank (2009) study for Ukraine, where the scope of unreported income was found to be varying within economic sectors; with enterprises engaged in trade being relatively more likely to underreport income as compared to services, construction, industry or transport. No sectoral differences are found in Joulfaian (2009) while investigating business tax evasion in transition economies. Similarly Mickiewicz et al. (2012), investigating the attitudes of Latvian businesses towards tax evasion, found no sectoral differences. They found that ‘other sectors’ and ‘wholesale’ categories become significant and positive in some of the specifications, but, according to them, this is hard to interpret. Given the unclear picture established so far, further investigation of sectoral differences becomes highly important. In Chapter V of this thesis we investigate sectoral differences as part of the firm characteristics. The general intuition is that sectors with higher amounts of cash transactions are more prone to evasion, given the inability of tax administration to identify properly tax obligations in such circumstances.

Conclusion

In this chapter we have reviewed the empirical investigations conducted in the field of tax evasion (mainly) from an individual perspective but also from business and cross-country perspectives. This was done in order to inform hypotheses and expectations for the three following empirical chapters. We have grouped the identified determinants of tax evasion into five main categories: namely traditional; institutional; socio-cultural; macroeconomic; and firm-characteristics.

Within the review of the first group of determinants, we found that studies on the tax rate have provided, as within the theory, quite controversial results with both a positive and a negative relationship between tax rates and tax evasion being supported. We note, however, that a slight preponderance (in terms of the quantity of papers, not necessarily the quality) supports a positive relationship, suggesting thus that an increase in tax rate is expected to kindle tax evasion. Given the theoretical and empirical ambiguity emphasized throughout, the empirical findings of this thesis (in the next three chapters), as well as their robustness, become highly important. In regards to audit and fine rate, the current tax literature supports generally a negative relationship with tax evasion; both fines and inspections make evasion more costly.

The second group of determinants, institutional, has a clearer impact on tax evasion. The vast majority of the reviewed studies confirm the intuitive expectation that higher/better fairness, treatment, benefit, accountability and/or transparency improve significantly the trust of taxpayers towards their respective institutions, which in turn increases both tax morale and tax compliance. In addition positive perceptions towards anti-corruption policies as well as low compliance costs act as tools to combat evasion. Studies in these areas have mostly reached similar findings regardless of their context.

When discussing institutional determinants, we also explain that we follow recent practice in treating tax morale as an aggregator of institutional influences on tax evasion and, hence, as an important independent variable in our model of tax evasion. However, we are also mindful of the older approach that treated tax morale attitudes more or less as a proxy for tax evasion behaviour. This suggests an empirical strategy whereby both tax morale and tax evasion are related to one another not as independent and dependent variables – i.e. as cause and effect – but as correlated to one another as dependent variables in a system. In this case, the appropriate model would be a two-equation system of "seemingly unrelated regressions" (SUR) allowing both tax morale and tax evasion to be jointly determined by similar (but not necessarily the same) observed and unobserved determinants. For reasons of space (and time), we do not undertake this analysis for this thesis. However, it is a possible extension of the work presented in Chapter 6.

The findings on the third group of determinants, socio-cultural, are less consistent. While empirical results on age and gender characteristics of taxpayers suggest homogeneously that male and younger taxpayer's are more likely to exhibit undutiful activities as compared to their counterparts (female and elderly taxpayers respectively), findings on education are less clear. This is because, on the one hand, fiscal knowledge may positively influence the practice of evasion, as more educated people may tend to better understand the opportunities for evading tax obligations; on the other hand, more educated people understand the importance of taxes better, which increases their level of voluntary compliance. The role of social norms is equally unclear with studies supporting both relevance and non-relevance of common social behaviour.

The fourth group of reviewed determinants consists of macroeconomic factors, inclusion of which are characteristic of cross-country investigations or within-country time series studies. Though rare, most studies in these areas have commonly found that per capita income reduces evasion and that periods/subjects with higher unemployment rates are characterized also by higher evasion levels. The impact of inflation on the other side is ambiguous; with both incentives to restore the purchasing power in times of inflation through evasion, as well as incentives to delay tax obligations for inflationary periods.

Last, the review of firm characteristic determinants supported the necessity to investigate business determinants of tax evasion; not only for transition economies but also for other groups of countries. The few reviewed studies showed that smaller firms are more likely to be evasive, as are sole proprietorships. Findings on sectoral differences across firms are less robust and less clear. Following the theoretical round-up in Chapter II, as well as the empirical review in Chapter III, the next step is to empirically investigate the determinants of business tax evasion for transition economies. We do so by introducing a cross-country investigation in Chapter IV, the firm-level context in Chapter V and the tax morale perspective (for Kosovo) in Chapter VI. The inclusion of brief summaries of empirical and theoretical reviews in subsequent chapters is done in order to maintain a continuity of new chapters with the present theoretical and empirical knowledge summarized in Chapter II and III.

Chapter FOUR

Business Tax Evasion in Transition Economies: A Cross-Country Panel Investigation

TABLE OF CONTENTS

Introduction

With taxes comes evasion (Cowell, 1990). Tax evasion imposes economic costs: it slows down economic growth by weakening the government's ability to provide adequate public goods (Johnson et al., 2000); it diverts resources to unproductive activities such as establishing financial subsidiaries to cover-up evasion (Slemrod, 2007); it provides an incentive for firms to remain small and invisible to facilitate evasion, thereby missing opportunities from the formal economy (Nur-tegin, 2008); and it generates inequity between the evaders and the honest taxpayers by shifting the burden to the latter group, thereby creating an incentive for further evasion (Feinstein, 1991).

Tax evasion is one of the major problems facing developing (Fuest and Riedel, 2009) and transition economies (Pirttila, 1999). The literature on the factors shaping tax evasion is fairly well developed (reviews include: Jackson and Milliron, 1986; Cowell, 1990; Andreoni, et.al, 1998; Franzoni, 2008; Torgler 2011). However, most of it relates to individuals. The lack of research on tax evasion by businesses is unfortunate, especially given the fact that in most countries the bulk of taxes is paid by firms and firms account for the bulk of tax evasion too (McCaffery and Slemrod, 2004; Crocker and Slemrod, 2005; Chang and Lai, 2004; Nur-tegin, 2008). Moreover, as suggested by Andreoni et al. (1998) there is a huge gap and thus a permanent need for international and cross country research on tax evasion; while the work in the context of transition countries is still less developed. This chapter aims to reduce this gap by introducing some empirical findings for businesses, cross-country and transition features of tax evasion.

So far, cross-country investigations on tax evasion have combined country-level data with data aggregated from lower levels. Through this chapter we want to build upon pioneering work of Riahl-Belkaoiu (2004) and Richardson (2006) who have analysed individual tax evasion in 30 respectively 45 countries. Riahl-Belkaoiu (2004) examines the international differences in tax evasion and relates these differences to selected determinants of tax morale. His findings show that tax evasion is lowest in countries characterized by high economic freedom, a developed equity market, effective competition laws and a low serious crime rate. Richardson (2006) on the other hand advances cross-country investigation of individual tax evasion using a larger sample and finds that non-economic determinants have the strongest impact on tax evasion in comparison with economic determinants; most notably, the complexity of the tax system, education, income source, fairness and tax morale are highly correlated with tax compliant behaviour.

We extend their approach by focusing on business instead of individual tax evasion and by focusing only on transition countries. This thesis contributes to the literature by using the Business Environment and Enterprise Performance Survey (BEEPS) for the years 1999, 2002 and 2005 to investigate business tax evasion in 25 transition economies. In our study, we incorporate institutional and macroeconomic indicators alongside tax rate and cultural influences on business evasion in transition economies. The aim of this study is to inform policies to combat tax evasion.

To analyse the data from 25 transition economies for the years 1999, 2002 and 2005, we employ a conventional fixed effects approach as well as a recent innovation in fixed effect panel analysis, known as fixed effect vector decomposition (FEVD), which hitherto has not been used in this context. The main benefit of this approach is that it enables us to model the effect of time-invariant (or, at least, "slow moving") variables, most notably proxies for institutional development.

The chapter is organized as follows. In *Section 1* we summarize briefly the existing literature on tax evasion. In *Section 2* we describe the data used in our study and we review the major determinants of tax evasion. In *Section 3* we outline the general form of the regression model. In *Section 4* we focus on our approach to estimation and highlight the importance of diagnostic testing. *Sections 5* and *6* report and discuss the empirical findings. The *last section* concludes.

4.1 Research Design

Over four decades of research on tax evasion have given rise to an enormous amount of work (for reviews see Jackson and Milliron, 1986; Cowell, 1990; Andreoni, et.al, 1998; and Franzoni 2008 and Torgler 2011). The vast majority of this work, however, has neglected three important factors. The first factor relates to the importance of cross-country investigations. In one of the most insightful reviews of tax evasion, Andreoni et al. (1998, p.855), while concluding and providing directions for future research, argue that "*…a broadening of the empirical database will improve the power of statistical tests of theoretical models, and spur comparative analysis across countries* ". The second factor relates to the lack of studies on business tax evasion. As Torgler (2011, p.6) argues, *"...business tax evasion in general, has received very little attention. Work in this area is therefore highly relevant".* Last, the context of transition economies in tax evasion studies has received limited attention (Pirttila, 1999).

In this chapter we attempt to fill these gaps by introducing all three components: businesses, cross-country and transition. In order to do so, we start by assuming that the behaviour of businesses is similar to the behaviour of individuals, and that the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. The decision on evasion, or compliance, is made by individual managers or entrepreneurs who, in essence, act as individuals (Arias, 2005). As Slemrod (2007, p.36) points out, the literature on business tax evasion "*adapts the theory of tax evasion, which for the most part concerns individual decision makers, to the tax compliance decisions made by businesses*". This is particularly true of small and medium sized enterprises (SMEs) where the decision making entrepreneur makes compliance decisions both as an individual and as a manager.

Ever since Allingham and Sandmo's conventional model was introduced in 1972, theoretical and empirical literature on tax evasion has flourished. Advances incorporating interactions between institutions and taxpayers, cultural and behavioural differences as well as individual socio-demographic characteristics have also been made. These and conventional determinants of tax evasion, namely the tax rate, fine rate and audit rate, have contributed profoundly to modelling compliance decisions.

As argued in Chapter II and III, in the traditional model the level of evasion of income tax is positively related with the probability of audit (see *Section 3.2.*2) by tax examiners and the level of punishment (see *Section 3.2.3*) provided by law. When analysing the impact of tax rates on compliance, the model predicts an ambiguous effect with the occurrence of both an income effect and a substitution effect. However, Yitzhaki (1974) argued that ambiguity was a result of an unrealistic assumption that the penalty is imposed on the amount of income evaded; if instead it is imposed on the evaded tax the substitution effect disappears and thus a tax rise will reduce evasion. Most of the models on business tax evasion have conducted comparative static analysis similar to that of the traditional model; namely, the firm evades less with higher probability of detection and larger fines, while the impact of tax rates is ambiguous (see Marelli, 1984; Martina, 1988; Virmani, 1989; Sandmo, 2004; Crocker and Slemrod, 2005). Consistent with the theory, the empirical evidence on the impact of tax rates is quite controversial. While Clotfelter (1983) – and a considerable number of papers reviewed in *Section 3.2.1* - found positive and significant effects of the marginal tax rate on evasion, Feinstein (1991), while employing the same data source found that the marginal tax rate has a negative relation with evasion – as did a number of papers reviewed in *Section 3.2.1*.

As already argued, the conventional model consisting of tax rate, audit and fine rate has often been criticized for its simplicity. Andreoni et al. (1998) suggested the incorporation of three main groups of factors that are important when treating tax evasion models. The first group involves moral rules and sentiments that directly guide and impact the decision to comply or not. The second group relates to how the fairness of the tax system and its enforcement affects individuals' willingness to comply. Last, the third group includes taxpayers' evaluations of the government according to the prevailing standards of performance, corruption and transparency. For an extensive review of the studies treating these aspects see *Section 3.3* of this thesis.

Socio-cultural determinants appear also as a powerful factor in influencing evasive behaviour. According to Chau and Leung (2009), different social norms and ethical values create different incentives for tax evasion. Cultural attributes in tax evasion are also highlighted by Cummings et al. (2005) and Chan et al. (2000) where peer influence is seen as part of the cultural characteristics of specific groups of individuals or nations (see also *Section 3.4.4*). In addition to social norms, individual characteristics of taxpayers were constantly included in tax evasion model. Beyond age (see *Section 3.4.1*) and gender (see *Section 3.4.1*), the tax evasion literature related taxpayers' ability to comprehend and comply with tax laws to education. Two opposing effects are observed. On the one hand, fiscal knowledge may positively influence the practice of evasion, as more educated people involved in businesses may tend to better understand the opportunities for evading tax obligations. On the other hand, more educated people understand the importance of taxes better, which increases their level of voluntary compliance. The level of education is particularly important at the firm level (for empirical review see *Section 3.4.3*).

In addition to the conventional moral, socio-cultural and demographic determinants, cross-country and within country time-series estimations, for both individual and business tax evasion, have also included economic determinants.[15] Per capita income, unemployment, inflation and other performance indicators are common in such studies (see *Section 3.5*). First, in regards to GDP per capita, Chelliah (1971), amongst others, argues that higher per capita income reflects a higher level of development which, in turn, means not only a greater willingness to pay taxes but also a greater capacity to collect taxes. Though most of the studies have established a negative relationship between *per capita income* and tax evasion, few have provided quite contrary results (see Feige and Cebula, 2009). Second, in regards to unemployment, it is widely believed that an increase in unemployment is usually associated with reduced income that, consequently, increases levels of tax evasion. Furthermore, an increase in cash payments caused by an increase in unemployment (as individuals may switch to the "hidden" economy) may give rise to problems related to tax collection. Last, in regards to the inflation, studies are summarised in two opposing groups. Fishburn (1981), amongst many, argues that inflation has a positive relationship with tax evasion as the decision to evade can be affected by the attempt of taxpayers to restore their purchasing power. Tanzi (1980) on the other hand argues that taxpayers delay tax payments to future high inflation periods, creating an overall negative relationship between inflation and tax evasion.

Following the above discussion, we will attempt to estimate a model around the available data which combines the traditional determinants with institutional, behavioural and economic determinants. The following section provides a detailed description of the variables used in our estimations.

[15] Firm level studies covered also firm characteristic determinants, such as size, legal status, ownership, sector, performance and region amongst others.

4.2 Data Description

In this chapter (and throughout the empirical investigation of this thesis), the dependent variable, *Tax Evasion*, is the most difficult to quantify. Furthermore, as evasion is not directly observable, the information on which the measure of tax evasion is based is difficult to obtain, particularly for transition economies and especially when dealing with businesses. In order to assess the level of tax evasion, we use the Business Environment and Enterprise Performance Survey (BEEPS) database, produced jointly by the European Bank for Reconstruction and Development (EBRD) and the World Bank, which provides firm-level data on a broad range of variables related to the business environment and performance of firms for TEs. The survey was first undertaken on behalf of the EBRD and World Bank in 1999 – 2000, when it was administered to approximately 4100 enterprises in 26 countries of Eastern Europe and Central Asia (including Turkey) to assess the environment for private enterprise and business development. In the second round of the BEEPS, the survey instrument was administered to approximately 6500 enterprises in 27 countries (including Turkey but excluding Turkmenistan) in the year 2002. In the third round of the BEEPS, the survey included approximately 9,500 enterprises in 28 countries in the year 2005. The fourth round of the BEEPS, for the period 2008-2009 is not included in our study as the main question on the level of tax evasion was dropped from the questionnaire.

4.2.1 Tax Evasion in Transition Economies

The question of interest for the present chapter is as follows:

> ***Q.48a (1999)***, ***Q.58 (2002)*** *and* ***Q.43a (2005)*** *- What percentage of the sales of a typical firm in your area of activity would you estimate is reported to the tax authorities, bearing in mind difficulties with complying with taxes and other regulations?*

Although the main question does not directly measure the level of compliance by the respondent, it is designed to act as a reasonable substitute by taking into account the respondents' obvious reluctance to reveal their own compliance. Such indirect measures of compliance (and other unlawful activities) are common in survey research. For more on how to conduct evasion questionnaires see Breman (1980), Hanousek and Palda (2004) and Gerxhani (2006).

For 1999, the respondents were asked to provide answers in eight categories between 0-100%. For each response we have taken the mid-point of the range; then we derived a country level of tax evasion by averaging mid-points. In the 2002 and 2005 survey's respondents were asked to provide a figure (in percentages) for the proportion of sales reported to the authorities. We then averaged these responses by country and thus obtained a country level of business tax compliance. We transform the question from a measure of compliance into a measure of evasion by subtracting the percentage of sales reported for tax purposes from 100.

Table 4.1 Levels of business tax evasion in transition economies

		1999	2002	2005
1	ALBANIA	69.56	22.53	22.96
2	ARMENIA	19.22	9.19	4.51
3	AZERBAIJAN	32.07	13.09	13.94
4	BELARUS	5.75	8.12	7.17
5	BOSNIA	53.54	32.46	11.79
6	BULGARIA	27.65	17.19	13.54
7	CROATIA	23.77	12.69	7.58
8	CZECH REPUBLIC	22.64	9.84	13.09
9	ESTONIA	15.95	7.32	3.07
10	GEORGIA	33.16	35.66	10.85
11	HUNGARY	15.06	11.55	11.28
12	KAZAKHSTAN	15.16	17.28	6.61
13	KYRGYZISTAN	16.98	26.15	14.65
14	LATVIA	24.14	12.57	7.10
15	LITHUANIA	19.04	14.66	10.28
16	MACEDONIA FYR	24.02	36.23	23.48
17	MOLDOVA	18.97	20.47	10.54
18	POLAND	14.59	9.78	10.00
19	ROMANIA	12.04	13.36	6.55
20	RUSSIA	23.02	18.04	15.55
21	SLOVAK REPUBLIC	21.77	13.11	4.45
22	SLOVENIA	3.47	17.96	7.23
23	TAJIKISTAN	32.39	15.41	27.74
24	UKRAINE	25.43	14.56	10.68
25	UZBEKISTAN	20.26	10.54	2.97

*Source: Author's aggregated data from BEEPS 99,02,05

Table 4.1 displays the tax evasion levels for 25 transition countries for all available years; these data define the extent of our panel dataset.[16] To our knowledge, this is the largest sample of transition countries so far used to assess the determinants of business tax evasion. The 25 countries included in our analysis for a three year span are: *Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Tajikistan, Ukraine and Uzbekistan.*

While looking at the time trends of the tax evasion country level, we notice a general improvement over the years. The correlation coefficient between 1999 and 2002 is 0.45, between 1999 and 2005 is 0.54 whilst between 2002 and 2005 is 0.56. These coefficients show a positive yet not large correlation amongst the years.

4.2.2 Independent Variables

The choice of independent variables used in our estimations derives from data limitations across transition economies as well as business tax evasion. For instance, tax rate is the only traditional determinant of tax evasion observed in this Chapter. At the present, given the data restrains, we fail to identify suitable proxies for remaining two traditional variables, that of audit probability and fine rate. We investigate though audit probability in consequent chapters of this study. Other independent variables were chosen from very reliable sources. Following an overview of independent variables is provided.

Tax Rate – We use the *Fiscal Freedom Index* published by The Heritage Foundation, which provides a good proxy for the level of tax rates across countries of our interest. The index, for the years 1999, 2002 and 2005 includes top tax rates on individual and corporate incomes and the

[16] We had to exclude Serbia, Kosovo and Montenegro because of the unavailability of data for these three countries over the three survey periods. For 1999 we averaged the responses of Bosnia and Republica Srpska to obtain the level of business tax compliance for Bosnia and Herzegovina as a whole. Last, as suggested by BEEPS (1999), we dropped country-level estimates for Lithuania and Slovakia for the year 1999, due to methodological mistakes committed by the survey team; instead we had to extrapolate data from the previous two years in order to get estimates for these two countries in the year 1999.

overall amount of tax revenue as a percentage of GDP. The index is presented in percentages. Given the theoretical and empirical ambiguity, the expected sign is of this variable with respect to tax evasion in this chapter is *ambiguous*.

Economic Performance – measures the level and trends of economic development throughout transition economies. The economic performance encompasses all those economic factors that affect a firm's operations but are outside firm's ability to control and influence. We use four proxies to capture for health of the overall economy, notably per capita income, unemployment, inflation and business environment.

GDP per capita **–** we use World Bank (WB) figures of *real GDP per capita* levels (expressed in constant US dollars $) for the 25 transition economies of our interest for the years 1999, 2002 and 2005. The expected sign of per capita income with respect to tax evasion is *negative*.

Unemployment – we use International Monetary Fund (IMF) figures of *unemployment* levels (expressed in percentages), for the 25 transition economies of our interest for the years 1999, 2002 and 2005. The expected sign is *negative*.

Inflation **–** we use the data from EBRD, Transition Report in obtaining the average annual percentage change of CPI for each country for the years 1999, 2002 and 2005. The expected sign with respect to tax evasion is *ambiguous*.

Business Environment – An encouraging and sustainable economic environment is expected to improve the performance of businesses and with that their ability to comply with tax requirements. A non friendly environment on the other side can cause a series of obstacles for businesses, which in turn most likely reflect on their short or long-term profits. Under such circumstances businesses will attempt to regain their purchasing power by reducing their compliance levels. In order to assess the performance of general businesses environment within a country we use the rate of non-performing loans at commercial banks. This rate provides unique and consistent information about how businesses are coping in certain business environments. In a favourable business environment, the likelihood of returning a loan is high, contrary to a restrictive environment where loan non-performance is highly expected. We use the data from EBRD Transition Reports to obtain the measures of non-performing loans for the years 1999, 2002 and 2005. These loans include sub-standard, doubtful and loss classification categories of loans, but exclude loans transferred to a state rehabilitation agency or consolidation bank, end-of-year. The expected sign is *positive*.

Institutions - One of the most important factors affecting tax evasion is the nature of institutions and institutional development within a country. The institutional framework may be defined in a number of ways but it would include such dimensions as the presence reforms, effective law enforcement, the prevalence of trust in government, fair and respectable treatments of taxpayers and so forth. In this study, we will explore the impact of corruption and institutional reforms in transition economies.

Corruption – To begin with, we consider the prevalence of corruption as an important indicator of institutional development. We use the *Control of Corruption Index* from World Governance Indicators. Control of Corruption Index is an aggregation of various indicators that measure the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Index ranges from -2.5 (for very poor performance) to +2.5 (for excellent performance).The expected sign with respect to tax evasion is *negative*.

Transition Index – The particular institutional reform within a country profoundly influences the relationship and trust between/of citizens and/to government. We use the EBRD Transition Index as a proxy to measure institutional change and reforms from central economy to market economy. Reformist governments steer positive perceptions and positive attitudes by taxpayers, which in turn will increase voluntary compliance. The Transition Index is an average of six standard EBRD transition indicator measuring progress in transition. Progress is measured against the standards of industrialised market economies, while recognising that there is neither a “pure” market economy nor a unique end-point for transition. Index ranges from 1 to 4+, where 1 represents little or no change from a rigid centrally planned economy and 4+ represents the standards of an industrialised market economy. The expected sign with respect to tax evasion is *negative*.

Culture - We proxy socio-cultural differences by capturing social norms and educational levels within each country. Other social factors such as age or region could not be included in this part of research given the lack of firm level data. Aggregation and usage of other individual data for business research requires strong assumptions. Amongst many the ratio between male and female population or labour force does not necessarily represent the gender structure of businesses in transition economies given the evident disproportions in gender ownership structure.

Social Norms - Different social norms and ethical values will create different incentives for tax evasion. Social studies acknowledge the process turning an unlawful behaviour into a social norm if the unlawful behaviour is repeated and sustained over the time. In this matter, a continuous refusal of a specific system by its citizens becomes at some stage a common practice for all other systems. To proxy for social norms we use electricity losses and stealing to assess whether the refusal of systems, in our case the tax system, is more than just a decision under uncertainty. We attempt to investigate whether such behaviour is correlated with other refusals; i.e. is a common way of how people in different cultural groups live. We use the percentage of electric power losses and stealing in relation to the total amount of produced electricity for the years 1999, 2002 and 2005; a set of data produced by World Bank under World Development Indicators. The expected sign is *positive*

Education – is a measure of education level within a country. We use the rate of progression to secondary school from World Bank, World Development Indicators, for the years 1999, 2002 and 2005, to assess the level of education within a country. Progression to secondary school refers to the number of new entrants to the first grade of secondary school in a given year as a percentage of the number of students enrolled in the final grade of primary school in the previous year. More educated nations have a tendency to increase the progression ratio. Assumption built here is that individual levels of education can be used also as a proxy for assessing the educational level of businesses. Given the previous empirical contradiction, the expected sign is *ambiguous.*

Table 4.2 reports descriptive statistics for the variables used in our model from a panel of 25 transition economies. We note that there are no missing observations; hence, econometric estimation proceeds using a fully balanced panel. Table 4.3 presents the list of variables together with their description, expected effects with respect to tax evasion (derived from the literature review above, which refers to the inverse of tax evasion, i.e. tax compliance) and the data source.

Table 4.2 Descriptive Statistics

Variable	Obs.	Mean	Std.Dev.	Min	Max
TaxEvasion	75	17.02	11.08	2.97	69.56
TaxRate	75	71.9	11.81	44.9	91.5
GDPpercapita	75	3538	3586	177.3	17908
Unemployment	75	12.58	8.29	0.3	37.25
Inflation	75	13.11	35.5	-8.5	293.7
BusinessEnv	75	13.67	15.42	0.1	84.2
TranIndex	75	3.20	0.59	1.55	3.99
Corruption	75	-0.34	0.65	-1.21	1.29
SocialNorms	75	16.08	9.04	3.43	48.8
Education	75	98.12	1.57	92.2	99.93
Year 2002	75	0.33	0.47	0	1
Year 2005	75	0.33	0.47	0	1

Source: STATA 2011

Table 4.3 Summary of variables

Variable	Description	Expected Sign	Source
TaxEvasion	Q.48 a, Q.58 and Q.43a – Recognising the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?		BEEPS 1999,2002,2005
TaxRate	The level of tax rates across countries, proxied by the Fiscal Freedom Index, an element of the Index of Economic Freedom for the years 1999, 2002 and 2005. The Index combines the top tax rates on individual and corporate incomes and the overall amount of tax revenue as a percentage of GDP. The index is presented in percentages.	Ambiguous	The Heritage Foundation 1999, 2002, 2005
Real GDP per capita	GDP per capita expressed in constant US dollars ($).	Negative	World Bank1999, 2002, 2005
Unemployment	Unemployment rate expressed in percentages	Positive	International Monetary Fund 1999, 2002, 2005
Inflation	Average annual percentage change in the Consumer Price Index	Ambiguous	Transition Report 1999, 2002, 2005
Business Environment	Business environment across countries proxied by the ratio of non-performing loans to total loans of commercial banks. Non-performing loans include categories of loans classified as sub-standard, doubtful and loss making, but exclude loans transferred to a state rehabilitation agency or consolidation bank, end-of-year.	Positive	Transition Report 1999, 2002, 2005
Education	The level of education within a country, proxied by the number of new entrants to the first grade of secondary education (general programs only) in a given year, expressed as a percentage of the number of pupils enrolled in the final grade of primary education in the previous year.	Negative	World Bank 1999, 2002, 2005

Variable	Description	Expected Sign	Source
Social Norms	Social norms, or general attitude of society towards systems; proxied by electric power transmission and distribution losses. These include losses in transmission between sources of supply and points of distribution and losses in the distribution to consumers, including pilferage. Persistent and continues refusal of specific system over a certain period becomes a common social habit for other systems as well.	Positive	World Development Indicators 1999, 2002, 2005
TranIndex	Intensity of reforms, proxied by the Transition Index; an average of six standard EBRD transition indicators measuring progress in transition. Progress is measured against the standards of industrialised market economies, while recognising that there is neither a “pure” market economy nor a unique end-point for transition. The Index ranges from 1 to 4+, where 1 represents little or no change from a rigid centrally planned economy and 4+ represents the standards of an industrialised market economy.	Negative	Transition Report 1999, 2002, 2005
Control of Corruption	Level of corruption within a country, proxied by the Control of Corruption Index; an aggregation of various indicators that measure the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. The Index ranges from -2.5 (for very poor performance) to +2.5 (for excellent performance).	Negative	World Governance Indicators 1999, 2002, 2005
Year 2002	Dummy Variable for data from 2002 (1999 is the omitted category)	Negative	BEEPS 2002
Year 2005	Dummy Variable for data from 2005 (1999 is the omitted category)	Negative	BEEPS 2005

4.2.3 Notes on selected variables

We acknowledge two main issues when using some of the above proxies. Both of these are addressed by our estimation strategy. First, the use of the World Governance Indicators (WGI) *Control of Corruption Index* has been questioned on methodological grounds and, hence, for its comparability across countries and over time. In response, Kaufman and Kraay (2009) point to the inherent difficulties in measuring something as complicated and multifaceted as governance across countries and over time. Moreover, if measurement errors vary much less over the medium term within countries than they do between countries then, in this study, their effects are controlled for by the country fixed effects that characterise our estimation methodology.

The second concern relates to the omitted variables-type endogeneity involving corruption and social norms and the dependent variable, tax evasion. The perception of levels of corruption and actual levels of electricity losses and pilferage might also be regarded as output variables with shared underlying determinants, whether observed or unobserved. However, the theoretical support for such concerns is not well developed and there is no supporting empirical investigation. Nonetheless, fixed effects estimation minimizes this type of potential endogeneity by controlling for all "time invariant" and/or "slowly moving" unobserved determinants of tax evasion, corruption and social norms. Country-level fixed effects displace such determinants from the error term into the estimated part of the model, thereby removing sources of potential endogeneity that otherwise might arise from omitted variables.

4.3 Basic Regression Model

To investigate the determinants of tax evasion in transition economies, we estimate the following model:

$$\begin{aligned}\mathbf{TaxEvasion}_{it} = {} & \hat{\theta}_i + \hat{\theta}_1 TaxRate_{it} + \hat{\theta}_2 GDPpercapita_{it} + \hat{\theta}_3 Unemployment_{it} + \hat{\theta}_4 Inflation_{it} + \\ & + \hat{\theta}_5 BusinessEnv_{it} + \hat{\theta}_6 TranIndex_{it} + \hat{\theta}_7 ControlofCorruption_{it} + \\ & + \hat{\theta}_8 SocialNorms_{it} + \hat{\theta}_9 Education_{it} + \varepsilon_{it}\end{aligned} \qquad \textbf{(12)}$$

The subscript *i* refers to countries (1,..., 25) and *t* to years 1999, 2002 and 2005. $TaxEvasion_{it}$ stands for the level of evasion; $TaxRate_{it}$ is the tax rate levied on businesses; $GDPpercapita_{it}$ is the level of real per capita income; $Unemployment_{it}$ is the unemployment rate; $Inflation_{it}$ is the inflation rate; $BusinessEnv_{it}$ is the state of the business environment proxied by the share of non-performing loans as a percentage of total loans; $TranIndex_{it}$ is the EBRD's transition index showing the progress of transition; $ControlofCorruption_{it}$ is the WGI Control of Corruption score; $SocialNorms_{it}$ is the society's attitude towards systems and compliance requirements (or social norms) proxied by the level of electricity losses and theft as a percentage of total output; while $Education_{it}$ is the progression rate of students to secondary school as a percentage of total graduates from primary schools. $\hat{\theta}_i$ are country fixed effects that control for all time invariant – or, at least, slowly moving – national geographic, historical/cultural, institutional, social and economic influences not otherwise explicitly specified in the model. $\hat{\theta}_{1\text{-}10}$ are estimated coefficients that measure the effects of each dependent variable on tax evasion. Finally, $\boldsymbol{\varepsilon_{it}}$ is the usual white noise error term.

The next section elaborates on various econometric issues related to the estimation of our model.

4.4 Econometric Issues

Our choice in using panel data sets derives from the need to address the topic of business tax evasion in TEs without the well-known constraints of either purely cross-sectional or purely time-series analysis. Panel datasets bring several advantages compared to other types of data. Gujarati (2002) argues that there is a certain unobserved heterogeneity in the data that relate to groups (i.e. individuals, firms, or countries over time); yet panel data estimation can take such heterogeneity explicitly into account by including individual-specific fixed effects (either as dummy variables in the estimated part of the model, or as a group-specific error term). In addition, the combination of time series with cross-section observations, gives more informative data, more variability, less collinearity among variables, more efficiency and more degrees of freedom. In several ways, panel data can enrich empirical analysis in ways that may not be possible by the use of either cross-sectional or time series data individually. There are, however, drawbacks from using panel analysis. First, time series analysis in panel context is relatively undeveloped; and second, several difficulties arise in diagnostic testing for panel analysis.

Choosing between the most appropriate estimation depends on the assumptions we make and about the nature of our data. But in general the most commonly used econometric models for panel data are *effects models*, which assume the effect of explanatory variables to be the same across different 'individuals'; namely, the Fixed Effects Model (FEM) and the Random Effects Model (REM).

4.4.1 CLRM vs. FEM vs. REM

Hausman and Taylor (1981) argue that an important purpose in combining time-series and cross-section data, i.e. having panel data, is to control for individual-specific unobservable effect which may be correlated with other explanatory variables. Analysis of time-series or cross-section data alone can neither identify nor control for such individual effects. In panel analysis, one can have this individual effect, whether there is a dummy variable or a group specific error term, because there is more than one observation per individual. In turn, the inclusion of the group-specific effects, whether they are in the estimated part of the model or the error term, prevents the influence of unobserved variables being attributed to one or more independent variables. Of course if unobserved influences are correlated with one or more of independent variables then (by definition) there is an endogeneity problem. Here the distinction between FE and RE becomes important.

With FE estimation the time-invariant unobserved influences are controlled for by group-specific dummy variables in the estimated part of the model. Because, therefore, the unobserved influences are not in the error term, they can be correlated with one or more independent variables. Conversely, in RE estimation, time-invariant unobserved influences are modelled as group-specific components of the error-term. Hence, RE estimation is legitimate only if the time-invariant unobserved influences can be assumed to be un-correlated with all of the independent variables. Given that in practice this assumption can rarely (possibly never) be made with certainty, pure preference is for FE estimation rather than for RE. We now support this a priori judgment by implementing the standard testing procedure in this section.

As argued, the separation of individual effects, in our case country effects, is a clear advantage that derives from panel estimation. One way to account for this country individuality is to use Fixed Effects where we let the intercept vary for each company and yet assume that the slope coefficients are constant across countries (see Wooldridge 2003). This can be written as: $y_{it} = \beta_{1i} + \beta_2 X_{it} + \varepsilon_{it},$ where ε_{it} capatures *general* ignorance of determinates of y_{it} ,that is within individual error; while β_{1i} captures *specific* ignorance about unit *i*, in our case country *i*. The key insight is that if the unobserved influences on the dependent variable do not change over time, then any changes in the dependent variable must be due to influences other than these fixed characteristics

(Stock and Watson, 2003). In the case of panel data the interpretation of the beta coefficients would be "…for a given country, as X varies across time by one unit, Y increases or decreases by β units".

Choosing the right model requires testing between various model types. We start initially by comparing Classic Linear Regression Model (CLRM) against "effect models" (see Appendix 4.1). Software packages (like STATA) calculate the group fixed effects as deviations from the mean FEM and they report the mean of the group effects as the model constant (Pugh 2010, Lecture Notes). We reject FEM if these deviations are not jointly significant and vice-versa. Our results suggest that we should choose FEM compared to CLRM estimation since:

H0: all ui=0:
F(24, 41) = 2.31
Prob > F = 0.008
Reject Ho; Estimate FE

Another way of testing is by conducting Breusch and Pagan Lagrangian multiplier test for Random Effects (see Appendix 4.3). The null hypothesis of the one-way random group effect model is that the variance of the group-specific error term is zero. If the null hypothesis is not rejected, the pooled regression model is appropriate. Our results support the usage of CLRM compared to RE:

H0: $\sigma 2ui = 0$; tests restriction that ui = α
Test: Var(u) = 0
chi2(1) = 0.05
Prob > chi2 = 0.81
Fail to Reject Ho; Estimate CLRM

So far our diagnostic testing has suggested that the FEM is more preferred compared to CLRM, and that the CLRM is preferred to REM. Our last comparison is between the two effects models. The generally accepted way of choosing between fixed and random effects is running a Hausman test, which is based on comparing two estimators. The null hypothesis in this test is that the preferred model is random effects vs. the alternative the fixed effects (see Greene, 2002, Chapter 9). It implicitly tests whether the unique errors (ui) are correlated with one or more of the regressors and the null hypothesis is they are not; by testing whether FE and RE estimators differ substantially. If they do not, it implies that RE estimates (see Appendix 4.2) are consistent, and therefore it is appropriate to use RE estimator. However, our results (see Appendix 4.4) show that we have to reject the null hypothesis and thus estimate the Fixed Effects Model:

Ho: difference in coefficients not systematic
chi2(11) = 22.07
Prob>chi2 =0.0048
Reject Ho; Estimate FE

After conducting the above tests we conclude that FE estimation appears to be the most appropriate approach. Next, we move to the diagnostics testing and investigate on several potential problems related to panel data estimations.

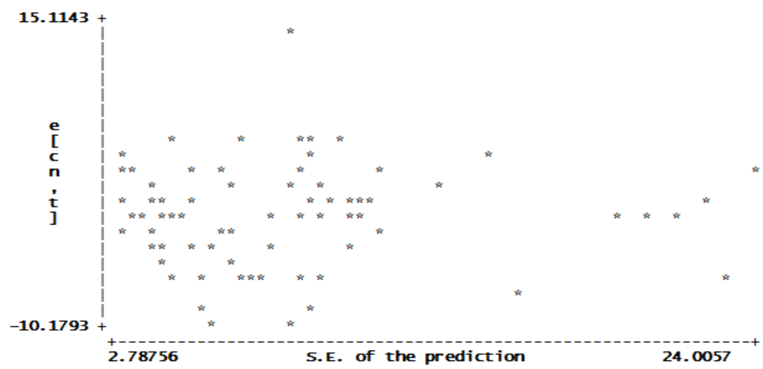
4.4.1 Fixed Effects Diagnostics

Post estimation (see Appendix 4.1), we subjected our conventional FE model to a series of diagnostic tests. The general principle is that all econometric models exist simultaneously as statistical and economic models; moreover, that before economic estimates and inferences can be interpreted it is necessary first to ensure that the statistical assumptions of the model are supported by the data. In this vein, we have followed, sort of, a protocol, which is accepted consensually as best practice by the leading applied economic literature. Our first test is for cross-sectional dependence in the errors, which can be caused by spatial correlation or omitted unobservable components. If the unobserved components that create interdependencies across cross-sections are correlated with included independent variables then fixed effects estimators will be biased and inconsistent (Pugh, 2010 Lecture Notes). However, as noted by Wooldridge (2003, p.6): "*For better or worse, spatial correlation is often ignored in applied work because correcting the problem can be difficult*". In our case, the Pesaran (2004) test for cross sectional dependence (see Appendix 4.5) does not indicate major presence of cross-section dependence; however, we include two period dummy variables for the years 2002 and 2005 to account for the potential effect of common shocks. With inclusion of dummies in a sense we ensure that any time effect is not in the residual but on the observable part of the mode. Understandably, in order to avoid the dummy trap we do not include a time dummy variable for the year 1999.

Pasaran 1	Pasaran 2 (with period DV's)
Ho: Zero Cross Dependence	*Ho: Zero Cross Dependence*
P Test: 0.353	P Test: -1.038
Pr = 0.724	Pr = 1.700
Fail to Reject Ho	Fail to Reject Ho

Our second test is for Groupwise Heteroskedasticity, a problem very common while working with panel datasets. One of the main assumptions for the OLS regression is the homogeneity of variance of the residuals. If the model is well-fitted, there should be no pattern to the residuals plotted against the fitted values. If the variance of the residuals is non-constant then the residual variance is said to be heteroskedastic.

Figure 4.1 Plotted residuals versus fitted values



Source: STATA printout

There are graphical and non-graphical methods for detecting heteroskedasticity. A commonly used graphical method is to plot the residuals versus fitted (predicted) values (Fig.4.1). Our plot diagram shows some presence of non homoskedastic variance.

In order to avoid any doubt, we use modified Wald Test (Appendix 4.6) for groupwise heteroskedasticity in fixed effects regression modes, which essentially tests whether the variance is constant over cross-section units. Our tests show a large presence of heteroskedasticity.

Modifief Wald Test

Ho: σ(i)^2 = σ ^2 for all i;

chi2 (25) = 4.4e+05

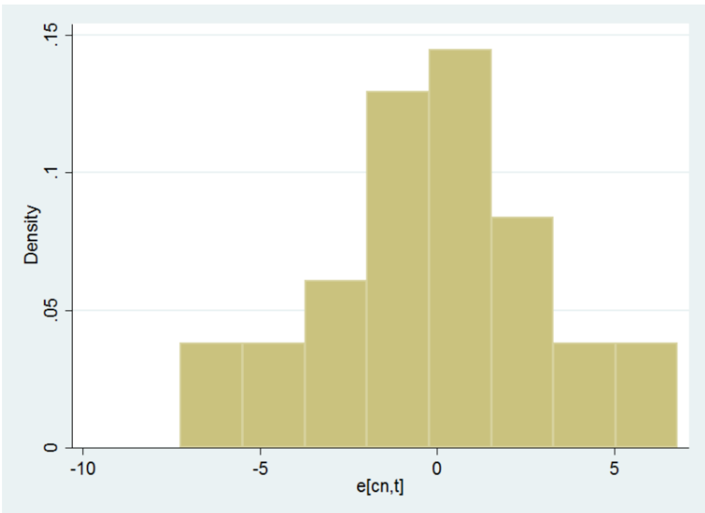
Prob>chi2 = 0.000

Reject Ho

A solution to account for this is to report robust standard errors. To do this, we also take account of clustering effects in the data. Clustered standard errors (SE's) are a very common practice whenever the data are nested, for instance students within universities, firms in different countries or households within different areas. In all these cases the lower level units are clustered within some higher level units and may therefore be a subject to common unobserved influences that can cause the error terms to be correlated within, but not between, clusters. In our case, we have years within countries; therefore we cluster on countries. Our clustered robust results are reported in Table 4.2 (and Appendix 4.7)[17].

Our last test for fixed effects analysis is to check for the normality of the errors. We must note that normality is not required in order to obtain unbiased estimates of the regression coefficients. It is required only for valid hypothesis testing in small samples, that is, the normality assumption assures that the p=values for the t-test and F-test will be valid (Gujarati 2002). There are two ways to check for normality. The first one is to simply plot the residuals and check if they are bell shaped (Fig.4.2).

Figure 4.2 Plotted residuals and normality



Source: STATA printout

[17] After clustering for standard errors, a next procedure would be to test for serial correlation. Again autocorrelation is a very common in panel analysis. Unfortunately, we are unable to perform such test as with only 3 years period we have insufficient observations and checking for serial correlation has no meaning.

The second way, which is more reliable, is by conducting the Skewness/Kurtosis Tests for Normality.[18] Our results (see Appendix 4.8) show some problems with kurtosis. One way of correcting for non-normality in residuals is by checking for any outliers in the data. Taking a glance at plot of residuals we notice two outliers in the case of Albania for the year 1999 and in the case of Macedonia for the year 1999. Both Albania and Macedonia during 1999 were heavily affected by neighbouring Kosovo-Serbia war. More than 1 million Kosovo-Albanian refugees sheltered in Albanian inhabited regions in Albania and Macedonia; affecting thus both actual state functioning as well as the credibility of the collected data. Inclusion of two country dummies improves significantly the distribution of residuals (see Appendix 4.8).

Post inclusion, both Skewness/Kurtosis Tests and graphical presentations how that the distribution of the residuals is bell shaped and that the null hypotheses of no skewness, no excess kurtosis and, jointly, of normality cannot be rejected at conventional levels of significance; respectively, p=0.698, 0.095 and 0.217.

Skewness/Kurtosis Tests
Ho: Normality in residuals
Pr Skewnes: 0.5591; Pr Kurtosis: 0.9734
Joint adj chi2(2) 0.34,
Prob>chi2 0.8427
Do Not Reject Ho

With normality check we have completed the standard diagnostic tests for FEM estimations. Before interpreting our final results, we introduce a recently developed alternative to conventional fixed effects (FE) estimation. Because it is new to the tax evasion literature, we present the key concepts of the Fixed Effects Vector Decomposition (FEVD) approach (Plümper and Troeger, 2004) and explain its application to our case.

[18] In STATA that is pantest2

4.4.2 Fixed Effects Vector Decomposition Approach (FEVD)

In fixed effects estimation, the group-specific fixed effects (i.e., dummy variables) fully account for all between-group variation. From this characteristic arise both the main advantage and the main disadvantages of FE estimation. The great advantage is that the group-specific fixed effects control for all *unobserved* sources of time-invariant heterogeneity between groups. The corresponding disadvantages are two-fold: first, the group-specific fixed effects fully account also for all *observed* sources of time invariant heterogeneity between groups so that time-invariant variables cannot be separately estimated (they are perfectly collinear with the fixed effects); a second but less well known corollary of the full absorption of between-group variation by the group-specific fixed effects, and the corresponding loss of information, is that *observed* variables with relatively little within-group variation cannot be estimated efficiently (Plümper and Troeger, 2007). Plümper and Troeger (2007, p.127) elaborate on the implications of this second disadvantage:

> *... inefficiency does not just imply low levels of significance; point estimates are also unreliable since the influence of the error on the estimated coefficients becomes larger as the inefficiency of the estimator increases.*

To address both of these disadvantages, Plümper and Troeger (2007) propose their Fixed Effects Vector Decomposition (FEDV) estimator. This is a three-stage approach that combines fixed effects estimation to analyse the effect of variables with relatively high within-group variation and pooled ordinary least squares (OLS) estimation of both time-invariant and "rarely changing" (or slowly moving) variables with relatively low within-group variation (Plümper and Troeger, 2011). With reference to our model, FEDV proceeds as follows.

Stage One is fixed effects estimation of our preferred model specified in Equation (12) with additional two country dummies (for Albania 1999 and Macedonia 1999) introduced given the empirical considerations. This model includes several variables that are rarely changing but none that are completely time invariant (see Table 4.4 below).

Stage Two is a cross-section regression of the vector of the estimated group fixed effects ($\hat{\theta}_i$) from Equation (12) on the time invariant variables and/or rarely changing explanatory variables from Equation (12) - our fully-specified model includes only the latter. The Stage 2 treatment of slowly moving variables in FEVD estimation is necessary to address the problem that conventional fixed effects estimates of the effects of slowly moving variables can be imprecise, as noted above. A second reason arises in cases where researchers are concerned by unobserved correlations between the estimated group fixed effects ($\hat{\theta}_i$) and time varying but slowly moving variables, Plümper and Troeger (2007, p.136) find that "*we can reduce the potential for bias of the estimation by including additional time-invariant or rarely changing variables into stage 2*", while warning that "*this may reduce bias but is likely to also reduce efficiency*". In country-level panels covering only a short time span such correlations and corresponding estimation biases can be presumed to be prevalent. In such cases, fixed effects capture unobserved time invariant country influences, which – given the short sample period - includes broad influences associated with history, culture and institutions that are most likely to be correlated with one or more of the slowly moving variables. Accordingly, to address these potential problems in estimating our model, we follow the rule of thumb recommended by Plümper and Troeger (2007) for the inclusion of variables in the Stage 2 regression. This guideline was subsequently endorsed by Greene (2011, p.9):

> *Strictly time invariant characteristics will obviously be included and variables with sufficiently low within-variance should also be included ... a between-to-within ratio of 2.8 is sufficient to justify the inclusion of the variable in the second stage.*

Table 4 below compares the between- and within-group variation (measured by standard deviations) for each variable in our model and indicates those that, according to this guideline, are slowly moving and thus included in our Stage 2 regression.

Accordingly, our Stage 2 FEVD regression is specified as follows:

$$\hat{\theta}_i = \hat{\beta}_0 + \hat{\beta}_1 Unemployment_{it} + \hat{\beta}_2 TranIndex_{it} + \hat{\beta}_3 ControlofCorruption_{it} + \hat{\beta}_4 SocialNorms_{it} + \omega_i \quad \textbf{(13)}$$

where $\hat{\beta}_0$ is the intercept; and ω_i is the unobservable part of the fixed effects (i.e. "the second stage residual"). This Stage 2 regression decomposes the vector of estimated group fixed effects from Equation (12), ($\hat{\theta}_i$), into two parts: the effects of the intercept β_0 and the observed slowly moving variables (*Unemployment*, *TranIndex*, *ControlofCorruption*, and *SocialNorms*); and the unobserved group effects (the Stage 2 residual, ω_i). It is this decomposition that characterises the FEVD estimator and that integrates its FE and pooled-OLS components.

Table 4.4 Identifying Slowly Changing Variables

Variable	Between	Within	Between/Within Ratio	Slowly Changing*
TaxEvasion	7.88	7.9	0.997	
GDPpercapita	3586	3270	1.097	
Unemployment	7.83	2.79	2.806	*
Inflation	23.44	27.19	0.862	
BusinessEnv	15.42	10.32	1.494	
TaxRate	9.41	7.29	1.291	
TranIndex	0.59	0.12	4.917	*
Corruption	0.63	0.18	3.500	*
SocialNorm	8.79	2.55	3.447	*
Education	1.27	0.94	1.351	
Year 2002	5.67E-17	0.47	0.000	
Year 2005	5.67E-17	0.47	0.000	
AL99	5.67E-17	0.47	0.000	
MC99	5.67E-17	0.47	0.000	

* If value > Rule of Thumb 2.8

Source: STATA 11

Stage Three: Finally, the *unobservable* part (ω_i) of the estimated vector of fixed effects ($\hat{\theta}_i$) obtained in Stage 2 is substituted for the vector of unit fixed effects ($\hat{\theta}_i$) in Equation (12).[19] Since the estimated unobservable effects $\widehat{\omega_i}$ control for potential sources of omitted variable bias, and are - by design - not correlated with the time invariant variables (Plümper and Troeger, 2007), we estimate the resulting Equation (14) by pooled OLS. In this case, the final model yields unbiased estimates, although the standard errors must be adjusted to account for $\widehat{\omega_i}$ being estimated in Stage 2, hence subject to error, as well as for unrepresented degrees of freedom

[19] If observable time invariant variables are part of the fully-specified model then these also appear in the Stage 2 regression and are then substituted, along with the unobservable part (ω_i) of the estimated vector of fixed effects ($\hat{\theta}_i$), for the vector of unit fixed effects ($\hat{\theta}_i$) in Equation 1.

(Plümper and Troger, 2007) (in a small sample, not making this adjustment will severely underestimate the standard errors).[20,21] The estimated coefficient on $\widehat{\omega_i}$ should be either equal to - or at least close to - 1.0 (Greene, 2010 and 2011), which may be regarded as a specification check on FEVD estimation.

$$\begin{aligned}\boldsymbol{TaxEvasion_{it}} = {} & \hat{\theta}_0 + \hat{\theta}_1 TaxRate_{it} + \hat{\theta}_2 GDPcapita_{it} + \hat{\theta}_3 Unemployment_{it} + \hat{\theta}_4 Inflation_{it} + \\ & + \hat{\theta}_5 BusinessEnv_{it} + \hat{\theta}_6 TranIndex_{it} + \hat{\theta}_7 ControlofCorruption_{it} + \\ & + \hat{\theta}_8 SocialNorms_{it} + \hat{\theta}_9 Education_{\,it} + \hat{\theta}_{10} Year2002_{\,it} + \hat{\theta}_{11} Year2005_{\,it} + \\ & + \hat{\theta}_{12} AL99_{\,it} + \hat{\theta}_{13} MC99_{\,it} + \omega_i + \varepsilon_{it}\end{aligned} \qquad \textbf{(14)}$$

Compared to conventional fixed effects estimation, the FEVD approach has an advantage with respect to the estimation of slowly moving variables: because the Stage 3 regression is estimated by OLS, both between-group and within-group variation is taken into account, which gives superior efficiency (i.e., more precise estimates). OLS estimation also has the advantage of a widely understood range of diagnostic tests and checks on the statistical integrity of the model. In the case of the model specified in Equation (14), standard diagnostic tests suggest that this Stage 3 FEVD regression is statistically well specified with respect to homoskedasticity, normal distribution of the model errors and as a linear model. In addition, diagnostic checks suggest no undue influence from (multi) collinearity or high-leverage observations.

A final advantage of FEVD, shared with conventional fixed effects estimation, is that it is well suited for the estimation of small samples, particularly because OLS has known small sample properties. In comparison with estimators whose properties are known only asymptotically, FEVD may be particularly appropriate for analysing transition and institutional processes where

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[20] Since we include only one variable (the error term of the second stage) to account for all remaining unobservable country effects in the third stage regression, we adjust the degrees of freedom by ($\hat{\theta}_i$-1), which in our case is 24.

[21] An important practical consequence for researchers is that the appropriate Stata ado-file to implement FEVD is version xtfevd4.0beta.ado (the latest at the time of writing), which computes standard errors based on an appropriately revised variance equation. This file, which is available from Plümper and Troeger's website, executes all three steps of FEVD and adjusts the variance-covariance matrix for the degrees of freedom.

panel datasets are often small (Plümper and Troger, 2007; Beck, 2011). For example, the cross-section dimension of the dataset in the present study is limited to the number of transition economies. FEVD estimation may have one disadvantage in short panels (for example, the three-periods available to the present study). Monte Carlo simulations establish that the accuracy of the standard errors on the time invariant variables depends on the number of the time series observations (T) in the panel (Plümper and Troger, 2011). Although the simulation evidence suggests that the FEVD standard errors on the time invariant variables are most accurate when the number of both cross-section and time series observations (N and T) both exceed 20, no evidence is reported on the extent of deterioration for $T<10$. For this reason, we do not report only FEVD estimates but also those from conventional fixed effects estimation.[22]

The three step procedure is shown in Appendices 4.11, 4.12, 4.13 and 4.14. The results of all these estimations and their implications are discussed in Section 4.5.

[22] One difficulty currently confronting applied researchers is that after decades of being the "workhorse" model for (static) panel analysis, the approach to fixed effects estimation is now being contested. Given that FEVD addresses the main weaknesses of FE estimation, this approach is gaining recognition in a growing body of published work. However, FEVD has attracted criticism (Breusch et al., 2010; Greene, 2010) as well as vigorous response (Plümper and Troeger, 2011). Space precludes a blow-by-blow account of this polemic. At the time of writing (June 2013), Greene (2011a) seems to have accepted not only the legitimacy of the FEVD approach but also its potential for development in new directions (Greene, 2011b). However, the critique that FEVD standard errors "were too small" has been conceded by Plümper and Troeger (2011, pp.3 and 33) with the consequence that a new variance equation has been introduced that "computes standard errors which are closer to the true sampling variance than the alternative suggestions".

4.4.3 FEVD Diagnostics

Before interpreting the final results, we provide a brief overview of the diagnostic checks on the third stage OLS estimation. At this point it is important to understand whether the model is statistically well specified with respect to homoskedasticity, normal distribution of the model errors and as a linear model. Moreover as argued by Plümper and Troger (2004) the problems of Heteroskedasticity and Serial-Correlation should be solved beforehand. On the first step we have accounted for heteroskedasticity through clustering and robusting standard errors. Cluster-robust standard errors also address arbitrary patterns of intra-group correlation in the residuals, including serial correlation (although we are unable to detect serial correlation due to insufficient time series depth in the data). Diagnostic test are performed post the three steep proceedure when Pooled OLS estimation enables us to use standard diagnostic tests.

We start with tests related to heteroskedasticity. In this line we conduct the White's test for heteroskedasticity and the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (see Appendix 4.15). Both test the null hypothesis that the variance of the residuals is homogenous. If the p-value is very small, there is a little chance of committing Type I error if we reject Ho; therefore we reject the null hypothesis and accept the alternative hypothesis that the variance is not homogenous. Results from our White test provide strong evidence in favour of homskedastic variance, as do test results from Breusch-Pagan/Cook-Weisberg

White's Test	Breusch-Pagan / Cook-Weisberg
Ho: Homoskedasticity	Ho: Constant variance
chi2(74) = 75.00;	chi2(1) = 0.16
p=0.4457	Prob >chi2 = 0.689
Fail to Reject Ho	Fail to Reject Ho

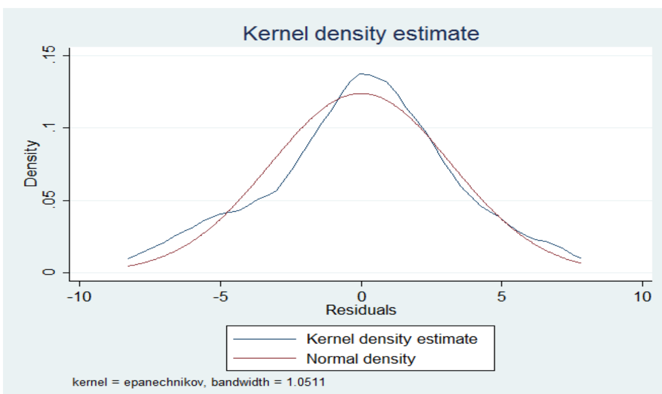
The Szroeter's test for Homosckedasticity is also presented at Appendix 4.15. It too shows no problems with heteroskedasticity of the error terms. This test shows that there is no evidence of heteroskedasticity associated with any variable specifically. This is very encouraging as we do have a set of mutually consistent reasons for using the default standard errors. First there is no evidence of heteroskedasticity and, second, when we use the robust standard errors we discover some potential peculiarities as standard errors either increase only slightly or become slightly smaller. Angrist and Pischke (2008) argue that this might be evidence of finite sample bias in the robust calculations. After all, this makes perfect sense as the theory of Robust SEs is asymptotic, in other words it accounts for what happens in an infinite size sample. In contrast we have a relatively small sample. These results suggest that the variance of the residuals in our data is homogenous.

The White's - Cameroon & Trivedi's test in addition to heteroskedasticity also checks for normality in residuals. Obtained results (see Appendix 4.15) suggest with some confidence that we are unable to reject the null hypothesis of normal distribution.

Cameron & Trivedi's Test
Skewness: chi2(13) =13.81; p=0.445
Kurtosis: chi2(1)=0.20; p=0.65

Normality in residuals is also supported by Kernel Test, according to which our Kernel Density Estimations are in alignment with normal density.

Figure 4.3 Kernel Test



Source: STATA printout

The next step is to conduct a model specification test. A model specification error can arise when one or more important regressors are omitted from the model or, at the other extreme one or more irrelevant variables are included in the model. If relevant variables are omitted from the model, the common variance they share with included variables may be wrongly attributed to those variables, and the error term is inflated. On the other hand, if irrelevant variables are included in the model, the common variance they share with included variables may be wrongly attributed to them. Model specification errors can substantially affect the estimate of regression coefficients. For that reason we use the Ramsey Test. The results (see Appendix 4. 16) show that we fail to reject null hypothesis of omitted variables at 1% and 5% level of significance. Moreover, from running the Ramsey Test using powers of the independent variables, the rejection is even stronger (p=0.165). The Ramsey test also supports the assumption of a linear relationship in the data.

Next we check for multicollinearity. When there is a perfect linear relationship among the variables, the estimates for a regression model cannot be individually computed. The term collinearity implies that two variables are near perfect linear combinations of one another. When more than two variables are involved it is often called multicollinearity, although the two terms are often used interchangeably. The primary concern is that as the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly exaggerated. We use the Variance Inflation Factor to check for multicollinearity. In this test there is a rule of thumb that suggests that each variable whose VIF values are greater than 10 may be a subject to a further investigation. Our results (see Appendix 4.17) show no problem with multicollinearity for any of the variables.

Our very last test is to check whether our data are “leveraged” by particular observations. The term leverage is used in order to check for any potential leverage point that has driven our regression in a “false” direction. These leverage points can have an effect on the estimate of regression coefficients. We observe two leverage points (see Appendix 4.18), that of Albania 1999 and Macedonia 1999. The removal of these two observations does not change our coefficients in size and significance compared to the previous models. This means that the results of our preferred model are not driven by high leverage, which again is the only clear diagnostic failure that we found.

To sum up, standard diagnostic tests suggest that this Stage 3 FEVD regression is statistically well specified with respect to homoskedasticity, normal distribution of the model errors and as a linear model. In addition, diagnostic checks suggest no undue influence from (multi) collinearity or high-leverage observations.

4.5 Estimation Results

The results are presented in three columns in Table 4.5. Column 1 presents fixed effects estimates of the basic model (Equation 12); Column 2 presents fixed effects results using cluster-robust standard errors (to address various sources of departure from the assumption of white noise error terms). Finally, the third column presents the FEVD estimates. The interpretation of results is based on this column.

Most of the estimated effects are in accordance with the theory and the previous empirical literature. The estimates consistently suggest that *TaxRate* and institutions (proxied by *TranIndex* and *ControlofCorruption*) are the most economically influential and consistently statistically significant variables. The association between *TaxRate* and *TaxEvasion* is positive and significant at the 1% level. A one percentage change in the level of the Fiscal Freedom Index, that is an increase in tax burden, leads to a rise of the tax evasion level by around one third of a percentage point. The relationship between *TranIndex* and *TaxEvasion* is negative and significant at the 10% level. An increase of the Transition Index by one point, that is improvement in reforms, lessens the level of tax evasion by 4.73%. The relationship between *ControlofCorruption* and *TaxEvasion* is also negative and significant at the 10% level. An increase in the *ControlofCorruption* score by 1 unit, that is improved control of corruption, reduces the level of tax evasion by around 6.36%.

The next sub-group of highly significant regressors are the dummy variables. The period dummies suggest that, at the 1% level of significance, compared to the base year, tax evasion falls in *2002* and *2005* by respectively 7 and 14 percent. These numbers are consistent with the unconditional statistics on business tax evasion presented in Table 1 (in which 13 of the 25 countries display continuous improvement) and suggest an increase in compliance over time that is consistent with more or less general progress in institutional reform. In addition, the dummies for Albania for the year 1999 and Macedonia for the year 1999 both suggest strongly positive but temporary effects on tax evasion (see Appendix 4.14).

Table 4.5 Regression results

	FIXED EFFECTS			FIXED EFFECTS			FEVD		
	1			**2**			**3**		
Dependent: **Tax Evasion**	Coeff		S.E	Coeff		robust S.E	Coeff		fevd S.E
Tax Rate	0.33	***	0.13	0.33	**	0.16	0.33	***	0.10
Economic Performance									
GDP per capita	0.00	**	0.00	0.00	**	0.00	0.00	**	0.00
Unemployment	0.08		0.19	0.08		0.13	0.31	**	0.15
Inflation	-0.02		0.02	-0.02		0.01	-0.02		0.02
Business Environment	0.03		0.05	0.03		0.09	0.03		0.05
Institutions									
Transition Index	-14.90		11.3	-14.90		10.6	-4.75	*	2.75
Corruption	-9.62	***	3.26	-9.62	***	3.13	-6.36	*	3.68
Culture									
Social Norms	0.00		0.27	0.00		0.29	0.21		0.16
Education	-0.32		0.70	-0.32		0.51	-0.32		0.66
Year Dummies									
2002	-7.56	***	2.39	-7.56		1.97	-7.56	***	1.59
2005	-14.75	***	3.98	-14.75		3.73	-14.75	***	2.54
Constant	69.8	***	87.4	69.8		70.0	32.0		66.4
Eta							1.00		.
R-squared	0.44			0.44			0.83		
Number of observations	75			75			75		

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

The relationship between *GDPpercapita* and *TaxEvasion* is positive across all estimations but the coefficient is very small: a huge amount of extra income per capita is required to make any substantial difference in the level of tax evasion: around $1,000 of additional per capita income are needed to reduce tax evasion by a single percentage point (this is purely indicative as, strictly speaking, this is outside the range of a merely marginal change). In the preferred regressions, the relationship between *Unemployment* and *TaxEvasion* is significant at the 5% level and the sign is in accordance with theoretical predictions and previous empirical findings. A rise in unemployment rate by one percentage point will increases the level of tax evasion by 0.31 percentage points. The other two remaining economic variables do not appear as statistically significant; moreover, both *Inflation* and *BusinessEnv* have very small coefficients across all of our estimated models.

Results for cultural differences and characteristics appear to be in line with theoretical expectations. The percentage of electricity losses or theft used as a proxy for *SocialNorms* is positively related to tax evasion, yet statistically insignificant in FEVD and conventional FE estimation. *Education* is estimated with a consistently negative sign but is also statistically insignificant across all estimations. Finally, as suggested by Plümper and Troeger (2004), our coefficient on $\boldsymbol{\omega_i}$ is 1.0 in FEVD, which confirms that our FEVD model is properly estimated.

4.5.1 Discussion and Interpretation

One of the most important findings in this study relates to the effect of the tax rate on tax evasion, particularly given the theoretical and empirical ambiguity associated with this relationship. The robust positive relationship in all of our estimated models suggest that higher tax rates increase the benefits of evasion as described in the Allingham and Sandmo (1972) model. For transition economies, it seems that the substitution effect prevails over the income effect.

We advance evidence that the macroeconomic environment has significant but minor effects on business tax evasion. The literature argues that per capita GDP acts as a proxy for the general level of development within a country. If so, then in transition economies levels of business tax evasion can be expected to fall as overall prosperity increases. However, this effect is very small. Increased unemployment enables businesses to increase their informal labour force, which reduces their tax and pension burden. In this case, the unemployment rate is positively related to tax evasion as suggested by our FEVD estimate. The small size of those economic effects that are estimated at conventional levels of significance (per capita GDP and unemployment) together with the non-significance of the others (inflation and the business environment) suggests that the decision to evade or not must depend on other non-economic factors.

The most important finding of our study is the impact of institutional factors on tax evasion. For even if a country is performing well in general economic terms, the presence of negative institutional phenomena (most notably corruption and lack of reforms) exert a dominant and immediate influence on the relationship between businesses and government. We used the measure of transition reforms and corruption levels to proxy the relationship between businesses and formal institutions. Reforms depend on the quality of state bodies which, in turn, affects citizens' trust in these same bodies, while corruption gives rise to both dissatisfaction and opportunities. The negative effect of both the *Transition Index* and the *Control of Corruption Index* on tax evasion is as expected; moreover, the size of these institutional effects is economically substantial. The size of the coefficients enforces the general claim in the literature that institutional factors do matter in accounting for tax evasion and suggests that their inclusion in models of tax evasion for transition economies is imperative. Our findings are consistent with several complementary explanations: first, if businesses feel betrayed by their government they may respond by non-payment of taxes as a form of revolt; secondly, corruption undermines the government-business relationship more broadly, thereby loosening feelings of social obligation; thirdly, corruption changes the risk of detection, which suggests that businesses from transition economies see corruption also as an opportunity to lessen their tax obligations.

Finally, positive, large and highly significant period effects for Year 2002 and Year 2005 relative to 1999 suggests that tax evasion is falling over time. This again is consistent with the importance of transitional reforms, in particular improvements in law enforcement and other institutions in these countries.

Conclusion

In spite of the extensive literature on tax evasion, business tax evasion in TEs has been largely neglected. Yet many of these economies suffer greatly from tax evasion. This study contributes to knowledge in this area by providing evidence from a cross-country investigation of business tax evasion in 25 transition economies. This is particularly important as most tax evasion is accounted for by the business sector. As well as conventional fixed effects estimation, we employ a recently developed approach known as fixed effect vector decomposition (FEVD), which is particularly suited to small samples. At each stage particular attention has been paid to model diagnostics to ensure the statistical integrity of the models and, hence, the validity of our estimates.

The major findings of this study are *the importance of institutional factors and of the tax rate:* higher corruption, slower reforms and higher tax rates all reduce substantially the amount of taxes paid by businesses in TEs. In addition, we identify *minor effects from the macroeconomic environment* on business tax evasion: on the one hand, falling unemployment in the short run and rising prosperity in the long run can be expected to reduce tax evasion.

This study contributes to the empirical literature on tax evasion by investigating the determinants of business tax evasion in transition countries and by its suggestions on model specification and estimation. However, this chapter is subject to two main limitations. The first is the lack of data on and consequent non-inclusion in the model both of the penalty element and of the probability of audit. Indeed the lack of data for fine rate is common in almost every tax evasion study which relies on data gathered through surveys. The most efficient technique to capture for the impact of fine rate on taxpayers decision would be through actual tax measurements programmes, which however, apart from US – given the financial costs they entail - are not common for the most parts of the world. At the present, most of the research on tax evasion – especially for TEs – must rely on surveys. We also note that, to the extent that that these variables (fine and audit rate) are time invariant or "slowly changing" their influence is controlled for by the country fixed effects and thus is not a source of omitted variables bias. The second limitation is also related to the nature of the data and the fact that the proxy for tax evasion is derived from a survey. Surveys of tax evasion are complicated, because evasion is a criminal activity and individuals are reluctant to admit such behaviour. We note that the questionnaire has taken into account the sensitive nature of the topic, i.e tax evasion – and consequently minimised the risk by designing and indirect question on tax evasion, i.e the amount of sales concealed by a firm similar to the respondent's. Because of this however, the data provided in surveys related to tax evasion are based on perceptions about the behaviour of others; therefore the outcomes are subjective and subject to measurement errors. Again, given the difficulties in obtaining any alternative data, studies on tax evasion for TEs have to accept these deficiencies as the least deficient ones. Indeed, though survey data might have their weakest links, they still provide incredible information – especially related to perceptions and behaviour of individuals – that could not be observed through any other available method.

Together, these findings have a number of policy implications for improving tax evasion in TEs. These act to reduce either the possibility of and/or the inclination to evade.

- Governments should reduce the tax burden on businesses to encourage higher compliance.
- Policymakers should improve the effectiveness of the tax system, which would include more effective tax administration, while generally improving the relationship between business taxpayers and institutions.
- Governments should adopt a serious anti-corruption policy. This could reduce tax evasion both by increasing voluntary compliance and by better performance of enforcement mechanisms.

Our findings suggest that in TEs institutional reform is the key to improving tax evasion. Additional institutional improvements could usefully include enhanced data collection. In particular, reporting data on penalties for evasion and audit practices would address one of the limitations of this study (and similar studies) noted above, and so better inform research and policy design.

Chapter FIVE

Firm Level Determinants of Tax Evasion in Transition Economies

TABLE OF CONTENTS

Introduction

In the previous Chapter we investigated business tax evasion in 25 Transition Economies (TEs) for the years 1999, 2002 and 2005. For our panel data, we used both conventional fixed effects estimation together with the recently developed Fixed Effect Vector Decomposition approach. Our results showed that there is a positive relationship between the tax rate and tax evasion, while we also found that higher corruption and/or lower institutional reforms reduce substantially the amount of taxes paid by businesses in TEs. In addition, we identified minor effects on tax evasion from the macroeconomic environment. In this Chapter, we focus on micro level determinants of business tax evasion. This is done in order to capture firm related determinants of tax evasion.

Cowell (2003) argues that there is no specific and generalized modelling of either individual or business tax evasion developed so far. The starting assumption of the literature on the tax behaviour of businesses is that their behaviour is similar to the behaviour of individuals, and that the determinants of business tax evasion may be similar, at least qualitatively, to the determinants of tax evasion by individuals or households. The decision on evasion, or compliance, is made by individual managers or entrepreneurs who, in essence, act as individuals (Arias, 2005). As Slemrod (2007, p.36) points out, literature on business tax evasion "*adapts the theory of tax evasion, which for the most part concerns individual decision makers, to the tax compliance decisions made by businesses*". This is particularly true of small and medium sized enterprises (SMEs) where the decision making entrepreneur makes compliance decisions as both an individual and a manager.[23]

Several authors, however, have distinguished between business and individual compliance for two reasons: a) the nature of internal organizations with separation of ownership and control (and hence variations in risk assumptions) which in turn affect important aspects of firms' external

[23] This may be different for large public companies where the compliance decision are made by one of the directors who is likely to be risk-neutral when it comes to tax compliance decisions (whereas the individuals are generally assumed to be risk averse). The directors' compliance decisions also depend on whether their remuneration is linked to the after tax profit of the company.

activity including tax reporting; and b) the nature of the firm's external activities in the market i.e the relationship between output and tax evasion. We have already elaborated the theoretical foundations of business tax evasion in Chapter II, and reviewed empirical investigation in Chapter III. Under theoretical discussion we argued that a key feature of the business tax evasion literature (for the latest review see Bayer and Cowell, 2009) is that their results are very divergent. These results depend greatly upon the assumptions made in regards not only to risk behaviour (averse or neutral) but also in regards to separability of evasion and output. Most of the business models have conducted a comparative static analysis similar in nature to that of the traditional model; i.e., that the firm evades less with higher probability of detection and larger fines, while the impact of tax rates is ambiguous (see Marelli, 1984; Martina, 1988; Virmani, 1989; Sandmo, 2004; Crocker and Slemrod, 2005).

The lack of data for TEs has limited considerably the scope of work for researchers interested in exploring empirically the nature of business tax evasion. However, BEEPS datasets provide an adequate measure for tax evasion. The question that fits most in measuring levels of tax evasion relates to the perception of a business towards compliance by other firms operating in their line of business. Understandably this is not the same question as the share of sales the respondent's firm reported. However, as argued in previous chapters, in the absence of tax measurement programmes for TEs, the literature has acknowledged indirect measurement of evasion as the most informative available meassure (Gerxhani, 2006). Apart from BEEPS 2002 and 2005, the EBRD has also conducted a survey in 1999. Although inclusion of the tax evasion question was encouraging for macro level studies, the lack of other important variables identified so far in our third chapter makes those data inappropriate for our firm level study. Regrettably enough, the tax evasion question was dropped from the 2008/2009 round, while the panel data do not contain our dependent variable. Hence in this chapter we make use of survey data for the years 2002 and 2005.

We build on two, and to our knowledge the only, works on the micro determinants of business tax evasion for TEs, that of Nur-tegin (2008) and Joulfaian (2009). These works came quite late and they both make use of BEEPS 2002 data. In Nur-tegin (2008) the focus of the study is on the relationship between evasion and the main traditional and non-traditional determinants to the tax evasion; while Joulfaian (2009) looks closely at the impact of bribes on the level of evasion. The availability of the BEEPS 2005 dataset, helps us extend the work of Nur-tegin (2008) and Joulfaian (2009) both in regards to sample size as well as to new determinants that were either not accounted for (due to 2002 data restrictions) or omitted for various reasons in one or both papers. By combining determinants and estimation methodology used in the one but not the other paper we tend to improve both model specification and empirical strategy. For instance while both papers use proxies for *tax rate*, *corruption*, *size* and *legal status*, the remaining determinants of business tax evasion are covered only partially in each respective work. Nur-tegin (2008) investigates in addition *trust in legal system* and *compliance costs*; while Joulfaian (2009) covers *ownership structure* and *industrial sector*. In this chapter we group all these determinants within one model specification.

This chapter is organized as follows. *Section 1* reviews two previous works on business tax evasion for transition economies and sets the grounds for further extension conducted in this chapter. *Section 2* describes the data used in our study and discusses the methodology applied to derive our dependent variable, tax evasion. We then discuss the independent variables used in the model, as well as their sources. *Section 3* outlines the general form of the regression model. In *Section 4* we focus on our approach to estimation and highlight the importance of controlling for sample selection bias and data censoring. In *Section 5* we report and discuss the empirical findings for our pooled cross section analysis, while in *Section 6* we analyse separately data from 2005 in order to account for two additional variables. The *last section* concludes.

5.1 Research Design

To our knowledge, so far there are only two papers that analyzed empirically the micro aspects of business tax evasion in TEs: Nur-tegin (2008) and Joulfaian (2009). These works came quite late and they both make use of BEEPS 2002 data. For Nur-tegin (2008) the main focus of the study is the relationship between the main traditional and non-traditional determinants to tax evasion; while Joulfaian (2009) looks closely at the impact of bribes on the level of evasion. In the following we present their key findings and methodology applied. This will enable us to build our work while concentrating on differences or areas not covered by these papers.

Nur-tegin (2008) provides empirical evidence of a number of determinants of tax evasion by firms from TEs. The analysis includes two sets of determinants, both traditional, such as tax rates and probability of detection; and non-traditional factors, such as trust in government, compliance costs, and corruption. The empirical analysis was carried out using data from the 2002 Business Environment and Enterprise Performance Survey (BEEPS II). The data contain responses from 6,367 firms in 27 TEs. Bosnia and Herzegovina, Macedonia, Yugoslavia and Turkey were excluded, primarily due to the lack of data on some key non-survey independent variables. Observations that had no entries for the dependent variable were also left out while missing entries in explanatory variables were substituted with the means of the remaining observations (note that missing values were not dropped in Joulfaian, 2009, and they will not be dropped in this chapter either). Thus, the final sample comprised 4,538 firms in 23 countries. Tax evasion was measured from the standard BEEPS question on percentages of sales underreported for tax purposes[24]. The question was then transformed from a measure of compliance to a measure of evasion by subtracting the percent of sales reported for tax purposes from 100. Nur-tegin (2008) measures the impact of tax rates on compliance by including three types of taxes: VAT (Value Added Tax); Social Security Contributions (SSC); and Corporate Income Tax (CIT). From all three measures of tax rates, only SSC appears to be significant and, contrary to widely held expectations, is positively related with compliance (negatively with evasion). The result is quite interesting as it provides evidence that higher tax rates may not be associated with evasion. The

[24] Q.58 Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?

coefficient on the cost of compliance, measured by the percentage of management's time dedicated to application and interpretation of laws and regulations, appears to be statistically significant but small in size. Another important result in Nur-tegin (2008) was the impact of corruption on compliance. Two dimensions of corruption were considered: first tax related corruption (measured by the intensity of informal payments for tax purposes); and general corruption (measuring the percentage of sales a firm pays as a gift to public officials). The results provided strong empirical evidence that corruption has a positive effect on tax evasion leading to recommendations that, for TEs where tax rates are already low, fighting corruption should be a prime objective for policymakers. In addition, Nur-tegin (2008) results provided evidence that smaller firms tend to comply with taxes to a lesser degree; that the coefficient on firms' trust in their government (statistically significant) indicates that firms tend to evade taxes less if they are more likely to believe that the legal system in their country is fair and impartial. Last, his measure of tax enforcement, the presence of accounting audit, appeared to be positively and statistically significant with compliance[25].

Joulfaian (2009) investigates the role of bribes to tax officials towards shaping compliance. Data used for empirical analysis were obtained from the BEEPS 2002 survey with 26 TEs (including Turkey). All public enterprises were excluded (927 observations) thus obtaining a final sample of 5,740 businesses. As in Nur-tegin (2008), the dependent variable in Joulfaian's work was tax evasion, measured by the fraction of sales concealed. Missing responses to this question were not excluded due to the possibility of endogeneity between nonresponse and firm behaviour related variables; instead sample selection models were applied. Second, due to restrictions imposed by lack of data for audit and fine rates, the conduct of tax administration is used as a proxy to determine the impact the tax regime. The conduct of the tax administration is obtained from a question measuring the perception of businesses towards the intensity of payments/gifts made to deal with taxes and tax collection. In addition to tax administration, tax rates were included (statutory tax rates were obtained from the IBFD European Tax Handbook). Taxes were set to zero when the profit to sales question was answered nul or negative. Last, ownership, control, industrial classification, size and country dummies were included in the analysis in order to

[25] BEEPS data for 2005 provides a much appropriate proxy for probability of audit by measuring the number of visits by tax administration. We explore that in our empirical investigation.

control for cultural, moral and administrative differences amongst countries (Alm and Togler, 2006). The results suggest that governance, as measured by the frequency of tax related bribes, is a significant determinant of compliance behaviour. Basic statistics show that, when compared to tax regimes with no bribes, noncompliance is larger where bribes are common. In addition, corporations tend to have less evasive behaviour compared to other organizational forms. The tax rate appears to be statistically significant, although contrary to Nur-tegin (2008), is negatively related to compliance (positively with evasion). Organizational choice with the underlying nature of the largest shareholders of the firm shows that compared to individual/family owners less evasion is reported by corporate owners.

5.1.1 Extension

The lack of data for transition economies has limited considerably the scope of work for researchers interested in exploring the nature of business tax evasion. However, the BEEPS datasets do provide an adequate measure of tax evasion. As seen from the work conducted so far, as well as from our methodology review in Chapter III, the question that fits most in measuring levels of evasion relates to the perception of a business towards compliance by other firms operating in their line of business. Understandably this is not the same question as the share of sales the respondent's firm reported. However, as argued already, in the absence of tax measurement programmes for TEs, the literature has acknowledged the indirect measure of evasion as the most adequate (Gerxhani, 2006). The EBRD has also an earlier dataset, that of BEEPS 1999. Although the inclusion of the tax evasion question was encouraging for macro level studies, the lack of other important variables identified so far in our third chapter makes these data inappropriate for our firm level study. Regrettably enough, the tax evasion question was dropped from the BEEPS 2008/2009 round while the panel data do not contain the tax evasion question; thus limiting our studies to only two datasets.

Availability of BEEPS 2005 datasets helps us to extend the work of Nur-tegin (2008) and Joulfaian (2009) both in regards to sample size (in order to get more precise estimators and test statistics with more power) as well as to new determinants that were either not accounted for (due to the 2002 data restrictions) or left out for unknown reasons. In terms of sample size, we extend the previous work by introducing BEEPS 2005, and by that adding around 9,000 firms to the previous 6,000 from BEEPS 2002. This enables us to look closely at the impact of time on the evasive behaviour by firms by introducing a dummy for year, as well as at the effect of potential changes in sample size. The year dummies are important not only as additional control variables, but they are also required to ensure adequate statistical specification of the model.

Table 5.1 provides a summary of two previous works and our proposed extension. As can be seen from the table, the joint features of all three studies are with respect to dependent variable as well as to *tax rate*, *corruption*, *size*, and *legal status*. the remaining determinants of business tax evasion are covered partially in each respective work. Nur-tegin (2008) investigates in addition *trust in legal system* and *compliance costs*; while Joulfaian (2009) covers *ownership structure* and *industrial sector*. In this chapter we group all these determinants within one model specification.

The previous two studies tend to differ substantially amongst each other. For instance, while investigating the relationship between tax rate and evasion, as measures of the tax rate in Nur-tegin (2008) were used data for the Social Security Tax, Value Added Tax (VAT) and Corporate Tax – all obtained from various papers, while in Joulfaian (2009) Statutory Tax Rates - obtained from the IBFD European Tax Book, were introduced and multiplied by the amount of profit declared by businesses. Opposing results found on the impact of the tax rate by two papers - i.e negative in Nur-tegin (2008) and positive in Joulfaian (2009) - are most likely to be due to differences in data sources on the tax rate proxy. Countrary to both studies, we use the BEEPS question on the perception of tax burden by businesses. We believe that such a measure tends to give us a more accurate impact of tax rate on firms as first, compared to statutory taxes, it does account only for eligible taxes[26], and second, it enables us to look at both 2002 and 2005 datasets.

[26] We argue that by including all statutory taxes we account for an unrealistic tax burden to businesses. For instance, the majority of businesses in TEs are individual or non-corporations. Accounting for Corporate Tax as part of statutory tax, means that we are evaluating the impact of the corporate tax burden on the individual tax burden. In our study, we look at the respondent's related tax burden as perceived by them. We argue that inclusion of statutory taxes is necessary only in the macro investigation of business tax compliance.

The audit probability is accounted for in Nur-tegin (2008) but not in Joulfian (2009). Regardless of that, we tend to disagree with Nur-tegin (2008) on the proxy used for the audit probability, which is a dummy variable for whether a business had an external accounting reviewer/auditor or not. We argue that this measure does not represent at all the perception of businesses on/or actual tax audit rates as assumed in theoretical considerations (Andreoni et al. 1998). Rather, it measures the quality of financial books and to some extent the degree of openness by firms. Most importantly, for most transition economies only corporations are required by law to have an external financial review of accounting books. BEEPS data for 2002 and 2005 account for only 39% and 31% respectively of businesses organized as corporations (privately held or listed). For the majority of respondents not having an external accounting auditor does not imply instantaneously lack of inspection by tax administration (and thus detection of evasion), it rather means that their financial statements were not examined by independent financial auditing bodies, which by definition have different objectives from tax inspectors. After all, financial auditors are not supposed to tackle evasion. To address the issue of audit probability we make use of BEEPS 2005 which has an impressive question; it accounts for whether a business had any inspection from the tax inspectorate over the past 12 months. This allows us to try and address empirically the impact of one of the most important and most unobservable determinants of tax evasion. Hence, in addition to pooled cross sectional analysis for 2002 and 2005 (without audit probability), we analyse separately the 2005 data and account for the audit rate. In one of the most profound literature reviews on tax evasion ever, Andreoni et al. (1998, p.843) argue that *"...being audited in one year raises one's perception of the chances of being audited in the future..."* thus tax inspections *"...may influence one's subsequent tax compliance behaviour"*. Involvement of audit probability in our model will contribute to understanding of the relationship of audit and business tax evasion in transition economies.

A real handicap for all three studies, is, and will continue to be, inability to account for the Fine Rate (the third traditional determinant) and its impact on tax evasion. Perhaps in future data obtained from tax authorities actual audit and fine reports might provide more light on this very important relationship. Nevertheless, with both tax rate and the audit probability in our model, we are able to empirically investigate two out of three determinants from the Allingham and Sandmo (1972) traditional model; and their implications for businesses in transition economies.

Table 5.1 Summary of business tax evasion in transition economies

Variable	Nur-tegin (2008)	Joulfaian (2009)	Our Work
Tax Evasion	BEEPS (2002) - Q.58 “Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?”	BEEPS (2002) - Q.58 “Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?”	BEEPS (2002 and 2005) - Q.58 and Q.43a “Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?”
Tax Rate	Social Security Tax – employer contribution (Martinez-Vazquez and McNab 2000), Value Added Tax (Mitra & Stern 2003), & Corporate Income Tax (Heritage Foundation)	Statutory tax rates - obtained from the IBFD European Tax Handbook, PriceWaterHouse Corporate Taxes – Worldwide Summaries, and various online sources	BEEPS (2002 and 2005) - Q.80g and Q.54h "Can you tell me how problematic are these different factors for the operation and growth of your business… Tax Rates".
Audit Rate	**X**	**X**	BEEPS (2005) Q.38ba1 "How many times in the last 12 months was your establishment either inspected by the following agencies or required to meet with officials from these agencies? … Tax Inspectorate"
Trust in Government	**X**	**X**	BQ.46a and Q.34a: “To what degree do you agree with the following statements? ... Information on the laws & regulations affecting my firm is easy to obtain”
Trust in Legal System	BEEPS (2002) Q. 41.a “How often do you associate the following descriptions with the court system in resolving business disputes? – a) fair and impartial.”	**X**	BEEPS (2002 and 2005) Q.42 and Q.28 "To what degree do you agree with this statement? “I am confident that the legal system will uphold my contract and property rights in business disputes”.

Variable	Nur-tegin (2008)	Joulfaian (2009)	Our Work
General Corruption	BEEPS (2002) - Q.55 “On average, what percent of total annual sales do firms like yours typically pay in unofficial payments/gifts to public officials?”	BEEPS (2002) Q.51 “How often is the following statement true? “If a government agent acts against the rules I can usually go to another official or to his superior and get the correct treatment without recourse to unofficial payments/gifts.”	BEEPS (2002 and 2005) Q.51 and Q.35c “It is common for firms in my line of business to have to pay some irregular “additional payments/gifts” to get things done ” with regard to customs, taxes, licenses, egulations, services etc”
Compliance Costs	BEEPS (2002) - Q.50 "What percent of senior management’s time in 2001 was spent in dealing with public officials about the application and interpretation of laws and regulations and to get or to maintain access to public services?”	**X**	BEEPS (2002 and 2005) - Q.50 and Q.35a "What percent of senior management’s time in 2001 was spent in dealing with public officials about the application and interpretation of laws and regulations and to get or to maintain access to public services?”
Size	BEEPS (2002) screening question on the number of full-time employees.	BEEPS (2002) screening question on the amount of sales.	BEEPS (2002 and 2005) screening questions on the number of full-time employees.
Ownership	BEEPS (2002) screening question on ownership	BEEPS (2002) screening question on ownership	BEEPS (2002 and 2005) screening questions on ownership
Legal Status	BEEPS (2002) screening question on the legal organization of the company.	BEEPS (2002) screening question on the legal organization of the company.	BEEPS (2002 and 2005) screening questions on the legal organization of the company.
Industrial Classification	**X**	BEEPS (2002) Q.2 - "What percentage of your sales comes from the following sectors in which your establishment operates?"	BEEPS (2002 and 2005) - Q.2 and Q.2 "What percentage of your sales comes from the following sectors in which your establishment operates?"
Year Dummies	**X**	**X**	2002 and 2005

Corruption is central in both studies, with Joulfiain (2009) looking more deeply at relationship between bribes and tax evasion. We will too account for business general perception about corruption in our estimations. In regards to other determinants, both papers have some deficiencies. While Joulfaian (2009) as opposed to Nur-tegin (2008) lacks inclusion of compliance costs and trust variables, Nur-tegin (2008) as opposed to Joulfaian (2009) lacks industrial classification. Our work will tend to combine all these determinants jointly in one regression model, and by that improve significantly model specificiation. In regards to trust, we will distinguish between trust in government and trust in the judicial system. Andreoni et al. (1998) argue in favour of separation between the role and impact of various institutions; as Cowell (1990) points out, in reality government is not a single unit controlling all policies. In practice, it is more likely that there is a very clear distinction between governmental agencies that set tax rates, the probability of audit and the fine rate. For instance, tax rates and audit probability are set by the central government and tax administration agency, while fine rates are set by specific courts. Therefore, measuring the perception of businesses towards each institution separately is necessary. Specifically, business perception towards the quality of courts is a good proxy for both trust and perceived fairness. To control for country characteristics, Nurtegin (2008) measures also Reform Progress (but does not include country dummies), while Joulfaian (2009) includes dummies for country specifics. We create country level dummies. Last, we will control for dynamic changes by adding a year dummy. The year dummies are important not only as additional control variables, but they are also required to ensure adequate statistical specification of the model. There are two good reasons (and hence advantages) for (from) their inclusion: 1) they minimize the effect of cross-group – time specific – common shocks; and 2) they provide adequate information on how the evasive behaviour by firms has changed across the years.

To sum up, our work not only trebles the sample size, but also includes commonly used determinants (tax rate, size, ownership, legal status, corruption) as well as determinants that are in one but not in the other paper. Furthermore we divide trust amongst government and courts in order to get a better picture of fairness and social interaction determinants. In addition, by introducing 2005 data, for the first time we will empirically investigate the impact of the probability of audit on business tax evasion in transition economies, as suggested by tax evasion modelling. Last, through pooled cross-sectional analysis, the time impact will be examined.

5.2 Data Description

The Business Environment and Enterprise Performance Survey (BEEPS) is part of the ongoing work of the EBRD and the World Bank to investigate the extent to which government policies and public services facilitate or impede the environment for investment and business development in Central and Eastern Europe (CEE) (including Turkey) and the Commonwealth of Independent Sates (CIS). BEEPS 2002 has 6,667 enterprises in 28 transitional economies: 16 from CEE (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, FR Yugoslavia (*Federation of Serbia and Montenegro), FYR Macedonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia and Turkey) and 12 from the CIS (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan).

Table 5.2 BEEPS sample size for each country

	Country	2002	2005		Country	2002	2005
1	Albania	200	200	14	Kazakhstan	300	585
2	Armenia	200	320	15	Kyrgyzstan	200	200
3	Azerbaijan	200	320	16	Latvia	200	200
4	Belarus	300	300	17	Lithuania	200	200
5	Bosnia	200	200	18	Moldova	200	350
6	Bulgaria	300	300	19	Poland	550	945
7	Croatia	200	200	20	Romania	300	585
8	Czech Republic	300	300	21	Russia	550	550
9	Estonia	200	200	22	Slovak Republic	200	200
10	FR Yugoslavia	300	300	23	Slovenia	200	200
11	FYR Macedonia	200	200	24	Tajikistan	200	200
12	Georgia	200	200	25	Ukraine	550	550
13	Hungary	300	585	26	Uzbekistan	300	300

Source: BEEPS 2002 and 2005

BEEPS 2005 has 9,654 enterprises in the 28 countries covered by the second round of the BEEPS. Our pooled cross-sectional analysis has a sample of 16,321 firms[27]. Initially, we drop Turkey as we want to focus only on post-communist countries i.e. transition economies, and we also drop Turkmenistan given the lack data for the most important questions. In addition, we drop public enterprises and cooperatives, in order to focus only on the private sector. Thus our final sample is 12,692 firms from 26 transition economies.

Next, we present a brief description of key variables of this chapter, and their construction:

Tax Evasion– Is a measure of the fraction of sales concealed. We derive this question from measuring the level of tax compliance (tax evasion = 100% – tax compliance). The question asked in the 2002 and 2005 surveys was as follows:

> ***Q.58*** *and* ***Q.43a*** *– Recognising the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?*

The respondents were asked to provide a single answer on the level of reporting, measured in percent. The survey does not provide a direct question on compliance. However, as argued in Chapter 3, indirect measures of compliance (and other unlawful activities) are common for survey data[28]. From 12,692 observations, 896 (7%) are left blank. From 11,796 businesses who decided to respond on this question, around 60% have declared full compliance (100%), around 20% are in the region of the 75-99% compliance level, 14% in the region of 50-74%, 3.5% answered 25-49% and around 2.5% believe that firms similar to theirs report only 1-24% of their sales for tax purposes; no responses are observed with 0% compliance. We transform the question from a measure of compliance to a measure of evasion by subtracting the percent of sales reported for tax purposes from 100. Under this transformation 60% of observations have 0% values. Such a distribution shows that our dependent variable is roughly continuous over

[27] Nur-tegin (2008) works on a sample of 4,538, after dropping firms from Albania, Bosnia, Macedonia, Serbia and Turkey, due to the lack of data on non-survey independent variables. Joulfaian (2009) drops public enterprises, in order to focus solely on private sector, and thus is left with 5,740 businesses.

[28] For more on how to conduct evasion questions see Brenan (1980), Hanousek and Palda (2004) and Gerxhani (2006)

strictly positive values, but is zero for a nontrivial fraction of population (Wooldridge, 2003). A sample in which information on the regressand is available only for some observations is known as a censored sample (Gujarati, 2002).

5.2.1 Independent Variables

Tax Rate – is a measure of the tax burden as perceived by businesses. As within the theory, the empirical evidence on the impact of tax rates is quite controversial (for this and empirical reviews of other determinants see Chapter 3). In regards to transition economies, Joulfaian (2009) found a positive and significant relationship between tax rate and evasion, while surprisingly enough, although using the same dataset, Nur-tegin (2008) establishes a negative relationship. One explanation to this discrepancy is, as elaborated earlier, the different sources of tax data used in their respective estimations. We define the relationship between evasion and one of its most important determinants by using a different proxy for the tax rate, that is the perceived burden from tax rates. In our macro investigation of business tax evasion for transition economies we found a positive and significant relationship with evasion, thus our expected sign is *positive*.

The question asked in the 2002 and 2005 surveys is as follows:

> ***Q.80g*** *and* ***Q.54h*** *"Can you tell me how problematic are these different factors for the operation and growth of your business… Tax Rates"*

Four possible answers are reported: (1) no obstacle, (2) minor obstacle, (3) moderate obstacle, and (4) major obstacle. The distribution of these responses shows that 2,262 (18%) are observations with no obstacle, 2,343 (18%) minor obstacle, 3,688 (29%) were moderate obstacle and 4,205 (33%) were major obstacle. Around 1.5% or 193 observations were left blank.

General Corruption – is measure of business' perception towards corruption in their respective country environment. The question asked in 2002 and 2005 surveys is as follows:

> ***Q.51*** *and* ***Q.35c*** *"It is common for firms in my line of business to have to pay some irregular "additional payments/gifts" to get things done" with regard to customs, taxes, licenses, regulations, services etc"*

Six possible answers are reported: (1) never, (2) seldom, (3) sometimes, (4) frequently, (5) usually, and (6) always. The distribution of these responses shows that 3,909 (30.8%) respondents have answered with never, 2,103 (16.6%) were seldom, 2,645 (20.8%) were sometimes, 1,288 (10.1%) were frequently, 938 (7.4%) were usually, and 552 (4.3%) were always. Around 9.9% or 1,260 observations were left blank. Corruption is expected to have a *positive* sign on tax evasion.

Trust – is a measure of the relationship between business taxpayers and their governments. Trust in institutions reflects the perception of citizens towards government responsiveness and fairness (see Jackson and Milliron, 1986; Eriksen and Fallan, 1996; Frey 1997; and Torgler, 2003) thus their behaviour towards tax obligations. Torgler (2007a) argues that increased trust in government, tax administration and legal system tends to increase tax morale (or intrinsic motivation to comply) and thus taxpayers' willingness to contribute voluntarily in tax payments. In measuring trust we distinguish amongst government and courts.

Trust in Government – is one of the most widely studied determinants of tax evasion. We use transparency as a measure of trust towards the government. Frey (1997) recognizes the importance of sharing information and treatment by the authorities towards citizens. If taxpayers feel as partners then honesty among them will be higher compared to the case when they feel as subordinates. BEEPS 2002 and 2005 have a question measuring the level of transparency as perceived by businesses. The question is as follows:

> ***Q.46a*** *and* ***Q.34a****: "To what degree do you agree with the following statements? ... Information on the laws & regulations affecting my firm is easy to obtain"*

Six possible answers are given 1) strongly disagree, (2) disagree in most cases, (3) tend to disagree, (4) tend to agree, (5) agree in most cases, and (6) strongly agree. The distribution of these responses shows that there are 1,040 (8%) observations with strongly disagree answer, 1,337 (11%) were disagree in some cases, 1,981 (16%) tend to disagree, 3,494 (28%) were tend to agree, 2,731 (22%) agree in most cases, and 1,831 (14%) were strongly agree. Around 2% or 281 observations were left blank. The expected sign is *negative*.

Trust in the Legal System – is measured as perception of businesses towards the effectiveness of courts in solving various business disputes. Torgler (2007a) argues that not only trust in government matters, but also trust in courts and in general the legal system to essential to tax conformity behaviour. He further suggests that trust in the legal system leads to acceptance of governments' decisions and produces the incentive to obey the rules. The question asked in BEEPS 2002 and 2005 surveys is as follows:

> ***Q.42** and **Q.28**: "To what degree do you agree with this statement? "I am confident that the legal system will uphold my contract and property rights in business disputes".*

Six possible answers are given 1) strongly disagree, (2) disagree in most cases, (3) tend to disagree, (4) tend to agree, (5) agree in most cases, and (6) strongly agree. The distribution of these responses shows that 1,374 (11%) respondents answered with strongly agree, 1,626 (13%) with disagree in some cases, 2,725 (21%) with tend to disagree, 3,510 (28%) with tend to agree, 2,048 (16%) with agree, and 707 (6%) were always. Around 6% or 702 observations were left blank. The expected sign is *negative.*

Compliance Costs – is a measure of amount of time that senior management spends dealing with various legal requirements. As elaborated in the Chapter III, various studies reveal that the complexity of the tax system has been associated with greater underreporting of tax. Slemrod (1985) argues that taxpayers may eliminate compliance costs (in the short run) by simply not filing returns. The question asked in BEEPS 2002 and 2005 surveys is as follows:

> ***Q.50** and **Q.35a** "What percent of senior management's time in "2001" (respectively "2004") was spent in dealing with public officials about the application and interpretation of laws and regulations and to get or to maintain access to public services?"*

Respondents were asked to provide a single answer on the level time spent, measured in percent. The expected sign is *positive.*

Industrial Classification – is a measure of the firm's major output in a specific operating sector. Cowell (2003) while modelling tax evasion in a competitive market, argues that evasive behaviour tends to be different across industries. Sectors that are more visible to tax administration and are subject to non-cash payments are expected to have less evasive opportunities thus more dutiful behaviour. The question asked in the BEEPS 2002 and 2005 surveys is as follows:

> ***Q.2** and **Q.2** "What percentage of your sales comes from the following sectors in which your establishment operates?"*

Eight possible answers were given 1) mining and quarrying, 2) construction, 3) manufacturing, 4) transport storage and communication, 5) wholesale, retail, repairs, 6) real estate, renting and business services, 7) hotel and restaurants, and 8) other. Answers with multiple percentages are grouped according to the one having the majority share (50% and higher). The distribution of answers is as follows: mining and quarrying 116 (0.9%); construction 1,379 (10.9%); manufacturing 4,410 (34.7%), transport, storage and communication 779 (6.1%); wholesale, retail and repairs (3,552 (28%); real estate, renting and business services 1,133 (8.9%); hotels and restaurants 706 (5.6%) and 617 (4.9%) observations are under Other category. We build a dummy for each sector.

Other Determinants – include *Size*, as measured by the number of employees (Small up to 49; Medium 50-249; and Large 250 – 9999); *Ownership*, as measured by the origin of the main investor (Domestic and Foreign); *Legal Status*, as measured by the legal organization of companies (sole proprietorship, partnership and corporations); and *Year*, as measured by the year when the survey took place (2002 or 2005). Our sample consists of 9,364 (73.8%) small firms, 2,251 (17.7%) medium, and 1,077 (8.5%) large enterprises; of which 11,020 (86.8%) are domestically owned and 1,672 (13.2%) have foreign owners. Of 12,692 surveyed enterprises, 5,295 (41.7%) are registered as sole proprietorships, 3,653 (28.8%) as partnerships, while 3,744 (29.5%) are registered as corporations. Around 36.6% (4,644 observations) belong to BEEPS 2002; with the remaining 63.4% (8,048) belonging to BEEPS 2005. We except size to be negatively related with evasion, foreign firms to be more compliant, proprietorships to express more undutiful behaviour (Nur-tegin, 2008, and Joulfaian, 2009), and last, improvement of compliance over the time. Last we include 25 country level dummies. In all our estimations we exclude and compare dummy results to base dummy FR Yugoslavia (*Serbia and Montegro).

For BEEPS 2005 analysis, two determinants are added:

Audit Probability – is a measure of whether a firm had or did not have any inspections from the tax inspectorate during the past twelve months. We build a dummy variable from the answers provided with values 1 if the firm had any inspection and zero otherwise. The question asked in BEEPS 2005 survey is as follows:

> ***Q.38ba1*** *"How many times in the last 12 months was your establishment either inspected by the following agencies or required to meet with officials from these agencies? … Tax Inspectorate; Inspections/meetings carried out. Yes/No"*

Table 5.3 provides descriptive statistics for pooled cross sectional analysis. Descriptives for the 2005 data including audit are provided later in Section 8. Table 5.4 provides a summary of the variables included in our regressions.

Table 5.3 Descriptive Statistics for Pooled Cross Sectional Analysis

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Max**	**Min**
Tax Evasion	11796	13.09	21.39	99	0
Tax Rate	12498	2.79	1.10	4	1
Trust in Government	12412	3.89	1.46	6	1
Trust in Judicial System	11990	3.45	1.38	6	1
General Corruption	11435	2.55	1.49	6	1
Compliance Costs	12214	5.89	10.66	95	0
Foreign	12692	0.13	0.34	1	0
Medium	12692	0.18	0.38	1	0
Large	12692	0.08	0.28	1	0
Individual	12692	0.29	0.46	1	0
Partnership	12692	0.29	0.45	1	0
Mining	12692	0.01	0.10	1	0
Construction	12692	0.11	0.31	1	0
Manufacturing	12692	0.35	0.48	1	0
Transportation	12692	0.06	0.24	1	0
Wholesale and Retail	12692	0.28	0.45	1	0
Real Estate	12692	0.09	0.29	1	0
Hotels and Restaurants	12692	0.06	0.23	1	0
Dummy Year	12692	0.63	0.48	1	0

Source: STATA 2011

Table 5.4 Summary of variables

Variable	Description	Question	Unit of measurement
Tax Evasion	measure of the fraction of sales concealed	*Q.58 and Q.43a – Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?*	In Percentage (%)
Tax Rate	measure of tax burden as perceived by businesses	*Q.80g and Q.54h "Can you tell me how problematic are these different factors for the operation and growth of your business… Tax Rates"*	1) no obstacle, (2) minor obstacle, (3) moderate obstacle, and (4) major obstacle
Audit Probability	measure of whether a firm had or not any inspections	*Q.38ba1 "How many times in the last 12 months was your establishment either inspected by the following agencies or required to meet with officials from these agencies? … Tax Inspectorate; Inspections/meetings carried out. Yes/No"*	Dummy: Yes and No (base dummy)
Trust in Government	measure of sharing information by central government	*Q.46a and Q.34a: "To what degree do you agree with the following statements? ... Information on the laws & regulations affecting my firm is easy to obtain"*	1) strongly disagree, (2) disagree in most cases, (3) tend to disagree, (4) tend to agree, (5) agree in most cases, and (6) strongly agree.
Trust in Legal System	measure of perception of businesses towards effectiveness of courts in solving various business disputes	*Q.42 and Q.28: "To what degree do you agree with this statement? "I am confident that the legal system will uphold my contract and property rights in business disputes".*	1) strongly dis agree, (2) disagree in most cases, (3) tend to disagree, (4) tend to agree, (5) agree in most cases, and (6) strongly agree

Variable	Description	Question	Unit of measurement
General Corruption	measure of business' perception towards corruption	*Q.51 and Q.35c "It is common for firms in my line of business to have to pay some irregular "additional payments/gifts" to get things done " with regard to customs, taxes, licenses, regulations, services etc"*	(1) never, (2) seldom, (3) sometimes, (4) frequently, (5) usually, and (6) always.
Compliance Costs	measure of amount of time that senior management spends dealing with various legal requirements	*Q.50 and Q.35a "What percent of senior management's time in 2001 was spent in dealing with public officials about the application and interpretation of laws and regulations and to get or to maintain access to public services?"*	In Percentage (%)
Industrial Classification	measure of firm's major output in specific operating sector	*Q.2 and Q.2 "What percentage of your sales comes from the following sectors in which your establishment operates?"*	Dummy for: 1) mining and quarrying, 2) construction, 3) manufacturing, 4) transport storage and communication, 5) wholesale, retail, repairs, 6) real estate, renting and business services, 7) hotel and restaurants, and 8) other (base dummy)
Size	number of employees	*S.4 "How many full-time employees work for this company?"*	Dummy for: Small 2-49 (base dummy); Medium 50-249; and Large 250 – 9999
Ownership	origin of main investor	*S.4c and S.5 "What percentage of your firm is owned by:"*	Dummy for: Domestic (base dummy) and Foreign
Legal Status	legal organization	*S.2 "What is the legal organization of this company?"*	Dummy for: Single Proprietorship, Partnership and corporations (base dummy)

5.3 Basic Regression Model

To investigate the micro determinants of business tax evasion in transition economies, we estimate the following model:

$$TE_i = \beta_0 + \hat{\beta}_1 taxrate_i + \hat{\beta}_2 trustgov_i + \hat{\beta}_3 trustlaw_i + \hat{\beta}_4 corruption_i + +\hat{\beta}_5 compcost_i + \hat{\beta}_6 own_i + \hat{\beta}_7 size_i + \hat{\beta}_8 lstatus_i + \hat{\beta}_9 industry_{it} + \hat{\beta}_{11} country_i + \hat{\beta}_{10} year_i + \varepsilon_i \quad \textbf{(15)}$$

Index *i* refers to observations 1,...,12,692. $\mathbf{TE}_i$ stands for the level of tax evasion for observation i; $\boldsymbol{taxrate_i}$ is the level of the tax burden; $\boldsymbol{trustgov_i}$ trust in government, $\boldsymbol{trustlaw_i}$ trust in courts and the legal system, ; $\boldsymbol{taxcorruption_i}$ business perception about the level of corruption, $\boldsymbol{compcost_i}$ represents firm's compliance costs; $\boldsymbol{ownership_i}$ is firm's ownership type (dummy 1 for foreign and 0 domestic); $\boldsymbol{size_i}$ is the size of the firm; $\boldsymbol{lstatus_i}$ is legal status; $\boldsymbol{industry}$ is the firm's industrial classification; $\boldsymbol{year_i}$ is year dummy (1 for 2005 and 0 for 2002), ***country*** is country level dummy for 26 transition countries (FR Yugoslavia as base dummy) and $\boldsymbol{\varepsilon_{ij}}$ is the usual error term. The next section elaborates on various econometric issues related to the estimation of our model.

5.4 Econometric Issues

In this section we explore the nature of our data, advantages from exploring independent cross sections across time, and potential problems with sample selection bias due to the nature of the dependent variable. We start with a brief outline of the advantages in pooling data. We explore minor problems arising from pooling as well as tools to solve them. On the second part we explore potential sample bias as well as the so far developed methods for addressing this issue. Last we address the issue of censored data.

5.4.1 Pooling Independent Cross Sections across time

BEEPS surveys are repeated at regular intervals of three years. Wooldridge (2003) argues that if a random sample is drawn at each time period, pooling the resulting random samples produces an independently pooled cross section; and this in turn has advantages similar to increase the sample size, getting more precise estimators and test statistics with more power. There are, however, some minor statistical complications, which mainly reflect the fact that the population may have different distributions at different times. Hence, inclusion of dummy variables for the year is required. Inclusion of dummy variable for the years 2002 and 2005 also enables us to understand changes in tax evasion levels over the time, after controlling for other observable factors.

In order to check for structural breaks across time, the Chow test (which is simply an F-test) can be used to determine whether a multiple regression function differs across two groups. As Wooldridge (2003) argues, a good way to compute the Chow test for two time periods is by interacting each variable with a year dummy for one of the two years and testing for joint significance of the year dummy and all of the interaction terms. Following this suggestion, our results show that there is no structural break across time; hence we can pool the independent cross sections.

5.4.2 Sample Selection Bias

The nature of the dependent variable in our study, derived from a survey, reflects a very sensitive issue, that of tax evasion. This in turn might restrict respondents' choices to provide either a truthful or indeed any perception on the phenomenon. Hence, two sources of potential sample bias arise: first, nonresponse may be endogeneous to firm behaviour, therefore the exclusion of missing values might bias estimates (Joulfaian, 2009); and, second, since the dependent variable asks firms to perceive the level of evasion by other firms, a part of the responses declaring full compliance might be false in order to cover a common evasive behaviour by firms (Nur-tegin, 2008). The latter does not deal with "missingness" as such; rather, some of the provided answers are treated as subject to varying degrees of truthfulness, which cannot be observed but which can be proxied by the estimated probability of external review (assumed to be positively related with truthfulness).

The selection bias problem was first acknowledged by Tobin (1958), who argued that if this sample selection problem is not accounted for in the estimation procedure, an ordinary least squares estimation (OLS) will produce biased parameter estimates. Later on, Heckman (1979) introduced a two-step statistical approach known as Heckit, which offers a means of correcting for non-randomly selected samples and provides consistent, asymptotically efficient estimates for all parameters in the model. Both Tobit and Heckit address those cases where the impact of independent variables can affect both the incidence (or intensity) and propensity of an event; in our case it is tax evasion. Tobit assumes that there is a similar effect of independent variables on intensity and propensity. Heckman, on the other side, relaxes this assumption by offering a two step approach. In the first step (selection equation) it measures the impact of independent variables on the propensity. The first step is estimated through a standard Probit. From there, a new variable is generated – known as the Inverse Mills Ratio (IMR) – which is a measure of the propensity (in our case propensity to evade). In the second step, Heckman introduces the IMR to the primary regression; hence measuring the intensity (in our case of tax evasion) – conditional on propensity (to evade).

The standard Heckit procedure starts from a linear regression model (main equation):

$$Y_i = \beta X_i + \varepsilon_i \tag{16}$$

where Y_i is the dependent variable tax evasion, X_i observed variables relating to the i'th observations and $\boldsymbol{\varepsilon_i}$ is an error term. The next step in the Heckman method is to create the selection model which must be estimated using the Probit estimator. The Probit model assumes that the error term follows a standard normal distribution (Heckman 1979). The selection equation is:

$$\mathrm{Wi}^* = \nu Z_i + u_i \tag{17}$$

where Z_i is a vector of exogenous variables determining the selection process or the outcome W_i* only when in the selection equation, W_i* crosses a specific threshold. W_i* is a dichotomous variable with the property that:

$$W_i = \begin{bmatrix} 1 & \text{if} & \mathrm{Wi}^* > 0 \\ 0 & \text{if} & \mathrm{Wi}^* \leq 0 \end{bmatrix} \tag{18}$$

When controlling for "missingness", we investigate whether nonresponse is endogenous to firm behaviour determinants, by generating a dummy from the responsiveness of the dependent variable. Not controlling for missing values may bias the estimates in Equation (15) (Joulfaian, 2009). Hence, Equations (17) and (18) become:

$$DResponse_i = \nu Z_i + u_i$$

$$DResponse_i = \begin{bmatrix} \mathbf{1} & \textbf{if} & DResponse_i^* > \mathbf{0} \\ \mathbf{0} & \textbf{if} & DResponse_i^* \leq \mathbf{0} \end{bmatrix} \tag{19}$$

where $DResponse_i$ is a dummy variable with values 1 if respondents have answered and 0 otherwise. Conditional upon positive responses we estimate Equation (15).

When controlling for "truthfulness", we are interested for the degree of openness by firms, hence we investigate whether the firm had its annual financial statements reviewed by external auditors[29]. In other words, if a firm was subject to review of its statements, then they have fewer reasons to underreport tax evasion. In this vein one can argue that their responses on zero evasion levels may be honest as well. The selection bias becomes an issue when misrepresentation by dishonest firms of their views is systematic in creating too many full compliance answers (Nur-tegin 2008). If, however, the misperception is random then selection bias is not present (Breen, 1996). Hence, Equations (17) and (18) become:

$$DExternal_i = \mathrm{v}\mathrm{Z}_\mathrm{i} + \mathrm{u}_\mathrm{i}$$

(20)

$$DExternal_i = \begin{vmatrix} \mathbf{1} & \mathbf{if} & DExternal_i{*} > \mathbf{0} \\ \mathbf{0} & \mathbf{if} & DExternal_i{*} \leq \mathbf{0} \end{vmatrix}$$

where $DExternal_i$ is a dummy variable with values 1 if respondents have declared that their businesses had external reviewers of their financial statements and 0 otherwise. Conditional upon positive responses we estimate Equation (15).

Once the Heckman selection equation is estimated, the residuals from it are used to form a new variable known as the Inverse Mills Ratio (IMR). Each observation in the study sample receives a value of IMR based on the residual observed for that observation. It is important to note that the IMR is a function not only of observed or measured variables that are included in the selection equation, but also of unobserved or unmeasured variables. These are captured through the error term or residual in the selection equation, and included through the non-linear function used to estimate the IMR. Hence, adding the IMR into the outcome equation introduces a term that attempts to capture both observed and unobserved variables that affect selection, or non-response, so that the model is estimated conditional on some otherwise unobserved selection forces (Sales et al. 2004). The final step in Heckman procedure is to include the IMR as a separate variable in the initial regression models. The last stage then reruns the regression with the inverse Mills ratio included as an extra explanatory variable, thereby removing the part of the error term correlated with the explanatory variables and avoiding the bias. In this case, sample

[29] The question reflecting openness is: *Q.74 and Q.49 - Does your establishment have its annual financial statement reviewed by an external auditor?*

selection bias has been corrected by the selection equation, which determines whether an observation makes it into the nonrandom sample.

In both cases, the final equation, which can be estimated by OLS, can be written as:

$$Y_i = \beta X_i + \theta\lambda_i + \eta_i \tag{21}$$

The conditional expectation of Y_i, given that Y_i is observed is:

$$E[Y_i \mid Wi^* > 0] = \beta X_i + \rho\sigma \frac{\phi\,(Z_i\,\Upsilon)}{\Phi\,(Z_i\,\Upsilon)} \tag{22}$$

where

$$\frac{\phi\,(Z_i\,\Upsilon)}{\Phi\,(Z_i\,\Upsilon)} = E[u_i \mid W_i^* > 0] \tag{23}$$

is the inverse Mills ratio. The inverse Mills ratio, named after John P. Mills, is the ratio of the probability density function to the cumulative distribution function of a distribution. ϕ denotes the standard normal density function, and Φ is the standard normal cumulative distribution function (Greene 2002). In conducting the two step procedure, Heckit estimates rho(ρ), which is the correlation of the residuals in the two equations and sigma (σ) which is the standard error of the residuals of the selection equation. Lambda ($\boldsymbol{\lambda}$), or the coefficient on the inverse Mills ratio, is $\rho * \sigma u_i$. Since $\sigma u_i > 0$, the coefficient on $\boldsymbol{\lambda}$ can only be zero if $\rho = 0$, so testing the null that the coefficient on $\boldsymbol{\lambda}$ is zero is equivalent to testing for sample selectivity (dependent on adequate identifying variables)[30]. In other words, if $\rho = 0$ then $\boldsymbol{\lambda} = \rho\sigma \frac{\phi\,(Z_i\,\Upsilon)}{\Phi\,(Z_i\,\Upsilon)}$ drops out.

Wooldridge (2003) argues that X_i should be a strict subset of Z_i. This has two implications. First, any element that appears as an explanatory variable in the main equation should also be an

[30] A common issue in Heckit procedure is the need to correct standard errors in the outcome equation (Golder 2010). This, for two main reasons: first, in the presence of selection bias, heteroscedasticity problems arise. These can be solved by using robust standard errors; and, second the IMR is estimated with uncertainty as $\hat{\boldsymbol{\lambda}}$ is just an estimator of $\boldsymbol{\lambda}$. For further discussion on how SE's are corrected, see Heckman (1979), Wooldridge (2003) and Greene (2002). Computer packages such as STATA and LIMDEP correct automatically these standard errors.

explanatory variable in the selection equation. A second major implication is that there must be at least one element of Z_i that is not also in X_i. This means that there is a need for a variable that affects selection but does not have a partial effect on Y. In the absence of such an *exclusion restriction variable* the results will be usually the less than convincing. According to Wooldridge (2003) the reason for this is that while the inverse Mills ratio is a nonlinear function of Z_i, it is often well-approximated by a linear function. If Z_i equals X_i, then λ_i can be highly correlated with the elements of X_i. Such multicollinearity can lead to very high standard errors for the $\hat{\beta}_1$. Furthermore, in the absence of a variable that affects selection but not Y, it is extremely difficult, if not impossible, to distinguish sample selection from a misspecified functional form in the main equation.

Having said that, we consider two exclusion restriction variables, each for the sample selection sources that we address. For "missingness", in the selection Equation (19) we use a variable with values 1 if the respondent was an owner and 0 otherwise. The assumption here is that such a proxy serves well in measuring firms' readiness to answer on very sensitive questions, such as the one related to tax evasion. Owners contrary to managers and other groups of respondents are more likely to hide common evasive behaviour (if present) by refusing to answer. Notably, the nature of interviewees, i.e. whether they are owners or managers or share/do not share information, is theoretically insignificant as a determinant of tax evasion. Consequently, we argue that the inclusion of this particular exclusion restriction variable does not appear on the main regression on strong theoretical grounds. The expected sign of dummy variable for owner in the Probit selection equation is *negative.*

For "truthfulness", as a exclusion restriction variable in the selection Equation (20) we use a dummy variable with values 1 if firm applies International Accounting Standards (IAS), and 0 otherwise. By doing so we assume that application of IAS's has a considerable impact on the firms' decision to have external reviewers, but not on the level of tax reporting. Here the expected sign of the IAS dummy in the Probit selection equation is *positive.*

An alternative to the Heckman[31] Two-Step Probit-OLS approach is the Heckman Maximum Likelihood. Joulfaian (2009) applies an extended Heckman ML procedure to the estimates of Tobit equation conditional upon a positive response on a Probit equation (note that standard Heckman Two-Step estimates OLS conditional upon Probit). Given that around 60% of respondents in our data have declared full compliance, i.e. no evasion, the dependent variable has a population distribution that is spread out over a range of positive values but with a pileup at the value zero. Under these circumstances, the extended Heckman ML procedure with Tobit estimation conditional upon a positive response in the Probit selection equation seems quite appealing.

Under this extended Heckman ML, procedure the correlation of the error terms across the two equations is $corr(\varepsilon,u) = \rho$. More importantly, if $\rho = 0$, then there is sufficient evidence to assume that there is no sample selection bias. The estimator here is a full information maximum likelihood (FIML) estimator. In Equation (17), a second step least squares regression is computed in order to obtain starting values for maximum likelihood estimates. As Greene (2002, p.785) argues:

> (estimates) *are corrected for selection, to a degree, but they are still inconsistent. The results given at this point are obtained by least squares, and, as such, are inconsistent in the same manner as the OLS coefficients are in the basic Tobit model. As noted these are just starting values for iterations. The MLE is consistent and efficient.*

Note that in the second-stage Tobit estimation, there is no $\boldsymbol{\lambda}$ variable included, since the estimator is not least squares. This sample selection model is fit by maximum likelihood, hence there is no selection "correction" variable as in the standard Heckit procedure.

31 A notable issue in Heckman Two-Step approach relates to standard errors, which remain problematic for three reasons. As Lin (2007) argues: first, the additional variance that results from the generated regressor - namely the inverse Mills ratio term - must be taken into account. Second, if there is indeed selection, then there is heteroskedasticity. Third, spatial dependence is induced by the fact that a common β is used to construct the estimated inverse Mills ratio for all of the observations. Heckman (1979) includes a consistent variance estimator that deals with all of these problems (for more See Greene 2002 p.785). STATA produces the correct standard errors automatically.

Maximum-likelihood estimation is straightforward. Let f (:) and F(:) be the density function and the cumulative density function for Y*. Then the model implies that the probabilities of observing a non-zero Y and a zero Y are f(Y) and p(Y*<0)=F(0), respectively. Hence, the log-likelihood function for the model is:

$$\ln L = ln\left(\prod_{Y_i>0} f(y_i) \prod_{Y_i=0} F(0)\right) = \sum_{Y_i>0} \ln f(Y_i) + \sum_{Y_i=0} \ln F(0) \tag{24}$$

Because Y* is normally distributed (since the error terms are normally distributed), the density function, the cumulative density function and the log-likelihood function, can all be expressed in terms of the density function and the cumulative density function of the standard normal distribution $\Phi(.)$ and $\phi(.)$. Hence, the log-likelihood function can be written in the familiar form:

$$\ln L = \sum_{Y_i>0} (-\ln\sigma + \ln\Phi(\frac{y_i - x_i\beta}{\sigma})) + \sum_{Y_i=0} \ln F(1 - \phi(\frac{x_i\beta}{\sigma})) \tag{25}$$

Our purpose here is not to provide a full elaboration of maximum likelihood approach, but rather to highlight its essentials; hence, any interested reader may refer to Greene (2002) and Wooldridge (2003) for further exposition.

We note that the ML approach requires stronger assumptions compared to the two-step procedure. For ML, we need to assume that: ε ~ N(0,σ2) ; u ~ N(0, 1); and corr(ε,u) = ρ that is both error terms are normally distributed with mean 0, variances as indicated and the error terms are correlated, where **ρ** indicates the correlation coefficient. The variance of u is normalized to 1 because only Wi, not Wi*, is observed. Due to such assumptions the MLE estimation is not as general as the Two-Step procedure. As Wooldridge (2003) notes, another drawback is that: a) it is less robust than the two-step procedure as relies more heavily on the functional form; and b) sometimes it is difficult to get it to converge. However, MLE estimation will be more efficient if *u* and ε really are jointly normally distributed. In our estimations we consider and report both versions of the Heckman selection procedure.

To sum up, we control for both the “missingness” and “the truthfulness” of answers in our dependent variable. While controlling for “missingness”, the selection variable is a dummy of responses, with values 1 if a response was given and 0 otherwise. A dummy variable controlling for whether the respondent was the owner or not is introduced as exclusion restriction variable. While controlling for "truthfulness", the selection variable is a dummy with values 1 if firms had an external reviewer and 0 otherwise. A dummy variable for application or not of international accounting standards is included as well in the selection equation an exclusion variable. We use the Heckman Selection Two-Step, 'Probit in the first stage – OLS in the second' (STATA) as well as 'Probit in the first stage – Tobit in the second' (LIMPDEP) to control for "missingness" and for "truthfulness".

5.4.3 Tobit Corner Solution

Under the assumption that missing values and truthfulness in the dependent variable are random and present respectively, that is they do not cause any sample selection bias, our final approach should address the issue of data censoring. We do that by using the Tobit Corner Solution. According to Wooldridge (2003), optimizing behaviour often leads to corner solutions for some nontrivial fraction of the population; in other words it is optimal to choose zero evasion. Around 60% of respondents in our data have declared full compliance i.e no evasion, therefore tax evasion has a population distribution that is spread out over a range of positive values, but with a pileup at the value zero. A linear model will likely lead to negative predictions for some of the firms, while taking the natural log is not possible because many observations are at zero. Therefore, the Tobit model, is explicitly designed to model corner solution dependent variables.

The Tobit model is defined as a latent variable model:

$$Y^*{}_{\mathrm{i}} = \beta \mathrm{X}_{\mathrm{i}} + \varepsilon_{\mathrm{i}}$$

$$\varepsilon_{\mathrm{i}}|\mathrm{X}_{\mathrm{i}} \sim \mathrm{N}(0,\sigma^2) \qquad \textbf{(26)}$$

$$\mathrm{Y} = \max(0, Y^*)$$

where Y* is the latent variable satisfying the classical linear model assumptions that the disturbance term is normally distributed and has homoscedastic variance; and that the observed variable, $Y=Y^*$ when $Y^*\geq 0$, but $Y=0$ when $Y^*<0$. Because Y^* is normally distributed, Y has a continuous distribution over strictly positive values.

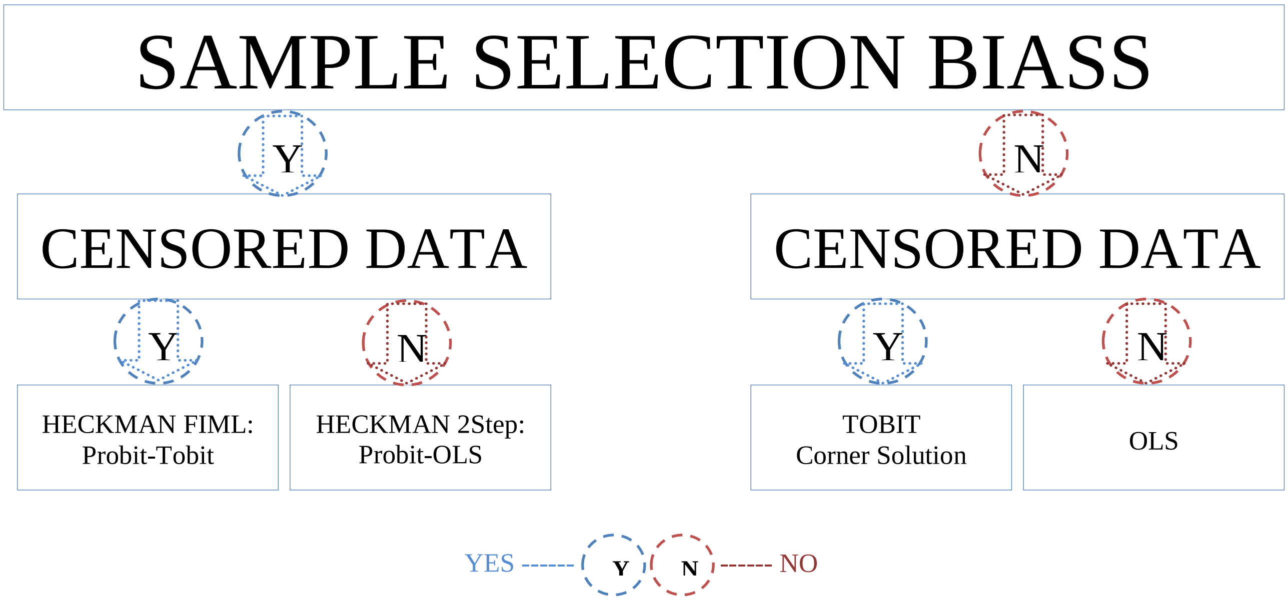
Even though the output of OLS and Tobit are often similar, the interpretation of them differs since in the Tobit model we have to interpret the partial effect of independent variables (Xi) on $E(Y^*|X)$ where Y^* is the latent variable. The variable we are interested in explaining is Y, the observed outcome of tax evasion.

In Tobit models what we obtain is two partial effects on Y, the conditional marginal effect $E(Y|Y>0, X)$ and the unconditional marginal effects $E(Y|X)$. In other words, total change in tax evasion (Y) can be disaggregated into two parts: the change in evasion above the threshold (Y>0), i.e. the incidence of tax evasion, weighted by the probability of being above the threshold; and the change in the probability of being above the threshold, i.e. the propensity to evade, weighted by the expected value of tax evasion.

The conditional effect is a measure of the incidence of tax evasion, while the unconditional effect is a measure of both incidence and propensity (note that Probit is a measure of only propensity). Given that there are two effects, various studies have failed to reach consensus in regards to reporting. Wooldridge (2003) recommends reporting both marginal effects. In addition, he also argues that one way to informally evaluate whether the Tobit model is appropriate is to estimate a Probit model where the binary outcome, W_i, equals one if $Y > 0$, and W= 0 if $Y = 0$; that is generating a dummy with values 1 on every observation with a tax evasion level higher than 0. Then, W_i follows a Probit model, where the coefficient ν_j on some variable X_j is equal to the ratio of Tobit estimates (ratio between Tobit coefficient β_j and Tobit estimated standard deviation of the residual σ); $\nu j=\beta_j/\sigma$. This means that we can estimate the ratio of β_j to σ by Probit for each observation j. If the Tobit model holds, then the Probit estimates ν_j should be "close" to β_j/σ, where $\hat{\beta}_j$ to $\hat{\sigma}$ are Tobit estimates. Due to sampling error, these will never be identical; however the signs and sizes should be close to each other. Wooldridge (2003) also argues that there should be no worry about sign changes or magnitude differences on explanatory variables that are insignificant in both models.

To sum up, our empirical strategy is designed as follows (see Fig. 5.1):

Figure 5.1 Empirical Strategy



We estimate the Heckman Selection FIML (Probit-Tobit) model under the assumptions that there is sample selection bias and that our dependent variable is censored. Conversely, we estimate Heckman Selection Two-Step (Probit-OLS) if the presence of sample selection bias is established and the dependent variable is not censored. The Tobit Corner Solution is estimated in the presence of censored data but not bias from sample selectivity; and, last, OLS is considered if both selection bias in the sample censoring of the dependent variable are not present. Note that sample selection bias is tested for both "missingness" and "truthfulness" of the dependent variable. Consequently, in data with sample selection bias, both Heckman FIML and Heckman Two-Step are run for each assumption of biasness. For nonbiased selection samples, the standard model in Equation (15) is estimated[32].

In the next section, we report and discuss the empirical findings.

[32] Estimation of the above models is performed using STATA 11 and LIMDEP 9.0

5.5 Estimation Results

Our results (for printouts see Appendix 5) show that all estimated effects are in accordance with theory and the previous empirical literature. Moreover, the signs of coefficients remain unchanged across all estimations (selection "missingness"; selection "truthfulness"; and Tobit corner solution), while differences in the SE's are minor in almost all cases. This is encouraging given the need for robustness checks; in particular for the relationship of the tax rate and compliance and its theoretical ambiguity. Tables 5.5 and 5.6 provide sample selection results for both "missingness" and truthfulness". Columns 1 in both tables present Full Information Maximum Likelihood (FIML) results of the extended two stage Heckman Selection procedure (Probit in the first stage, Tobit in the second) while Columns 2 in both tables present standard Two-Step Heckman Selection results (Probit in the first stage, OLS in the second). As argued, given that the dependent variable is censored, the final equation requires a Tobit estimation (hence FILM: Probit-Tobit); while presentation of Two-Step Heckman Selection (Probit-OLS) is done mainly for a robustness check both for sample selection and variable significance. In addition to 5.5 and 5.6, Table 5.7 presents standard Tobit results; and it will serve as the interpretation base if our data do not suffer from sample selection bias.

In Table 5.5, when checking for sample selection bias from "missingness", the indicator of interest is rho (ρ) or the correlation of the error terms across the two equations. Its statistical nonsignificance shows that under the assumption of having good identifying variables, there is a high chance of making type one error by rejecting Ho: there is zero correlation between error terms; that is, sample selectivity problem arising from truthfulness is not present in the given data set. We do not receive such requiring results though from lambda (λ), or the coefficient on the inverse Mills ratio, which appears to be significant at the 5% level in our robust (Probit-OLS) estimation.

Our exclusion restriction variable (respondent is owner) appears to be significant at the 5% level for the Two-Step Heckman Selection; and has a negative sign, supporting thus our theoretical consideration. This result is encouraging as it validates our assumptions in including these particular variables in the selection equation based on strong theoretical grounds. Results from Heckman FIML however, show that the exclusion restrictions have lost their significance. Note that coefficients' sizes of Probit estimations are identical in both Two-Step Heckman (estimated by STATA) and FIML Heckman (estimated by LIMDEP). This ensures us that the procedure is run correctly, however we do not know (and unfortunately no explanation is given in the manual) how the SE's are calculated in LIMDEP or what is the difference between the LIMDEP SE's and those estimated by STATA. Regardless of that, given the results, one can fairly conclude that sample selection bias caused by missingness is not an issue in our data. Our next step is to check for sample selection bias from "truthfulness".

At this point we note that our preferred model is Heckman FIML, because: 1) the dependent variable is censored; and 2) the Heckman Two-Step model is provided as a robustness check in particular of the adequacy of the identifying variable in the selection equation (suggested by the significance of the exclusion restriction variable in the main equation and of the coefficient in the Probit selection equation. Given this robustness check, it is reasonable to assure that any selection bias is controlled for in the Heckman FIML estimates and that the relatively large SE on rho (ρ) does not reflect inadequate – weak – identification of the Probit selection equation.

Table 5.6 shows Heckman results for "truthfulness". Again the indicators of interest here are rho (ρ), or the correlation of the error terms across the two equations as well as lambda (λ), or the coefficient on the inverse Mills ratio; depending on whether we are using FIML Heckman ot Two-Step Heckman. Results from both these indicators show that even under the assumption of having good identifying variables, there is high chance of making type one error by rejecting *Ho: there is zero correlation between error terms*; that is, sample selectivity problem arising from dishonest answers is not present in the given data set. The results show that our exclusion restriction variable (having external reviewer/auditor) appears to be significant at the 1% level across both estimations; the sign is positive, supporting hence our theoretical hypothesis that firms which apply International Accounting Standards are more likely to have independent external reviewers/auditors. This result is encouraging as it validates our assumptions in including this particular variable in the selection equation based on strong theoretical grounds.

Table 5.5 Sample Selection Bias from 'Missingness'

	HECKMAN FIML 1 – Equation (19)						HECKMAN TWO STEP 2 – Equation (20)					
	Main TOBIT			**Selection** PROBIT			**Main** OLS			**Selection** PROBIT		
Dependent Variable:	**Tax Evasion**			**D Response**			**Tax Evasion**			**D Response**		
	Coeff		S.E	Coeff		S.E	Coeff		S.E	Coeff		S.E
Tax Rate	2.61	***	0.49	0.06	*	0.03	0.89	***	0.23	0.06	*	0.02
Trust												
Trust in Government	-0.74	**	0.32	0.22		0.27	-0.34	**	0.15	0.22		0.22
Trust in Judicial System	-1.24	***	0.36	0.28		0.29	-0.53	***	0.17	0.28	*	0.02
General Corruption	7.11	***	0.36	0.38		0.29	2.90	***	0.16	0.38		0.02
Compliance Costs	0.13	***	0.40	0.00		0.00	0.08	***	0.02	0.00		0.00
Ownership												
Foreign Firm	-6.37	***	1.42	0.00		0.11	-2.51	***	0.65	0.00		0.06
Size												
Medium	-7.65	***	1.30	-0.13		0.10	-3.21	***	0.60	-0.13	*	0.05
Large	-10.3	***	1.78	-0.11		0.13	-3.97	***	0.81	-0.11		0.07
Legal Status												
Individual	7.01	***	1.32	-0.04		0.10	2.84	***	0.62	-0.04		0.06
Partnership	2.87	**	1.44	-0.08		0.12	0.90		0.67	-0.08		0.06
Industry Sector												
Mining	-9.3	*	5.49	0.06		0.46	-4.17	*	2.34	0.06		0.24
Construction	-3.14		2.44	-0.06		0.21	-1.67		1.17	-0.06		0.11
Manufacturing	-2.87		2.21	-0.04		0.19	-1.71		1.06	-0.04		0.10
Transportation	-7.29	***	2.79	-0.16		0.22	-3.53	***	1.32	-0.16		0.12
Wholesale and Retail	-3.38		2.19	-0.02		0.19	-1.65		1.06	-0.02		0.10
Real Estate	-3.04		2.52	-0.16		0.20	-1.44		1.23	-0.16		0.11
Hotels and Restaurants	4.54		2.89	-0.15		0.22	1.77		1.37	-0.15		0.12
Exclusion Restriction Variable												
Respodent is Owner				-0.13		0.09				-0.13	**	0.05
Constant	-14.1	**	6.18	0.88	**	0.36	10.1	***	3.03	0.88	***	
Year Dummy	-10.0	***	2.09	0.58	***	0.08	-2.95	***	1.05	0.58	***	
Country Level Dummies	Yes			Yes			Yes					
Rho	0.12		0.45									
Lambda (λ)							18.2	**	0.19			
Number of observations	10303						10303					

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance;

Table 5.6 Sample Selection Bias from 'Truthfulness'

	HECKMAN FIML						**HECKMAN TWO STEP**					
	1 – Equation (19)						**2 – Equation (20)**					
	Main			**Selection**			**Main**			**Selection**		
	TOBIT			PROBIT			OLS			PROBIT		
Dependent Variable:	**Tax Evasion**			Dummy External			**Tax Evasion**			Dummy External		
	Coeff		S.E	Coeff		S.E	Coeff		S.E	Coeff		S.E
Tax Rate	3.22	***	0.74	-0.02	*	0.01	0.80	***	0.29	-0.02	*	0.01
Trust												
Trust in Government	-1.81	***	0.51	0.02	***	0.01	-0.96	***	0.21	0.02	***	0.01
Trust in Judicial System	-1.47	**	0.57	0.00		0.01	-0.69	***	0.23	0.00		0.01
General Corruption	6.65	***	0.55	0.01		0.01	2.30	***	0.21	0.01		0.01
Compliance Costs	0.12	*	0.06	0.00	***	0.00	0.07	***	0.02	0.00	***	0.00
Ownership												
Foreign Firm	-6.99	***	2.14	0.40	***	0.05	-2.55	***	0.88	0.40	***	0.04
Size												
Medium	-8.63	***	2.47	0.60	***	0.04	-3.27	***	1.00	0.60	***	0.04
Large	-11.1	***	3.23	0.95	***	0.07	-3.45	**	1.33	0.95	***	0.06
Legal Status												
Individual	7.25	***	2.50	-0.40	***	0.04	3.26	***	1.00	0.40	***	-0.40
Partnership	3.87	*	2.20	-0.17	***	0.04	1.77	**	0.88	0.17	***	-0.17
Industry Sector												
Mining	-1.20		8.71	0.19		0.17	-1.60		3.12	0.19		0.19
Construction	2.15		4.42	0.13	*	0.07	0.50		1.84	0.13		0.13
Manufacturing	-0.31		4.11	0.19	***	0.06	-0.75		1.71	0.19	**	0.19
Transportation	-8.21	*	4.88	0.15	*	0.08	-3.67	*	1.99	0.15	*	0.15
Wholesale and Retail	-2.82		4.10	0.11	*	0.06	-1.51		1.71	0.11		0.11
Real Estate	2.62		4.57	0.00		0.07	0.88		1.91	0.00		0.00
Hotels and Restaurants	11.2	**	5.06	0.00		0.08	4.35	**	2.11	0.00		0.00
Exclusion Restriction Var.												
International Accounting Standards				0.58	***	0.04				0.58	***	0.03
Constant	-15.3	*	8.31	-0.77	***	0.13	15.8	***	3.65	-0.77	***	0.14
Year Dummy	-9.70	***	1.57	0.07	**	0.03	-4.30	***	0.64	0.75	**	0.03
Country Level Dummies	Yes			Yes			Yes			Yes		
Rho	0.02		0.12									
Lambda (λ)							0.37		0.84			
Number of observations	8818						8818					

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

We also note that in terms of signs of coefficients, there is no evident difference between FIML: Probit-Tobit estimation and Two-Step: Probit-OLS estimation; majority of variables hold same signs and statistical significance – serving to our arguments for robustness results.

As elaborated in Fig. 5.1, under the assumption of the non-existence of sample selection bias, our final choice is Tobit Corner Solution, given the censored nature of the dependent variable. Tobit results are shown in Table 5.7, with Column 1 representing standard Tobit estimations (left censored dependent variable). In order to evaluate whether the Tobit model is appropriate, we estimate a Probit with dummy variable tax evasion (1 if evasion occurs and zero otherwise). We then divide the Tobit coefficients by sigma (from Tobit) and obtain $\nu_j=\beta_j/\sigma$ (ratio between Tobit coefficient β_j and Tobit estimated standard deviation of the residual σ). As can be seen from Column 2, the relative-to-sigma ν_j coefficients are very close (almost identical) to Probit, suggesting that the choice of using Tobit is legitimate.

For many models, including Tobit, the pseudo-R2 has no real meaning (STATA 2011). Wooldridge (2003, p.529) argues that:

> *we should remember that the Tobit estimates are not chosen to maximize an R-squared—they maximize the log-likelihood function—whereas the OLS estimates are the values that do produce the highest R-squared.*

Note that the Tobit results are almost identical with the converged FIML Heckman' estimations. This is of no surprise as second stage in FIML Heckman is run using Tobit. These similarities serve as strong robust check that sample selection bias is not present in our data (under the presence of severe sample selection bias the Heckman results would be substantially different). For this reason, we interpret our Tobit estimates without further reference to the very similar FIML results.

As argued previously, we cannot interpret straightforward the β coefficient as the effect of Xi on Yi, as one would do with a linear regression model. Instead, it should be interpreted as the combination of (1) the change in Yi of those above the limit, weighted by the probability of being above the limit; and (2) the change in the probability of being above the limit, weighted by the expected value of Yi if above. Hence we derive two marginal effects: conditional (Column 3)

Table 5.7 TOBIT estimation results

	TOBIT			Probit	βj/σ	Conditional Marginal Effects			Unconditional Marginal Effects		
	1			**2**		**3**			**4**		
Dependent: **Tax Evasion**	Coeff		Robust S.E	Coeff		Coeff		S.E	Coeff		S.E
Tax Rate	2.55	***	0.73	0.08	0.07	0.81	***	0.22	1.06	***	0.29
Trust											
Trust in Government	-0.76	*	0.39	-0.02	-0.02	-0.24	**	0.12	-0.32	**	0.16
Trust in Judicial System	-1.27	**	0.52	-0.03	-0.03	-0.40	**	0.16	-0.52	**	0.21
General Corruption	7.08	***	0.46	0.21	0.19	2.26	***	0.13	2.95	***	0.17
Compliance Costs	0.13	***	0.04	0.00	0.00	0.04	***	0.01	0.05	***	0.01
Ownership											
Foreign Firm	-6.39	***	1.55	-0.16	-0.17	-1.97	***	0.46	-2.51	***	0.57
Size											
Medium	-7.57	***	1.34	-0.21	-0.20	-2.33	***	0.40	-2.96	***	0.51
Large	-10.3	***	2.05	-0.28	-0.27	-3.08	***	0.57	-3.85	***	0.69
Legal Status											
Individual	7.07	***	2.06	0.19	0.19	2.28	***	0.67	2.99	***	0.88
Partnership	2.95		2.16	0.09	0.08	0.95		0.70	1.24		0.93
Industry Sector											
Mining	-10.0	**	4.23	-0.21	-0.27	-2.96	***	1.14	-3.68	***	1.33
Construction	-3.09		1.96	-0.08	-0.08	-0.97		0.59	-1.25	*	0.75
Manufacturing	-2.82	**	1.38	-0.07	-0.08	-0.89	**	0.43	-1.16	**	0.55
Transportation	-7.16	***	2.15	-0.20	-0.19	-2.18	***	0.61	-2.75	***	0.74
Wholesale and Retail	-3.36	**	1.57	-0.10	-0.09	-1.06	**	0.49	-1.37	**	0.63
Real Estate	-2.91		1.88	-0.14	-0.08	-0.91		0.57	-1.17		0.73
Hotels and Restaurants	4.68	**	2.29	0.11	0.12	1.55	**	0.79	2.05	*	1.06
Constant	-12.8	***	4.53	-0.62	-0.34						
Year Dummy	-10.50	***	2.92	-0.25	-0.28	-3.45	***	0.96	-4.55	***	1.26
Country Level Dummies	Yes			Yes		Yes			Yes		
Pseudo R2	0.03										
Sigma	37.6										
Number of observations	9705										
Left-Censored Observations	5642										
Uncensored Observations	4063										
Right-Censored Observations	0										

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

and unconditional (Column 4). There is no clear cut recommendation on the preferable marginal effect but, since coefficient sizes are almost the same and since the unconditional marginal effect applies to the whole sample, we will interpret only Column 4.

Our results show that the association between *tax rate* and tax evasion is positive and significant at the 1% level. An increase in the tax rate barrier by one category increases tax evasion by 1.06 percentage points, holding other factors constant. The relationship between c*orruption* and tax evasion is also positive and statistically significant at the 1% level. All other things held constant, a rise of perception of corruption by tax officials by one level increases tax evasion by 2.95 percentage points. A positive relationship is observed also between *Compliance costs* and tax evasion, at the 1% level of significance, although the impact seems to be quite small.

As expected, *Trust* variables are negatively related to evasive behaviour by firms. *Trust in government* is statistically significant at the 5% level. A rise in transparency by one level, reduces tax evasion by 0.32 percentage points. *Trust on judicial system* is also statistically significant at the 5% level and is negatively related to tax evasion; for every positive change in satisfaction by one category, tax evasion reduces by almost 0.52 percentage points.

Firm related determinants, *ownership, size* and *legal status* have the highest coefficients while their statistical significance is strong (at 1% level)[33]. Evasion drops by around 2.51 percentage points if firm is owned by *foreign* entrepreneurs, compared with domestic owners. Compared to s*mall* firms, less evasion is reported by *medium* and large *businesses*. All other factors held constant, *medium* firms are more compliant than *small* firms by 2.96 percentage points, while this gap is extended (in absolute terms) with *large* firms to 3.85 percentage points; who evade around 1 percentage point less than *medium*. The estimates also point to higher levels of evasion if the firm is *individual* or a *partnership* as compared to *corporate*. The estimated coefficient is 2.99 for individual, followed by an estimate of 1.24 for partnerships.

Firms in various *industry* sectors tend to have different compliance behaviour. Compared to '*Other'* (base category), firms operating in *'Hotels and restaurants'* appear to be most evasive (coefficient of 2.05 and statistically significant at 10% level), followed by firms in

[33] Apart from *partnership* variable which does not to be statistically significant.

'Manufacturing' (-1.16 and statistically significant at 5% level), '*Real estate, renting and business services'* (-1.17), *'Construction'* sector (-1.25 and statistically significant at 10% level), *'Wholesale, retail and repairs*' (-1.37 and statistically significant at 5% level), and *'Transport storage and communication'* (-2.75, and statistically significant at 1% level). Firms operating in *'Mining and quarrying'* have lowest evasive behaviour. Ceteris paribus, firms in this sector evade by 3.68 percentage points less than 'Other'; the statistical significance of this category is at 1% level.

Last, the period dummy suggest that, at the 1% level of significance, compared to the base year (2002), tax evasion falls in 2005 by respectively 4.55 percentage points. The statistical significance of the year dummies becomes more important given the relevance for the inclusion of these particular variables. Results for country level dummies are included in Appendix 5.

5.6 Audit Rate

In addition to pooling two independent cross sectional data sets, we conduct a separate analysis involving only the BEEPS 2005 dataset. This is done in order to account for one specific variable: the audit probability. To our knowledge, there has been no study so far on the relationship between audit probability and business tax evasion in TEs, because data on actual inspection rates are unobservable for the most of these countries. Tax measurement programmes in TEs are rare, and commonly unavailable for researchers. The only attempt so far to analyse audit probability in business tax evasion for transition economies was made in Nur-tegin (2008); however, as argued in Section 5.3 we tend to disagree with the proxy used in this study, which is the review of end of year financial statements by accounting auditors. Instead we use actual tax inspections carried out by the respective tax inspectorates, as declared by businesses.

BEEPS 2005 has 9,655 observations for 28 transition economies, including Turkey. We exclude Turkey in order to focus solely on post-communist countries; as well as public enterprises and cooperatives in order to focus only on the private sector; and we exclude Turkmenistan given the lack of information for some of the most important determinants. The remaining sample of 8,048 enterprises in BEEPS 2005 includes only 325 missing values on the dependent variable. This relatively low rate of missing values (approximately 4%), in missing data literature is considered to be trivial. Samples with missing values below 5% are commonly dropped (SPSS, 2010):

> *When there are few missing values (very roughly, less than 5% of the total number of cases) and those values can be considered to be missing at random; ... then the typical method of listwise deletion is relatively "safe"(p.1)*

Given the proportion of missing values, one would not expect any major changes in the results even if nonresponse might, in principle, cause bias. Hence, we drop all the missing values on our dependent variable, and thus remain with a final sample of 7,683 firms.

The variables of interests are already explored in Section 5.4. Once including tax audit probability the basic regression model (1), becomes[34]:

$$TE_i = \beta_0 + \hat{\beta}_1 taxrate_i + \hat{\beta}_2 audit + \hat{\beta}_3 trustgov_i + \hat{\beta}_4 trustlaw_i + \ \hat{\beta}_5 corruption_i + +\hat{\beta}_6 compcost_i + \hat{\beta}_7 own_i + \hat{\beta}_8 size_i + \ \hat{\beta}_9 lstatus_i + \ \hat{\beta}_{10} industry_{it} + \hat{\beta}_{11} country_i + \varepsilon_i \tag{27}$$

Since sample selection bias from "missingness" is not an issue in the 2005 data, we are left with potential sample selection bias from "truthfulness". As argued previously, the assumptions and identifying variables to assess and correct respectively such bias remain strongly supported. Here again we use the same approach as elaborated in Fig 1. We estimate a Heckman Selection FIML (Probit-Tobit) model and a Heckman Selection Two-Step (Probit-OLS) model. If the presence of sample selection bias is established, we report the Heckman results, otherwise, we estimate the Tobit Corner Solution to address the presence of censored data but not bias on sample selectivity.

Table 5.8 reports descriptive statistics on the variables used in Equation (27).

[34] Note that here we also exclude year dummy as now we are treating only data from 2005. The methodology applied here is similar to the one elaborated in Section 5.6.

Table 5.8 Descriptive Statistics for 2005

Variable	Obs.	Mean	Std. Dev.	Min	Max
Tax Evasion	7683	10.72	18.77	0.00	98.00
Tax Rate	7570	2.80	1.09	1.00	4.00
Audit	5647	2.49	6.30	0.00	99.00
Trust in Government	7522	3.89	1.45	1.00	6.00
Trust in Judicial System	7290	3.45	1.37	1.00	6.00
General Corruption	6851	2.44	1.47	1.00	6.00
Compliance Costs	7478	4.97	9.91	0.00	95.00
Foreign	7683	0.10	0.31	0.00	1.00
Medium	7683	0.18	0.38	0.00	1.00
Large	7683	0.07	0.26	0.00	1.00
Individual	7683	0.44	0.50	0.00	1.00
Partnership	7683	0.28	0.45	0.00	1.00
Mining	7683	0.01	0.10	0.00	1.00
Construction	7683	0.10	0.30	0.00	1.00
Manufacturing	7683	0.41	0.49	0.00	1.00
Transportation	7683	0.06	0.23	0.00	1.00
Wholesale and Retail	7683	0.25	0.43	0.00	1.00
Real Estate	7683	0.08	0.28	0.00	1.00
Hotels and Restaurants	7683	0.05	0.22	0.00	1.00

Source: BEEPS 2005

5.6.1 Estimation Results for 2005

Table 5.9 represents results from sample selection techniques. Again the indicators of interest here are rho (ρ) or the correlation of the error terms across the two equations as well as lambda (λ), or the coefficient on the inverse Mills ratio; depending on whether we are using FIML Heckman ot Two-Step Heckman. Results from both these indicators show that, under the assumption of having good identifying variables, there is high chance of making type one error by rejecting *Ho: there is zero correlation between error terms*; that is, sample selectivity problem arising from dishonest answers is not present in the given data set.

It is important to note also that our exclusion restriction variable (*international accounting standards*) appears to be significant at the 1% level for both FIML and Two-Step Heckman Selections; and has a positive sign, supporting thus our theoretical consideration. This result is encouraging as it, again, validates our assumptions in including these particular variables in the selection equation based on strong theoretical grounds. Given that sample selection bias is not an issue in BEEPS 2005 dataset we continue with Tobit estimations.

Results for the 2005 data are shown in Table 5.10, with Column 1 representing standard Tobit estimations (left censored dependent variable). In order to evaluate whether the Tobit model is appropriate, we estimate a Probit with dummy variable tax evasion (1 if evasion occurs and zero otherwise). We then divide Tobit coefficients by sigma (from Tobit) and obtain $\nu_j=\beta_j/\sigma$ (ratio between Tobit coefficient β_j and Tobit estimated standard deviation of the residual σ). As can be seen from Column 2, the relative-to-sigma ν_j coefficients are very close (almost identical) to Probit, suggesting that the choice of using Tobit for 2005 data is adequate. As argued previously, we derive two marginal effects: conditional (Column 3) and unconditional (Column 4).

The first observation from the 2005 analysis is that all estimated effects are in accordance with theory and the previous empirical literature. The signs of each variable in the 2005 analysis are the same as are the results from our pooled cross section. Moreover the size of the estimated coefficients is almost identical. The statistical significance of the variables generally remains the same.

Table 5.9 BEEPS 2005 Sample Selection Bias from 'Truthfulness'

	HECKMAN FIML 1 – Equation (19)				HECKMAN TWO STEP 2 – Equation (20)			
	Main TOBIT		**Selection** PROBIT		**Main** OLS		**Selection** PROBIT	
Dependant Variable:	**Tax Evasion**		Dummy External		**Tax Evasion**		Dummy External	
	Coeff	S.E	Coeff	S.E	Coeff	S.E	Coeff	S.E
Tax Rate	3.86 ***	0.97	-0.02	0.01	1.08 ***	0.34	-0.02	0.01
Audit Rate	-0.13	0.16	0.00	0.00	-0.03	0.05	0.00	0.00
Trust								
Trust in Government	-1.91 ***	0.64	0.03 **	0.01	-0.91 ***	0.24	0.03 **	0.01
Trust in Judicial System	-1.26 *	0.70	0.00	0.01	-0.58 **	0.26	0.00	0.01
General Corruption	7.04 ***	0.69	0.01	0.01	2.26 ***	0.24	0.01	0.01
Compliance Costs	0.44	0.08	0.00 *	0.00	0.04	0.03	0.00 *	0.00
Ownership								
Foreign Firm	-3.64	2.93	0.42 ***	0.07	-1.16	1.06	0.42 ***	0.06
Size								
Medium	-5.78 *	3.28	0.59 ***	0.05	-1.95	1.21	0.59 ***	0.05
Large	-8.42 *	4.41	0.95 ***	0.10	-1.87	1.70	0.95 ***	0.08
Legal Status								
Individual	7.66 **	3.49	-0.47 ***	0.05	3.11 **	1.26	-0.47 ***	0.05
Partnership	5.66 **	2.79	-0.18 ***	0.06	2.10 **	1.02	-0.18 ***	0.06
Industry Sector								
Mining	5.96 **	10.5	0.34	0.23	2.60	3.55	0.34	0.21
Construction	6.73	6.44	0.19 *	0.10	2.73	2.36	0.19 *	0.11
Manufacturing	5.93	5.99	0.30 ***	0.09	2.89	2.21	0.30 ***	0.10
Transportation	-4.01	7.05	0.25 **	0.11	-0.74	2.51	0.25 **	0.12
Wholesale and Retail	1.74	6.10	0.19 *	0.09	1.37	2.23	0.19 *	0.10
Real Estate	7.89	6.49	0.10	0.10	3.69	2.43	0.10	0.11
Hotels and Restaurants	15.7 **	7.02	0.14	0.11	6.65 **	2.65	0.14	0.13
Exclusion Restriction Var.								
Int. Accounting Standards			0.51 ***	0.05				
Constant	-47.5 ***	12.1	-0.99 ***	0.16	-1.01	4.62	-1.00 ***	0.18
Country Level Dummies	Yes		Yes		Yes		Yes	
Rho	0.12	0.19						
Lambda (λ)					2.01	2.47		
Number of observations	5647				5922			

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

Table 5.10 BEEPS 2005 TOBIT Estimation Results

	TOBIT			Probit	βj/σ	Conditional Marginal Effects			Unconditional Marginal Effects		
	1			**2**		**3**			**4**		
Dependent: **Tax Evasion**	Coeff		Robust S.E	Coeff		Coeff		S.E	Coeff		S.E
Tax Rate	2.54	***	0.92	0.08	0.07	0.76	***	0.26	0.95	***	0.33
Audit	-0.00		0.08	-0.00	0.00	-0.00		0.02	-0.00		0.03
Trust											
Trust in Government	-0.62		0.52	-0.02	-0.02	-0.18		0.15	-0.23		0.19
Trust in Judicial System	-1.19		0.75	-0.02	-0.03	-0.35		0.22	-0.44		0.28
General Corruption	7.71	***	0.54	0.23	0.21	2.30	***	0.14	2.87	***	0.17
Compliance Costs	0.03		0.05	0.00	0.00	0.01		0.01	0.01		0.02
Ownership											
Foreign Firm	-4.82	**	1.99	-0.12	-0.13	-1.39	**	0.55	-1.70	**	0.66
Size											
Medium	-7.41	***	1.39	-0.20	-0.21	-2.13	***	0.38	-2.58	***	0.44
Large	-8.76	***	2.27	-0.24	-0.24	-2.46	***	0.60	-2.93	***	0.68
Legal Status											
Individual	7.76	***	2.18	0.22	0.22	2.34	***	0.66	2.94	***	0.84
Partnership	3.25		2.41	0.08	0.09	0.98		0.73	1.23		0.93
Industry Sector											
Mining	-6.99		7.16	-0.14	-0.19	-1.97		1.90	-2.36		2.16
Construction	-1.04		3.37	-0.01	-0.03	-0.31		0.99	-0.38		1.22
Manufacturing	-1.93		2.60	-0.05	-0.05	-0.57		0.77	-0.71		0.96
Transportation	-6.09	*	3.34	-0.04	-0.17	-1.74	*	0.90	-2.10	**	1.05
Wholesale and Retail	-2.44		2.78	-0.07	-0.07	-0.72		0.81	-0.89		1.00
Real Estate	-2.72		2.99	-0.13	-0.08	-0.79		0.86	-0.98		1.04
Hotels and Restaurants	5.06		3.13	0.05	0.14	1.57		1.00	2.01		1.31
Constant	-33.9	***	6.16	-1.17	-0.94						
Country Level Dummies	Yes			Yes		Yes			Yes		
Pseudo R2	0.03										
Sigma	35.9										
Number of observations	6218										
Left-Censored Observations	3856										
Uncensored Observations	2362										
Right-Censored Observations	0										

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

Our variable of interest in 2005 is *audit rate*, which is estimated with a sign in line with theoretical expectations (both in Tobit and Heckman FIML estimation). However, the dummy variable on tax inspection occurring in a firm during the past twelve months (as opposed to not) is not statistically significant across all estimations. Unconditional marginal effects from the Tobit results show that, all other things equal, firms that had no inspections are more likely to evade by compared to the firms that were audited. However the size of the audit coefficient remains low. Inability to provide a statistical significance on the audit is quite unfortunate given the data availability for transition countries. The sign of this variable might however, serve for some indication and expectancy for future research in this direction.

Table 5.11 contains all relevant empirical results presented so far. Because of spacing we present only final estimations (corrected estimations for sample selection biases) as well as the standard Tobit results. As can be seen, the coefficients, signs and levels of statistical significance are quite robust and do not vary much regardless of the empirical choices we apply. This is quite encouraging given the need for robustness in reporting the most important determinants of tax evasion.

Table 5.11 Summary of results

Dependent: **TAX EVASION**	BEEPS 2002 and 2005						BEEPS 2005			
	MISSINGNESS		TRUTH		TOBIT		TRUTH		TOBIT	
	1	2	3	4	5	6	7	8	9	10
	FIML	2STEP	FIML	2STEP	COND	UNCON	FIML	2STEP	COND	UNCOND
Tax Rate	2.61 ***	0.89 ***	3.22 ***	0.80 ***	0.81 ***	1.06 ***	3.86 ***	1.08 ***	0.76 ***	0.95 ***
Audit Rate							-0.13	-0.03	-0.00	-0.00
Trust										
Trust in Government	-0.74 **	-0.34 **	-1.81 ***	-0.96 ***	-0.24 **	-0.32 **	-1.91 ***	-0.91 ***	-0.18	-0.23
Trust in Judicial System	-1.24 ***	-0.53 ***	-1.47 **	-0.69 ***	-0.40 **	-0.52 **	-1.26 *	-0.58 **	-0.35	-0.44
General Corruption	7.11 ***	2.90 ***	6.65 ***	2.30 ***	2.26 ***	2.95 ***	7.04 ***	2.26 ***	2.30 ***	2.87 ***
Compliance Costs	0.13 ***	0.08 ***	0.12 *	0.07 ***	0.04 ***	0.05 ***	0.44	0.04	0.01	0.01
Ownership										
Foreign Firm	-6.37 ***	-2.51 ***	-6.99 ***	-2.55 ***	-1.97 ***	-2.51 ***	-3.64	-1.16	-1.39 **	-1.70 **
Size										
Medium	-7.65 ***	-3.21 ***	-8.63 ***	-3.27 ***	-2.33 ***	-2.96 ***	-5.78 *	-1.95	-2.13 ***	-2.58 ***
Large	-10.3 ***	-3.97 ***	-11.1 ***	-3.45 **	-3.08 ***	-3.85 ***	-8.42 *	-1.87	-2.46 ***	-2.93 ***
Legal Status										
Individual	7.01 ***	2.84 ***	7.25 ***	3.26 ***	2.28 ***	2.99 ***	7.66 **	3.11 **	2.34 ***	2.94 ***
Partnership	2.87 **	0.90	3.87 *	1.77 **	0.95	1.24	5.66 **	2.10 **	0.98	1.23
Industry Sector										
Mining	-9.3 *	-4.17 *	-1.20	-1.60	-2.96 ***	-3.68 ***	5.96 **	2.60	-1.97	-2.36
Construction	-3.14	-1.67	2.15	0.50	-0.97	-1.25 *	6.73	2.73	-0.31	-0.38
Manufacturing	-2.87	-1.71	-0.31	-0.75	-0.89 **	-1.16 **	5.93	2.89	-0.57	-0.71
Transportation	-7.29 ***	-3.53 ***	-8.21 *	-3.67 *	-2.18 ***	-2.75 ***	-4.01	-0.74	-1.74 *	-2.10 **
Wholesale and Retail	-3.38	-1.65	-2.82	-1.51	-1.06 **	-1.37 **	1.74	1.37	-0.72	-0.89
Real Estate	-3.04	-1.44	2.62	0.88	-0.91	-1.17	7.89	3.69	-0.79	-0.98
Hotels and Restaurants	4.54	1.77	11.2 **	4.35 **	1.55 **	2.05 *	15.7 **	6.65 **	1.57	2.01

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

Conclusion

The standard economic model of tax evasion (Allingham and Sandmo, 1972) when assessing the relationship between tax rate and evasion provided two counteracting effects: income and substitution. Business modelling, on the other side, showed that the theoretical predictions on this regards are very sensitive to the assumptions made, but with most studies suggesting ambiguity. As with the theory, the empirical evidence on the impact of tax rates is quite controversial. Even in works dealing with TEs, when the same datasets were used (BEEPS 2002), the established results were opposing. While Nur-tegin (2008) finds a negative relationship between tax rate and evasion, Joulfaian (200) finds a positive relationship. In our study the impact of tax rate on tax evasion is positive and this result remains robust regardless of differences in the models estimated. Moreover, the impact of the tax rate on evasion is highly significant for both Tobit estimations of pooled cross section and separately for the 2005 analysis. These results suggest that increasing taxes for businesses in transition economies leads to higher levels of tax evasion.

Evasive behaviour becomes more understandable once institutional variables are included. Firm's decisions are largely impacted by the treatment they receive from respective governments and courts. As expected, trust in government and courts remains negatively related with tax evasion. Corruption findings are in line with the Nur-tegin (2008) and Joulfaian (2009) results, suggesting that for TEs fighting corruption is a close substitute for fighting tax evasion. Compliance costs remain an important theoretical factor behind the choice to evade. In our estimations, although significant at 1% and positively related to tax evasion in all estimations, the impact of this variable remains minor as the coefficient is generally small.

One of the most important findings of this study is that a firm's characteristics determine largely its tax evasion. Our results show that a firm's size matters; the larger the firm the smaller the evasion. A general reflection can be drawn from the fact that in the majority of TEs, tax inspectorates are more concerned with large businesses than with small ones. Given the deficiencies in tax administrations, the allocation of human resources requires a strategy that optimizes revenues collected. Hence, large firms, due to their higher turnovers (and so potential returns from detection of evasion), are more attractive, leaving thus small firms less observed. In addition, foreign firms are generally more compliant. This is understandable as foreign investors tend to be more risk averse given the unfamiliarity of a foreign business environment. Similarly, corporations and partnerships are more compliant than individual firms. This result suggests that involvement of more people in decision-making reduces unlawful activities; after all activities such as tax evasion are more likely in the cases of full discretion by lone decisionmakers.

Several interesting results are derived from the industrial differences amongst firms in TEs. A general impression from our estimations is that sectors that involve higher cash transactions and/or activities less visible to tax administration are more evasive. In this regards, hotels and restaurants record the highest evasion. Similarly, firms in construction, real estate or wholesale and retail are more evasive compared to others. The lowest evasive behaviour is observed in mining and transportation. These results indicate the need for more presence of tax inspectors in high cash transaction businesses. In cases where human resources are insufficient, tax incentives for buyers (such as tax deductions for all invoice collections by consumers) could be adequate. Further, several TEs have practiced tax incentives for non-cash transactions.

Last, positive, large and highly significant period effects for Year 2005 relative to Year 2002 suggests that tax evasion seems to fall over time. This again is consistent with the importance of transitional reforms, in particular improvements in law enforcement and other institutions in these countries.

Together, our findings suggest some policy guidelines for improving tax evasion in transitional economies (for extended policy implications see Chapter VII). These act to reduce either the possibility and/or the inclination to evade.

- Governments in transition countries should promote tax rate cuts in order to reduce the tax burden and increase compliance levels. The tax burden should be reduced also by eliminating all excessive compliance costs.
- Government should focus their audit strategies according to firm characteristics in order to tackle evaders amongst small firms, domestic firms and/or sole proprietorships.
- Governments should also tackle sectors that involve higher cash transactions in order to reduce opportunities for tax evasion.

- Governments should engage in a serious fight against corruption, in order to both improve their relationship with taxpayers, and to reduce opportunities for evasion through corrupted tax officials.
- Governments should improve their performance, transparency and accountability, and with that their relationship with business taxpayers.

Findings in this chapter reinforce findings from Chapter IV, suggesting that in transitional economies institutional reforms are the key to increasing the fight against evasion and that tax rates are positively related to tax evasion. Moreover, observations from firm related characteristics provide some insights for optimizing audit strategies in order to maximise tax revenues.

Chapter SIX

Understanding Business Tax Morale: The Case of Kosovo

TABLE OF CONTENTS

Introduction

Following the introduction of the traditional model of tax compliance by Allingham and Sandmo (1972), consequent tax research has identified and brought forward various extensions in an attempt to solve, as Torgler (2007a) puts it, "*the puzzle of tax compliance*" (the term was initially introduced by Andreoni et al, 1998). The puzzle itself refers to a condition where levels of tax compliance do not correspond with the levels of enforcements. As Torgler, (2011) argues, the issue of tackling tax evasion is *"not simply a matter of applying penalties and/or increasing the frequency of audits (p. 12)".* Instead, different levels of deterrence factors have produced two very different types of outcomes. First, when audits and fines rates were set at high extremes, low levels of compliance were observed. This was mainly because oppressive tax enforcement and harassment of taxpayers through unremitting audits and visits decreased individual perceptions of institutional legitimacy and so increased resistance to payment. Extreme penalties on the other side provided the basis for the corruption of tax officials, hence causing generally low levels of tax compliance. In such cases, questions as to "*why people evade taxes?*" were raised.

Second, when audit and fine rates were set at low extremes, contrary to intuitive expectations, high levels of compliance were observed, hence questions as to "*why people pay taxes?*" were counter-raised. Frey (1997) argues about the importance of "intrinsic motivation" of tax compliance, which due to "civic virtue", makes taxpayers comply; as opposed to "extrinsic motivation", known also as deterrence impact, in which taxpayers pay because they fear the punishment. This "intrinsic motivation" is known today as tax morale. The investigation of tax morale and its impact on tax evasion for businesses in transition economies is the main objective of this chapter.

Inclusion of morality in tax compliance today is customary; indeed non-inclusion would be quite odd. As Alm and McClellan (2012) argue, if values of taxpayers are controlled by social norms, values or institutions, and if these factors affect the inclinations "to pay or not to pay" taxes through tax morale, then tax morale is a very important factor in studying tax compliance. Not accounting for such an important factor in a dissertation on business tax compliance in transition economies would be a severe limitation. In our case, by covering for business tax morale we complement previous two chapters that deal with cross-country investigation and firm level investigation of business tax evasion.

The work in this chapter is divided into two parts. In the first part we explore the impact of tax morale on tax evasion using theoretical models provided by the recent literature (Torgler et al. 2010; and Alm and McClellan, 2012). We will then take the research a step further by investigating the determinants of tax morale focusing on institutions, governance and socio-demographic indicators (Torgler et al. 2010).

In order to do so we develop a questionnaire and conduct a survey with 600 Small and Medium Sized Enterprises (SME) in Kosovo. The questionnaire is developed upon the previous work done so far both in the field of individual tax morale and tax evasion, and is adopted for the business case taking the recommendations and suggestions by recent and leading tax morale and tax evasion literature.

We use Tobit Model to estimate determinants of tax evasion, most notably tax morale, deterrence factors as well as firm's characteristic. Probit Model is applied to investigate determinants of tax morale, namely institutions and socio-cultural characteristics. A number of other specified regressions are run in order to capture any robust finding. Results of this chapter are in addition compared to the previous results investigated under Chapters IV and V, and to the theoretical and empirical discussion presented under Chapters II and III.

This Chapter is organised as follows. *Section 1* discusses proposed theoretical directions from very recent and leading studies in regards to business tax morale. *Section 2* provides a detailed description of the survey and questionnaire developed for this study, as well as a set of descriptive statistics which in turn serve as indicators of some of the most important tax topics raised and discussed in Kosovo. In *Section 3* we investigate and interpret the relationship between business tax evasion and tax morale. *Section 4* advances research into the determinants of business tax morale. The *last section* concludes.

6.1 Business Tax Morale

The role of tax morale in tax compliance has been research attractive since the 90s. Yet the pioneering work in the field of tax morale was done much earlier, by the Cologne School of Tax Psychology in the 60s, who tried to link the concept of taxation as an economic sub discipline to social psychology (see Strümpel, 1969 and Torgles, 2007a for more). This linkage had subsequent consequences on the necessity of inclusion of other factors that shape the compliance decisions of taxpayers, beyond the tax, audit and fine rates. Spicer and Ludstedt (1976) argue that the taxpayer's choice is not made solely on the grounds of penalties and fines but also on the grounds of attitudes, values and norms. Long and Swinger (1991) have argued that it is natural to expect cases when taxpayers are simply predisposed not to evade; hence they are predisposed to not even search for ways to cheat on taxes. Andreoni et al. (1998, p.850) have argued in favour of incorporation of morals and social dynamics, beyond traditional determinants: *"...it has been suggested that factors such as a moral obligation to be truthful, or the social consequences of being a known cheater, may add further enforcement incentives that are not accounted for in our models*". Further they elaborated three main groups of factors that are important when treating tax evasive models that are beyond the range of tax, audit and penalty rates. The first group involves moral rules and sentiments that directly guide and impact decisions to comply or not. Morality in tax compliance has attracted the attention of tax researchers quite recently (for an extensive review see Torgler 2007a). Torgler et al. (2010) when discussing moral rules and sentiments summarize also a set of views that take into account even an altruistic approach; such an individual's behaviour that is interested not only about his/her own welfare but also in the general welfare. Other views are related to a 'Kantian' morality approach, and they see taxpayers as having anxiety, guilt or even inferiority if their share of taxes paid is lower than what is defined as fair.

The second group proposed by Andreoni et al. (1998) relates to the fairness of the tax system, enforcement of which affects extensively individuals' willingness to comply. Jackson and Milliron (1986, p.137) argued that tax fairness consists of at least two different dimensions: "*One dimension appears to involve the equity of the trade - the benefits received for the tax dollars given...*" *as defined by effectiveness, "...the other dimension appears to involve the equity of the* *taxpayers' burden in reference to that of other individuals*". Unfair and unequal tax treatment will eventually backfire through attempts at non-compliance.

Last, the third group, includes taxpayer's evaluations of government within the standards of performance, corruption and transparency. Hanousek and Palda (2004) looked at tax evasion as a form of legitimate protest by citizens against their governments; perception towards which were negative. Tirole (1996) explains that when taxpayers see their government as corrupt and irresponsible, evasion is seen as a "vote of dissent" on the government.

Today the evidence of impact of tax morale in tax compliance is overwhelming. Torgler (2007a) provides a very thorough empirical review and contribution on the relationship between tax morale in compliance. His work in Transition Economies, Europe, Asia, Latin America, and Australia, and practically every other country within these regions, has concluded robustly that when considering tax compliance, the moral dimension impacted by governance, political system, legal structure, property rights, regulatory restraints, bureaucratic procedures, corruption, transparency, accountability, fairness, respect, treatment, social norms, social capital, social interactions, gender, education, age, region, religion and even marital status must be taken into account.

However, regardless of the substantial engagement in identifying the determinants of tax morale from various authors and various studies, in various countries and various cultures, surprisingly enough one can hardly identify tax morale research that is not focused solely on personal income tax i.e individuals. As Torgler (2011, p.55) argues:

> *In general, in most of the studies on tax morale and tax compliance, research has focused on personal income tax. Business tax evasion has received very little attention. This is a surprise taking into account the economic importance of the business sector and the importance of business taxation for tax administrations. Work in this area is therefore highly relevant for transition economies...*

In a very recent attempt to provide some evidence on whether values, social norms and attitudes have measurable effects on the economic behaviour of firms, most notably on tax compliance, Alm and McClellan (2012, p.6) while stating that up to their work there was "no evidence on tax morale of firms" argue that:

> *The potential importance of firm tax morale has been ignored, perhaps because of the absence of firm level information that would allow a firm's tax morale to be measured ...*

To our knowledge, Alm and McClellan (2012) is one out of two, and only, studies that empirically addressed the issue of morality and tax compliance for firms. The second study, Mickiewicz et al. (2012), relates to Latvian business.

The attempt by Alm and McClellan (2012) to investigate tax morale in 34 countries, however, as acknowledged by authors, does not have a standard measure of tax morale as the related literature suggests (we discuss the measurement technique of tax morale variable in sections below). The variable is instead derived from the firm's perception on tax burden; i.e how firm consider taxes in their business environment. High "taxes as obstacles" represents heavy burden imposed by tax rates and vice-versa. Such indirect measurement of tax morale generally assumes that firms with antipathy towards paying taxes consider "taxes as obstacles" also as high; which, again as argued by authors themselves, is a strong assumption. There might be cases when firms even while having sympathy towards tax payments can and do consider "taxes as obstacle" also high because they simply are high. Having that in mind, we argue that the assumption of a positive relationship between taxes as an obstacle and tax morale is too strong; and despite the limitations in data availability, it does not optimally contribute to the investigation of either the impact of tax morale in tax compliance on the determinants of tax morale – all that from the firm's perspective.

Upon previous work done so far in the field of tax morale and tax compliance, taking into consideration the strong recommendations cited above, building on Alm and McClellan (2012) firm perspective work and the Torgler et al. (2010) individual perspective work, we will attempt to develop an empirical investigation of business tax morale and tax compliance. In order to do so we devise a questionnaire to capture most variables of interest, as underlined by both theoretical considerations and sufficient empirical work on individual tax compliance. We then conduct a face-to-face survey with 600 SMEs in Kosovo to finally provide some contribution on the impact of business tax morale on business tax evasion as well as on the nature of factors that shape business tax morale itself.

We build our research in two complementary stages. In the first part we explore the impact of tax morale on tax evasion using theoretical models provided by Alm and McClellan (2012) from a business perspective and Torgler et al. (2010) from an individual one. By designing and conducting a survey specifically for theoretical frameworks constructed by leading authors in the field of tax morale and compliance, we will attempt for the first time to investigate the relationship between business tax morale and tax evasion in Kosovo.

Once investigating the above mentioned relationship, we will then take the research a step further by investigating the determinants of tax morale, independently focusing on institutions, governance and socio-demographic indicators as suggested by Torgler et al. (2010). Tax morale, unlike tax evasion, measures not individual behaviour but individual attitudes. It represents a moral obligation to pay taxes, a belief in contributing to society by doing so (Torgler, 2007a). Focusing on determinants of business tax morale is essential; as Feld and Frey (2002, p.88) point out:

> *Most studies treat 'tax morale' as a black box without discussing or even considering how it might arise or how it might be maintained. It is usually perceived as being part of the meta-preferences of taxpayers and used as the residuum in the analysis capturing unknown influences to tax evasion. The more interesting question then is which factors shape the emergence and maintenance of tax morale*.

While the factors have been largely defined and robustly estimated for the context of individual taxpayers, estimation within a business context is scarce. Again, by using a survey to obtain information on the main determinants of tax morale, we will attempt for the first time to investigate factors that shape business tax morale in Kosovo.

The following section provides a detailed overview of research design, questionnaire, survey, data collection and statistical interpretation.

6.2 Research Design

For the purpose of this chapter, and with the aim of further contributing in the topic of business tax morale, a major in person (face-to-face) survey of 600 SMEs was conducted throughout Kosovo; the last European country to enter the transition process. The main purpose of the survey was to collect data that would best explain both the relationship of tax morale with tax compliance and the determinants of tax morale from the business perspective in a transition economy. Following we provide a detailed description of questionnaire design, data collection procedures and protocol, and descriptive statistics of data obtained.

6.2.1 Questionnaire Design

The first step of the data collection process was to develop a questionnaire (for complete questionnaire see Appendix 6.22) containing questions that would give raise to variables measuring the determinants of interest. Questions related to tax compliance and tax morale were of special interest. For the first, following the arguments used in the previous chapters when discussing the methodology and technique of obtaining tax compliance data (which we intentionally do not repeat here), we created a question that would ask business respondents to provide a single answer (measured in percent) on the level of reporting of sales in firms similar to theirs:

> ***Q.15*** *- Recognising the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?*

We then subtract the answers from 100% to obtain a measure of tax evasion (tax evasion=100-tax compliance).

For the second, tax morale, we replicated what by now is the touchstone question on estimating the level of tax morale, which uses the justifiability of tax evasion as a proxy for tax morale (Torgler 2007). In our case, the question which origins from the World Values Survey (WVS), ask respondents to provide a four scale answer:

> ***Q.17*** *- Please tell me whether you think that cheating on taxes if you have a chance, is: a) completely justified, b) partly justified, c) partly unjustified, or d) completely unjustified?*

We then grouped responses a, b and c to form a dummy variable with values 0 if respondents justify tax evasion and 1 otherwise (answered under d). Treating tax morale through dummies is a common practice in tax morale literature. Nevertheless for robustness check we report both standard and ordered Probit estimations; given the ordered structure of dependent variable. As argued under section 6.1, lower tax morale is expected to have a positive relationship with tax evasion.

In order to estimate the impact of tax rate, the first traditional variable from the Allingham and Sandmo (1972) model, firm perceptions in regards to the level of tax rates were evaluated. Question: ***Q.18*** *- Please tell me, how do you consider tax rates relevant to your business?* had five possible answers: (1) very low, (2) low, (3) moderate (4) high, and (5) very high. Theoretical and empirical relationship between tax rate and tax evasion has been already argued under Chapter IV and V. We found strong and significant positive relationship between tax rates and tax evasion in both cross-country (Chapter IV) and firm level (Chapter V) investigations. Indeed tax rate appeared so far to be the most robust and statistically significant variable in all our estimations; and this is especially important given the theoretical assumption and empirical investigations in the past which have led largely to ambiguity. Given the robustness of the findings prevailing in our investigations when treating transition economies, the expected sign of tax rate in tax evasion is *positive*.

For the audit probability, the second traditional variable, the following question was asked: ***Q.16*** *- Please tell me, over the past 12 months, how many times your business was inspected or was asked to meet with tax/custom officials/administration?*. The answers were given in ‘number of times’. For consistency, the question measuring the audit rate in Kosovo is identical to the one used in the Chapter V when estimating the impact of the audit rate in tax evasion for 7,683 firms in 28 transition economies. We note that in Chapter V, although the sign of *audit* was in accordance with theoretical expectations, we failed to establish a statistically significant relationship. The expected sign of audit rate in tax evasion is again *negative*.

We note that the *fine rate*, or the third and last traditional determinant of tax evasion, was not included in this group of deterrence variables given the difficulty of obtaining such a measure from the survey. Non-observation of the impact of fine rate in this Chapter as well as in two other empirical Chapters IV and V, given the data limitations, would potentially handicap the study. We argue however, that if fine rates are assumed to be more or less the same for all firms, that is if they are systematic, then their effect should be captured, but not measured, by the intercept. The captured effect is even more convincing if the fine rate is assumed to be one of the most important determinants of tax evasion; as by being so it will dominate the intercept more than any other potentially omitted variable. We also note that fine rate can take two types of forms. It can be perceived as equal (hence systematic) to all by respondents (businesses) or it can be firm related. In the latter case, firms that had previously been fined could perceive the risk from fines at higher levels than non-fined firm. Under such assumptions, systematic presence of fines does not hold. For the future research in regards to the impact of fine rates in tax evasion we propose the use of panel analysis as fine rate specific to firms and unobservable to researchers is after all a firm specific effect (hence Fixed Effects). We also encourage future research to use tax administration measurement programmes, if existent.

Under firm control group of variables, apart from screening questions discussed below, we make also a question measuring firms performance by asking respondents to declare if ***Q.11*** *Over the past 12 months, your sales have a) increased; b) decreased; c) remained same*. We then form a dummy variable with values 1 if firm had fall in their sales (all answers under b) and 0 otherwise (answers a and c).

Next group of questions relate to institutional variables which are constructed to investigate the determinants of tax morale. These questions were obtained through measuring three important factors, again consistent with the methodology applied in Chapter V (i.e estimation of business tax evasion for 12,280 firms in 28 transition economies), as well as the theoretical (Chapter II) and empirical (Chapter III) discussions conducted in this thesis. These factors are: a) trust in government; b) effectiveness of the courts (rule of law); and c) perception about presence of corruption. In order to measure trust in government, question ***Q.19** - Please tell me, how much do you trust the government?* was constructed, with five possible answers: (1) always, (2) often, (3) neutral, (4) rarely, (5) never. Higher coded values meant that businesses have lower levels of trust in the government. Hence the expected sign of "trust in government" on tax morale is *negative.*

When measuring the effectiveness of courts, i.e. trust in legal system, the following question was constructed: ***Q.20** - To what degree do you agree with this statement: I am confident that the legal system will uphold my contract and property rights in business disputes?* There were five possible answers were provided: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree. Contrary to "trust in government", here the higher coded values meant that businesses have higher trust in the legal system. Hence the impact of "trust in legal system" in tax morale is expected to be *positive*.

Lastly, perceptions of corruption were measured through six complementary questions, answers of which were averaged to provide an index of business perception towards corruption in Kosovo. The question was constructed as follows: ***Q.14** - Thinking about officials, would you say it is common for a business similar to yours to pay "bribes/gifts"* Subsequent statements were then given so respondents could rank them from 1 (always) to 5 (never): *a) To get connected to and maintain public services; b) To obtain business licenses and permits; c) To obtain government contracts; d) to evade taxes; e) to avoid customs.* Higher scores meant less corruption while less corruption means higher tax morale. So the relationship between corruption and tax morale is expected to be *positive*.

Firm and socio-demographic control variables for both determinants of tax evasion and tax morale were constructed as screening questions. Questionnaire was designed to ask respondents to provide their position/occupation within the firm (note that only owners or top managers – if different were interviewed); legal status (individual, partnership or corporations); number of full time employees (hence size of the company); year of establishment; membership in business associations; as well as gender, age and education of respondent (which is either owner or top manager) According to theoretical background set under Chapter III and empirical investigation related to firm characteristics under Chapter V, the expectations of screening questions are as follows.

In regards to determinants of tax evasion, it is expected that larger firms show lower levels of tax evasion hence the relationship between size and tax evasion is *negative*. Partnerships and Corporations are expected to have also lower levels of tax evasion; hence the signs of respective dummy variables are expected to be *negative.* Firms that have more experience i.e. have more years in the market are expected to be more reputable, more sustainable and less likely to use tax evasion as a tool for increasing their purchasing power or to risk by getting caught and fined. The expected sign of years and tax evasion is *negative.* Last, firms that for the past 12 months have experienced fall in sales are expected to use tax evasion as an opportunity to regain the market power and create (unfair) competitive advantage. Hence the impact of dummy variable for firm's performance measured by fall in annual turnover is expected to have a *positive* relationship with tax evasion.

In regards to determinants of tax morale, education is expected to have two contrary effects. On the one side, fiscal knowledge may positively influence the practice of evasion as more educated people involved in businesses may tend to better understand the opportunities for evading tax obligations; on the other side more educated people understand better the importance of tax levying hence increase their levels of voluntary compliance. Therefore the sign of education in tax morale is *ambiguous*. As argued in Chapter III, Female owners are expected to have higher levels of tax morale, as are elderly owners, compared to their male respectively younger counterparts'. Last businesses that are members of business associations are expected to have more social capital and consequently more social responsibility, hence higher levels of tax morale. The expected sign of membership with tax morale is *positive*.

Table 6.1 and 6.2 provides a summary of variables discussed so far and ordered according to models of estimations for both the relationship between business tax morale and business tax evasion, as well as the determinants of business tax morale.

The next two sub-sections provide detailed information on the data collection process and descriptive statistics from the survey results.

Table 6.1 Summary of variables for MODEL 1: Tax Evasion

Variable	Description	Question	Unit of measurement
Tax Evasion (Dep Var)	measure of the fraction of sales concealed	*Q.15 – Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what per cent of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?*	in percentage (%) 100% – answer
Tax Morale	measure of intrinsic motivation to comply	*Q.17 - Please tell me whether you think that cheating on taxes if you have a chance, is: a) completely justified, b) partly justified, c) partly unjustified, or d) completely unjustified?*	(1) completely justified, (2) partly justified, (3) partly unjustified, and (4) completely unjustified
Tax Rate	measure of tax burden as perceived by businesses	*Q.18 – Can you tell me, how do you consider tax rates applicable to your business?*	1) very low, (2) low, (3) moderate, (4) high, and (5) very high
Audit Probability	measure amount of inspections a firm had	*Q.16- Please tell me, over the past 12 months, how many times your business was inspected or was asked to meet with tax/custom officials/administration?*	Number of times
Size	number of employees	*Q.6 "How many full-time employees work for this company?"*	Number of employees
Legal Status	legal organization	*Q.5 "What is the legal organization of this company?"*	(1) Single Proprietorship, (2) Partnership and (3) Corporations. Dummy Variable: 1 if number of owners >1 and 0 otherwise
Year Established	measure of years since establishment	*Q.7"When was your business established?"*	2012 - year of establishment
Performance	measure of percentage change in sales	*Q.11 "Can you tell me, over the past 12 months your sales have a) increased, b) decreased, or c) remained same?*	Dummy Variable: 1 if sales decreased and 0 otherwise

Table 6.2 Summary of variables for MODEL 2: Tax Morale

Variable	Description	Question	Unit of measurement
Tax Morale (Dep Var)	measure of intrinsic motivation to comply	*Q.17- Please tell me whether you think that cheating on taxes if you have a chance, is: a) completely justified, b) partly justified, c) partly unjustified, or d) completely unjustified?*	(1) completely justified, (2) partly justified, (3) partly unjustified, and (4) completely unjustified
Trust in Government	measure of trust towards central government	*Q.19 - Please tell me, how much do you trust the government?*	(1) always, (2) often, (3) neutral, (4) rarely, (5) never
Trust in Legal System	measure of perception of businesses towards effectiveness of courts in solving various business disputes	*Q20 - "To what degree do you agree with this statement? "I am confident that the legal system will uphold my contract and property rights in business disputes".*	(1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (6) strongly agree
General Corruption	measure of business' perception towards corruption	*Q.14 – "Thinking about officials, would you say it is common for a business similar to yours to pay "bribes/gifts: a) To get connected to and maintain public services; b) To obtain business licenses and permits; c) To obtain government contracts; d) to evade taxes; e) to avoid customs."*	(1) always, (2) often, (3) neutral, (4) rarely, (5) never Average of all answers
Compliance Costs	measure of amount of time that senior management spends dealing with various legal requirements	*Q.21 "How many days of senior management's time within a week is spent in dealing with public officials about the application and interpretation of laws and regulations and to get or to maintain access to public services?"*	in percentage (%)
Age	respondents' age	*Q.9 "What is your age"*	In number
Education	respondents' level of education	*Q.9 "What is the level of your education?"*	Dummy for: Primary (base dummy); Secondary and Tertiary
Gender	respondents' gender	*Q.9: Respondents' Gender*	Dummy Variable: 1 if male and 0 otherwise
Membership	Membership in a Business Association	*Q.12 "Are you a member in any business association?"*	Dummy Variable: 1 if member and 0 otherwise

6.2.2 Data collection

Once the questionnaire design was completed, Riinvest Institute[35] was engaged to implement the survey. Riinvest is a leading think-tank institution in Kosovo with 18 years of experience and over quarter million respondents interviewed so far. The author of this questionnaire was in charge of the team that conducted the survey through trained and experienced Riinvest Institute enumerators.

The targeted population of the survey were Kosovan businesses. The Tax Administration register of the whole business population was initially obtained in order to identify the sample and obtain business addresses. Possession of this database enabled the team to better stratify the sample and to better identify active businesses in whole Kosovo. The Tax Administration register of 65.000 businesses contained sufficient information on the profile of each business including: sector of activity; size location; address; and even phone contacts. According to the Tax Administration Agency database, there are around 65.000 active businesses operating in Kosovo. Based on these assumptions in order to provide reliable results at the 95% confidence level and with 4% margin of error a sample size of 600 businesses is needed. Hence a sample of 600 business respondents throughout Kosovo was stratified according to size, region and sector[36].

Once the sample was chosen, questionnaires were printed and tested, and the process of choosing and training enumerators began. Riinvest typically employs the best students as enumerators (because many of Riinvest’s staff are on the faculty then the best students can be identified as enumerators). By virtue of being at the university, these individuals tend to be intelligent and to have respect for research. As they are young, they tend to be unthreatening to respondents. Moreover, there are the dual sources of employer and lecturers for conveying to enumerators the necessity of a thorough and professional approach to the work. Some of the elected students already had experience as enumerators and Riinvest has developed training procedures for new recruits for every survey needed. The importance of the knowledge and controls regarding

[35] For more see www.riinvestinstitute.org - Riinvest Institute has also a considerable experience in dealing with business surveys, after actively and professionally surveying kosovan businesses on regular annual basis since year 2000. This survey was conducted within such standards and such experience.

[36] Sample stratification was done according to Riinvest Institute well recognized standards.

enumerators cannot be overstressed. Without such controls, there is a high potential for improperly completed, even falsified, questionnaires. All enumerators receive training. As part of this training, enumerators receive a survey-specific training manual explaining the importance and overall goals of the survey, how to dress and present themselves to respondents, and detailed explanations of the questionnaire. Small groups (2-to-5) of enumerators work under a team leader. In the field, the team leader revisits 15% percent of the respondents for each enumerator, ostensibly to thank them for their cooperation. During these visits, selected questions are re-asked for verification. These questions may include those considered most crucial to the research effort, as well as any for which the original responses suggested possible inconsistencies. This activity is part of a field control. In addition to that, from Riinvest's offices, a similar verification process is carried out by phone by the research team and Project Leader for another 15% of randomly selected respodents. Around 30% of surveys are re-verified by the Riinvest team who calls respondents and ensures that 2-3 selected screening answers correspond to the ones filled by enumerator. Once the questionnaires are returned they are stored at the Riinvest premises. A logical control is also conducted. Each questionnaire is verified by researchers to check if there is any irrational answer or non-fitting answers with previous claims. These helps detect potential defects within each survey. Once the logical failures are found, the Riinvest team together with enumerator call or re-visit the respondent. Logical control serves to identify falsely completed questionnaires by enumerators. If any detected, they are taken as invalid and a substitute questionnaire is set for the field.

Survey data once collected and controlled were, customarily, encoded by experienced personnel using 'Microsoft EXCEL' spreadsheets prepared with the data fields and pop-up tables indicating relevant codes. After entry, two individuals, one using the questionnaire and one the spreadsheet, read aloud to one another to confirm the correctness of the responses. Changes are made as appropriate. Next, the data is analyzed using 'SPSS' to identify responses outside of expected ranges, including potential inconsistencies across variables. Changes are made as appropriate. At each stage, copies of the data are maintained with the individuals currently working on the spreadsheets and with the Project Leader. Periodic checks are made by the Project Leader, primarily through comparing variable means and distributions across files, to ensure data has not been altered, intentionally or otherwise. The original questionnaires are stored for at least two years after completion of the project.

6.2.2 Descriptive Statistics

Table 6.3 presents a summary of the variables of interest in the tax evasion model. The mean value of *TaxEvasion*, 39.87%, is of special interest for this chapter as it represents the level of tax evasion in Kosovo measured by conventional survey technique applied also in other TEs.

Table 6.3 Descriptive Statistics for Tax Evasion Analysis

	Obs	Mean	Std.Dev.	Min	Max
Tax Evasion	551	39.5	27.2	0	98
Tax Morale	582	3.35	1.07	1	4
Tax Rate	562	2.32	1.3	1	5
Audit Rate	512	4.52	9.51	1	180
Size	590	5.01	13.5	1	200
Partnership	599	0.06	0.24	0	1
Corporations	599	0.01	0.13	0	1
Years	592	9.48	8.35	0	91
Performance	553	0.28	0.45	0	1

Source: STATA 2011

This is the very first time that business tax evasion has been measured in Kosovo, and the number itself becomes even more compelling if compared to country level aggregate data from BEEPS surveys used in Chapter IV, Table 4.1. By applying the same methodology and approach to measurement of tax evasion, we have obtained a comparable level that also allows us to see Kosovo *vis-à-vis* other TEs; and thus to perhaps get an approximate idea of the institutional, economical and political development of the country in regards to the fight against tax evasion.

With the current level of tax evasion, Kosovo falls within the top three highest recorded levels of evasion in transition economies for the period 1999-2002-2005, which also happen to be Kosovo's neighbouring or nearby countries; Albania 1999 (70%), Bosnia 1999 (54%) and Macedonia 2002 (36%) top that list. Indeed, on further investigation we notice that the average of Albania, Bosnia and Macedonia for the year 1999 is roughly around 50%. The average of the same countries for 2002, however, falls to around 30%. It seems that the current level of tax evasion in Kosovo is quite similar to the average for the region, yet somewhere in-between the years 1999-2002. This comes as no surprise considering the recent political history of Kosovo.

Being the last country in Europe to embark on the road to transition to a market economy the level of development remains significantly behind even compared to other regional countries. The transition process began from a very difficult starting point. Initially under the former Yugoslavia, Kosovo was the least developed entity and its position within the Yugoslav economic system was deteriorated continuously, from 47% in 1947 to less than 30% of average per capita output in Yugoslavia by the end of 80's. The 90s brought further regress as Serbian colonial rule pushed more than 70% of Albanian employees out of their jobs. During this period country was facing sharp disinvestment and deindustrialization processes while, at the end of the decade (1997-1999), a war begun, giving Kosovo the very last economic thump (Mustafa and Abdixhiku, 2012). According to Riinvest (2000), a post-war survey, more than 50% of the resident population has been forcefully deported out of the country, housing fund was reduced by 40%, 70% of housing equipment was stolen or destroyed while livestock was reduced for more than 50%. Following the NATO intervention and liberation in 1999, the United Nation Mission in Kosovo (UNMIK) administration was put in place. Regardless of initial progressive impact, the foreign aid and international technical assistance was not sequenced properly with progress in building absorptive capacities and, hence, Kosovo experienced "shock of aid economies" after initial growth. Social and political tensions confronted this status quo and finally the main actors involved in the Kosovo state building process understood that final political status needed to be addressed and determined. In 2008 Kosovo, in accordance with support from the international community, declared its independence.

Today, according to official data from Statistical Office, Kosovo has an unemployment rate of 45%, while poverty rates remain alarmingly high, with extreme poverty also prevalent among a significant proportion of the population. Official data show that around twelve percent of the population live in extreme poverty, on 1.02 Euros a day, with 34 percent below the poverty line of 1.55 Euros per adult per day.[37] Presently, Kosovo's GDP stands at about 5 billion Euros with

[37] Nevertheless, the level of poverty is considered to be narrow, with many people living around the poverty line. A slight increase or decrease in income pulls or pushes a great deal of people from or into poverty. Kosovo is reported as having among the worst outcomes in the region with regard to achieving the Millennium Development Goal

slightly more than 3000 Euros income per capita, half of that of Bosnia and Herzegovina (BiH), about a third of that of Macedonia and Albania and about a quarter of that of Serbia. Moreover, according to World Bank estimates, Kosovo's economy would need to grow at ten percent per annum for a decade to reach Albania's income level (assuming Albania's economy continues to grow by 5.5 percent annually during this period). A very recent study by Riinvest (2011) highlights unfair competition to be the top barrier in business environment in Kosovo. Moreover, according to interviews with selected businesses from the same study, tax evasion is the single most important factor impacting the unfair competition, in the private sector in Kosovo. Data from the Statistical Office of Kosovo on employment when compared to Tax Administration tax contributions or other official registers of pension contributions have shown considerable mismatches between the formal and the informal labour force; providing thus a profound base for accepting non-reporting of labour force and, we argue, sales, as being on considerably high levels. Against this background, the level of tax evasion of around 39.87% observed in our survey seems reasonable enough.

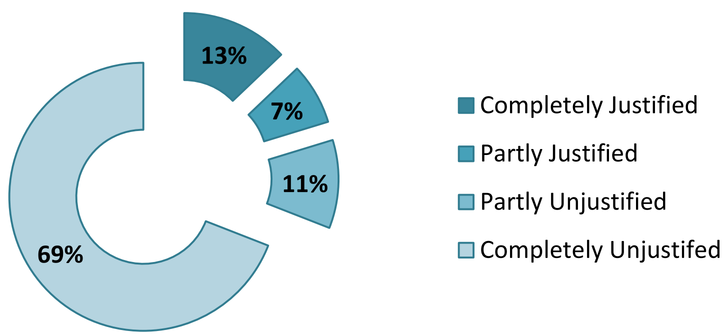
The second variable of interest is *Tax Morale*, or the measurement of "intrinsic motivation" to comply. Fig.6.1 shows the percentage of answers according to the categories provided. Around 13% of surveyed businesses consider cheating on taxes if they had a chance as *completely justified*; while, on the other hand, 69% of Kosovan businesses see tax evasion as *completely unjustified* in any circumstance.

Obtained data enable us to compare business tax morale in Kosovo with individual tax morale worldwide, using data from World Value Surveys (WVS). Of course the assumption here is that individual tax morale can act as a proxy for business tax morale. Data from WVS cover surveys in 55 countries worldwide in periods between 2005 and 2007 (note, not all surveys were conducted at the same time). The question of interest for measuring the level of tax morale was as follows: ***V201.-*** *Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between*. Respondents could provide answers from 1 *never justifiable* to 10 *always justifiable*. Due to lack of variation in answers provided, individual tax literature usually groups the answers to four categories. When

(MDG) indicators (transition into secondary school, particularly girls; life expectancy; combating tuberculosis and other diseases; access to safe water; child mortality and maternal mortality, among others).

comparing negative extremes, that is respondents stating that they always justify tax evasion, Kosovo with its 13% level ranks quite close with Serbia (15%), a neighbouring country. Such evenness could also indicate the reliability of our data. The same level puts Kosovo below India (9%) or Brazil (8.6%), and considerably below western countries.

Figure 6.1 The level of Tax Morale in Kosovo



In regards to *tax rate*, out of 599 respondents, 36% have considered tax rates as *very low*; 17% as *low*; 22% as *moderate*; 11% as *high*; and 8% as *very high*. Around 6% of answers were left blank. Around 91% of respondents were *individual* businesses. The remaining 6.5% and 2.5% were *partnerships* and *corporations* respectively. Moreover, around 88% of surveyed business were *micro*-enterprises (1-9 employees); around 10% were *small* firms (10-49 employees) and the remaining 2% were *medium* and large firms (>50 employees). The distribution of businesses according to their legal status and size is fully in accord with official data from the Tax Administration, again ensuring the credibility and reliability of the current data. We also note that the average *years* of businesses operating in the market is 9.4 years, suggesting as expected, that the majority of current businesses are relatively young and that the "year zero" for Kosovo begun just after the liberation in 1999. Our data also show that roughly 28% of surveyed businesses have declared a fall in their *performance*; i.e. annual turnover, suggesting thus a very difficult business year when the surveying occurred.

Table 6.4 represents the remaining descriptive statistics from the determinants of tax morale. We start from distribution of variable *Trust in Government*. Out of 582 respondents, 11% have declared that they *always* trust their government; 48% *often*; 19% *neutral*; 16% *rarely*; and 4% stated that they *never* trust the government. The remaining 2%, or 11 answers, are blank.

Table 6.4 Descriptive Statistics for Tax Morale Analysis

	Obs	Mean	Std.Dev.	Min	Max
Tax Morale	582	0.69	0.46	0	1
Trust in Government	571	2.51	1.00	1	5
Trust in Legal System	566	3.21	1.12	1	5
Corruption	544	4.13	1.19	1	5
Compliance Costs	435	5.2	1.86	1	7
Secondary Education	547	0.61	0.48	0	1
Tertiary Education	547	0.27	0.44	0	1
Gender	582	0.87	0.33	0	1
Age	526	40.2	10.6	20	75
Membership	582	0.12	0.32	0	1

Source: STATA 2011

In regards to *Trust in Legal System* around 20% of respondents have declared that they *strongly agree* that the legal system will uphold their contract and property rights in business disputes; 8% have declared *agree*; 48% have *neutral* beliefs; 16% *disagree*; and 6% *strongly disagree*. The remaining 3% or 16 answers are blank. *Corruption* averages at 4.13 (paying bribes is a common practice: 1 *always* and 5 *never*); while the average number of days per week on which businesses undertake some activity corrected with public officials is 5.2, suggesting thus a very high cost of compliance. The socio-cultural-demographic indicators of businesses, all related to owners/top-manager education, gender or age; as well as collective action and cooperation (measured by membership in business association) are distributed as follows. Roughly 10% of surveyed businesses have owners/top-managers with primary education; 57% with secondary, while the remaining 33% have tertiary education. Around 85% of surveyed businesses are owned by males, and the average age of the respondent owner/top-manager is 40 years. Last, only 12% of surveyed businesses are members of any existing business association.

Next sections discuss model and empirical setting for both estimations.

6.3 Tax Evasion and Tax Morale

In order to investigate the impact of tax morale on tax evasion i.e. noncompliance, we will estimate the following model:

$$\boldsymbol{TAXEVASION}_i = \beta_0 + \hat{\beta}_1 DETERRENCE_i + \hat{\beta}_2 TAXMORALE_i + \hat{\beta}_3 FIRMCTRL_i + \varepsilon_i \qquad \textbf{(28)}$$

where index *i* refers to observations 1,...,n. $TAXEVASION_i$ Stands for the level of tax evasion for observation i; $DETERRENCE_i$ measures two out of three traditional factors as modelled in the Allingham and Sandmo (1972) conventional model, notably tax and audit rate. As already discussed, given the data restrictions we cannot include here the third factor, fine rate. $TAXMORALE_i$ is the level of tax morale as declared by firms. In line with the Alm and McClellan (2012) theoretical discussion, the model also contains several control variables for firms $FIRMCTRL_i$ which include firms size; ownership type; years since establishment; and a dummy for firm's changes in sales during the last year. The model itself, as proposed by very recent and leading literature, combines a set of traditional with non-traditional determinants; while controlling for firm individual characteristics.

In the following section we discuss some of the empirical issues related to tax evasion model estimation.

6.3.1 Empirical Considerations: Tobit

Under Chapter V we have treated the issue of sample selection bias through controlling for both "missingness" and "truthfulness" of the dependent variable. We argued that the nature of the dependent variable in our study, derived from a survey, reflects on a very sensitive issue, that of tax evasion. This in turn might restrict respondents' choice to provide either a truthful or indeed any perception on the phenomenon. Hence, two sources of potential sample bias could arise: first, nonresponse may be endogeneous to firm behaviour, therefore the exclusion of missing values might bias estimates (Joulfaian, 2009); and, second, since the dependent variable asks firms to perceive the level of evasion by other firms, a part of the responses declaring full compliance might be false in order to cover a common evasive behaviour by firms (Nur-tegin, 2008). Consequently we used the standard Heckman Two-Step approach and an extended Heckman Full Information Maximum Likelihood (FIML) procedure to estimate Tobit equation conditional upon an estimated positive response in a Probit selection equation (note that the standard Heckman Two-Step approach estimates OLS conditional upon Probit). The results however, showed robustly that our data were not suffering from either "missingness" or "truthfulness". Given that the missing values or truthfulness in the dependent variable did not cause any sample selection bias, our final approach was directed towards addressing the issue of data censoring through the Tobit Corner Solution; estimations of which served as basis for interpretation and discussion. Tobit estimation assumes that the same variables influence, in the same direction, both the propensity to tax evade and the incidence of tax evasion (given that it occurs at all).

In this Chapter we do not undertake any special treatment of either "missingness" or "truthfulness" of the dependent variable. We do not address the issue of "missingness" as the amount of missing data in the dependent variable when treating tax evasion is relatively small (49 observations out of 599). "Truthfulness" on the other hand is not addressed for three main reasons. First, and the most important reason, our database does not provide us with an identifying variable for the Probit selection equation for truthfulness. Second, the robust results presented in Chapter V do not suggest the presence of sample selection bias in BEEPS data. Hence we have more certainty in assuming that data from tax evasion surveys are not expected to suffer from untruthful answers; or alternatively, even if there are untruthful answers they are not severe to cause any sample selection bias. Third, the practice of controlling the sample selection bias from truthfulness is less than common in tax evasion studies; indeed apart from Nur-tegin (2008) and our Chapter V; we do not find any such application. This does not mean that researchers should not account for truthfulness when treating survey studies of tax evasion whenever it is possible to do so. However in the case of data restrictions, as is the case with this chapter, non accounting for truthfulness does not necessarily present a major limitation. Having that in mind, in this chapter when treating the determinants of tax evasion we follow a standard Tobit estimation.

According to Wooldridge (2003), optimizing behaviour often leads to corner solutions for some nontrivial fraction of the population; in other words it is optimal to choose zero evasion. Around 20% of respondents in our data have declared full compliance i.e no evasion, therefore tax evasion has a population distribution that is spread out over a range of positive values, but with a pileup at the value zero (although this share is much lower than compared to Chapter V, where 60% of respondents have declared zero evasion). Regardless of that, a linear model will likely lead to negative predictions for some of the firms, while taking the natural log is not possible because many observations are at zero. Therefore the Tobit model is explicitly designed to model corner solution dependent variables.

The Tobit model is defined as a latent variable model:

$$Y^*_i = \beta X_i + \varepsilon_i$$

$$\varepsilon_i | X_i \sim N(0,\sigma^2) \qquad (29)$$

$$Y = \max(0, Y^*)$$

where Y* is the latent variable satisfying the classical linear model assumptions that the disturbance term is normally distributed and has homoscedastic variance; and that the observed variable, Y=Y* when Y*≥0, but Y=0 when Y*<0. Because Y* is normally distributed, Y has a continuous distribution over strictly positive values.

Even though the output of OLS and Tobit are often similar, the interpretation of them differs since in the Tobit model we have to interpret the partial effect of independent variables (Xi) on E(Y*|X) where Y* is the latent variable. The variable we are interested in explaining is Y, the observed outcome of tax evasion. In Tobit models what we obtain is two partial effects on Y, the conditional marginal effect E(Y|Y >0, X) and the unconditional marginal effects E(Y|X).

In other words, total change in tax evasion (Y) can be disaggregated into two parts: the change in evasion above the threshold (Y>0), i.e. the incidence of tax evasion, weighted by the probability of being above the threshold; and the change in the probability of being above the threshold, i.e. the propensity to evade, weighted by the expected value of tax evasion. The conditional effect is a measure of incidence of tax evasion, while the unconditional effect is a measure of both incidence and propensity (note that Probit is a measure of only propensity).

Given that there are two effects, various studies have failed to reach consensus in regards to reporting. Wooldridge (2003) recommends reporting both marginal effects. In addition, he also argues that one way to informally evaluate whether the Tobit model is appropriate is to estimate a Probit model where the binary outcome, W_i, equals one if $Y > 0$, and W= 0 if $Y = 0$; that is generating a dummy with values 1 on every observation with a tax evasion level higher than 0. Then, W_i follows a Probit model, where the coefficient ν_j on some variable X_j is equal to the ratio of Tobit estimates (ratio between Tobit coefficient β_j and Tobit estimated standard deviation of the residual σ); $\nu_j=\beta_j/\sigma$. This means that we can estimate the ratio of β_j to σ by Probit for each observation j. If the Tobit model holds, then the Probit estimates ν_j should be "close" to β_j/σ, where $\hat{\beta}_j$ to $\hat{\sigma}$ are Tobit estimates. Due to sampling error, these will never be identical; however the signs and sizes should be close to each other. Wooldridge (2003) also argues that there should be no worry about sign changes or magnitude differences on explanatory variables that are insignificant in both models.

6.3.2 Tobit Estimation Results

Table 6.7 is a summary of various Tobit estimations. Column 1 represents Tobit estimation of the relationship between tax evasion and tax morale as the sole independent variable. We then build gradually with Column 2 by adding deterrence determinants. This is done to check the robustness of the estimated effect of tax morale. Column 3 is a standard Tobit estimation (left censored dependent variable), including tax morale, deterrence factors as well as firm characteristics. Three columns altogether show that the relationship of both tax morale and deterrence factors with tax evasion is strong and significant regardless of model specification. The sign and sizes of the estimated coefficients remain largely unchanged and robust.

In Tobit regression, one cannot straightforwardly interpret the β coefficient as the effect of X_i on Y_i, as one would do in the context of linear regression. Instead, it should be interpreted as the combination of (1) the change in Y_i of those above the zero threshold (giving the *incidence* of evasion), weighted by the probability of being above the limit; and (2) the change in the probability of being above the zero threshold (giving the *propensity* to evade), weighted by the expected value of Y_i if above. Correspondingly, Tobit estimation yields two distinct marginal effects: the *conditional* marginal effects of changes in each independent variable on the incidence of evasion (Column 5); and the *unconditional* marginal effects, which measure the effects of changes in each independent variable on evasion that occur via changes both in the incidence of evasion and in the propensity to evade (Column 6). There is no clear cut recommendation on preferable marginal effect but, since coefficient sizes are similar, and since the unconditional marginal effect applies to the whole sample, we will interpret only Column 6 or unconditional marginal effects (as in Chapter V).

Tobit and Probit estimation are related: Tobit estimates the incidence of evasion, given that firms evade at all (conditional marginal effects) as well as the combined effect of both firms' propensity to evade and – where observed – their incidence of evasion (unconditional marginal effects); and Probit yields estimates of the propensity to evade. This relationship is the basis of a useful procedure to check the validity of Tobit estimation. Namely, if the independent variables have a similar effect on the propensity to evade (from Probit) and on the unconditional marginal

Table 6.7 TOBIT estimation results

	TOBIT			TOBIT			TOBIT			PROBIT		T/P	Conditional Marginal Effects			Unconditional Marginal Effects		
	1			**2**			**3**			**4**		**5**	**6**			**7**		
Dependent: **Tax Evasion**	Coeff		Robust S.E	Coeff		Robust S.E	Coeff		Robust S.E	Coeff		βj/σ	Coeff		S.E	Coeff		S.E
Tax Morale	-3.62	***	1.20	-3.39	***	1.30	-4.18	***	1.23	-0.14	*	-0.15	-3.01	***	0.89	-3.78	***	1.11
Deterrence																		
Tax Rate				3.98	***	1.30	4.04	***	1.25	0.36	***	0.14	2.91	***	0.88	3.66	***	1.12
Audit Rate				-0.49	**	0.20	-0.44	***	0.17	-0.01	**	-0.02	-0.32	***	0.12	-0.40	***	0.15
Firm Control																		
Size							-0.16		0.15	-0.00		-0.01	-0.11		0.11	-0.14		0.14
Partnership							-10.6	*	5.49	-0.42		-0.37	-7.14	**	3.44	-9.26	**	4.60
Corporations							-42.9	**	14.4	-1.89	***	-1.49	-22.3	***	4.97	-30.4	***	6.58
Years							-0.50	***	0.19	-0.01	*	-0.02	-0.36	***	0.13	-0.45	***	0.17
Performance							3.05		3.37	-0.08		0.11	2.22		2.48	2.77		3.08
Constant	49.4	***	4.19	41.5	***	6.00	51.4	***	6.06	1.26	***	1.78						
Sigma	31.8			30.8			28.8			28.8								
Prob>F	9.07			7.62			7.26			7.26								
Number of observations	536			431			395			395								
Left-Censored Observations	89			69			57			57								
Uncensored Observations	447			362			338			338								
Right-Censored Observations	0			0			0			0								

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

effects (from Tobit) then the underlying assumption of Tobit estimation – i.e. that the independent variables act in much the same manner on both the propensity to evade and on the incidence of evasion – is supported by the data. Accordingly, following the procedure recommended by both Greene (2002) and Wooldridge (2003), to evaluate whether the Tobit model is appropriate, we estimate a Probit with dummy variable tax evasion (1 if evasion occurs and zero otherwise). We then divide the estimated Tobit coefficients (β_j) by sigma (σ) (or the estimated standard deviation of the residual in Tobit) to obtain $\nu_j=\beta_j/\sigma$. As can be seen from Column 4, the relative-to-sigma ν_j coefficients are very close (almost identical) to the corresponding Probit estimates, which suggests that the choice of using Tobit is supported. For many models, including Tobit, the pseudo-R^2 has no real meaning (STATA 2011).[38]

Computation of Unconditional Marginal Effects (Column 6) as expected does not change either the signs or significance of the tax evasion determinants. As expected, it changes the size of coefficients. The results show that there is a strong and statistically significant relationship between *tax morale* and *tax evasion.* An increase in tax morale by one category reduces tax evasion by 3.8 percentage points, holding all other factors constant. Higher levels of tax morale significantly reduce, as predicted, the level of tax evasion.

The second group of determinants, which is deterrence or traditional factors, shows also consistent and robust relationships with tax evasion. Our results show that the association between the *tax rate* and tax evasion is positive and significant at the 1% level. An increase in tax rate by one category increases tax evasion by 3.66 percentage points. *Audit* on the other hand is also statistically significant at the 1% level and is negatively related to tax evasion, suggesting that an increase of audit by one unit reduces tax evasion by 0.40 percentage points.

The firm control group of determinants appear to have signs in accordance with theoretical expectations and our previous discussion. Evasion drops by around 0.14 percentage points if firms increases in *size* by one employee; however this variable is not statistically significant even at the 10% level (p=240). Legal status of firms appears to be statistically significant influence for

[38] Wooldridge, 2002, p.529 argues that ”*we should remember that the Tobit estimates are not chosen to maximize an R-squared—they maximize the log-likelihood function—whereas the OLS estimates are the values that do produce the highest R-squared*”, hence we do not report estimated pseudo-R^2.

partnerships and c*orporations* at the 5% and the 1% levels respectively. Compared to *individual* firms, less evasion is reported by *partnerships* and *corporations*. All other factors held constant, *partnership* firms are more compliant than individual firms by 9.26 percentage points; while this gap is extended (in absolute terms) with *corporations* at 30.4 percentage points, who evade around 20 percentage points less than do *partnerships*. Statistical significance at 1% level is also reported for *years* of the firms' existence. An increase in years since operating by 1 unit (that is year) reduces tax evasion by almost half of a percentage point. Lastly, firms *performance*, measured by percentage change in annual turnover, appears not to be a statistically significant influence (p=367); however, the sign of the coefficient is in accordance with the theoretical discussion presented so far. Firms that have experienced a fall in their sales, evade more by almost 3 percentage points.

These results are substantially in line with the previous discussions in this Chapter, and moreover are also in line with results identified in our empirical investigation of tax evasion for transition economies in Chapters IV and V. For instance the positive relationship of tax rate and tax evasion is again confirmed, and follows a cross-country investigation for transition economies in Chapter IV, as well as a firm-level investigation in Chapter V. This is particularly important given the previous theoretical and empirical ambiguity of published findings. Note that the (individual) traditional model of Allingham and Sandmo (1972) predicts an ambiguous effect of the tax rate on tax evasion; with the occurrence of both an income effect (as tax rates rise, people become poorer and, in the presence of decreasing absolute risk aversion, evade less) and a substitution effect (rising taxes means that the return from evasion is higher, thus the taxpayer prefers the risky choice to the safer one). An ambiguous relationship was also established in business modelling (see Marelli, 1984; Martina, 1988; Virmani, 1989; Sandmo, 2004; Crocker and Slemrod, 2005). A positive relationship between tax rate and tax evasion was found in empirical investigations by Clotfelter (1983), Masson and Calvin (1984), Alm et al. (1992), Pommerehne and Frey (1992), Alm et al. (1993) Pommerehne and Weck-Hannemann (1996), Joulfaian and Rider (1996), Caroll (1998), Sillamaa and Veall (2000), Fisman and Wei (2004), Trehub and Krasnikova (2006), Torgler (2006), Chiarini et al. (2008), Gorodnichenko et al. (2009), Nur-tegin (2008), Bernasconi et al. (2013). On the other hand, a negative relationship was reported by Alm et.al (1990), Feinstein (1991), Christian and Gupta (1993), Alm et al. (1995), Kamdor (1995) and Joulfaian (2009). To make the review on the impact of tax rates even more ambiguous, the works of Baldry (1987), Porcano (1988) and Joulfain and Rider (1996) found no effect at all on compliance from tax rates. We have already argued in favour of future Meta-Regression analysis to investigate the relationship between tax rate and tax evasion. Yet, at this point, given cross-country and firm level investigation for transition countries, as well as the current Kosovo study, it is with more evidence and confidence that we can claim a robust and positive relationship between tax rates and tax evasion; higher tax rates will lead to higher evasion levels. In the light of potential policy implications, which we elaborate further in the concluding part of this thesis, it is worth noting that countries with a high level of tax evasion should consider seriously lowering the tax rates for businesses.

A particularly important finding of this Chapter is also the relationship and significance of the *audit* rate. As expected, higher audit intensities by tax officials will lead to higher compliance levels or lower evasive behaviour. The finding becomes particularly important given the inability of previous studies to find a good proxy for audit rates from survey data. In the previous Chapter, in addition to pooling two independent cross sectional data, we conducted a separate analysis involving only the BEEPS 2005 dataset. This was done in order to account for one specific variable: the audit probability. We argued then that the only attempt so far to analyse audit probability in business tax compliance for transition economies was made by Nur-tegin (2008); however, as elaborated in Section 5.3 of Chapter V, we disagreed with the proxy used in this study, which is the review of financial statements at the end of the year from accounting auditors. Instead we used actual tax inspections carried out by the respective tax inspectorates, as declared by businesses; a measure available in BEEPS 2005 but not in BEEPS 2002 (hence, the separate analysis in Chapter V). We failed to establish a statistically significant relationship between audit and tax evasion, yet the sign of the variable was in line with theoretical expectations. We constructed a similar question for the survey involving 600 SMEs in Kosovo. The final result is robust and statistically significant at 1% level, suggesting for the first time that perceptions of kosovan businesses about audit rates impact the level of reporting.

Findings from this Chapter also replicate the robust findings from firm-level determinants identified in Chapter V when investigating 28 transition countries. Again, firm characteristics matter; indeed, when related to audit findings, they might provide an interesting perspective for future audit policies. Note that larger firms, as well as partnership and corporations, are robustly more compliant than smaller and individual firms respectively. These results are confirmed both from the investigation conducted in this chapter as well as the ones conducted in Chapter V. If the audit policies by tax inspectorates in transition countries are oriented towards larger firms, and/or partnerships and corporations, simply because in the vein of limited human capacities one has to choose strategies that maximise revenues by targeting the bulk of taxpayers (given their size and turnover), then it might be worth noting that the real evaders are left cosy. It might be worth noting also that perhaps future audit strategies in transition countries, or countries with similar characteristics, should orient their audit strategies towards smaller and/or individual firms (for more see policy implications in Chapter VII of this thesis).

The most important finding in this Chapter is the robust relationship between tax morale and tax evasion; investigated for the first time in the business context. Our results show that the “intrinsic motivation”, or the voluntary compliance behaviour, is a very important factor when treating business tax evasion. The sign, significance and the size of the estimated coefficients provide sufficient information supporting the essential inclusion of tax morale in business tax evasion models; as suggested by previous theoretical literature and evidence from individual tax morale studies. The next section provides an empirical investigation of factors that shape business tax morale.

6.4 Determinants of Tax Morale

In order to investigate the determinants of tax morale, we estimate the following model:

$$\boldsymbol{TAXMORALE}_i = \beta_0 + \hat{\beta}_1 INSTITUTIONS_i + \hat{\beta}_2 SOCIODEM_i + \varepsilon_i \qquad \textbf{(30)}$$

Index i refers to observations 1,...,n. $INSTITUTIONS_i$ is a vector of institutional variables, which measure trust in government; perceived functionality of judiciary system; perceived levels of corruption; as well as compliance costs. In line with Torgler et al. (2010) we also include control variables $SOCIODEM_i$, which represent levels of education, gender, age and membership in associations (to capture collective action and cooperation). Such a specification is in line with the tax morale literature. Amongst many, Alm and Torgler (2005) argue that: *"...the tax morale is likely to be influenced by such factors as perceptions of fairness, trust in the institutions of government, the nature of the fiscal exchange between taxpayers and government, and a range of individual characteristics*".

In the following section we discuss some of the empirical issues related to tax morale model estimation.

6.4.1 Empirical Considerations: Probit

In models in which the dependent variable Y has only two values, the regressand is known to be a binary or dichotomous variable. When Y is discrete and takes on a small number of values, it makes no sense to treat it as an approximately continuous variable. Discreteness of Y does not in itself mean that linear models are inappropriate. However, as Wooldridge (2003) argues for binary responses, the linear probability model has certain drawbacks. The first and most important drawback is that the fitted probabilities can be less than zero or greater than one. Note that the Linear Probability Model (LPM) is interpreted as a model that gives the probability of occurrence of an event (in our case would be a category of response) given a certain level of independent variable $X_{i.}$ So as being probability $E[Y_i/X_i]$, it must fall in the interval between 0 and 1. But in order to be so, then the fitted values should be bounded between 0 and 1. However, nothing constraints the predictions of the Linear Probability Model (LPM) offered by OLS from being either less than 0 or greater than 1, as $E[Y_i/X_i] = \beta_0+\beta_1X_i$ and $-\infty< X_i <+\infty$. As a result, the $\beta_0+\beta_1X_i$ can take any value from the entire line; i.e $-\infty< \beta_0+\beta_1X_i <+\infty$; meaning that $-\infty< E[Y_i/X_i] <+\infty$; hence irrational result with probability having infinite values: $-\infty< P_i <+\infty$. The second problem relates to violations of well known OLS properties, BLUE (Best Linear Unbiased Estimator). One of the assumptions within BLUE properties is that the variance σ^2 of the disturbance term *u* is constant, or $\sigma_i^2 = \sigma^2$. This condition however is not met if the dependent variable is dichotomous, since it is impossible to know if the computed standard errors are either too large or too small. Any conclusion about the range of the population is meaningless, and under such condition although the OLS estimates will not be biased, the estimates of their standard errors will be invalid.

These two limitations can be overcome by using Logit and Probit models. Probit models offer an alternative to logistic regression for modelling categorical dependent variables. Even though the outcomes tend to be similar, the underlying distributions are different. Gujarati (2002) argues that the main difference between these two quite similar models is that the logistic distribution has slightly fatter tails; that is to say, the conditional probability P_i approaches zero or one at a slower rate in Logit than in Probit. Further he argues that there is no compelling reason to choose one over the other and that in practice many researchers choose the Logit model because of its comparative mathematical simplicity. We report both estimations, especially given the need to check robustness; however, we concentrate more on Probit given its frequent use in previous tax morale studies.

A more advanced (as well as complicated) approach is Ordered Probit, where the dependent variable has more than two possible outcomes. Many survey questions have a set of categorical answers, as is the case with our dependent variable *TaxMorale* that has four categories of *justifiability* as answers. Note that similarly, the Logit method, has its own counterpart, the Ordered Logit. Ordered Probit usage is however less common given on the difficulty of interpretation of the estimated coefficients. We opt for standard Probit mainly because the mainstream literature of tax morale (as a dependent variable) has grouped *justifiability* answers into two groups, notably those that do not justify tax evasion at any cost (in our case values 1), and those that justify it in different intensities (from sometimes to always). However, we report both Probit and Ordered Probit, particularly given the need for robustness checks.

A Probit model is a type of regression that constraints the estimated probabilities between 0 and 1, and moreover it relaxes the constraint that the effect of X_i is constant across different predicted values of Y. The Probit model, proposed in 1934 by Chester Bliss, assumes that while one can observe only values of 0 and 1 for the dependent variable Y, there is a latent and unobserved continuous variable Y* that determines the value of Y (Nagler, 1994). This latent variable Y* can be specified as follows:

$$Y_i^{*}= \beta_0+\beta_1X_{1i}+\beta_2X_{2i}+...\beta_kX_{ki}+u_i \tag{31}$$

where $X_1,X_2...X_k$ represent a vector of random variables, and *u* represents a random disturbance term. The dependent variable Y_i can take values 1 if $Y_i^{*}>0$; and otherwise:

$$\begin{aligned} Y_i &= 1 \text{ if } Y_i^{*}>0 \\ Y_i &=0 \text{ if } Y_i^{*}=0 \end{aligned} \tag{32}$$

In other words, the Probit model assumes that the probability of $Y_i=0$ is equal to the probability of $Y_i^{*}=0$, or:

$$\Pr(Y_i=1) = \Pr(\beta_0+\beta_1X_{1i}+\beta_2X_{2i}+...\beta_kX_{ki}+u_i > 0) \tag{33}$$

Following a set of rearrangements (for detailed explanation see Wooldridge, 2003), this equation becomes:

$$Pr(Y_i=1)=\Phi(X_i\beta) \qquad \textbf{(34)}$$

where Φ is the normal cumulative distribution function (CDF) or the probability that a real-valued variable X_i with a given probability distribution will be found at a value less than or equal to X_i. In other words, the purpose of the Probit model is to estimate the probability that a particular observation with particular characteristics will fall into one of the categories. Using maximum likelihood techniques, Probit computes coefficients β and corresponding standard errors that are asymptotically efficient. However, the β's cannot be interpreted in a standard approach as they show the impact on the latent variable Y* and not the dependent variable Y itself. To transfer latent variable Y* into a probability estimate for Y it is required to compute the cumulative normal distribution of Y*. This transformation however, means that there is no linear relationship between the β's and $Pr(Y_i=1)$; hence, the change in $Pr(Y_i=1)$ caused by given change of X_i will depend also upon the value of all other independent variables (X's) and their corresponding coefficients (β's). A more useful measure is the marginal effects. As Cameron & Trivedi (2009, p.333) note:

> *An ME [marginal effect], or partial effect, most often measures the effect on the conditional mean of Y of a change in one of the regressors, say X_i. In the linear regression model, the ME equals the relevant slope coefficient, greatly simplifying analysis. For nonlinear models, this is no longer the case, leading to remarkably many different methods for calculating MEs.*

Marginal effects provide a good approximation to the amount of change in dependent variable Y that will be caused by a 1 unit change in X*i*. This in turn offers the same advantage as the Linear Probability Model (LPM) does; yet the effect provided by ME's are not wrong as in the case of LPM.

The simplest approach used to present final Probit estimates is by setting each independent variable to its mean, and thus show the effect on Pr(Yi=1) as the independent variables vary one at a time. This method implies the computation of the average of discrete or partial changes over all observations, yielding average marginal effects; hence, it is known as the Average Marginal Effects (AME). In other words, with the AME, a marginal effect is computed for each case, and then all the computed effects are averaged. The second approach involves computation of marginal effects at fixed values of independent variables; these fixed values are mostly sample means, hence the name Marginal Effect at the Mean (MEM). In other words, MEM are computed by setting X variables at their means and then seeing how a change in one of the X_i variables changes P(Y=1). There is no clear cut advantage of one method compared to the other; however, according to Bartus (2005, p.310):

> *...the main argument in favour of AME is based on the demand for realism: the sample means used during the calculation of MEM might refer to either nonexistent or inherently nonsensical observations, a problem typically encountered when there are dummies among the regressors...*

Moreover, Greene (2002) notes a movement towards the AME approach. To sum up, for the purpose of investigating the determinants of tax morale we estimate both ordered Probit and standard Probit models. We do so in order to provide some robustness checks on the estimated results. However, given the simplicity in interpretation and given the general practice in the previous tax morale studies, we opt to estimate marginal effects from standard Probit rather than from Ordered-Probit. We then choose Average Marginal Effects (AME) over Marginal Effect at the Mean (MEM), given the support from the literature for the former. Nevertheless we report both effects. In addition, given the similarities between Probit and Logit models we report also AME of Logit estimation. As Gujarati (2002, p.625) argues:

> *...for all practical purposes, both logit and probit models give similar results. In practice, the choice therefore depends on the ease of computation, which is not a serious problem with sophisticated statistical packages that are now readily available*.

Similarity of results will again add robustness to final interpretation. Lastly, we will also report OLS estimations to highlight potential changes, if any, from probability models. But before we continue with computation and then interpretation of results, in line with good practice in empirical literature we investigate a set of post estimation diagnostics. We start with several specification tests post standard Probit estimation.

First, when we create a Probit model we assume that the Probit outcome is a linear combination of the independent variables. We also assume that the Probit function is the correct function to use. It could however happen that either the Probit function nor the independent variables are rightly chosen. Beyond theoretical explanation, inclusion of a set of independent variables requires a test for potentially omitted variables. STATA 11 provides a command “linktest” that can be used to detect specification error and it is applied once the Probit function is estimated. The idea behind the “linktest” is to investigate whether there are any additional independent variables that are statistically significant (not by chance) and that are not included in the model. In order to do so, ”linktest” uses the linear predicted value “hat” and also the linear predicted value squared, or “hatsq”. Both predicted values are used as independent variables to rebuild the model. The expectations here are that the variable “hat” should be statistically significant, as it is a predicted value from the model, suggesting thus a proper model specification. In addition, a properly specified model also requires “hatsq” not to be statistically significant; otherwise the model is suffering from omitted variable bias. Appendix 6.9 shows that the “hat” variable is statistically significant at the 1% level, while “hatsq” is not statistically significant even at the 10% level (p=0.249).

The second test is the Likelihood Ratio Test, which is the most commonly used and the most easily calculated. The Likelihood Ratio is applied when willing to test for exclusion restrictions, or when investigating whether a variable or a set of variables should be excluded from the model. The idea is rather simple. Since in Probit function we are maximizing the log likelihood function, then the excluded variables from the regression relationship should cause a fall in the objective function. The question here is, however, whether there is a significant fall in the log likelihood function value. The Likelihood Ratio Test compares the log likelihoods of the two models (one necessarily restrictive to the other) and tests whether this difference is statistically significant. If the difference is statistically significant then the model with more variables fits the data better. We perform Likelihood Ratio test by dropping one variable at a time in turn. Results from Appendix 6.10 show that from the comparison within models in various restrictive estimations, adding variables of interest in our model fits the data better; hence, there is no reason to exclude any of the specified variables as this would be to result in a model that fits the data less well.

The Wald Test, approximates the Likelihood Ratio test, but with the advantage that it only requires estimating one model. The Wald test works by testing that the parameters of interest are simultaneously equal to zero. If they are, this strongly suggests that removing them from the model will not substantially reduce the fit of that model, since an independent variable whose coefficient is very small relative to its standard error is generally not doing much to help predict the dependent variable. The Wald Test from standard Probit output in Appendix 6.8 shows that we are able to reject the null hypothesis and that the inclusion of variables in our model causes significant improvements in our fitted model.

Fourth, we estimate Hosmer and Lemeshow's Goodnes of Fit test. This is similar to a chi-square test and again indicates the extent to which the model fits the data. The Hosmer and Lemeshow's (H-L) Goodness of Fit test divides subjects into deciles based on predicted probabilities. Based on observed and expected frequencies the H-L test computes then a chi-square statistic. Then, a probability value is computed from the distribution of the chi-square to test the fit of the model. If this test is not statistically significant then we fail to reject the null hypothesis that there is no difference between observed and model predicted values. By default the command in STATA works with covariate patterns. The test compares observed and fitted frequencies in each group using Pearson's formula and therefore the Pearson chi-squared are reported. Results from Appendix 6.11 show that the test indicates once more that we have a well-fitted model. We note however, according to the STATA manual, that in case of individual data one can find too many covariate patterns, especially if there are few continuous independent variables (as is the case with our model). In such cases one should group data; usually 10 groups are used (default level in STATA). Again, the post-grouping results (Appendix 6.12) show that our model is well fitted.

The last fitting test that we apply is the classification test, which produces a crostabulation of observed and predicted outcomes, where one predicts a positive outcome if the probability is higher than 0.5; and a negative outcome otherwise. Results (Appendix 6.13) show that in our case the Probit model predicts around 75% of the cases correctly; a rate which is largely acceptable.

These five tests, together, robustly suggest that our model is well specified and that it fits the data well. In the next section we present the estimated results.

6.4.2 Probit Estimation Results

Table 6.8 presents the estimated results of our tax morale model. The first two columns report, respectively, Ordered Probit and standard Probit estimates. As argued already, this provides a robustness check by providing evidence on whether the choice of standard Probit over Ordered Probit has any severe implications. The coefficients, their signs and robust standard errors are almost identical in Columns 1 and 2. With that in mind the decision to opt for Probit over Ordered Probit is supported, especially given the less complicated interpretation procedure of Probit. From the Column 2 estimates, which is our base tax morale model, we compute the Average Marginal Effects (Column 3) as well the Marginal Effects at the Mean (Column 4). Note that both computed marginal effects are nearly identical, making the discussion over which marginal effects to interpret in our case irrelevant; in both cases, the interpretation would be identical (the sign, size and significance of the estimated effects are mainly the same). In addition, Average Marginal Effects from the Logit estimation (Column 5) appear to be same as both marginal effects from Probit estimation; and even the OLS estimates (Column 6) are in line with the marginal effects from Probit and Logit estimations. Given these circumstances we can interpret with more confidence the estimated results. Nevertheless for the purpose of consistency and given the empirical discussion in the section above, we interpret the AMEs (Column 3) from the standard Probit model. The results are as follows.

The group of institutional variables appear to be the most significant determinants of tax morale in Kosovo. Trust in government, trust in the legal system, perceptions about corruption and compliance costs are all estimated with signs in accordance with theoretical expectations. *Trust in government*, as expected, is negatively related to tax morale. The predicted probability of never justifying tax evasion (i.e. tax morale=1) falls by 0.08 percentage points if Trust in Government increases by one category (i.e. trust mitigates the propensity to justify tax evasion) from its average point, all other variables held at their means. An alternative to this interpretation would be to predict all dummy variables at their values equal to 1, and hold continuous variables at their average values again; or potentially at any other categorical values of interest. Since such an interpretation would lead to multiple combinations, we opt to stick to average interpretation for our institutional variables.

Table 6.8 PROBIT estimation results

	O-PROBIT		PROBIT		PROBIT Average Marginal Effects		PROBIT Marginal Effects at Means		LOGIT Average Marginal Effects		OLS	
	1		**2**		**3**		**4**		**5**		**6**	
Dependent: **Tax Morale**	Coeff	Robust S.E	Coeff	Robust S.E	Coeff	Robust S.E	Coeff	Robust S.E	Coeff	Robust S.E	Coeff	Robust S.E
Institutions												
Trust in Government	-0.26 ***	0.07	-0.24 ***	0.07	-0.08 ***	0.02	-0.08 ***	0.02	-0.08 ***	0.02	-0.08 ***	0.02
Trust in Legal System	0.10 *	0.06	0.12 *	0.06	0.03 *	0.02	0.03 *	0.02	0.03 *	0.02	0.03 *	0.02
Corruption	0.25 ***	0.07	0.18 **	0.07	0.05 **	0.02	0.05 **	0.02	0.06 ***	0.02	0.06 ***	0.02
Compliance Costs	-0.15 ***	0.04	-0.13 ***	0.04	-0.04 ***	0.01	-0.04 ***	0.01	-0.04 ***	0.01	-0.04 ***	0.01
Socio-Demographics												
Secondary Education	-0.40 *	0.25	-0.45 *	0.24	-0.14 *	0.07	-0.15 *	0.08	-0.13 *	0.07	-0.12 **	0.06
Tertiary Education	-0.50 **	0.27	-0.57 **	0.27	-0.18 **	0.08	-0.18 **	0.08	-0.18 **	0.08	-0.16 **	0.07
Owners Gender	-0.17	0.23	-0.16	0.25	-0.05	0.08	-0.05	0.08	-0.04	0.08	-0.04	0.06
Owners Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Membership	0.23	0.25	0.25	0.25	0.08	0.08	0.08	0.08	0.09	0.08	0.07	0.06
Constant			1.27 **	0.62							0.88 ***	0.19
Wald chi2	34.11 ***		27.19 ***									
Number of observations	340		340		340		340		340		340	

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

The estimated marginal effect of *Trust in Legal System* suggests that a change by one category (that is trust increases) will increase the probability of never justifying tax evasion by 0.03 percentage points; provided that the category increase starts from the average category of this particular variable and that the values of other variables stay unchanged at their own average[39]. Perception about the level of *corruption* is also positively related to tax morale. Again, an increase in corruption perception by one category will increase probability of high tax morale by 0.05 percentage points, all other variables held at their average values. *Compliance costs*, as expected under the theoretical discussion, are negatively related to tax morale. The predicted probability of never justifying tax evasion (i.e. tax morale=1) falls by 0.04 percentage points if compliance costs increase by one day; again, conditional on the increase starting from the average value of the compliance cost variable, and on all other variables being held at their own average.

The second group of determinants relates to socio-cultural characteristics of respondents, who are either the owners or top managers of the surveyed businesses. This group of determinants appears mainly to be statistically less significant than the institutional group; indeed apart from the two variables proxying different educational levels, which appear to be statistically significant at 10% and 5% respectively, all other variables fail to establish any statistical significance.

Note that at this point we make a different interpretation of marginal results. Interpreting dummy variables at their means may not provide us with a rational result. Here we take computations, and thus interpretation, a step further. We set each of dummy variables estimated in our model at values 1, and then interpret the coefficient of that variable not by changing its value from its own average (which again in case of dummies would be irrational), but by having a value equal to 1. Table 6.9 provides these results. Columns 1, 2, 3 and 5 represent regressions when the respective dummies are set to 1; contrary to the previous interpretations when they were set at their averages. Column 4, when interpreting *ownerage* remains the same as in standard Probit estimation as this variable is continuous. We note however that the changes in coefficients' size and significance are still minor regardless of the alternations.

[39] Note that when interpreting AME we assume that the change in the interpreted X_i is starting from its own average, and that the all other X_j's are held at their averages as well.

Table 6.9 AME interpretation with dummy variables set at 1

	SEC=1; TERTIARY=0			TERTIARY=1; SEC=0			GENDER=1			PROBIT Average Marginal Effects			MEMBER=1		
	1			**2**			**3**			**4**			**5**		
Dependent: **Tax Morale**	Coeff		Robust S.E	Coeff		Robust S.E	Coeff		Robust S.E	Coeff		Robust S.E	Coeff		Robust S.E
Institutions															
Trust in Government	-0.08	***	0.02	-0.08	***	0.02	-0.08	***	0.02	-0.08	***	0.02	-0.07	***	0.02
Trust in Legal System	0.04	*	0.02	0.04	*	0.02	0.03	*	0.02	0.03	*	0.02	0.03	*	0.01
Corruption	0.06	**	0.02	0.06	**	0.02	0.05	**	0.02	0.05	**	0.02	0.05	**	0.02
Compliance Costs	-0.04	***	0.01	-0.04	***	0.01	-0.04	***	0.01	-0.04	***	0.01	-0.03	***	0.01
Socio-Demographics															
Secondary Education	-0.15	*	0.08	-0.15	*	0.08	-0.14	*	0.07	-0.14	*	0.07	-0.12	*	0.07
Tertiary Education	-0.18	**	0.09	-0.19	**	0.09	-0.18	**	0.08	-0.18	**	0.08	-0.15	**	0.07
Owners Gender	-0.05		0.08	-0.05		0.08	-0.05		0.08	-0.05		0.08	-0.04		0.06
Owners Age	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00
Membership	0.08		0.08	0.09		0.08	0.08		0.08	0.08		0.08	0.07		0.05
Number of observations	340			340			340			340			340		

*** at 1% level of significance; ** at 5% level of significance; * at 10% level of significance

The results are as follows. If the owner has *secondary education* then the probability of not justifying tax evasion (all other variables held at their averages) falls by 0.14 percentage points. Note that when interpreting *secondary education* we set *tertiary education* to 0. If instead the owner has *tertiary education* then the probability of high tax morale falls by 0.19 percentage points; all other determinants held at their averages. We note that the sign on the education proxies is contrary to our findings from Chapter V; still pointing to exactly the theoretical ambiguity underlined in our previous discussion. The remaining estimates are not statistically significant and thus are interpreted with a note of due caution. If the owner/top manager of the business is *male*, then the probability of never justifying tax evasion falls by 0.05 percentage points; all other variables held at their own averages. The estimated marginal effect of *ownerage* suggests that the age of owners/top managers has little effect in tax morale. The coefficient of 0.0002 is too small for any practical implications. Last, businesses that are members of associations have an increased probability of never justifying tax evasion by 0.07 percentage points.

To round it up, the results are all in line with theoretical expectations as well as with previous work in individual tax morale studies. We note that when treating the issue of tax morale, and hereafter tax evasion, specifying models with institutional influences is essential. The robust statistical significance of our institutional variables shows that the perception of businesses with respect to institutional quality affects considerably their perception about the moral obligation of paying taxes. If businesses lose their trust towards their government then their evasive decision becomes a more common behaviour. The role of trust in tax morale investigation is also authenticated by the significant influence of *Trust in Legal System*, which again seems to have an important role on how businesses perceive institutional services, including property rights and contract enforcement. When treating institutional services, we note that the perception about the level of *corruption* is also highly significant and considerably related to perceptions towards tax compliance. If businesses pay the bulk of taxes then their perception of how public money is spent must necessarily have great relevance in any tax compliance research and investigation. Last, *compliance costs* also appear to be essential when investigating the level of tax morale. Firms that are constantly dealing with bureaucratic procedures are more likely to see the process of compliance as a pragmatic rather than as a moral and justifiable act. The institutional findings are generally in line with the Jackson and Milliron (1986, p.137) argument that tax compliance depends on tax fairness which, in turn, consists of at least two different dimensions: "*One dimension appears to involve the equity of the trade - the benefits received for the tax dollars given...*", which is captured essentially by trust and corruption variables; *"...the other dimension appears to involve the equity of the taxpayers' burden in reference to that of other individuals*", which could partly be captured by compliance costs if the bureaucratic processes are applied selectively and hence arbitrarily – rather than universally - increase compliance costs. In addition findings about institutional variables are also in line with Hanousek and Palda (2004) that looked at tax evasion as a form of legitimate protest by citizens against the government; or with Tirole (1996), which explains that when taxpayers see their government as corrupted and unfair, evasion is seen as a "vote of dissent" on government activities.

So far our results have shown that the level of business tax compliance is dependent on an intrinsic motivation which, in turn, is affected by general perceptions towards institutions. The role of institutions in tax evasion was also investigated in Chapter V; and the relationship of institutions with tax morale here serves to underpin the robustness of those results. At this point it is important to note that from the business perspective the role and the impact of institutions in tax morale and tax evasion remains as much important as when treating individual tax morale and tax evasion.

Socio-demographic and cultural attributes of business owners/ top managers tell us also a similar story; namely, that the determinants of business tax morale are shaped similarly as in the case of individual tax morale. To start with, we observed the educational level of owners/top managers. Our findings showed that, at conventional significance levels across various specifications, education appears to have a negative relationship with tax morale. This is quite contrary to the general expectations; and, moreover is quite contrary to the findings reported in Chapter IV when treating education as a part of broader cultural attributes in a cross-country investigation. Still, the negative relationship with the education of owners/ top managers is in line with theoretical ambiguity; and perhaps the opposing findings of our two chapters prove exactly this ambiguity. Note that in our theoretical discussion in the beginning of this chapter, as well as throughout Chapter III, we reviewed literature that largely agrees that fiscal knowledge may positively influence the practice of evasion, as more educated people involved in businesses may tend to better understand the opportunities for evading tax obligations; yet, at the same time, more educated people understand better the importance of tax levying, hence increasing their levels of voluntary compliance. In our case, the owners/top managers with higher education, beyond better understanding evasive opportunities, may perceive lack of proper institutions with higher degrees of dissatisfaction, given their *a priori* higher expectations about institutional performance; hence the evasive behaviour is justified by them as a moral act of legitimate protest.

The signs of two demographic variables, gender and age, are in accordance with theoretical expectations and previous studies on individual tax morale. Female owners as expected are more compliant than their male counterparts. Tittle (1980) argued that "women are less self-reliant" and more aversive to risks. Gilligan (1993) has suggested that men and women may differ in moral development, while Torgler and Valev (2006) analysing the World Values Survey (1981-1984) established strong gender differences with women being significantly less likely to agree that cheating on taxes can be justified. Age on the other side has a positive relationship with tax compliance, and hence is in full accordance with the most common finding in the tax compliance literature: that the older the taxpayer, the more compliant (see Section 3.4.1). Older people have more social ties and therefore are more attached to decisions made by others. Consequently their behaviour is negatively correlated with breaking the law. Social scientists suggest that older members of society are usually more risk averse and strongly attached to community; and, as underlined in Chapter II, increasing risk averseness increases the level of tax compliance. We note however that, regardless of the sign, the size of the coefficient fails to provide any reasonable interpretation of the impact of age on business tax morale.

Speaking of the attachment to the community, membership in a business association, used to proxy for collective action and cooperation, is positively related to tax morale, and consequently to tax compliance. Members are more likely to exhibit compliance behaviour given their positive collective intention and the will to impact their business environment through memberships in associations. Collectivism, networking and cooperation as determinants of tax morale are also mentioned and observed in Alm and Gomez (2008).

Conclusion

In this chapter we have investigated the relationship between business tax morale and business tax evasion. In line with theoretical modelling and suggestions provided by very recent and leading literature in the field of tax morale, we constructed a questionnaire and conducted a survey with 600 SMEs in Kosovo, the last country to enter the transition period.

The work in this chapter was divided into two parts. In the first part we explored the impact of tax morale on tax evasion; and accounted for deterrence as well as firm characteristic determinants. The most important finding in this part was that business tax morale, as is the case with individuals, has a strong and negative relationship with tax evasion. Our estimates showed that regardless of model specification, this relationship remained robust and statistically significant. Improving tax morale, however, requires a systematic approach towards increasing the quality of institutions, their relationship with taxpayers as well as creation of social attitudes and norms that consider tax payment as a rightful and necessary act. In the vein of findings that an increase in tax morale by one category increases tax compliance by significant proportion, it is important to note the difficulty of policy making to make such alternations; even for one category in tax morale. Shifting across justifiability categories of business perceptions requires significant improvement in government policies towards tax collection (compliance costs or treatment) and budgetary spending (corruption or gains), as well as significant improvements in rule of law and contract enforcement.

Strong and statistically significant effects were displayed also by the deterrence factors, the tax and audit rates. The positive relationship between tax rate and tax evasion is of special interest given the theoretical and empirical ambiguity found in the past studies; while the negative relationship between the audit rate and tax evasion is crucial considering that investigations of this factor are rare. In addition, the legal status as well as the experience of firms had significant effects on tax evasion.

In the second part of the research we investigated the determinants of business tax morale focusing on institutions and socio-demographic characteristics of owners/top managers.

Institutions - proxied by trust, corruption and compliance costs - appeared to have strong and statistically significant effects on business tax morale in all estimations and model specifications. Individual characteristics of owners and/or top managers were less significant, although their signs were in accordance with theoretical expectations and evidence from individual tax morale studies. These findings and similarities suggests that the factors shaping tax morale do not differ between businesses and individuals; hence the investigation of business tax morale must be carried out in the same way as is the investigation of individual tax morale.

Together these findings suggest a set of policy guidelines for improving the levels of tax compliance in Kosovo and other transition countries. These also act to increase the level of business tax morale as well.

First, in regards to the deterrence factors, the tax and audit rates, governments should reduce the tax burden on business in order to encourage higher levels of tax compliance. This is especially important if tax collection capacities and mechanisms are weak and/or inefficient. In the vein of selective payment of taxes by business, most probably driven by audit strategies that target specific firms, a set of conditions determining unfair competition prevail. This, in turn, undermines the proper development of businesses and their capacities to add value; which, in turn, undermines their ability to pay taxes.

Second, frequent tax audits will increase reporting behaviour, but these audit strategies should be combined with reference to firms' characteristics; most notably tax administration should orient their efforts towards individual firms, smaller firms and/or male owned firms. Larger firms, corporations and partnerships are more likely to become at some point self-selective in the light of identifying tax cheaters. This is especially true if audit strategies were oriented towards these types of firms for longer periods, which is the case in transition economies. Note that in the light of limited human capacities within tax administration and taking into considerations the general objectives of tax inspectorates that tend to optimise collection rates given these limitations, concentration of audits on larger firms (which are more likely to be corporations and partnerships too) is very common. After all it is firms as such that create the bulk of tax revenues. According to tax registers from Tax Administration of Kosovo, around 75% of non-border taxes come from the top 25% of firms ranked by size.

Third, the relationship of institutions with business taxpayers is essential in establishing the level of intrinsic motivation to comply; i.e. tax morale. Governments, courts and other relevant institutions involved in the day to day life of businesses should engage substantially in improving their respective performances, which in turn will improve general perceptions of businesses towards them. It is of special interest to adopt serious anti-corruption policies that not only diminish opportunities to report less, but also increase incentives for business taxpayers to voluntarily comply; especially of those businesses with owners that have higher educational levels.

Fourth, governments should introduce policies to identify individuals with low tax morale and improve their communication with such businesses. Governments should encourage participation of these businesses in business improvement efforts. This will in turn foster mutual relationships as well as tax compliance.

Last, governments in transition countries should use moral obloquy (or naming and shaming) as a tool to improve collection rates. Tax evaders, cheaters and corrupted officials should be treated publicly in order to discourage shameful acts in the future. Moreover, well performing institutions should use public campaigns and public awareness tools that stress the importance of tax payments for the same taxpayers; while tax compliance should be established as a patriotic act. Portraying tax compliance within a broader picture of patriotism is likely to encourage social cohesion towards both stigmatizing cheaters as well as increasing tax morale; one of the most important determinants of tax evasion.

Chapter SEVEN

Conclusions and Policy Implications

TABLE OF CONTENTS

Introduction

The main aim of this thesis was to investigate the determinants of business tax evasion in transition economies, with a focus on small and medium sized enterprises; and a special emphasises on Kosovo. We have started by defining the nature and history of tax evasion, as well as presenting the objectives of the thesis, including discussion about tax evasion in the transition context (Chapter I). We then summarized the existing theoretical foundations of business tax evasion (Chapter II), and reviewed empirical studies on the individual, business and cross-country determinants of tax evasion (Chapter III). Next, we conducted a cross-country panel investigation of business tax evasion, using the BEEPS data for the years 1999, 2002 and 2005, for 25 transition economies through application of both the conventional fixed effects estimation and the recently developed Fixed Effect Vector Decomposition approach (Chapter IV). Then by making use of pooled cross section data for 12,960 firms in 26 transition economies for the years 2002 and 2005, we focused on micro analysis of business tax evasion in order to capture firm related determinants of tax evasion. To perform estimations, we employed the standard Heckman Two-Step approach and the Full Information Maximum Likelihood Heckman as well as the Tobit Corner Solution model (Chapter V). Lastly, in the line with recent and leading tax evasion literature, we constructed a questionnaire and conducted a survey with 600 SMEs in Kosovo to explore the impact of tax morale on tax evasion as well as to investigate, for the first time, the determinants of business tax morale in Kosovo (Chapter VI).

In this chapter we aim to provide an overall summary of the research conducted in all six chapters. We start by summarizing the main findings across the theoretical and empirical chapters with regards to business tax evasion in transition economies. In order to inform institutions in TEs and countries with similar characteristics about the tools required to tackle the problem of tax evasion, a set of policy recommendations is provided in *Section 2*. In *Section 3* we elaborate the main aspects of the contribution to knowledge provided by this work. In *Section 4* we report limitations of this work; while the *last section* provides directions for future research.

7.1 Main findings

The first chapter of this thesis (***Chapter I)*** provided a general introduction to the thesis by briefly reviewing the history of tax evasion and then discussing the aims, objectives and the context of this investigation. In the first chapter we underlined the need to investigate the determinants of business tax evasion for transition economies; an important field that has not received much attention from researchers. We also set-up several targets that needed to be achieved, such as the need for theoretical and empirical review of factors that shape tax evasion, empirical investigation from cross-country, firm level and tax morale perspectives and derivation of policy recommendations intended to reduce either the possibility and/or the inclination to evade. We argued that although the literature on individual tax evasion is fairly well developed, the investigation of business tax evasion has remained largely underdeveloped. Moreover, the transition context of business compliance was even less explored, while the cross-country analysis of businesses and studies concerned with the moral perspectives were lacking. Accordingly we elaborated the aims of next three empirical investigations: the first one from a cross-country perspective on business tax evasion in TEs; the second one investigating firm related determinants in TEs; and the last one focused on business tax morale, with a special focus on Kosovo – the last country to enter the transition process. In the first chapter we also provided the general context of tax evasion in transition countries. We argued that the movement from a system where the state made decisions over production and consumption of goods and services towards a market economy where such decisions are set independently by economic agents, was accompanied with many institutional and behavioural discrepancies, deficiencies and divergences. While, for instance, in centralized economies social services and benefits were provided by using the resources generated mainly by state-owned enterprises, hence zero tax evasion, in market economies the resources were required to be collected from privately owned enterprises. In the vein of weak institutions, insufficient collecting mechanisms, poor institutional performance and considerable presence of corruptive, unfair and unjust public treatment – all common characteristics of post-communist (transition) countries, tax evasion became very common.

In the second chapter of this thesis (***Chapter II***) we presented the current theoretical knowledge on the determinants of tax evasion. We start by elaborating the very basic model of tax evasion, presented in 1972 by Michael G. Allingham and Agnar Sandmo. These pioneers adopted and adapted models from the economics of criminal activities and the economics of uncertainty, to produce what would later become the *magnum opus* of tax evasion literature. Their model assumed that the decision over the amount of income to be evaded is made under uncertainty that could or could not provoke a reaction in the form of a penalty; depending on whether the decision maker is audited or not. Their model also assumes that the decision maker is a rational taxpayer who makes the tax reporting decision like any other rational consumer choice, but is also inclined to dishonesty, that is, his decision is assumed to be isolated from any environmental, community, state, regret, guilt or shameful impact; though such simplicity was later criticized and motivated further extensions. Most importantly, this model assumes that the rational taxpayer is risk averse. Under such assumptions, the level of income tax evasion is negatively related to the level of punishment imposed by law and the probability of audit by tax examiners. However, when analysing the impact of tax rates on evasion, the model predicted an ambiguous effect with the occurrence of both an income effect (as tax rates rise, people become poorer and, in the presence of decreasing absolute risk aversion, they evade less) and a substitution effect (rising taxes means that the return from evasion is higher, thus the taxpayer prefers the risky choice to the safer one). Yitzhaki (1974) argued that the ambiguity was a result of an unrealistic assumption of the model that the penalty is imposed on the amount of income not reported; if, instead, it is imposed on the evaded tax the substitution effect disappears and thus a tax rise will reduce evasion. Similar comparative statics were established in extended business modelling: namely, the firm evades less with higher probability of detection and larger fines, while the impact of tax rates is ambiguous; though, similar to the case of individuals, changing assumptions about risk preferences leads to very divergent results. For the case of businesses, these results depended greatly upon the assumptions made in regards not only to risk behaviour (averse or neutral) but also in regards to separability of evasion and output. Consequent tax research has identified and brought forward various extensions in an attempt to solve the puzzle of tax compliance, or the condition where levels of tax compliance do not correspond with the levels of enforcements and the levels of tax evasion are not, as the traditional model predicts, simply a matter of taxes, penalties and audits. Different levels of deterrence factors have produced two very different types of outcomes. First, when audits and fines rates were set at high extremes, low levels of compliance were observed. In such cases, questions as to "*why people evade taxes?*" were raised. Second, when audit and fine rates were set at low extremes, contrary to intuitive expectations, high levels of compliance were observed, hence questions as to "*why people pay taxes?*" were counter-raised. In the light of such observations, various extensions have incorporated moral and social dynamics to the traditional model. As Andreoni et al. (1998) have summarized, these extensions have included: moral rules and sentiments; the fairness of the tax system; and, last, taxpayer's evaluations of government within the standards of performance, corruption and transparency. The theoretical set-up in this chapter enables us to summarize and empirically investigate in subsequent chapters the determinants of business tax evasion.

In the third chapter of this thesis (***Chapter III***) we started by discussing the standard empirical methodology applied so far in the field of tax evasion. We reviewed advantages and disadvantages of actual tax audit programmes, laboratory experiments and survey studies. We argued that in the absence of data from tax records – characteristic of the US and a few developed countries, survey data not only acts as a decent substitute but sometimes provides information on taxpayers' characteristics that could not be alternatively observed through actual measurement programmes. This information is specifically relevant to the observation of non-traditional determinants acknowledged to be highly relevant in the theoretical set-up. We then grouped determinants of tax evasion into five categories, according to empirical investigation conducted in studies worldwide. These groups were: traditional; institutional; firm-characteristics; economic and socio-cultural. Under the first category, traditional, we reviewed previous studies that have established positive, negative or no effect on tax rate, audit rate and fine rate. From a wide consensus we then set the hypothesis that audit and fine rate are negatively related to tax evasion, while the impact of the tax rate is ambiguous in empirical investigation (similar to the theoretical prediction). The theoretical and empirical ambiguity becomes important in subsequent chapters, once we obtain robust results on the impact of the tax rate in business tax evasion for TEs (all positive). The second category, institutional, included factors proxying the performance of different institutions and the relationship of businesses/individuals with those institutions. We reviewed trust, corruption, fairness and treatment as the most commonly estimated institutional determinants, and find that higher trust, lower corruption, more fairness and better treatment of taxpayers are found to be positively related to tax evasion in most empirical investigations conducted so far. The third category, firm characteristics, grouped those few studies that have investigated firm size, legal status, and sectoral activates and their impact on tax evasion. The fourth category, economic environment, reviews similarly few studies that have conducted aggregate or cross-country investigations and have analyzed the impact of macroeconomic factors, such as per capita income, unemployment or inflation in tax evasion. In the last category, socio-cultural, we reviewed a wide range of studies, most commonly related to individual tax compliance (relationships of which are assumed to be, at least theoretically, similar to those of businesses) and summarizes negative relationship of tax evasion with female, older, married and religious taxpayers, the ambiguous effect of education as well as the necessity to account for social norms and other cultural characteristics.

In the forth chapter of this thesis (***Chapter IV***) we used the BEEPS data for the years 1999, 2002 and 2005 to investigate cross-country business tax evasion in 25 transition economies. We build initially upon pioneering work of Riahl-Belkaoiu (2004) and Richardson (2006) who have analysed individual tax evasion in 30 respectively 45 countries. We extend their work to businesses. Tax rate is the only traditional determinant of tax evasion considered in this chapter. Given the data constrains, we were unable to identify suitable proxies for two remaining traditional variables: the probability of audit; and the fine rate (we address though audit rate in subsequent chapters). We used The Fiscal Freedom Index to account for the tax burden across countries. The economic performance variables included the level and trends of economic development throughout transition economies. We used four proxies to capture the national economic environment: per capita GDP; unemployment; inflation; and non-performing loans. In this chapter we explored also the impact of corruption and institutional reforms in transition economies (as a proxy for institutional determinants) measured by Control of Corruption from the World Governance Indicators and the Transition Index published by the EBRD. Last, we used social norms and educational levels within each country to proxy for socio-cultural differences across TEs. To analyse the data we employed a conventional fixed effects approach as well as a recent innovation in fixed effect panel analysis, known as fixed effect vector decomposition (FEVD), which hitherto has not been used in this context. This is a three-stage approach that combines fixed effects estimation to analyse the effect of variables with relatively high within-group variation and pooled ordinary least squares (OLS) estimation of both time-invariant and “rarely changing” (or slowly moving) variables with relatively low within-group variation (Plümper and Troeger, 2011). The main benefit of this approach was that it enabled us to model the effect of time-invariant (or, at least, “slow moving”) variables, most notably proxies for institutional development.

One of the most important findings in the fourth chapter related to the effect of the tax rate on tax evasion, particularly given the theoretical and empirical ambiguity associated with this relationship. The robust positive relationship in all of our estimated models suggested that higher tax rates increase the benefits of evasion as described in the Allingham and Sandmo (1972) model. For transition economies, it seemed that the substitution effect prevails over the income effect; potentially because business taxpayers in TEs are likely to be more risk takers, i.e. less risk averse. We advance evidence that the macroeconomic environment has significant but minor effects on business tax evasion. The literature argues that per capita GDP acts as a proxy for the general level of development within a country. If so, then in transition economies levels of business tax evasion can be expected to fall as overall prosperity increases. However, this effect is very small. Increased unemployment enables businesses to increase their informal labour force, which reduces their tax and pension burden. In this case, the unemployment rate is positively related to tax evasion as suggested by our FEVD estimate. The small size of those economic effects that are estimated at conventional levels of significance (per capita GDP and unemployment) together with the non-significance of the others (inflation and the business environment) suggested that the decision to evade or not must depend on other non-economic factors. The most important finding of this chapter was the impact of institutional factors on tax evasion, which suggested that even if a country is performing well in general economic terms, the presences of negative institutional phenomena (most notably corruption and lack of reforms) exert a dominant and immediate influence on the relationship between businesses and government. Since we used the measure of transition reforms and corruption levels to proxy the relationship between businesses and formal institutions, we argued that the reforms depend on the quality of state bodies which, in turn, affects citizens’ trust in these same bodies, while corruption gives rise to both dissatisfaction and opportunities. The negative effect of both the transition index and the corruption index on tax evasion is as expected; moreover, the size of these institutional effects is economically substantial. The size of the coefficients enforced the general claim in the literature that institutional factors do matter in accounting for tax evasion and suggested that their inclusion in models of tax evasion for transition economies is imperative. Our findings were consistent with several complementary explanations: first, if businesses feel betrayed by their government they may respond by non-payment of taxes as a form of revolt; secondly, corruption undermines the government-business relationship more broadly, thereby loosening feelings of social obligation; thirdly, corruption changes the risk of detection, which suggests that businesses from transition economies see corruption also as an opportunity to lessen their tax obligations. Finally, positive, large and highly significant period effects for the Year 2002 and the Year 2005 relative to the Year 1999 suggested that tax evasion is falling over time. This again was consistent with the importance of transitional reforms, in particular improvements in law enforcement and other institutions in these countries.

In the fifth chapter of this thesis (***Chapter V***) we focused on micro level determinants of business tax evasion. This was done in order to capture firm related determinants of tax compliance that were not captured in the previous macro chapter. We made use of BEEPS firm level data, covering a set of 26 transition economies for the years 2002 and 2005, to investigate firm-level determinants of tax evasion. Our pooled cross-sectional analysis used a sample of 16,321 firms. Throughout the fifth chapter we built on two, and to our knowledge the only, works on the micro determinants of business tax compliance for TEs, those of Nur-tegin (2008) and Joulfaian (2009). By combining determinants and estimation methodology used in one but not the other paper, we tended to improve both model specification and empirical strategy. To address the impact of audit probability we made use of BEEPS 2005 separately, given that the BEEPS 2002 has no adaptable question to proxy the audit rate. The independent variables investigated were grouped into three categories: traditional (tax and audit rate); institutional (trust in government, trust in legal system, corruption and compliance costs); and firm characteristics (size, ownership, legal status and sector). Given that the nature of the dependent variable in our study, derived from a survey, reflected on very sensitive issue, that of tax evasion, we devoted specific attention to considering respondents' choice to provide either a truthful or indeed any perception on the phenomenon. In other words, in the Chapter V we addressed two sources of potential sample bias: first, nonresponse could be endogenous to firm behaviour, therefore the exclusion of missing values could have biased estimates (Joulfaian, 2009); and, second, since the dependent variable asks firms to perceive the level of evasion by other firms, a part of the responses declaring full compliance could have been false in order to cover a common evasive behaviour by firms (Nur-tegin, 2008). We addressed issues with sample selection bias by employing both the standard Heckman Two-Stage approach as well an extended version known as the Full Information Maximum Likelihood Heckman approach. Results from both estimations showed that sample selection bias was not present in our sample, hence we used the Tobit Corner Solution model given the censored nature of the dependent variable. Post-estimation results reinforced the positive relationship between tax rate and tax evasion established in the cross-country investigation from the Chapter V. This positive and statistically strong significant relationship remained robust across various estimations both in Tobit and Heckman alternatives and, as such, provided valuable information towards addressing the theoretical and empirical controversy. The robust positive relationship becomes even more important given the conflicting findings established in Nur-tegin (2008) and Joulfaian (2009) while using the same datasets as the one upon which we build our work. Another important finding in this chapter, which again reinforces findings from the previous cross-country chapter, was that the institutional variables had the most statistically significant and the most robust coefficients. We found that higher trust in government and higher trust in the judicial system were negatively related to tax evasion; moreover, higher corruption and higher compliance cost increased substantially the level of tax evasion. Another robust finding from this chapter came from the strong statistical significance and genuinely large coefficients of firm characteristics. Our results showed that, firstly, the firm's size matters; the larger the firm the smaller the evasion. Secondly, foreign firms are generally more compliant than domestic firms. Thirdly, sole proprietor businesses tend to evade more than partnerships and corporations; and fourthly, although with less robustness and lesser statistical significance, sectors involving higher cash transactions and/or activities less visible to tax administration are more evasive. We also find that tax evasion falls over time. In the separate analysis of BEEPS 2005 round, conducted in order to capture the impact of audit rate, we did not establish any statistical significance; although the sign of the coefficient of audit proxy was in accordance with theoretical expectations.

In the sixth chapter of this thesis (***Chapter VI***) we focused on what Frey (1997) defined as the "intrinsic motivation" of tax compliance, known as tax morale, which due to "civic virtue" makes taxpayers comply; as opposed to "extrinsic motivation", known also as deterrence impact, in which taxpayers pay because they fear the punishment. Motivated by recommendations from the very recent and leading literature on tax evasion and tax morale we developed a questionnaire and conducted a survey with 600 Small and Medium Sized Enterprises (SME) in Kosovo – the last country to enter the transition process. The reasons to focus on Kosovo were twofold. First, because Chapter V contributed substantially more to knowledge by targeting a country with little or no similar research; and, second, by being the last country to enter the transition process, and arguably, by being still in the transition process, data collected at present are the only available data from an actual and ongoing transition process. The research in this chapter was organized in two parts. In the first part we investigated the relationship between business tax morale and business tax evasion, including a set of firm related determinants. We then advanced the research a step further by investigating the determinants of business tax morale. We used the Tobit Model to estimate the determinants of tax evasion, most notably tax morale, traditional determinants (tax and audit rate) as well as firm's characteristics (size, legal status, years in operation and performance). The Probit Model was applied to investigate the determinants of tax morale, namely institutions (trust in government, trust in legal system, corruption and compliance costs) and socio-cultural characteristics (education, gender, age and cooperation). A number of other specified regressions were run in order to check the robustness of our findings. For the first part of the research, the most important finding was that business tax morale, as is the case with individuals, had a strong and negative relationship with tax evasion. Our estimates showed that regardless of model specifications, this relationship remained robust and statistically significant. Improving tax morale, however, requires a systematic approach towards increasing the quality of institutions, their relationship with taxpayers as well as creation of social attitudes and norms that consider tax payment as a rightful and necessary act. The strong relationship in this business investigation confirms also theoretical assumptions of applying individual modelling to business context. Traditional determinants, namely tax and audit rate, appeared to be robustly significant; with the tax rate being again positively related to tax evasion and re-confirming a similar relationship from the previous two empirical investigations. The impact of audit rate was also statistically and robustly significant; suggesting that higher audit rates reduce considerably the amount of tax evaded. Firm characteristics appeared to be less significant, yet the legal status of the respondents had a strong effect on tax evasion. This result reinforced again the findings from Chapter V, where individual companies appeared to exhibit more evasive behaviour as compared to partnerships and corporations. Lastly, we found that the younger firms are less compliant than are firms with more experience.

In the second part of the research we investigated the determinants of business tax morale focusing on institutions and socio-demographic characteristics of owners/top managers. The institutional category of business determinants, which on purpose was constructed identically as in Chapter V, appeared to be statistically significant and strongly related to the evasive decision, providing thus a similar relationship as in the case of the firm-level investigation carried out for 16,321 firms in TEs. Higher trust in government, higher trust in legal system, lower level of corruption and lower levels of compliance costs reduce substantially the level of tax morale, and consequently the level of business tax evasion. Socio-cultural group of determinants appeared to be less significant. Apart from education of the owner no other variable showed any statistical significance at conventional levels; although their signs were in accordance with theoretical expectations. Education revealed a negative relationship with tax morale; suggesting that the more educated the owners/top managers of businesses are, the less inclined they were to justify tax payment in principle.

To sum up, the main findings of this ***thesis*** are:

a) Regardless of the theoretical and previous empirical ambiguity, when it comes to transition economies the relationship between tax rate and tax evasion is positive. Higher tax rates and higher tax burden will increase the likelihood of tax evasion by businesses;
b) The macroeconomic environment has minor effects on business tax evasion, suggesting that the decision to evade or not must depend on other non-economic factors;
c) Even if a country is performing well in general economic terms, the presence of negative institutional phenomena exert a dominant and immediate influence on the relationship between businesses and government;
d) Business tax morale, as is the case with individuals, has a strong and negative relationship with tax evasion. Moreover, given that the same considerations on morality apply to both individuals and businesses, policies on individual context apply also to businesses;
e) Lower corruption, higher trust and better treatment of business taxpayers improves significantly both tax morale and tax compliance; and,
f) The levels of tax evasion vary across firm characteristics.

7.2 Policy recommendations

The results and main findings of this study have a number of policy implications for improving tax evasion in transition countries. These act to reduce either the possibility of and/or the inclination to evade. According to findings established in our study we group policy recommendations into three categories; notably policies on *tax burden*, on *audit strategy* and on *tax morale*.

On *tax burden*, countries with weak collecting mechanisms, should work on reducing the levels of tax burden in order to increase both voluntary compliance and general tax revenues, which in turn will target both unfair competition and supply of public goods. Note that in the presence of weak deterrence mechanisms, opportunities for tax evasion will be promoted, and thus principles of fair market competition will be distorted by giving unfair advantage to evaders. Moreover, such evasive practices over the long term will be transformed into social norms or common practices, disengagement of which requires collective transformation of behaviours and perceptions. Reduction of the tax burden can be done through the following proposed policies:

- Promote tax rate cuts, where tax rates are high, in order to increase tax compliance. Tax cuts are also believed to increase the tax base and as a result improve general tax revenues within a country. Similar practices are observed in several transition economies, amongst which, the most acknowledged case is that of Russia. According to Ivanova et al. (2005), Russian tax cuts during the late 90's have improved not only the levels of tax compliance (in percentage), but have also improved significantly tax revenues (in amount of local currency); the latter was particularly impacted by an immediate augmentation of the tax base of labour income tax reporting.
- Eliminate all unnecessary compliance costs (note, no compliance has zero costs), especially amongst countries where bureaucratic procedures and paperwork requirements are excessive. Low tax rates do not necessarily reduce all tax burdens. As seen from the case of Kosovo, despite the average tax rate being amongst the lowest in all TEs (around 10%), the level of tax evasion is amongst the highest (39.5%). Other sources of burden include reporting costs, bureaucratic costs or even treatment costs. Some of these costs

sometimes become transaction points; which are preserved solely for corruptive requirements of officials.

- Special attention should be paid to the simplicity of laws related to reimbursable taxes, such as Value Added Tax. If the amount of time required for VAT reimbursement is sufficient to discourage taxpayer’s compliant behaviour, then regardless of the tax rate (low or high) evasive behaviour becomes highly likely.
- Programme tax debt/obligation in the case of a difficult economic year. Such incentive would encourage businesses to avoid any intention of compensating their lost purchasing power in the market by evading taxes. In cases of long term-debts, tax amnesties are preferable when possible. Yet their timing and intensity must be chosen carefully as not to infuriate compliant businesses or send messages that noncompliance will eventually be amnestied.

On *audit strategy*, countries should engage their human monitoring capacities to increase the rate of audits which, in turn, will increase the cost of evasion. It is important however, that the perceived frequency of audits should serve more as a tool to correct self-reporting of business taxpayers, rather than as a tool to identify wrongdoers or collect fines; especially in those countries where human capacities of tax administrations are largely scarce. In addition, as seen from the literature review, more frequent audits will increase uncertainty of taxpayers, which in turn does lead to taxpayers’ overestimation of the probability of being caught which, in turn, increases compliance. Following, there are a set of policy recommendations that act to maximize revenue collection through optimizing audit strategies:

- Audit rates should not be random, as assumed to be in the Allingham and Sandmo (1972) conventional model. Given that the compliance levels differ across the firm’s size, ownership, legal status or sector, tax agencies should consider audits rates endogenous to such characteristics. Reinganum and Wilde (1985) have already argued that audit rates should be conditional on the level of reported tax; we advance their conclusion by suggesting non-randomness according to firm attributes rather than just reported income. Such approach would be roughly an analogy to profiling techniques found commonly in criminal investigations.

- Orient tax inspections towards smaller firms. Many countries direct their audit strategies towards the largest firms, in order to maximise revenue collected in the context of very limited tax administration capacities. By doing so they play on very safe bets. This however, allows a wide spectrum of smaller firms to remain invisible, hence potentially evasive.
- Focus audit rates on sectors that include higher rates of cash transactions. In such sectors, and much more, legal obligations for possession of receipts by consumers would facilitate the engagement and efficiency of tax inspections.
- Optimize audit rates as to treat equally competitors within same clusters, i.e. competitors with same characteristics (size, sector, or region). Equal auditing, or perceived non-discrimination from equal treatment, will increase perceptions related to the fairness of tax administration and consequently increase voluntary tax compliance; or at least diminish unfair competition caused by selective within-group auditing.

On *tax morale*, countries should make significant efforts to improve the relationship between taxpayers and institutions. Morality, beliefs, social norms and other ethical values lie at the heart of every fiscal system. A healthy relationship between those that raise taxes and those that spend taxes creates a synergy for a non tax evasive environment which, in turn, enforces an even healthier relationship. We already argued that even if a country is performing well in general economic terms, the presence of negative institutional phenomena (most notably corruption and lack of reforms) exerts a dominant and immediate influence on the relationship between businesses and government; suggesting thus that institutional policies tackling tax evasion should be independent from general economic policies. Accordingly, there are a set of policy recommendations that could help to improve general levels of tax morale and tax compliance:

- Adopt and enforce serious anti-corruption policies. This could reduce tax evasion both by increasing voluntary compliance and by better performance of enforcement mechanisms. The latter is specifically important given the more direct impact on levels of tax evasion. Corrupted tax officials not only do not intend to prevent tax evasion but, given their personal benefit from evasion, they will rather reinforce it. While the question "who guards the guards" remains infinitely important to answer, supervision of field tax officials is indispensable.

- Beyond improving transparency and accountability, governments should also improve the link between revenues collected and revenues spent. This will drive positive responses of taxpayers towards the governments and other relevant institutions. Some countries have introduced even exclusive linkages between types of taxes and types of spending, say income tax with education or health, in order for taxpayers to understand and percept better their contribution to society.
- Use moral obloquy as a tool to improve collection rates. Tax evaders, cheaters and corrupted officials should be treated publicly in order to discourage shameful acts in the future. Moreover, institutions should use public campaigns and public awareness tools that stress the importance of tax payments for the same taxpayers; while tax compliance should be established as a patriotic act. Portraying tax compliance within a broader context of patriotism is likely to encourage social cohesion towards both stigmatizing cheaters as well as sympathizing with fighters.
- Understand better taxpayers, most importantly cheaters, through identifying the socio-demographic characteristics of individuals with low tax morale. Identification could help draw strategies that would improve their relationship with institutions.
- Improve the efficiency and modernize significantly public administration; especially that part of administration that is in day-to-day contact with businesses. Improvement of the taxpayer's experience could be important also at the local level. Fiscal decentralization should be considered too.

As underlined already in Chapter VI of this thesis, the motivation for investigating tax evasion and tax morale in Kosovo was threefold. First, while tax evasion affects every country, it is the poorer ones that suffer more; in this line treating tax evasion in Kosovo becomes of special interest. Second, by being the last country to enter the transition process and arguably, by being still in the transition process, data collected at present are the only available data from an actual and ongoing transition process. For the case of tax morale – which has received attention quite recently – this is a rare opportunity. Third, since the research in Kosovo in regards to tax evasion and tax morale was never conducted before, the general contribution to knowledge and policy recommendations derived from findings become much more important.

We note, however, that while the findings about Kosovo cannot be generalized to every other transition economy, they may be relevant to countries that have similar characteristics – most notably to Balkan countries – and who largely fall within the same set of economic, cultural, historical and behavioural characteristics. These findings can also be applicable for countries that have similar institutional and economical level of development as Kosovo.

Moreover, the methodology – notably the questionnaire and survey technique, along with the empirical methods applied in Chapter VI of this thesis – can be easily transferred for future research on every other transition economy.

7.3 Contribution to knowledge

This dissertation makes its contribution to knowledge by investigating the determinants of business tax evasion in transition economies, by investigating a broad spectrum of variables in the field of tax evasion, by applying advanced econometric methods, by collecting primary data through surveys conducted for the purpose of this thesis, and by providing a set of policy recommendations and proposals to promote the fight against evasion to policy makers as well as other interested parties in transition economies and countries with similar characteristics. The most important contributions are summarized in the points below.

Firstly, given the general focus of researchers on individual tax compliance we advance the current knowledge on tax evasion by extending investigation to the business context as well as to the transition economies; two largely neglected topics in the field of tax evasion literature.

Secondly, for the first time we conduct a cross-country analysis of business tax evasion in transition countries; by employing a recent innovation in fixed effect panel analysis, known as fixed effect vector decomposition (FEVD), which hitherto has not been used in this context. While the cross-country studies on individual tax evasion are rare and quite recent, the context of business cross-country investigation has been completely unexplored. Moreover the transition perspective covered in a cross-country study is again novel, given the lack of interest in the past research. Hence empirical investigation in a cross country, business and transition context, combined or each separately, is one of the most important contributions of this thesis. By aggregating tax evasion data from the Business Environment and Enterprise Performance Survey (BEEPS) for the years 1999, 2002 and 2005, we provide for the first time empirical findings for business tax evasion in 25 transition economies and for a six year time span. Usage of panel data, for the first time in a cross-country context of tax evasion for TEs, enables us also to engage in dynamic analysis and to observe potential changes over time. Our robust findings that support institutional performance over the macroeconomic environment was not established in any previous study related to business tax evasion in transition, and as such can serve to better inform policymakers in these countries.

Thirdly, by employing sample selection techniques - the standard Heckamn Two-Step approach, the extended Heckman FIML approach and Tobit Corner Solution - we expand on the (two) previous firm-level studies in TEs. By using BEEPS 2005 data, in addition to BEEPS 2002 used previously, we increase the sample size, which in turn provides us with more precise estimates and test statistics with more power, as well as allows us to observe new determinants that were not accounted for (due to 2002 data restrictions). In addition, by combining determinants and estimation methodology used in the previous works, we improve both model specification and empirical strategy and again reach more precise estimators.

Fourthly, by concluding a robust and statistically significant positive relationship between the tax rate and tax evasion in TEs, we provide more evidence on the ambiguous theoretical and empirical background set so far. We enforce the belief that in transition countries higher tax rates will increase tax evasion. We also argue that the income effect established in the conventional model of tax evasion, which is assumed to work in negative relationship with evasion, could be less present, as businesses in transition countries are more likely to be less risk averse; hence less compliant.

Fifthly, through several estimations in both transition countries as well as Kosovo, we robustly conclude that foreign firms, larger firms, and non-individual firms are substantially more compliant than domestic firms, smaller firms and partnership or corporations respectively. We also reinforce findings that sectors involving higher cash transactions are likely to be more evasive. These findings suggest designing new audit policies that are not set random but are endogenous to specific firm characteristics.

Sixthly, for the purpose of this thesis, we generate primary data by designing a questionnaire and conducting a survey according to recent theoretical arguments put forward by the leading authors in the field of tax morale. The survey questionnaire is designed to proxy both determinants of business tax morale as well as determinants of tax evasion, as explored and investigated in the previous chapters. Investigation of business tax morale is one of the most important contributions of this thesis, given the very rare and very recent country-specific investigation of this topic.

Seventhly, by focusing our empirical research on business tax morale in Kosovo, we investigate for the first time the topic of tax evasion in Kosovo. We establish for the first time the level of business tax evasion in Kosovo, as measured by the most standard survey technique in the tax literature. We also find the level of compliance morale justifiability by kosovan businesses and we further investigate what shapes these beliefs. We find that the performance of kosovan institutions (or potentially those of any other transition and developing country) affects significantly and robustly the moral perception about tax obligations.

Eighthly, we find that deterrence factors, such as tax rate and audit rate, are strongly and statistically significant related to the level of tax evasion in Kosovo. While higher taxes lead to lower levels of compliance, increased audit rates will reduce considerably evasion. Findings such as these for Kosovo were never established before.

Ninthly, we advance further the empirical review of determinants of tax evasion by summarizing up to date studies conducted through survey, tax measurement programmes or experiments in various countries worldwide. We also group up to date findings in order to observe for potential consensuses or divergences amongst tax evasion studies.

Lastly, with the policy implications drawn from the empirical investigation throughout the thesis, we inform institutions in transition economies, specifically institutions in Kosovo, in regards to tools required to fight one of the oldest and most common policy problems worldwide, tax evasion.

7.4 Limitations

Although this thesis has offered several important contributions to the existing literature and knowledge on tax evasion, there are several constraints to be taken into account. These constraints are related to the availability and quality of data used throughout the research. Following, we list the most important limitations of our thesis.

First, and the most important limitation relates to the qualitative nature of the self reported independent variable of tax evasion, used in all three empirical chapters (VI, V and VI). Lack of accurate and actual tax reporting data for transition economies, similar to tax measurement programmes available for the US, forces this work to rely entirely on perceptions; some of which, as is the case with every other survey, may be subjective and prone to individual preferences and characteristics. Surveys of tax evasion are rather more complicated, because tax evasion is perceived to be an unlawful activity and socially undesirable, thus making individuals quite reluctant to admit such behaviour. In addition, there is a fear of penalties and other sanctions which, in turn, induce individuals to either provide untruthful answers about their compliance behaviour or refuse to answer at all. Although we control for sample selection bias at some stage of this research, the usage of actual tax and audit databases would have increased the precision of our estimates.

Second, lack of actual tax and audit programmes for TEs precludes control for the impact of the fine rate in tax evasion. Though we argue in Chapter VI that under the assumption of fine rates being systematic, the potential effect should be captured by the intercept, we fail to investigate and measure (given the restrictions from survey data) one of the most important determinants of tax evasion. A better estimation of the audit rate would have also been possible with either tax measurement programmes or actual audited tax returns as evidence.

Third, given again the lack of available data for transition economies, we fail to capture the impact of tax morale in a cross-country or a firm level context for a broader set of countries in transition. The relationship of business tax morale to business tax evasion remains still largely unexplored; though our survey conducted for 600 SMEs in Kosovo provides some indications for expectations in other countries or regions as well.

Fourth, the lack of data for a larger time span than the maximum observed in our thesis (three rounds in six years in Chapter IV), could have potentially increased the quality of our estimations. It could have also provided more information on the potential time shocks or any other time-related impact on observed tax evasion levels throughout transition periods. Moreover, the lack of recent data for transition economies did not allow us to investigate further the institutional impact on compliance; especially as these countries are assumed to have improved their respective institutional performance continuously over the time. Though the inclusion of tax evasion question on BEEPS data for three datasets (1999, 2002 and 2005) was encouraging, the exclusion of same question from subsequent datasets has limited considerably the potential for time series analysis.

Last, inability to differentiate amongst types of taxes and the impact of each tax rate on business tax evasion also limits the findings of this study. Lack of data for actual profit tax rates, income tax rate, Value Added Tax rate, or any other tax rate does not enable us to further investigate the divergences within the impact of tax rates on tax evasion. In most transition economies the rates amongst types of taxes are different and, at least theoretically, the investigation of the relationship between each of these taxes with compliance would have provided better policy recommendations.

7.5 Suggestions for further research

Given the needs and importance of studying the topic of tax evasion as underlined in Chapter I of this thesis, in the light of the theoretical background summarized in Chapter II, building upon the empirical investigations conducted so far and reviewed in Chapter III, as well as upon the contribution provided in this thesis through empirical investigations in Chapters IV, V and VI, we summarize a set of points to inform direct future research in the field of business tax evasion in transition economies or/and countries that have similar characteristics with transition economies.

First, given the theoretical and empirical ambiguity of the impact of tax rate on both individual and business tax evasion, a Meta Regression Analysis is highly recommended. Combining results from different studies would potentially provide some interesting results on patterns amongst tax rate results; especially for contrasting cases when using the same data-bases or investigating the same regions.

Second, work in the field of business tax morale for transition countries, both at firm-level or from a cross-country perspective is highly recommended. While the availability of data at present is limited/inexistent, future studies might initiate or make use of morality data for businesses in transition countries.

Third, future research studies might also initiate/make use (if possible) of actual tax and audit measurement programmes in order to provide more accurate estimations and/or robust current findings. A highly recommended research is also related to the impact of the fine rate on business tax evasion in transition countries; which can be obtained only through such measurement programmes.

Fourth, it is important to advance the research on the relationship between various taxes and compliance. In particular the relationship between Value Added Tax, as the most important income source for transition economies, and tax evasion, is highly recommended. In such cases future research might also consider VAT compliance as a dependent variable and estimate it *vis-*

à-vis a set of VAT characteristics, such as VAT rate, VAT grace periods, and VAT reimbursement practices; amongst others.

Fifth, in order to provide policy recommendations to help design better audit policies, investigation of tax evasion within economic sectors and subsectors is highly recommended. While the relationship of several firm characteristics, such as size, legal status or even ownership type (foreign or domestic) is fairly established and robustly concluded, the within sectoral characteristics of evaders are less studied.

Sixth, in Chapter III, Section 3.3, we explain that we follow recent practice in treating tax morale as an aggregator of institutional influences on tax evasion and, hence, as an important independent variable in our model of tax evasion. However, we are also mindful of the older approach that treated tax morale attitudes more or less as a proxy for tax evasion behaviour. This suggests an empirical strategy whereby both tax morale and tax evasion are related to one another not as independent and dependent variables – i.e. as cause and effect – but as correlated to one another as dependent variables in a system. In this case, the appropriate model would be a two-equation system of "seemingly unrelated regressions" (SUR) allowing both tax morale and tax evasion to be jointly determined by similar (but not necessarily the same) observed and unobserved determinants. For reasons of space (and time), we do not undertake this analysis for this thesis. However, it is a possible extension of the work presented in Chapter VI.

Seventh, while the vast majority of theoretical approaches have used the expected utility theory to analyze the choice of taxpayers in regards to the tax reporting, we encourage future research to attempt elaborating tax evasion through alternative theories; most notably through principal-agent theory (with a specific focus on the relationship of asymmetric information between the tax administration acting as an agent and the taxpayer acting as a principal) and prospect theory – the foundations of which have been briefly elaborated in Chapter II of this thesis. These alternative theories might provide completely new insights to the problem of tax evasion.

Last, empirical investigation of time series data on business tax evasion will potentially uncover further, as yet unobserved factors that shape tax evasion.

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LUMIR ABDIXHIKU

APPENDICES

DETERMINANTS OF BUSINESS TAX EVASION IN TRANSITION ECONOMIES

CHAPTER IV

Business Tax Evasion in Transition Economies: A Cross-Country Panel Investigation

CHAPTERV

Firm Level Determinants of Tax Evasion in Transition Economies

CHAPTER VI
Understanding Business Tax Morale: The Case of Kosovo

4.1 Fixed Effects

```
Fixed-effects (within) regression               Number of obs      =        75
Group variable: cn                              Number of groups   =        25

R-sq:  within  = 0.6130                         Obs per group: min =         3
       between = 0.2108                                        avg =       3.0
       overall = 0.1877                                        max =         3

                                                F(9,41)            =      7.22
corr(u_i, Xb)  = -0.9417                        Prob > F           =    0.0000

------------------------------------------------------------------------------
  TaxEvasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
GDPpercapita |   .0005376   .0006547     0.82   0.416    -.0007846    .0018599
   Education |  -2.220872   .8639098    -2.57   0.014    -3.965573   -.4761705
   Inflation |   -.020669   .0338344    -0.61   0.545     -.088999    .0476611
     TaxRate |   .2245493   .1399617     1.60   0.116     -.058109    .5072077
 BusinessEnv |   .0614254   .0802896     0.77   0.449    -.1007227    .2235734
Unemployment |   .3778789    .270782     1.40   0.170    -.1689764    .9247342
   TranIndex |  -42.60114   10.01691    -4.25   0.000    -62.83069   -22.37158
  Corruption |  -9.322069   4.584785    -2.03   0.049    -18.58123   -.0629077
 SocialNorms |   .1429963   .3341811     0.43   0.671    -.5318962    .8178887
       _cons |   342.5833   89.92745     3.81   0.000     160.9711    524.1955
-------------+----------------------------------------------------------------
     sigma_u |  26.211894
     sigma_e |  6.6040352
         rho |  .94031111   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(24, 41) =     2.31              Prob > F = 0.0089

.
```

4.2 Random Effects

```
Random-effects GLS regression                   Number of obs      =        75
Group variable: cn                              Number of groups   =        25

R-sq:  within  = 0.4007                         Obs per group: min =         3
       between = 0.6963                                        avg =       3.0
       overall = 0.5362                                        max =         3

Random effects u_i ~ Gaussian                   Wald chi2(9)       =     63.65
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
  TaxEvasion |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
GDPpercapita |   .0000108   .0005058     0.02   0.983    -.0009806    .0010022
   Education |  -2.507615    .706798    -3.55   0.000    -3.892914   -1.122317
   Inflation |  -.0278489   .0319052    -0.87   0.383    -.0903818    .0346841
     TaxRate |  -.0218426   .1113683    -0.20   0.845    -.2401204    .1964353
 BusinessEnv |   .2096433    .070637     2.97   0.003     .0711974    .3480892
Unemployment |   .1178977   .1550005     0.76   0.447    -.1858977    .4216931
   TranIndex |  -1.613707   2.776283    -0.58   0.561    -7.055121    3.827707
  Corruption |  -4.500568   3.267917    -1.38   0.168    -10.90557    1.904431
 SocialNorms |   .2810102   .1559375     1.80   0.072    -.0246217    .5866421
       _cons |   259.7253   69.39851     3.74   0.000     123.7067    395.7439
-------------+----------------------------------------------------------------
     sigma_u |  3.3391221
     sigma_e |  6.6040352
         rho |  .20359974   (fraction of variance due to u_i)
------------------------------------------------------------------------------

.
```

4.3 Breusch and Pagan Lgrangian Multiplier Test

```
xttest0
Breusch and Pagan Lagrangian multiplier test for random effects

        TaxEvasion[cn,t] = Xb + u[cn] + e[cn,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               TaxEvas~n |   122.9393        11.0878
                       e |   43.61328       6.604035
                       u |   11.14974       3.339122

        Test:   Var(u) = 0
                             chi2(1) =     0.05
                         Prob > chi2 =     0.8166
```

4.4 Hasuman Test

```
hausman FE RE
Note: the rank of the differenced variance matrix (8) does not equal the number of
        coefficients being tested (9); be sure this is what you expect, or there may be
        problems computing the test.  Examine the output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the coefficients
        are on a similar scale.


                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |       FE           RE         Difference          S.E.
-------------+----------------------------------------------------------------
GDPpercapita |    .0005376     .0000108        .0005269        .0004157
   Education |   -2.220872    -2.507615        .2867435        .4967662
   Inflation |    -.020669    -.0278489        .0071799        .0112618
     TaxRate |    .2245493    -.0218426        .2463919        .0847725
 BusinessEnv |    .0614254     .2096433       -.1482179        .0381685
Unemployment |    .3778789     .1178977        .2599812        .2220309
   TranIndex |   -42.60114    -1.613707       -40.98743        9.624483
  Corruption |   -9.322069    -4.500568       -4.821501        3.215738
 SocialNorms |    .1429963     .2810102        -.138014        .2955681
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       22.07
                Prob>chi2 =      0.0048
                (V_b-V_B is not positive definite)
```

4.5 Pasaran Tests

```
xtcsd, pesaran
Pesaran's test of cross sectional independence =     0.353, Pr = 0.7242
```

```
xtcsd, pesaran
Pesaran's test of cross sectional independence =    -1.038, Pr = 1.7006
```

4.6 Modified Wald Test

```
xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (25)  =    4.4e+05
Prob>chi2 =      0.0000
```

4.7 Clustered Standard Errors

```
Fixed-effects (within) regression               Number of obs      =        75
Group variable: cn                              Number of groups   =        25

R-sq:  within  = 0.6989                         Obs per group: min =         3
       between = 0.5612                                        avg =       3.0
       overall = 0.5721                                        max =         3

                                                F(11,24)           =      9.30
corr(u_i, Xb)  = -0.6141                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 25 clusters in cn)
------------------------------------------------------------------------------
             |               Robust
  TaxEvasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
GDPpercapita |   .0015174    .000643     2.36   0.027     .0001904    .0028444
   Education |  -1.111625   .9271697    -1.20   0.242    -3.025209    .8019596
   Inflation |  -.0198027   .0158351    -1.25   0.223    -.0524848    .0128793
     TaxRate |   .3686278     .17576     2.10   0.047      .005877    .7313785
 BusinessEnv |   .0504617      .0909     0.56   0.584    -.1371467    .2380702
Unemployment |   .2745871   .1930366     1.42   0.168    -.1238209    .6729951
   TranIndex |  -5.493088   12.88762    -0.43   0.674    -32.09183    21.10565
  Corruption |   -11.3822   4.473319    -2.54   0.018    -20.61467   -2.149718
 SocialNorms |   .5625874   .4330811     1.30   0.206    -.3312481    1.456423
   Year_2002 |  -10.05756   2.788309    -3.61   0.001    -15.81234   -4.302769
   Year_2005 |  -15.77409   4.147687    -3.80   0.001    -24.33449   -7.213681
       _cons |   103.5579   99.07786     1.05   0.306    -100.9287    308.0446
-------------+----------------------------------------------------------------
     sigma_u |  7.4686161
     sigma_e |  5.9726346
         rho |  .60993599   (fraction of variance due to u_i)
------------------------------------------------------------------------------

.
```

4.8 Normality of residuals

```
Test for serial correlation in residuals
Null hypothesis is either that rho=0 if residuals are AR(1)
or that lamda=0 if residuals are MA(1)
LM= 7.9894943
which is asy. distributed as chisq(1) under null, so:
Probability of value greater than LM is .00470496
LM5= 2.8265693
which is asy. distributed as N(0,1) under null, so:
Probability of value greater than abs(LM5) is .00235248


Test for significance of fixed effects
F= 1.8422856
Probability>F= .04371992


Test for normality of residuals

                    Skewness/Kurtosis tests for Normality
                                                         ------- joint ------
    Variable |    Obs   Pr(Skewness)   Pr(Kurtosis)  adj chi2(2)    Prob>chi2
-------------+---------------------------------------------------------------
    __00000B |     75      0.6781         0.0822         3.32         0.1905
```

4.9 Normality of residuals with Albania99 and Macedonia99

```
Test for serial correlation in residuals
Null hypothesis is either that rho=0 if residuals are AR(1)
or that lamda=0 if residuals are MA(1)
LM= 5.3104573
which is asy. distributed as chisq(1) under null, so:
Probability of value greater than LM is .02119779
LM5= 2.304443
which is asy. distributed as N(0,1) under null, so:
Probability of value greater than abs(LM5) is .0105989


Test for significance of fixed effects
F= 2.8476758
Probability>F= .00178476


Test for normality of residuals

                    Skewness/Kurtosis tests for Normality
                                                         ------- joint ------
    Variable |    Obs   Pr(Skewness)   Pr(Kurtosis)  adj chi2(2)    Prob>chi2
-------------+---------------------------------------------------------------
    __00000B |     75      0.5591         0.9734         0.34         0.8427
```

4.10 FE estimation

```
Fixed-effects (within) regression               Number of obs      =        75
Group variable: cn                              Number of groups   =        25

R-sq:  within  = 0.8340                         Obs per group: min =         3
       between = 0.2705                                        avg =       3.0
       overall = 0.4443                                        max =         3

                                                F(13,37)           =     14.30
corr(u_i, Xb)  = -0.5862                        Prob > F           =    0.0000

------------------------------------------------------------------------------
  TaxEvasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
GDPpercapita |   .0014504   .0005792     2.50   0.017     .0002767     .002624
   Education |  -.3230158   .7067132    -0.46   0.650    -1.754953    1.108921
   Inflation |   -.022634   .0235041    -0.96   0.342    -.0702578    .0249898
     TaxRate |   .3395033   .1077175     3.15   0.003      .121247    .5577596
 BusinessEnv |   .0305303   .0573181     0.53   0.597    -.0856071    .1466678
Unemployment |   .0813219   .1937764     0.42   0.677    -.3113065    .4739502
   TranIndex |  -14.90238   11.30727    -1.32   0.196    -37.81308    8.008325
  Corruption |  -9.629685   3.262646    -2.95   0.005    -16.24043   -3.018936
 SocialNorms |  -.0030072   .2798046    -0.01   0.991    -.5699452    .5639308
   Year_2002 |  -7.568094   2.391919    -3.16   0.003    -12.41458   -2.721606
   Year_2005 |  -14.75417    3.98685    -3.70   0.001     -22.8323   -6.676046
  DAlbania99 |   28.78258   6.247629     4.61   0.000     16.12368    41.44148
DMacedonia99 |  -20.10015   6.566888    -3.06   0.004    -33.40593   -6.794366
       _cons |    69.8282   87.49742     0.80   0.430    -107.4584    247.1148
-------------+----------------------------------------------------------------
     sigma_u |  9.5265406
     sigma_e |  4.5529705
         rho |  .81405902   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(24, 37) =     2.70              Prob > F = 0.0032
```

4.11 FEVD Step One (robust SE)

```
Fixed-effects (within) regression               Number of obs      =        75
Group variable: cn                              Number of groups   =        25

R-sq:  within  = 0.8340                         Obs per group: min =         3
       between = 0.2705                                        avg =       3.0
       overall = 0.4443                                        max =         3

                                                F(11,24)           =         .
corr(u_i, Xb)  = -0.5862                        Prob > F           =         .

                                    (Std. Err. adjusted for 25 clusters in cn)
------------------------------------------------------------------------------
             |               Robust
  TaxEvasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
GDPpercapita |   .0014504   .0005479     2.65   0.014     .0003195    .0025812
   Education |  -.3230158   .5164838    -0.63   0.538    -1.388986    .7429544
   Inflation |   -.022634   .0155353    -1.46   0.158    -.0546972    .0094292
     TaxRate |   .3395033   .1649003     2.06   0.051    -.0008342    .6798408
 BusinessEnv |   .0305303   .0964784     0.32   0.754    -.1685914     .229652
Unemployment |   .0813219   .1386855     0.59   0.563     -.204911    .3675547
   TranIndex |  -14.90238    10.6558    -1.40   0.175    -36.89487    7.090118
  Corruption |  -9.629685   3.135479    -3.07   0.005    -16.10099   -3.158375
 SocialNorms |  -.0030072   .2959101    -0.01   0.992    -.6137356    .6077212
   Year_2002 |  -7.568094    1.97317    -3.84   0.001    -11.64052   -3.495671
   Year_2005 |  -14.75417   3.739571    -3.95   0.001    -22.47227   -7.036075
  DAlbania99 |   28.78258   3.245076     8.87   0.000     22.08507    35.48008
DMacedonia99 |  -20.10015   4.406235    -4.56   0.000    -29.19417   -11.00612
       _cons |    69.8282   70.06245     1.00   0.329    -74.77359      214.43
-------------+----------------------------------------------------------------
     sigma_u |  9.5265406
     sigma_e |  4.5529705
         rho |  .81405902   (fraction of variance due to u_i)
------------------------------------------------------------------------------

.


predict Fixed, u
```

4.12 FEVD Step Two

```
      Source |       SS       df       MS              Number of obs =      75
-------------+------------------------------           F(  4,    70) =   41.33
       Model |  4590.45696     4  1147.61424           Prob > F      =  0.0000
    Residual |  1943.90145    70  27.7700207           R-squared     =  0.7025
-------------+------------------------------           Adj R-squared =  0.6855
       Total |  6534.35841    74  88.3021407           Root MSE      =  5.2697

------------------------------------------------------------------------------
       Fixed |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Unemployment |   .2341763   .0835617     2.80   0.007     .0675178    .4008348
   TranIndex |    10.1477   1.314117     7.72   0.000     7.526777    12.76863
  Corruption |   3.264711   1.297266     2.52   0.014     .6773947    5.852026
 SocialNorms |   .2148417   .0829022     2.59   0.012     .0494984    .3801849
       _cons |  -37.79688   4.550975    -8.31   0.000    -46.87351   -28.72025
------------------------------------------------------------------------------

.
```

```
predict SecStageRes, residuals
```

4.13 FEVD Step Three

Source	SS	df	MS
Model	8330.51469	14	595.036764
Residual	766.993016	60	12.7832169
Total	9097.50771	74	122.939293

Number of obs =	75
F(14, 60) =	46.55
Prob > F =	0.0000
R-squared =	0.9157
Adj R-squared =	0.8960
Root MSE =	3.5754

TaxEvasion	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GDPpercapita	.0014504	.0002573	5.64	0.000	.0009358	.001965
Education	-.3230158	.3315348	-0.97	0.334	-.9861841	.3401526
Inflation	-.022634	.014669	-1.54	0.128	-.0519764	.0067084
TaxRate	.3395033	.0559246	6.07	0.000	.2276374	.4513692
BusinessEnv	.0305303	.036068	0.85	0.401	-.0416164	.102677
Unemployment	.3154982	.063962	4.93	0.000	.1875552	.4434411
TranIndex	-4.754675	1.105747	-4.30	0.000	-6.966498	-2.542852
Corruption	-6.364975	1.433996	-4.44	0.000	-9.233393	-3.496556
SocialNorms	.2118345	.0632135	3.35	0.001	.0853886	.3382804
Year_2002	-7.568094	1.13215	-6.68	0.000	-9.83273	-5.303458
Year_2005	-14.75417	1.447734	-10.19	0.000	-17.65007	-11.85827
DAlbania99	28.78258	4.16373	6.91	0.000	20.45388	37.11128
DMacedonia99	-20.10015	4.172351	-4.82	0.000	-28.44609	-11.7542
SecStageRes	1	.0975227	10.25	0.000	.8049255	1.195074
_cons	32.03132	32.92636	0.97	0.335	-33.8312	97.89384

.

4.14 FEVD Adjusted for Degrees of Freedom

```
panel fixed effects regression with vector decomposition

degrees of freedom fevd    =        37           number of obs      =        75
mean squared error         = 10.22657            F( 15, 37)         =   13.0031
root mean squared error    = 3.197901            Prob > F           = 4.45e-10
Residual Sum of Squares    =  766.993            R-squared          =   .915692
Total Sum of Squares       = 9097.508            adj. R-squared     =  .8313839
Estimation Sum of Squares  = 8330.515

------------------------------------------------------------------------------
             |                fevd
  TaxEvasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
GDPpercapita |   .0014504   .0006202     2.34   0.025     .0001936    .0027071
   Inflation |   -.022634   .0233334    -0.97   0.338    -.0699119    .0246439
     TaxRate |   .3395033   .1084904     3.13   0.003     .1196809    .5593257
 BusinessEnv |   .0305303   .0565214     0.54   0.592    -.0839929    .1450536
   Education |  -.3230158   .6692348    -0.48   0.632    -1.679014    1.032983
   Year_2002 |  -7.568094    1.59272    -4.75   0.000    -10.79525   -4.340938
   Year_2005 |  -14.75417   2.540264    -5.81   0.000    -19.90123   -9.607107
 DAlbania99 |   28.78258   6.168599     4.67   0.000     16.28381    41.28135
DMacedonia99 |  -20.10015   5.887588    -3.41   0.002    -32.02953   -8.170759
Unemployment |   .3154982   .1506514     2.09   0.043     .0102495    .6207469
   TranIndex |  -4.754675    2.75859    -1.72   0.093    -10.34411    .8347595
  Corruption |  -6.364975   3.681237    -1.73   0.092    -13.82387    1.093921
 SocialNorms |   .2118345   .1590658     1.33   0.191    -.1104635    .5341325
         eta |          1          .        .       .            .           .
       _cons |   32.03132   66.44241     0.48   0.633    -102.5938    166.6564
------------------------------------------------------------------------------
```

.

4.15 Tests for Heteroskedasticity

estat hettest

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of TaxEvasion

         chi2(1)      =     0.16
         Prob > chi2  =   0.6894
```

estat imtest, white

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(74)     =     75.00
         Prob > chi2  =    0.4457

Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df      p
---------------------+-----------------------------
  Heteroskedasticity |      75.00     74    0.4457
            Skewness |      13.81     14    0.4642
            Kurtosis |       0.20      1    0.6554
---------------------+-----------------------------
               Total |      89.01     89    0.4799
---------------------------------------------------
```

estat szroeter, rhs

```
Szroeter's test for homoskedasticity

    Ho: variance constant
    Ha: variance monotonic in variable

---------------------------------------
    Variable |      chi2   df      p
-------------+-------------------------
GDPpercapita |      4.09    1   0.0430 #
   Education |      0.53    1   0.4661 #
   Inflation |      0.32    1   0.5700 #
     TaxRate |      0.23    1   0.6318 #
 BusinessEnv |      2.05    1   0.1520 #
Unemployment |      0.17    1   0.6766 #
   TranIndex |      1.28    1   0.2578 #
  Corruption |      2.06    1   0.1515 #
 SocialNorms |      0.00    1   0.9997 #
   Year_2002 |      0.64    1   0.4253 #
   Year_2005 |      0.08    1   0.7830 #
  DAlbania99 |      0.51    1   0.4765 #
DMacedonia99 |      0.51    1   0.4765 #
 SecStageRes |      1.85    1   0.1738 #
---------------------------------------
                  # unadjusted p-values
```

4.16 Ramsey Test

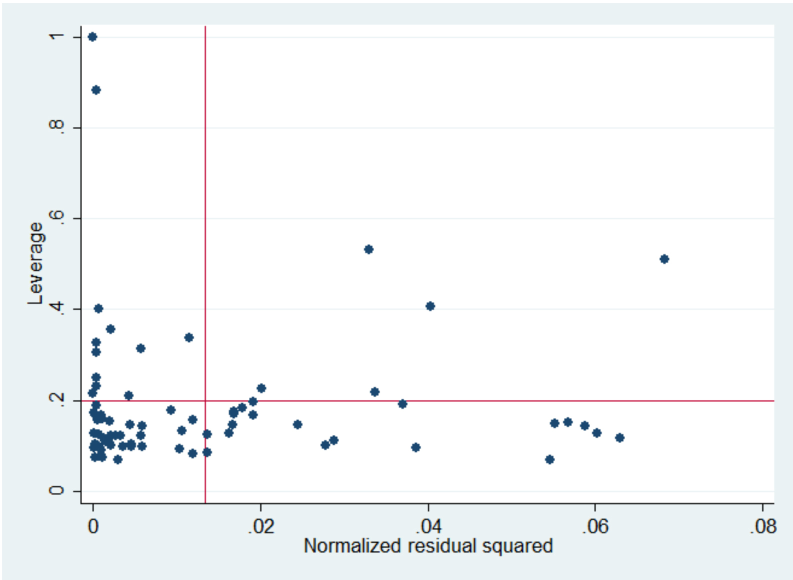
```
estat ovtest


Ramsey RESET test using powers of the fitted values of TaxEvasion
       Ho:  model has no omitted variables
                  F(3, 57) =      2.48
                  Prob > F =      0.0706
```

```
estat ovtest, rhs

Ramsey RESET test using powers of the independent variables
       Ho:  model has no omitted variables
                 F(30, 30) =      1.43
                  Prob > F =      0.1657
```

4.17 Variance Inflation Factor VIF

```
estat vif

Variable |       VIF       1/VIF
-------------+----------------------
  Corruption |      5.07    0.197431
GDPpercapita |      4.93    0.202950
   Year_2005 |      2.73    0.365943
     TaxRate |      2.53    0.395970
   TranIndex |      2.52    0.396989
 SocialNorms |      1.89    0.527969
 BusinessEnv |      1.79    0.558042
   Year_2002 |      1.67    0.598389
Unemployment |      1.63    0.613703
   Inflation |      1.58    0.634538
   Education |      1.57    0.636581
 SecStageRes |      1.45    0.691440
DMacedonia99 |      1.34    0.744232
  DAlbania99 |      1.34    0.747317
-------------+----------------------
    Mean VIF |      2.29
```

4.18 Leverage



5.1 Heckman Two-Step "Missingness"

```
heckman taxevasion taxrate trustingovernment trustinjudicalsystem corruption1 compliancecost
foreign medium large individual partnership miningandquarrying construction manufacturing
transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dummyyear dum1 dum2 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12
dum13 dum14 dum15 dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25, select
(dummyresponse = taxrate  trustingovernment  trustinjudicalsystem corruption1 compliancecost
foreign medium large individual partnership dummyyear miningandquarrying construction
manufacturing transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dummyownermanager dum1 dum2 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11
dum12 dum13 dum14 dum15 dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25) twostep
```

```
Heckman selection model -- two-step estimates   Number of obs      =     10303
(regression model with sample selection)        Censored obs       =       598
                                                Uncensored obs     =      9705

                                                Wald chi2(43)      =   1328.91
                                                Prob > chi2        =    0.0000
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
taxevasion						
taxrate	.8934944	.2335892	3.83	0.000	.435668	1.351321
trustingov~t	-.3454797	.158871	-2.17	0.030	-.6568612	-.0340982
trustinjud~m	-.5377856	.1726835	-3.11	0.002	-.8762391	-.1993321
corruption1	2.903152	.1644685	17.65	0.000	2.5808	3.225505
compliance~t	.0812193	.0207206	3.92	0.000	.0406077	.1218308
foreign	-2.513826	.6528849	-3.85	0.000	-3.793457	-1.234195
medium	-3.217647	.6043376	-5.32	0.000	-4.402127	-2.033167
large	-3.977415	.8199239	-4.85	0.000	-5.584437	-2.370394
individual	2.848361	.6239913	4.56	0.000	1.625361	4.071362
partnership	.9068526	.6771023	1.34	0.180	-.4202435	2.233949
miningandq~g	-4.178606	2.340392	-1.79	0.074	-8.765691	.4084777
construction	-1.677226	1.179009	-1.42	0.155	-3.988042	.633589
manufactur~g	-1.710924	1.066449	-1.60	0.109	-3.801126	.3792773
transports~t	-3.539609	1.324914	-2.67	0.008	-6.136392	-.9428262
wholesaler~s	-1.657336	1.060344	-1.56	0.118	-3.735572	.4208996
realestate~s	-1.445402	1.233021	-1.17	0.241	-3.86208	.9712751
hotelsandr~s	1.776288	1.370634	1.30	0.195	-.910105	4.462682
dummyyear	-2.954116	1.052724	-2.81	0.005	-5.017417	-.8908145
dum1	3.544839	2.004901	1.77	0.077	-.3846937	7.474372
dum2	3.24523	1.9561	1.66	0.097	-.5886552	7.079116
dum3	5.09331	1.883431	2.70	0.007	1.401853	8.784767
dum4	-6.711705	2.055278	-3.27	0.001	-10.73998	-2.683434
dum5	4.285802	2.011421	2.13	0.033	.3434891	8.228115
dum6	-3.088306	1.896055	-1.63	0.103	-6.804506	.6278936
dum7	-3.781763	1.651514	-2.29	0.022	-7.018671	-.5448542
dum8	-4.745875	1.542107	-3.08	0.002	-7.76835	-1.7234
dum9	-5.342036	1.983528	-2.69	0.007	-9.229678	-1.454393
dum10	-2.358382	1.614147	-1.46	0.144	-5.522053	.8052892
dum11	-2.245212	1.699797	-1.32	0.187	-5.576753	1.086328
dum12	-7.796747	2.096924	-3.72	0.000	-11.90664	-3.686851
dum13	-4.433595	1.679056	-2.64	0.008	-7.724484	-1.142706
dum14	-1.235078	1.686824	-0.73	0.464	-4.541193	2.071037
dum15	-1.269539	1.822457	-0.70	0.486	-4.84149	2.302411
dum16	-4.765874	2.048432	-2.33	0.020	-8.780727	-.751021
dum17	-5.830353	2.090573	-2.79	0.005	-9.9278	-1.732906
dum18	-8.950838	2.170911	-4.12	0.000	-13.20574	-4.695931
dum19	9.695967	1.957929	4.95	0.000	5.858497	13.53344
dum20	-8.537954	1.883786	-4.53	0.000	-12.23011	-4.845801
dum21	-6.084572	1.605752	-3.79	0.000	-9.231789	-2.937355
dum22	-2.405596	1.785418	-1.35	0.178	-5.904951	1.093759
dum23	-9.061991	1.82071	-4.98	0.000	-12.63052	-5.493464
dum24	-.8406625	1.52876	-0.55	0.582	-3.836978	2.155653
dum25	.0463671	1.894352	0.02	0.980	-3.666494	3.759228
_cons	10.1716	3.030038	3.36	0.001	4.232836	16.11037

```
dummyrespo~e |
     taxrate |   .0684088   .0203915     3.35   0.001     .0284423    .1083754
trustingov~t |   .0227543    .015081     1.51   0.131    -.0068039    .0523126
trustinjud~m |   .0291088   .0164342     1.77   0.077    -.0031017    .0613193
 corruption1 |   .0386835    .015672     2.47   0.014      .007967    .0694001
compliance~t |   .0012846   .0020579     0.62   0.532    -.0027488     .005318
     foreign |  -.0022792   .0623246    -0.04   0.971    -.1244331    .1198748
      medium |  -.1325002   .0583554    -2.27   0.023    -.2468746   -.0181257
       large |  -.1159601   .0775378    -1.50   0.135    -.2679314    .0360111
  individual |   -.052015   .0604268    -0.86   0.389    -.1704494    .0664194
 partnership |  -.0829512   .0653595    -1.27   0.204    -.2110536    .0451511
   dummyyear |   .5813822   .0442478    13.14   0.000     .4946581    .6681063
miningandq~g |   .0665536   .2406954     0.28   0.782    -.4052008     .538308
construction |  -.0715248   .1158213    -0.62   0.537    -.2985305    .1554808
manufactur~g |  -.0457261   .1057478    -0.43   0.665     -.252988    .1615358
transports~t |  -.1661801   .1251975    -1.33   0.184    -.4115627    .0792024
wholesaler~s |  -.0318474   .1044393    -0.30   0.760    -.2365446    .1728499
realestate~s |  -.1641252   .1154917    -1.42   0.155    -.3904848    .0622343
hotelsandr~s |  -.1530065   .1266648    -1.21   0.227     -.401265    .0952519
dummyowner~r |  -.1207473   .0520663    -2.32   0.020    -.2227955   -.0186992
        dum1 |  -.2174034   .1646886    -1.32   0.187    -.5401871    .1053804
        dum2 |   .5806161    .212624     2.73   0.006     .1638807    .9973514
        dum3 |   .2992184   .1900007     1.57   0.115     -.073176    .6716129
        dum4 |  -.4191292   .1540594    -2.72   0.007      -.72108   -.1171783
        dum5 |   .0322934   .1847526     0.17   0.861    -.3298151    .3944018
        dum6 |  -.2202448   .1544911    -1.43   0.154    -.5230417    .0825522
        dum7 |   .6104348    .156821     3.89   0.000     .3030712    .9177983
        dum8 |   .0888272   .1428016     0.62   0.534    -.1910588    .3687132
        dum9 |   .8630943    .229602     3.76   0.000     .4130827    1.313106
       dum10 |   .0952166   .1507385     0.63   0.528    -.2002255    .3906587
       dum11 |    .111004   .1584875     0.70   0.484    -.1996258    .4216338
       dum12 |  -.3005526   .1648973    -1.82   0.068    -.6237454    .0226402
       dum13 |   .2013936   .1651224     1.22   0.223    -.1222403    .5250275
       dum14 |   .1005074    .155598     0.65   0.518     -.204459    .4054738
       dum15 |  -.1293528   .1658597    -0.78   0.435    -.4544319    .1957262
       dum16 |   .2055844   .2015403     1.02   0.308    -.1894274    .6005961
       dum17 |  -.3912335   .1611511    -2.43   0.015    -.7070839   -.0753831
       dum18 |  -.3123495   .1698552    -1.84   0.066    -.6452595    .0205604
       dum19 |   .0907243   .1763123     0.51   0.607    -.2548415    .4362901
       dum20 |   .6876494   .2101532     3.27   0.001     .2757567    1.099542
       dum21 |   .2010243   .1526216     1.32   0.188    -.0981085    .5001572
       dum22 |   .3150288   .1818578     1.73   0.083     -.041406    .6714635
       dum23 |    .407323   .1767917     2.30   0.021     .0608176    .7538283
       dum24 |  -.0329065   .1386142    -0.24   0.812    -.3045854    .2387723
       dum25 |    .223479   .1825742     1.22   0.221    -.1343599    .5813179
       _cons |   .8891141   .1955911     4.55   0.000     .5057625    1.272466
-------------+----------------------------------------------------------------
mills        |
      lambda |   18.24455   8.163337     2.23   0.025     2.244701    34.24439
-------------+----------------------------------------------------------------
         rho |    0.85952
       sigma |  21.226487
      lambda |  18.244548   8.163337
------------------------------------------------------------------------------

.
```

5.2 Heckman FIML "Missingness"

```
REJECT; TAXRATE=-999$
REJECT; TRUSTING=-999$
REJECT; TRUSTINJ=-999$
REJECT; COMPLIAN=-999$
REJECT; CORRUPTI=-999$

PROBIT;Lhs=DUMMYRES;Rhs=ONE,TAXRATE,TRUSTING,TRUSTINJ,CORRUPTI,COMPLIAN,FOREIGN,MEDIUM,LARGE,INDI
VIDU,PARTNERS,DUMMYYEA,MININGAN,CONSTRUC,MANUFACT,TRANSPOR,WHOLESAL,REALESTA,HOTELSAN,DUMMYOWN,DU
M1,DUM2,DUM3,DUM4,DUM5,DUM6,DUM7,DUM8,DUM9,DUM10,DUM11,DUM12,DUM13,DUM14,DUM15,DUM16,DUM17,DUM18,
DUM19,DUM20,DUM21,DUM22,DUM23,DUM24,DUM25;Hold$

Normal exit from iterations. Exit status=0.
+---------------------------------------------+
| Binomial Probit Model                       |
| Maximum Likelihood Estimates                |
| Model estimated: Apr 19, 2013 at 02:59:00AM.|
| Dependent variable              DUMMYRES    |
| Weighting variable                  None    |
| Number of observations             10303    |
| Iterations completed                   7    |
| Log likelihood function        -2062.206    |
| Number of parameters                  45    |
| Info. Criterion: AIC =            .40905    |
|   Finite Sample: AIC =            .40909    |
| Info. Criterion: BIC =            .44067    |
| Info. Criterion:HQIC =            .41974    |
| Restricted log likelihood      -2282.566    |
| McFadden Pseudo R-squared       .0965404    |
| Chi squared                     440.7198    |
| Degrees of freedom                    44    |
| Prob[ChiSqd > value] =          .0000000    |
| Results retained for SELECTION model.       |
| Hosmer-Lemeshow chi-squared =    7.10753    |
| P-value=  .52508 with deg.fr. =        8    |
+---------------------------------------------+
+--------+--------------+----------------+--------+--------+----------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+--------+--------------+----------------+--------+--------+----------+
---------+Index function for probability
 Constant|     .88911408       .19559111     4.546   .0000
 TAXRATE |     .06840884       .02039147     3.355   .0008   2.78433466
 TRUSTING|     .02275433       .01508102     1.509   .1313   3.87129962
 TRUSTINJ|     .02910880       .01643424     1.771   .0765   3.44889838
 CORRUPTI|     .03868353       .01567199     2.468   .0136   2.56498107
 COMPLIAN|     .00128463       .00205789      .624   .5325   6.15966223
 FOREIGN |    -.00227915       .06232461     -.037   .9708    .13500922
 MEDIUM  |    -.13250016       .05835538    -2.271   .0232    .18208289
 LARGE   |    -.11596013       .07753777    -1.496   .1348    .08696496
 INDIVIDU|    -.05201499       .06042682     -.861   .3894    .40784238
 PARTNERS|    -.08295121       .06535954    -1.269   .2044    .29418616
 DUMMYYEA|     .58138218       .04424780    13.139   .0000    .62787538
 MININGAN|     .06655359       .24069542      .277   .7822    .01019121
 CONSTRUC|    -.07152486       .11582132     -.618   .5369    .11093856
 MANUFACT|    -.04572612       .10574781     -.432   .6654    .34504513
 TRANSPOR|    -.16618013       .12519750    -1.327   .1844    .06289430
 WHOLESAL|    -.03184736       .10443929     -.305   .7604    .27593905
 REALESTA|    -.16412521       .11549169    -1.421   .1553    .09298263
 HOTELSAN|    -.15300655       .12666482    -1.208   .2271    .05425604
 DUMMYOWN|    -.12074733       .05206634    -2.319   .0204    .31903329
 DUM1    |    -.21740336       .16468863    -1.320   .1868    .02290595
 DUM2    |     .58061607       .21262398     2.731   .0063    .02717655
 DUM3    |     .29921842       .19000066     1.575   .1153    .02727361
 DUM4    |    -.41912916       .15405939    -2.721   .0065    .03057362
 DUM5    |     .03229338       .18475261      .175   .8612    .01970300
 DUM6    |    -.22024476       .15449107    -1.426   .1540    .03096186
 DUM7    |     .61043476       .15682103     3.893   .0001    .09822382
```

```
 DUM8    |     .08882719       .14280160      .622   .5339    .07221198
 DUM9    |     .86309574       .22960217     3.759   .0002    .03581481
 DUM10   |     .09521661       .15073853      .632   .5276    .05988547
 DUM11   |     .11100402       .15848752      .700   .4837    .04241483
 DUM12   |    -.30055259       .16489731    -1.823   .0684    .02310007
 DUM13   |     .20139358       .16512238     1.220   .2226    .05299427
 DUM14   |     .10050738       .15559795      .646   .5183    .04154130
 DUM15   |    -.12935285       .16585970     -.780   .4355    .03018538
 DUM16   |     .20558437       .20154031     1.020   .3077    .01941182
 DUM17   |    -.39123350       .16115115    -2.428   .0152    .02581772
 DUM18   |    -.31234955       .16985516    -1.839   .0659    .01941182
 DUM19   |     .09072433       .17631232      .515   .6069    .02242065
 DUM20   |     .68764956       .21015321     3.272   .0011    .03824129
 DUM21   |     .20102432       .15262161     1.317   .1878    .06037077
 DUM22   |     .31502876       .18185780     1.732   .0832    .03571775
 DUM23   |     .40732296       .17679168     2.304   .0212    .03717364
 DUM24   |    -.03290654       .13861421     -.237   .8123    .07366786
 DUM25   |     .22347901       .18257424     1.224   .2209    .02591478

+----------------------------------------+
| Fit Measures for Binomial Choice Model |
| Probit   model for variable DUMMYRES   |
+----------------------------------------+
| Proportions P0= .058041   P1= .941959  |
| N =   10303 N0=     598   N1=    9705  |
| LogL=    -2062.206 LogL0=   -2282.566  |
| Estrella = 1-(L/L0)^(-2L0/n) = .04399  |
+----------------------------------------+
|     Efron |  McFadden  |  Ben./Lerman  |
|    .04594 |    .09654  |       .89584  |
|    Cramer | Veall/Zim. |     Rsqrd_ML  |
|    .04751 |    .13360  |       .04187  |
+----------------------------------------+
| Information  Akaike I.C. Schwarz I.C.  |
| Criteria        .40905        .44067   |
+----------------------------------------+
+-------------------------------------------------------+
|Predictions for Binary Choice Model.  Predicted value is |
|1 when probability is greater than  .500000, 0 otherwise.|
|Note, column or row total percentages may not sum to     |
|100% because of rounding. Percentages are of full sample.|
+------+---------------------------------+----------------+
|Actual|         Predicted Value         |                |
|Value |       0                1        | Total Actual   |
+------+----------------+----------------+----------------+
|  0   |      0 (   .0%)|    598 (  5.8%)|    598 (  5.8%)|
|  1   |      0 (   .0%)|   9705 ( 94.2%)|   9705 ( 94.2%)|
+------+----------------+----------------+----------------+
|Total |      0 (   .0%)|  10303 (100.0%)|  10303 (100.0%)|
+------+----------------+----------------+----------------+

=======================================================================
Analysis of Binary Choice Model Predictions Based on Threshold =  .5000
-----------------------------------------------------------------------
Prediction Success
-----------------------------------------------------------------------
Sensitivity = actual 1s correctly predicted                   100.000%
Specificity = actual 0s correctly predicted                      .000%
Positive predictive value = predicted 1s that were actual 1s    94.196%
Negative predictive value = predicted 0s that were actual 0s      .000%
Correct prediction = actual 1s and 0s correctly predicted       94.196%
-----------------------------------------------------------------------
Prediction Failure
-----------------------------------------------------------------------
False pos. for true neg. = actual 0s predicted as 1s          100.000%
False neg. for true pos. = actual 1s predicted as 0s             .000%
False pos. for predicted pos. = predicted 1s actual 0s          5.804%
False neg. for predicted neg. = predicted 0s actual 1s           .000%
False predictions = actual 1s and 0s incorrectly predicted      5.804%
=======================================================================
```

```
SELECTION;Lhs=TAXEVASI;Rhs=ONE,TAXRATE,TRUSTING,TRUSTINJ,CORRUPTI,COMPLIAN,FOREIGN,MEDIUM,LARGE,I
NDIVIDU,PARTNERS,MININGAN,CONSTRUC,MANUFACT,TRANSPOR,WHOLESAL,REALESTA,HOTELSAN,DUMMYYEA,DUM1,DUM
2,DUM3,DUM4,DUM5,DUM6,DUM7,DUM8,DUM9,DUM10,DUM11,DUM12,DUM13,DUM14,DUM15,DUM16,DUM17,DUM18,DUM19,
DUM20,DUM21,DUM22,DUM23,DUM24,DUM25;MLE;Tobit$
```

```
+----------------------------------------------------------+
| Sample Selection Model                                   |
| Probit selection equation based on DUMMYRES              |
| Selection rule is: Observations with DUMMYRES =  1       |
| Results of selection:                                    |
|                  Data points     Sum of weights          |
| Data set            10303           10303.0              |
| Selected sample      9705            9705.0              |
+----------------------------------------------------------+
```

```
+----------------------------------------------------+
| Sample Selection Model                             |
| Two step    least squares regression               |
| Model was estimated Apr 19, 2013 at 03:01:34AM     |
| LHS=TAXEVASI Mean                 =   13.29500     |
|              Standard deviation   =   21.30745     |
| WTS=none     Number of observs.   =       9705     |
| Model size   Parameters           =         45     |
|              Degrees of freedom   =       9660     |
| Residuals    Sum of squares       =   3772081.     |
|              Standard error of e  =   19.76068     |
| Fit          R-squared            =   .1398270     |
|              Adjusted R-squared   =   .1359090     |
| Model test   F[ 44,  9660] (prob) =  35.69 (.0000) |
| Diagnostic   Log likelihood       =  -42705.00     |
|              Restricted(b=0)      =  -43458.44     |
|              Chi-sq [ 44]  (prob) =1506.89 (.0000) |
| Info criter. LogAmemiya Prd. Crt. =   5.972014     |
|              Akaike Info. Criter. =   5.972014     |
| Not using OLS or no constant. Rsqd & F may be < 0. |
| Standard error corrected for selection..  21.22649 |
| Correlation of disturbance in regression           |
| and Selection Criterion (Rho)...........    .85952 |
+----------------------------------------------------+
```

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]	Mean of X
Constant	10.1716011	3.03003798	3.357	.0008	
TAXRATE	.89349442	.23358919	3.825	.0001	2.79845440
TRUSTING	-.34547971	.15887104	-2.175	.0297	3.87140649
TRUSTINJ	-.53778563	.17268353	-3.114	.0018	3.45234415
CORRUPTI	2.90315220	.16446851	17.652	.0000	2.57207625
COMPLIAN	.08121929	.02072056	3.920	.0001	6.15456981
FOREIGN	-2.51382581	.65288492	-3.850	.0001	.13353941
MEDIUM	-3.21764691	.60433756	-5.324	.0000	.18093766
LARGE	-3.97741516	.81992394	-4.851	.0000	.08603812
INDIVIDU	2.84836123	.62399129	4.565	.0000	.41040701
PARTNERS	.90685256	.67710227	1.339	.1805	.29386914
MININGAN	-4.17860640	2.34039207	-1.785	.0742	.01030397
CONSTRUC	-1.67722642	1.17900910	-1.423	.1549	.11076765
MANUFACT	-1.71092447	1.06644908	-1.604	.1086	.34930448
TRANSPOR	-3.53960925	1.32491364	-2.672	.0075	.06213292
WHOLESAL	-1.65733601	1.06034377	-1.563	.1180	.27594024
REALESTA	-1.44540245	1.23302139	-1.172	.2411	.09088099
HOTELSAN	1.77628844	1.37063414	1.296	.1950	.05296239
DUMMYYEA	-2.95411580	1.05272404	-2.806	.0050	.64451314
DUM1	3.54483929	2.00490066	1.768	.0770	.02153529
DUM2	3.24523035	1.95609989	1.659	.0971	.02823287
DUM3	5.09331029	1.88343108	2.704	.0068	.02802679
DUM4	-6.71170477	2.05527776	-3.266	.0011	.02771767
DUM5	4.28580202	2.01142112	2.131	.0331	.01947450
DUM6	-3.08830642	1.89605520	-1.629	.1034	.02895415
DUM7	-3.78176267	1.65151430	-2.290	.0220	.10221535
DUM8	-4.74587502	1.54210726	-3.078	.0021	.07212777
DUM9	-5.34203406	1.98352782	-2.693	.0071	.03760948
DUM10	-2.35838166	1.61414749	-1.461	.1440	.06007213

```
 DUM11    |   -2.24521210      1.69979686    -1.321   .1865    .04214323
 DUM12    |   -7.79674682      2.09692395    -3.718   .0002    .02143225
 DUM13    |   -4.43359527      1.67905588    -2.641   .0083    .05430191
 DUM14    |   -1.23507789      1.68682443     -.732   .4641    .04121587
 DUM15    |   -1.26953953      1.82245717     -.697   .4860    .02998454
 DUM16    |   -4.76587410      2.04843209    -2.327   .0200    .01968058
 DUM17    |   -5.83035318      2.09057269    -2.789   .0053    .02400824
 DUM18    |   -8.95083826      2.17091070    -4.123   .0000    .01803194
 DUM19    |    9.69596662      1.95792888     4.952   .0000    .02225657
 DUM20    |   -8.53795364      1.88378634    -4.532   .0000    .03997939
 DUM21    |   -6.08457153      1.60575242    -3.789   .0002    .06151468
 DUM22    |   -2.40559563      1.78541802    -1.347   .1779    .03668212
 DUM23    |   -9.06199048      1.82071017    -4.977   .0000    .03812468
 DUM24    |    -.84066250      1.52876025     -.550   .5824    .07202473
 DUM25    |     .04636715      1.89435177      .024   .9805    .02617208
 LAMBDA   |    18.2445494      8.16333619     2.235   .0254    .11246877

Maximum iterations reached. Exit iterations with status=1.

+----------------------------------------------+
| ML Estimates of Selection Model              |
| Maximum Likelihood Estimates                 |
| Model estimated: Apr 19, 2013 at 03:02:38AM.|
| Dependent variable             TAXEVASI      |
| Weighting variable                 None      |
| Number of observations            10303      |
| Iterations completed                101      |
| Log likelihood function       -25706.15      |
| Number of parameters                 91      |
| Info. Criterion: AIC =          5.00770      |
|   Finite Sample: AIC =          5.00786      |
| Info. Criterion: BIC =          5.07164      |
| Info. Criterion:HQIC =          5.02931      |
| LHS is CENSORED. Tobit Model fit by MLE.     |
| FIRST 45 estimates are probit equation.      |
+----------------------------------------------+
+---------+--------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+---------+--------------+----------------+--------+--------+
---------+Selection (probit) equation for DUMMYRES
 Constant|     .88897707       .36066273     2.465   .0137
 TAXRATE |     .06735478       .03662471     1.839   .0659
 TRUSTING|     .02269844       .02713249      .837   .4028
 TRUSTINJ|     .02834806       .02981066      .951   .3416
 CORRUPTI|     .03893470       .02914702     1.336   .1816
 COMPLIAN|     .00117409       .00384305      .306   .7600
 FOREIGN |    -.00380159       .11174554     -.034   .9729
 MEDIUM  |    -.13412232       .10645932    -1.260   .2077
 LARGE   |    -.11783418       .13776642     -.855   .3924
 INDIVIDU|    -.04905374       .10937479     -.448   .6538
 PARTNERS|    -.08224272       .12140622     -.677   .4981
 DUMMYYEA|     .58144237       .08717611     6.670   .0000
 MININGAN|     .06844246       .46513203      .147   .8830
 CONSTRUC|    -.06980868       .21188531     -.329   .7418
 MANUFACT|    -.04296358       .19423967     -.221   .8249
 TRANSPOR|    -.16306744       .22586458     -.722   .4703
 WHOLESAL|    -.02894247       .19132016     -.151   .8798
 REALESTA|    -.16011073       .20803006     -.770   .4415
 HOTELSAN|    -.15435754       .22619279     -.682   .4950
 DUMMYOWN|    -.13086079       .09589054    -1.365   .1724
 DUM1    |    -.20807685       .28077830     -.741   .4586
 DUM2    |     .56835734       .45733509     1.243   .2140
 DUM3    |     .30864030       .38136507      .809   .4183
 DUM4    |    -.41369019       .26429920    -1.565   .1175
 DUM5    |     .03012563       .33227772      .091   .9278
 DUM6    |    -.21761733       .26424145     -.824   .4102
 DUM7    |     .62371310       .31437688     1.984   .0473
 DUM8    |     .09699882       .25824561      .376   .7072
 DUM9    |     .86911536       .54776186     1.587   .1126
 DUM10   |     .10581619       .27606088      .383   .7015
 DUM11   |     .12137578       .28426705      .427   .6694
```

DUM12	-.29419673	.27909076	-1.054	.2918
DUM13	.20937316	.31530835	.664	.5067
DUM14	.10994102	.28189301	.390	.6965
DUM15	-.12563634	.30146925	-.417	.6769
DUM16	.20965577	.38907558	.539	.5900
DUM17	-.38466603	.27503534	-1.399	.1619
DUM18	-.30831337	.28944548	-1.065	.2868
DUM19	.08927026	.32503741	.275	.7836
DUM20	.68952669	.46633679	1.479	.1392
DUM21	.20180489	.28822995	.700	.4838
DUM22	.32670395	.35602750	.918	.3588
DUM23	.40716197	.34712015	1.173	.2408
DUM24	-.02474315	.24658783	-.100	.9201
DUM25	.21950420	.34282691	.640	.5220
---------+Corrected regression, Regime 1				
Constant	-14.0848618	6.18163112	-2.279	.0227
TAXRATE	2.61286141	.49426405	5.286	.0000
TRUSTING	-.74913443	.32880441	-2.278	.0227
TRUSTINJ	-1.24635901	.36386948	-3.425	.0006
CORRUPTI	7.11457236	.36175626	19.667	.0000
COMPLIAN	.13491039	.04086117	3.302	.0010
FOREIGN	-6.37582282	1.42218836	-4.483	.0000
MEDIUM	-7.65119090	1.30879085	-5.846	.0000
LARGE	-10.3780362	1.78410956	-5.817	.0000
INDIVIDU	7.01128102	1.32675282	5.285	.0000
PARTNERS	2.87496359	1.44658958	1.987	.0469
MININGAN	-9.93933661	5.49648848	-1.808	.0706
CONSTRUC	-3.14060877	2.44991152	-1.282	.1999
MANUFACT	-2.87249779	2.21097805	-1.299	.1939
TRANSPOR	-7.29673221	2.79380670	-2.612	.0090
WHOLESAL	-3.38284666	2.19169762	-1.543	.1227
REALESTA	-3.04363269	2.52266585	-1.207	.2276
HOTELSAN	4.54398685	2.82944526	1.606	.1083
DUMMYYEA	-9.99561912	2.09620285	-4.768	.0000
DUM1	9.38926071	3.73678860	2.513	.0120
DUM2	3.98817326	3.77836158	1.056	.2912
DUM3	10.9556927	3.88426271	2.821	.0048
DUM4	-4.51064961	4.32235679	-1.044	.2967
DUM5	5.65069019	3.64321016	1.551	.1209
DUM6	2.50873612	3.82605746	.656	.5120
DUM7	-4.28921671	3.30741908	-1.297	.1947
DUM8	-13.0144845	2.94075872	-4.426	.0000
DUM9	-15.3392788	3.86348027	-3.970	.0001
DUM10	-.22854958	3.20694769	-.071	.9432
DUM11	2.28305452	3.41645653	.668	.5040
DUM12	-8.93393702	4.55792864	-1.960	.0500
DUM13	-8.98327254	3.43508216	-2.615	.0089
DUM14	-.58854187	3.26351888	-.180	.8569
DUM15	2.12765555	3.75625423	.566	.5711
DUM16	-8.24126025	4.29302604	-1.920	.0549
DUM17	-3.69957817	4.12759039	-.896	.3701
DUM18	-7.12381769	5.28597325	-1.348	.1778
DUM19	16.4238548	3.94696595	4.161	.0000
DUM20	-19.4201462	3.97666760	-4.884	.0000
DUM21	-15.0230598	3.14699097	-4.774	.0000
DUM22	-6.87910220	3.46854331	-1.983	.0473
DUM23	-26.2921892	3.86282263	-6.806	.0000
DUM24	-.94480640	2.90044409	-.326	.7446
DUM25	.42402764	3.67668085	.115	.9082
SIGMA(1)	37.7134068	.64975820	58.042	.0000
RHO(1,2)	.12335981	.45711432	.270	.7873

5.3 Heckman Two Step “Truthfulness”

```
heckman taxevasion taxrate trustingovernment trustinjudicalsystem corruption1 compliancecost
foreign medium large individual partnership miningandquarrying construction manufacturing
transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dummyyear dum1 dum2 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12
dum13 dum14 dum15 dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25, select
(externalauditor = taxrate trustingovernment trustinjudicalsystem corruption1 compliancecost
foreign medium large individual  partnership miningandquarrying construction manufacturing
transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants  dummyyear intaccountingstandards dum1 dum2 dum3 dum4 dum5 dum6 dum7 dum8
dum9 dum10 dum11 dum12 dum13 dum14 dum15 dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24
dum25) twostep
```

```
Heckman selection model -- two-step estimates   Number of obs      =      8818
(regression model with sample selection)        Censored obs       =      4687
                                                Uncensored obs     =      4131

                                                Wald chi2(43)      =    753.65
                                                Prob > chi2        =    0.0000
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
taxevasion						
taxrate	.8094216	.2989993	2.71	0.007	.2233938	1.395449
trustingov~t	-.9675227	.2197863	-4.40	0.000	-1.398296	-.5367495
trustinjud~m	-.6930248	.233711	-2.97	0.003	-1.15109	-.2349597
corruption1	2.307742	.2183714	10.57	0.000	1.879742	2.735742
compliance~t	.0765083	.0278454	2.75	0.006	.0219323	.1310843
foreign	-2.557567	.8802701	-2.91	0.004	-4.282865	-.8322692
medium	-3.271967	1.008885	-3.24	0.001	-5.249345	-1.294588
large	-3.455246	1.337567	-2.58	0.010	-6.076829	-.8336627
individual	3.263161	1.009633	3.23	0.001	1.284317	5.242004
partnership	1.776103	.8886609	2.00	0.046	.0343601	3.517847
miningandq~g	-1.605953	3.122749	-0.51	0.607	-7.726429	4.514523
construction	.5054425	1.843479	0.27	0.784	-3.10771	4.118595
manufactur~g	-.7574353	1.7155	-0.44	0.659	-4.119754	2.604883
transports~t	-3.673249	1.990375	-1.85	0.065	-7.574313	.2278144
wholesaler~s	-1.513416	1.716093	-0.88	0.378	-4.876897	1.850065
realestate~s	.8869872	1.91459	0.46	0.643	-2.86554	4.639515
hotelsandr~s	4.351797	2.116103	2.06	0.040	.2043105	8.499283
dummyyear	-4.306893	.6436306	-6.69	0.000	-5.568386	-3.045401
dum1	5.738142	3.109864	1.85	0.065	-.3570785	11.83336
dum2	-1.821747	2.811368	-0.65	0.517	-7.331927	3.688432
dum3	3.646794	2.627603	1.39	0.165	-1.503213	8.796802
dum4	-4.599763	2.674749	-1.72	0.085	-9.842175	.6426493
dum5	7.416862	2.988012	2.48	0.013	1.560466	13.27326
dum6	.4468276	2.701603	0.17	0.869	-4.848216	5.741871
dum7	-6.468991	2.146379	-3.01	0.003	-10.67582	-2.262166
dum8	-4.795209	2.166564	-2.21	0.027	-9.041595	-.5488225
dum9	-8.189382	2.403032	-3.41	0.001	-12.89924	-3.479525
dum10	-2.64427	2.315555	-1.14	0.253	-7.182675	1.894135
dum11	.5699639	2.454419	0.23	0.816	-4.240609	5.380537
dum12	-5.312078	2.81131	-1.89	0.059	-10.82214	.1979881
dum13	-3.302947	2.50521	-1.32	0.187	-8.213068	1.607174
dum14	-2.006928	2.411774	-0.83	0.405	-6.733918	2.720062
dum15	-.4266553	3.26304	-0.13	0.896	-6.822097	5.968786
dum16	-3.830487	2.746536	-1.39	0.163	-9.213598	1.552624
dum17	-2.443622	2.654572	-0.92	0.357	-7.646488	2.759244
dum18	-6.25754	2.80289	-2.23	0.026	-11.7511	-.7639775
dum19	9.722569	2.679073	3.63	0.000	4.471683	14.97345
dum20	-9.96307	2.442909	-4.08	0.000	-14.75108	-5.175056
dum21	-9.071387	2.313259	-3.92	0.000	-13.60529	-4.537482
dum22	-.5412185	2.473285	-0.22	0.827	-5.388768	4.306331
dum23	-8.268938	2.401325	-3.44	0.001	-12.97545	-3.562427
dum24	-2.251703	2.204009	-1.02	0.307	-6.571482	2.068076
dum25	1.499411	3.185368	0.47	0.638	-4.743796	7.742618
_cons	15.82377	3.652178	4.33	0.000	8.665637	22.98191

externalau~r						
taxrate	-.0249547	.0145363	-1.72	0.086	-.0534454	.003536
trustingov~t	.0277363	.0106302	2.61	0.009	.0069015	.048571
trustinjud~m	.0080318	.0114861	0.70	0.484	-.0144807	.0305442
corruption1	.0117657	.0106986	1.10	0.271	-.0092032	.0327345
compliance~t	.0040778	.0014254	2.86	0.004	.0012841	.0068715
foreign	.3997187	.0465819	8.58	0.000	.3084198	.4910175
medium	.6071773	.0401937	15.11	0.000	.5283991	.6859554
large	.9552553	.0601285	15.89	0.000	.8374056	1.073105
individual	-.4047327	.0423903	-9.55	0.000	-.4878162	-.3216493
partnership	-.1722183	.0456706	-3.77	0.000	-.2617311	-.0827055
miningandq~g	.1980186	.166153	1.19	0.233	-.1276352	.5236725
construction	.1304984	.0821691	1.59	0.112	-.0305501	.291547
manufactur~g	.1938462	.0748007	2.59	0.010	.0472396	.3404529
transports~t	.1529952	.0914878	1.67	0.094	-.0263177	.332308
wholesaler~s	.1122301	.07463	1.50	0.133	-.0340419	.2585021
realestate~s	.0098056	.0846719	0.12	0.908	-.1561483	.1757595
hotelsandr~s	.005824	.095112	0.06	0.951	-.1805922	.1922402
dummyyear	.0750849	.0327849	2.29	0.022	.0108276	.1393422
intaccount~s	.5852748	.0382246	15.31	0.000	.5103559	.6601937
dum1	-.11879	.1395351	-0.85	0.395	-.3922739	.1546938
dum2	-.2542764	.1272255	-2.00	0.046	-.5036339	-.004919
dum3	1.393116	.1315364	10.59	0.000	1.135309	1.650923
dum4	-.2556223	.1264457	-2.02	0.043	-.5034513	-.0077933
dum5	.2758946	.1424794	1.94	0.053	-.0033599	.555149
dum6	.0002757	.1242952	0.00	0.998	-.2433385	.2438898
dum7	.2120118	.1006649	2.11	0.035	.0147122	.4093114
dum8	.1195598	.1021535	1.17	0.242	-.0806574	.3197771
dum9	.4249124	.115353	3.68	0.000	.1988247	.6510001
dum10	.9870306	.1117515	8.83	0.000	.7680017	1.206059
dum11	.1849354	.1158192	1.60	0.110	-.042066	.4119369
dum12	.3263935	.1382641	2.36	0.018	.0554009	.5973862
dum13	-.4079611	.1120553	-3.64	0.000	-.6275854	-.1883367
dum14	.2148363	.1135017	1.89	0.058	-.0076229	.4372956
dum15	-.7778453	.1286509	-6.05	0.000	-1.029996	-.5256942
dum16	.8454108	.1434449	5.89	0.000	.5642641	1.126558
dum17	.2373311	.1301862	1.82	0.068	-.0178293	.4924914
dum18	1.249949	.1752608	7.13	0.000	.9064437	1.593453
dum19	1.126775	.1380217	8.16	0.000	.8562577	1.397293
dum20	.1989823	.1122906	1.77	0.076	-.0211032	.4190679
dum21	-.1050034	.1047212	-1.00	0.316	-.3102532	.1002464
dum22	.6821171	.1162976	5.87	0.000	.454178	.9100563
dum23	.5982267	.1161302	5.15	0.000	.3706156	.8258377
dum24	.1114045	.1027988	1.08	0.278	-.0900775	.3128864
dum25	-.3229171	.128378	-2.52	0.012	-.5745334	-.0713007
_cons	-.7721986	.1410199	-5.48	0.000	-1.048592	-.4958047
mills						
lambda	.3788884	1.909411	0.20	0.843	-3.363488	4.121265
rho	0.01994					
sigma	18.999327					
lambda	.37888845	1.909411				

5.4 Heckman FIML "Truthfulness"

```
REJECT; TAXRATE=-999$
REJECT; TAXEVASI=-999$
REJECT; TRUSTING=-999$
REJECT; TRUSTINJ=-999$
REJECT; COMPLAIN=-999$
REJECT; CORRUPTI=-999$
REJECT; FOREIGN=-999$
REJECT; COMPLIAN=-999$
REJECT; MEDIUM=-999$
REJECT; LARGE=-999$
REJECT; INTACCOU=-999$
REJECT; EXTERNAL=-999$

PROBIT;Lhs=EXTERNAL;Rhs=ONE,TAXRATE,TRUSTING,TRUSTINJ,CORRUPTI,COMPLIAN,FOREIGN,MEDIUM,LARGE,MINI
NGAN,CONSTRUC,MANUFACT,TRANSPOR,WHOLESAL,REALESTA,HOTELSAN,INDIVIDU,PARTNERS,INTACCOU,DUM1,DUM2,D
UM3,DUM4,DUM5,DUM6,DUM7,DUM8,DUM9,DUM10,DUM11,DUM12,DUM13,DUM14,DUM15,DUM16,DUM17,DUM18,DUM19,DUM
20,DUM21,DUM22,DUM23,DUM24,DUM25,DUMMYYEA;Hold$

Normal exit from iterations. Exit status=0.

+---------------------------------------------+
| Binomial Probit Model                       |
| Maximum Likelihood Estimates                |
| Model estimated: Apr 19, 2013 at 04:17:34AM.|
| Dependent variable            EXTERNAL      |
| Weighting variable                None      |
| Number of observations            8818      |
| Iterations completed                 5      |
| Log likelihood function      -4895.352      |
| Number of parameters                45      |
| Info. Criterion: AIC =         1.12052      |
|   Finite Sample: AIC =         1.12057      |
| Info. Criterion: BIC =         1.15667      |
| Info. Criterion:HQIC =         1.13283      |
| Restricted log likelihood    -6094.632      |
| McFadden Pseudo R-squared     .1967763      |
| Chi squared                   2398.558      |
| Degrees of freedom                  44      |
| Prob[ChiSqd > value] =        .0000000      |
| Results retained for SELECTION model.       |
| Hosmer-Lemeshow chi-squared =  36.13683     |
| P-value=  .00002 with deg.fr. =       8     |
+---------------------------------------------+
```

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]	Mean of X
Index function for probability					
Constant	-.77219858	.14101987	-5.476	.0000	
TAXRATE	-.02495466	.01453634	-1.717	.0860	2.79734634
TRUSTING	.02773626	.01063015	2.609	.0091	3.87672942
TRUSTINJ	.00803176	.01148615	.699	.4844	3.45214334
CORRUPTI	.01176565	.01069861	1.100	.2714	2.56951690
COMPLIAN	.00407781	.00142538	2.861	.0042	6.16845090
FOREIGN	.39971868	.04658191	8.581	.0000	.13721932
MEDIUM	.60717726	.04019365	15.106	.0000	.18360172
LARGE	.95525528	.06012849	15.887	.0000	.08981628
MININGAN	.19801864	.16615297	1.192	.2333	.01009299
CONSTRUC	.13049844	.08216912	1.588	.1122	.11113631
MANUFACT	.19384625	.07480069	2.592	.0096	.35257428
TRANSPOR	.15299518	.09148783	1.672	.0945	.06180540
WHOLESAL	.11223009	.07462996	1.504	.1326	.27421184
REALESTA	.00980559	.08467191	.116	.9078	.09049671
HOTELSAN	.00582402	.09511204	.061	.9512	.05284645
INDIVIDU	-.40473275	.04239028	-9.548	.0000	.40927648
PARTNERS	-.17221828	.04567063	-3.771	.0002	.29371740
INTACCOU	.58527484	.03822464	15.311	.0000	.26559311
DUM1	-.11879003	.13953515	-.851	.3946	.01893853

```
 DUM2     |    -.25427643       .12722553    -1.999   .0456    .02721706
 DUM3     |    1.39311596       .13153641    10.591   .0000    .02869131
 DUM4     |    -.25562230       .12644568    -2.022   .0432    .02755727
 DUM5     |     .27589455       .14247938     1.936   .0528    .01587662
 DUM6     |     .00027565       .12429523      .002   .9982    .02971195
 DUM7     |     .21201179       .10066493     2.106   .0352    .10217736
 DUM8     |     .11955982       .10215354     1.170   .2418    .07654797
 DUM9     |     .42491243       .11535299     3.684   .0002    .03923792
 DUM10    |     .98703058       .11175149     8.832   .0000    .05534135
 DUM11    |     .18493542       .11581918     1.597   .1103    .04275346
 DUM12    |     .32639355       .13826407     2.361   .0182    .01950556
 DUM13    |    -.40796109       .11205530    -3.641   .0003    .05284645
 DUM14    |     .21483634       .11350171     1.893   .0584    .04241325
 DUM15    |    -.77784530       .12865089    -6.046   .0000    .03039238
 DUM16    |     .84541082       .14344486     5.894   .0000    .01814470
 DUM17    |     .23733105       .13018624     1.823   .0683    .02370152
 DUM18    |    1.24994853       .17526077     7.132   .0000    .01735087
 DUM19    |    1.12677519       .13802168     8.164   .0000    .02381492
 DUM20    |     .19898235       .11229063     1.772   .0764    .04286686
 DUM21    |    -.10500340       .10472122    -1.003   .3160    .06486732
 DUM22    |     .68211713       .11629762     5.865   .0000    .03538217
 DUM23    |     .59822668       .11613022     5.151   .0000    .03674303
 DUM24    |     .11140446       .10279879     1.084   .2785    .07269222
 DUM25    |    -.32291706       .12837803    -2.515   .0119    .02755727
 DUMMYYEA|      .07508491       .03278493     2.290   .0220    .64413699


+----------------------------------------+
| Fit Measures for Binomial Choice Model |
| Probit   model for variable EXTERNAL   |
+----------------------------------------+
| Proportions P0= .531526   P1= .468474  |
| N =    8818 N0=    4687   N1=    4131  |
| LogL=    -4895.352 LogL0=   -6094.632  |
| Estrella = 1-(L/L0)^(-2L0/n) = .26132  |
+----------------------------------------+
|     Efron |  McFadden  |  Ben./Lerman  |
|    .25013 |    .19678  |        .62502  |
|    Cramer | Veall/Zim. |      Rsqrd_ML  |
|    .24705 |    .36854  |        .23815  |
+----------------------------------------+
| Information  Akaike I.C. Schwarz I.C.  |
| Criteria        1.12052       1.15667  |
+----------------------------------------+
+-------------------------------------------------------+
|Predictions for Binary Choice Model.  Predicted value is |
|1 when probability is greater than  .500000, 0 otherwise.|
|Note, column or row total percentages may not sum to     |
|100% because of rounding. Percentages are of full sample.|
+------+---------------------------------+----------------+
|Actual|         Predicted Value         |                |
|Value |       0                1        | Total Actual   |
+------+----------------+----------------+----------------+
|  0   |   3738 ( 42.4%)|    949 ( 10.8%)|   4687 ( 53.2%)|
|  1   |   1489 ( 16.9%)|   2642 ( 30.0%)|   4131 ( 46.8%)|
+------+----------------+----------------+----------------+
|Total |   5227 ( 59.3%)|   3591 ( 40.7%)|   8818 (100.0%)|
+------+----------------+----------------+----------------+

=======================================================================
Analysis of Binary Choice Model Predictions Based on Threshold =  .5000
-----------------------------------------------------------------------
Prediction Success
-----------------------------------------------------------------------
Sensitivity = actual 1s correctly predicted                     63.955%
Specificity = actual 0s correctly predicted                     79.753%
Positive predictive value = predicted 1s that were actual 1s    73.573%
Negative predictive value = predicted 0s that were actual 0s    71.513%
Correct prediction = actual 1s and 0s correctly predicted       72.352%
-----------------------------------------------------------------------
Prediction Failure
```

```
-----------------------------------------------------------------------
False pos. for true neg. = actual 0s predicted as 1s            20.247%
False neg. for true pos. = actual 1s predicted as 0s            36.045%
False pos. for predicted pos. = predicted 1s actual 0s          26.427%
False neg. for predicted neg. = predicted 0s actual 1s          28.487%
False predictions = actual 1s and 0s incorrectly predicted      27.648%
=======================================================================
```

SELECTION;Lhs=TAXEVASI;Rhs=ONE,TAXRATE,TRUSTING,TRUSTINJ,COMPLIAN,CORRUPTI,FOREIGN,MEDIUM,LARGE,MININGAN,CONSTRUC,MANUFACT,TRANSPOR,WHOLESAL,REALESTA,HOTELSAN,INDIVIDU,PARTNERS,DUMMYYEA,DUM1,DUM2,DUM3,DUM4,DUM5,DUM6,DUM7,DUM8,DUM9,DUM10,DUM11,DUM12,DUM13,DUM14,DUM15,DUM16,DUM17,DUM18,DUM19,DUM20,DUM21,DUM22,DUM23,DUM24,DUM25;MLE;Tobit$

```
+----------------------------------------------------------+
| Sample Selection Model                                   |
| Probit selection equation based on EXTERNAL              |
| Selection rule is: Observations with EXTERNAL =  1       |
| Results of selection:                                    |
|                  Data points     Sum of weights          |
| Data set             8818            8818.0              |
| Selected sample      4131            4131.0              |
+----------------------------------------------------------+

+----------------------------------------------------+
| Sample Selection Model                             |
| Two step    least squares regression               |
| Model was estimated Apr 19, 2013 at 04:18:34AM     |
| LHS=TAXEVASI Mean                 =   11.90317     |
|              Standard deviation   =   20.71588     |
| WTS=none     Number of observs.   =       4131     |
| Model size   Parameters           =         45     |
|              Degrees of freedom   =       4086     |
| Residuals    Sum of squares       =   1474628.     |
|              Standard error of e  =   18.99730     |
| Fit          R-squared            =   .1588325     |
|              Adjusted R-squared   =   .1497744     |
| Model test   F[ 44,  4086] (prob) =  17.53 (.0000) |
| Diagnostic   Log likelihood       =  -18001.90     |
|              Restricted(b=0)      =  -18381.78     |
|              Chi-sq [ 44]  (prob) = 759.76 (.0000) |
| Info criter. LogAmemiya Prd. Crt. =   5.899429     |
|              Akaike Info. Criter. =   5.899428     |
| Not using OLS or no constant. Rsqd & F may be < 0. |
| Standard error corrected for selection..  18.99933 |
| Correlation of disturbance in regression           |
| and Selection Criterion (Rho)...........    .01994 |
+----------------------------------------------------+
```

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]	Mean of X
Constant	15.8237748	3.65217838	4.333	.0000	
TAXRATE	.80942163	.29899926	2.707	.0068	2.76978940
TRUSTING	-.96752267	.21978628	-4.402	.0000	4.03001695
TRUSTINJ	-.69302477	.23371096	-2.965	.0030	3.54829339
COMPLIAN	.07650831	.02784539	2.748	.0060	6.83710966
CORRUPTI	2.30774220	.21837137	10.568	.0000	2.55700799
FOREIGN	-2.55756685	.88027011	-2.905	.0037	.21132898
MEDIUM	-3.27196659	1.00888517	-3.243	.0012	.25901719
LARGE	-3.45524571	1.33756691	-2.583	.0098	.15468410
MININGAN	-1.60595331	3.12274918	-.514	.6071	.01282982
CONSTRUC	.50544253	1.84347883	.274	.7839	.11571048
MANUFACT	-.75743533	1.71550019	-.442	.6588	.38634713
TRANSPOR	-3.67324911	1.99037509	-1.846	.0650	.06656984
WHOLESAL	-1.51341583	1.71609316	-.882	.3778	.25538611
REALESTA	.88698724	1.91459004	.463	.6432	.08206245
HOTELSAN	4.35179697	2.11610342	2.057	.0397	.04647785
INDIVIDU	3.26316076	1.00963260	3.232	.0012	.30065359
PARTNERS	1.77610342	.88866086	1.999	.0456	.35366739
DUMMYYEA	-4.30689329	.64363058	-6.692	.0000	.61776809
DUM1	5.73814230	3.10986366	1.845	.0650	.01428226
DUM2	-1.82174747	2.81136782	-.648	.5170	.02009199

```
 DUM3    |    3.64679441      2.62760293     1.388   .1652    .05083515
 DUM4    |   -4.59976287      2.67474926    -1.720   .0855    .02517550
 DUM5    |    7.41686235      2.98801205     2.482   .0131    .01670298
 DUM6    |     .44682763      2.70160252      .165   .8686    .02396514
 DUM7    |   -6.46899132      2.14637886    -3.014   .0026    .08569354
 DUM8    |   -4.79520893      2.16656352    -2.213   .0269    .07480029
 DUM9    |   -8.18938188      2.40303211    -3.408   .0007    .04284677
 DUM10   |   -2.64427002      2.31555509    -1.142   .2535    .08666183
 DUM11   |     .56996386      2.45441890      .232   .8164    .03824740
 DUM12   |   -5.31207825      2.81131001    -1.890   .0588    .02130235
 DUM13   |   -3.30294694      2.50521003    -1.318   .1874    .03824740
 DUM14   |   -2.00692771      2.41177386     -.832   .4053    .03897361
 DUM15   |    -.42665535      3.26304041     -.131   .8960    .01379811
 DUM16   |   -3.83048682      2.74653561    -1.395   .1631    .02687001
 DUM17   |   -2.44362164      2.65457232     -.921   .3573    .02662794
 DUM18   |   -6.25754022      2.80288965    -2.233   .0256    .03340595
 DUM19   |    9.72256892      2.67907253     3.629   .0003    .03969983
 DUM20   |   -9.96307021      2.44290937    -4.078   .0000    .03873154
 DUM21   |   -9.07138723      2.31325934    -3.921   .0001    .04914064
 DUM22   |    -.54121854      2.47328492     -.219   .8268    .04381506
 DUM23   |   -8.26893799      2.40132521    -3.443   .0006    .04623578
 DUM24   |   -2.25170307      2.20400933    -1.022   .3070    .06439119
 DUM25   |    1.49941134      3.18536819      .471   .6378    .01404018
 LAMBDA  |     .37888845      1.90941091      .198   .8427    .67115146

Maximum iterations reached. Exit iterations with status=1.

+----------------------------------------------+
| ML Estimates of Selection Model              |
| Maximum Likelihood Estimates                 |
| Model estimated: Apr 19, 2013 at 04:18:59AM.|
| Dependent variable             TAXEVASI      |
| Weighting variable                 None      |
| Number of observations             8818      |
| Iterations completed                101      |
| Log likelihood function       -14194.88      |
| Number of parameters                 91      |
| Info. Criterion: AIC =          3.24016      |
|   Finite Sample: AIC =          3.24038      |
| Info. Criterion: BIC =          3.31328      |
| Info. Criterion:HQIC =          3.26507      |
| LHS is CENSORED. Tobit Model fit by MLE.     |
| FIRST 45 estimates are probit equation.      |
+----------------------------------------------+
+--------+--------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+--------------+----------------+--------+--------+
---------+Selection (probit) equation for EXTERNAL
 Constant|    -.77276947       .13188737    -5.859   .0000
 TAXRATE |    -.02490555       .01409096    -1.767   .0771
 TRUSTING|     .02776638       .01026347     2.705   .0068
 TRUSTINJ|     .00805611       .01116569      .722   .4706
 CORRUPTI|     .01184331       .01029629     1.150   .2500
 COMPLIAN|     .00408871       .00142442     2.870   .0041
 FOREIGN |     .40014894       .05202039     7.692   .0000
 MEDIUM  |     .60726697       .04341649    13.987   .0000
 LARGE   |     .95559644       .07532544    12.686   .0000
 MININGAN|     .19675674       .17530604     1.122   .2617
 CONSTRUC|     .13068803       .07618705     1.715   .0863
 MANUFACT|     .19361270       .06833617     2.833   .0046
 TRANSPOR|     .15343567       .08637329     1.776   .0757
 WHOLESAL|     .11207558       .06773463     1.655   .0980
 REALESTA|     .00974634       .07756923      .126   .9000
 HOTELSAN|     .00600252       .08730253      .069   .9452
 INDIVIDU|    -.40487570       .04152376    -9.750   .0000
 PARTNERS|    -.17235931       .04660868    -3.698   .0002
 INTACCOU|     .58468197       .04071734    14.360   .0000
 DUM1    |    -.11847814       .12873414     -.920   .3574
 DUM2    |    -.25419916       .11810006    -2.152   .0314
 DUM3    |    1.39325783       .15744943     8.849   .0000
 DUM4    |    -.25478343       .12093486    -2.107   .0351
```

```
 DUM5    |    .27592561       .13679789     2.017   .0437
 DUM6    |    .00041334       .11623594      .004   .9972
 DUM7    |    .21193887       .09385617     2.258   .0239
 DUM8    |    .11946510       .09587078     1.246   .2127
 DUM9    |    .42507420       .11097134     3.830   .0001
 DUM10   |    .98722820       .11465612     8.610   .0000
 DUM11   |    .18449375       .11021366     1.674   .0941
 DUM12   |    .32669867       .13635125     2.396   .0166
 DUM13   |   -.40766194       .10453787    -3.900   .0001
 DUM14   |    .21507600       .10705777     2.009   .0445
 DUM15   |   -.77752274       .11322707    -6.867   .0000
 DUM16   |    .84667379       .15105114     5.605   .0000
 DUM17   |    .23794128       .12659407     1.880   .0602
 DUM18   |   1.25129344       .25190891     4.967   .0000
 DUM19   |   1.12696553       .15982493     7.051   .0000
 DUM20   |    .19959015       .10425584     1.914   .0556
 DUM21   |   -.10463164       .09652783    -1.084   .2784
 DUM22   |    .68199645       .11406135     5.979   .0000
 DUM23   |    .59875969       .11520754     5.197   .0000
 DUM24   |    .11133137       .09585763     1.161   .2455
 DUM25   |   -.32238413       .11293382    -2.855   .0043
 DUMMYYEA|    .07510779       .03214201     2.337   .0195
---------+Corrected regression, Regime 1
 Constant|  -15.3564182      8.31861667    -1.846   .0649
 TAXRATE |   3.22646343       .74831137     4.312   .0000
 TRUSTING|  -1.81947015       .51554577    -3.529   .0004
 TRUSTINJ|  -1.47462998       .57729457    -2.554   .0106
 COMPLIAN|    .12196077       .06300235     1.936   .0529
 CORRUPTI|   6.65367280       .55601631    11.967   .0000
 FOREIGN |  -6.99547368      2.14366676    -3.263   .0011
 MEDIUM  |  -8.63144971      2.47377360    -3.489   .0005
 LARGE   |  -11.1152399      3.23802325    -3.433   .0006
 MININGAN|  -1.20999731      8.71332779     -.139   .8896
 CONSTRUC|   2.15224105      4.42086742      .487   .6264
 MANUFACT|   -.31807923      4.11664690     -.077   .9384
 TRANSPOR|  -8.21388022      4.88899485    -1.680   .0929
 WHOLESAL|  -2.82315996      4.10156584     -.688   .4913
 REALESTA|   2.62832537      4.52780141      .580   .5616
 HOTELSAN|   11.2940776      5.06219949     2.231   .0257
 INDIVIDU|   7.25146104      2.50963273     2.889   .0039
 PARTNERS|   3.87587071      2.20662815     1.756   .0790
 DUMMYYEA|  -9.70253170      1.57589093    -6.157   .0000
 DUM1    |   11.2301448      5.86844155     1.914   .0557
 DUM2    |   -.95724991      5.83642040     -.164   .8697
 DUM3    |   11.6464203      5.94282550     1.960   .0500
 DUM4    |  -4.56768361      6.36350899     -.718   .4729
 DUM5    |   13.8912780      5.90077601     2.354   .0186
 DUM6    |   9.69848370      5.87874964     1.650   .0990
 DUM7    |  -7.54913063      4.61470203    -1.636   .1019
 DUM8    |  -12.9557419      4.39624527    -2.947   .0032
 DUM9    |  -18.1587836      5.47199909    -3.318   .0009
 DUM10   |    .82618640      4.97822188      .166   .8682
 DUM11   |   8.10988304      5.18300170     1.565   .1177
 DUM12   |  -7.06427703      6.81545807    -1.037   .3000
 DUM13   |  -6.06702210      5.53449578    -1.096   .2730
 DUM14   |  -1.93908981      5.11686348     -.379   .7047
 DUM15   |   5.62993582      7.46771686      .754   .4509
 DUM16   |  -3.12781193      6.23711140     -.501   .6160
 DUM17   |   -.71024670      5.59389728     -.127   .8990
 DUM18   |  -3.12013730      6.86903145     -.454   .6497
 DUM19   |   18.7274923      6.01651399     3.113   .0019
 DUM20   |  -18.3038306      5.76530352    -3.175   .0015
 DUM21   |  -22.5232703      5.17729350    -4.350   .0000
 DUM22   |    .29649375      5.35311612      .055   .9558
 DUM23   |  -20.9282602      5.31523526    -3.937   .0001
 DUM24   |  -3.45268514      4.50202353     -.767   .4431
 DUM25   |   9.11275547      6.93788835     1.313   .1890
 SIGMA(1)|   38.1089213       .86701623    43.954   .0000
 RHO(1,2)|    .02887904       .12071540      .239   .8109
```

5.5 Tobit Corner Solution

```
tobit taxevasion taxrate trustingovernment trustinjudicalsystem corruption1 compliancecost
foreign medium large individual partnership miningandquarrying construction manufacturing
transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dummyyear dum1 dum2 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12
dum13 dum14 dum15 dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25, ll robust cluster
(country)

Tobit regression                                  Number of obs   =       9705
                                                  F(  19,    9662) =          .
                                                  Prob > F        =          .
Log pseudolikelihood = -23644.245                 Pseudo R2       =     0.0322

                               (Std. Err. adjusted for 26 clusters in country)
------------------------------------------------------------------------------
             |               Robust
  taxevasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     taxrate |   2.557377   .7336422     3.49   0.000     1.119284    3.995469
trustingov~t |  -.7697116   .3945491    -1.95   0.051     -1.54311    .0036873
trustinjud~m |  -1.271342   .5278755    -2.41   0.016    -2.306089   -.2365959
 corruption1 |   7.084876   .4678346    15.14   0.000     6.167822     8.00193
compliance~t |    .133474   .0461303     2.89   0.004     .0430489     .223899
     foreign |  -6.391161   1.552762    -4.12   0.000    -9.434901   -3.347422
      medium |  -7.570771   1.344277    -5.63   0.000    -10.20584   -4.935706
       large |  -10.31266   2.052943    -5.02   0.000    -14.33686   -6.288462
  individual |   7.072492   2.067364     3.42   0.001     3.020026    11.12496
 partnership |   2.951762   2.167804     1.36   0.173    -1.297589    7.201113
miningandq~g |  -10.02247   4.239158    -2.36   0.018    -18.33211   -1.712834
construction |  -3.096372   1.969926    -1.57   0.116     -6.95784    .7650965
manufactur~g |  -2.823763   1.381505    -2.04   0.041    -5.531802   -.1157244
transports~t |  -7.164742   2.150486    -3.33   0.001    -11.38015   -2.949339
wholesaler~s |  -3.365238    1.57462    -2.14   0.033    -6.451822   -.2786529
realestate~s |  -2.910605   1.889007    -1.54   0.123    -6.613454    .7922445
hotelsandr~s |   4.684868   2.293236     2.04   0.041     .1896444    9.180092
   dummyyear |  -10.51115   2.929502    -3.59   0.000    -16.25358   -4.768707
        dum1 |   9.663188   .5454474    17.72   0.000     8.593996    10.73238
        dum2 |   3.603592    .426081     8.46   0.000     2.768384      4.4388
        dum3 |    10.7224   .5915824    18.12   0.000      9.56277    11.88202
        dum4 |  -4.002573    1.07435    -3.73   0.000    -6.108523   -1.896623
        dum5 |   5.631339   .5345639    10.53   0.000     4.583482    6.679197
        dum6 |   2.804204   1.130514     2.48   0.013     .5881595    5.020249
        dum7 |  -4.667288   .7714141    -6.05   0.000    -6.179422   -3.155155
        dum8 |  -13.08969   .8349504   -15.68   0.000    -14.72636   -11.45301
        dum9 |  -15.85402   1.269422   -12.49   0.000    -18.34235   -13.36569
       dum10 |  -.3104505   1.204986    -0.26   0.797    -2.672476    2.051575
       dum11 |   2.220012   1.106097     2.01   0.045     .0518295    4.388194
       dum12 |  -8.519496   1.195417    -7.13   0.000    -10.86276   -6.176229
       dum13 |  -9.130908   1.556862    -5.86   0.000    -12.18268   -6.079132
       dum14 |   -.663561   .5624396    -1.18   0.238    -1.766061    .4389385
       dum15 |   2.224563   .9669704     2.30   0.021     .3290983    4.120028
       dum16 |   -8.40875   .7899848   -10.64   0.000    -9.957286   -6.860214
       dum17 |  -3.241448   1.388686    -2.33   0.020    -5.963563   -.5193324
       dum18 |  -6.748247   1.241476    -5.44   0.000      -9.1818   -4.314695
       dum19 |   16.34678   1.012338    16.15   0.000     14.36239    18.33118
       dum20 |  -19.83728   .7490272   -26.48   0.000    -21.30553   -18.36903
       dum21 |  -15.20296   .5589012   -27.20   0.000    -16.29852    -14.1074
       dum22 |  -7.113487   .6072673   -11.71   0.000    -8.303859   -5.923116
       dum23 |  -26.63161    .973144   -27.37   0.000    -28.53918   -24.72405
       dum24 |  -.9043329   .4465191    -2.03   0.043    -1.779604   -.0290619
       dum25 |   .2216952   .4018658     0.55   0.581    -.5660458    1.009436
       _cons |  -12.84305   4.534406    -2.83   0.005    -21.73144   -3.954666
-------------+----------------------------------------------------------------
      /sigma |   37.66257   1.753836                      34.22468    41.10046
------------------------------------------------------------------------------
  Obs. summary:       5642  left-censored observations at taxevasion<=0
                      4063     uncensored observations
                         0 right-censored observations
```

5.6 Probit

```
probit taxevasion taxrate trustingovernment trustinjudicalsystem corruption1 compliancecost
foreign medium large individual partnership miningandquarrying construction manufacturing
transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dummyyear dum1 dum2 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12
dum13 dum14 dum15 dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25


Iteration 0:   log likelihood = -6597.9692
Iteration 1:   log likelihood = -5890.2211
Iteration 2:   log likelihood = -5889.4031
Iteration 3:   log likelihood = -5889.4031

Probit regression                                 Number of obs   =       9705
                                                  LR chi2(43)     =    1417.13
                                                  Prob > chi2     =     0.0000
Log likelihood = -5889.4031                       Pseudo R2       =     0.1074

------------------------------------------------------------------------------
  taxevasion |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     taxrate |   .0881151   .0134799     6.54   0.000     .0616949    .1145353
trustingov~t |  -.0169217   .0097557    -1.73   0.083    -.0360426    .0021992
trustinjud~m |  -.0291673   .0105497    -2.76   0.006    -.0498443   -.0084904
 corruption1 |   .2183839   .0098881    22.09   0.000     .1990036    .2377642
compliance~t |   .0028171   .0012939     2.18   0.029     .0002811    .0053531
     foreign |  -.1694688   .0421498    -4.02   0.000    -.2520809   -.0868566
      medium |  -.2183763   .0374894    -5.83   0.000    -.2918541   -.1448984
       large |  -.2890491   .0528321    -5.47   0.000     -.392598   -.1855002
  individual |   .1937114   .0390505     4.96   0.000     .1171737     .270249
 partnership |   .0923332   .0424215     2.18   0.030     .0091886    .1754779
miningandq~g |  -.2182746   .1523443    -1.43   0.152    -.5168639    .0803148
construction |  -.0899744   .0739658    -1.22   0.224    -.2349448     .054996
manufactur~g |  -.0731888   .0667796    -1.10   0.273    -.2040744    .0576968
transports~t |    -.20396   .0826517    -2.47   0.014    -.3659543   -.0419658
wholesaler~s |  -.1045927   .0665844    -1.57   0.116    -.2350957    .0259104
realestate~s |  -.1447702   .0761624    -1.90   0.057    -.2940458    .0045054
hotelsandr~s |   .1121706   .0849569     1.32   0.187    -.0543419    .2786831
   dummyyear |  -.2544312   .0291626    -8.72   0.000    -.3115888   -.1972736
        dum1 |   .2179216   .1210241     1.80   0.072    -.0192813    .4551246
        dum2 |   .0664649   .1129521     0.59   0.556    -.1549172     .287847
        dum3 |   .5546046   .1171764     4.73   0.000     .3249431    .7842661
        dum4 |   .1117189   .1156908     0.97   0.334    -.1150309    .3384688
        dum5 |  -.0331638   .1258375    -0.26   0.792    -.2798008    .2134731
        dum6 |   .2919878   .1140297     2.56   0.010     .0684937     .515482
        dum7 |   .0980717   .0925179     1.06   0.289    -.0832599    .2794034
        dum8 |  -.4302794   .0966038    -4.45   0.000    -.6196193   -.2409395
        dum9 |   -.339014   .1099248    -3.08   0.002    -.5544626   -.1235654
       dum10 |   .1454501   .0998606     1.46   0.145    -.0502731    .3411732
       dum11 |   .3040477   .1052474     2.89   0.004     .0977666    .5103289
       dum12 |  -.0091052   .1248802    -0.07   0.942    -.2538659    .2356556
       dum13 |  -.1229252   .1040675    -1.18   0.238    -.3268938    .0810434
       dum14 |    .051638   .1045444     0.49   0.621    -.1532653    .2565413
       dum15 |   .2202864   .1133582     1.94   0.052    -.0018915    .4424643
       dum16 |  -.0941383   .1271712    -0.74   0.459    -.3433892    .1551127
       dum17 |   .0497477   .1194764     0.42   0.677    -.1844217    .2839171
       dum18 |   .1927606   .1303628     1.48   0.139    -.0627458     .448267
       dum19 |   .4983576   .1249628     3.99   0.000      .253435    .7432803
       dum20 |  -.3545915   .1076228    -3.29   0.001    -.5655284   -.1436546
       dum21 |  -.3725617   .0990499    -3.76   0.000    -.5666959   -.1784274
       dum22 |  -.2241824   .1076141    -2.08   0.037    -.4351022   -.0132626
       dum23 |  -.6325138    .111781    -5.66   0.000    -.8516005    -.413427
       dum24 |  -.0321752   .0950312    -0.34   0.735    -.2184329    .1540826
       dum25 |    .063079   .1155217     0.55   0.585    -.1633394    .2894973
       _cons |   -.625171   .1284125    -4.87   0.000    -.8768548   -.3734872
------------------------------------------------------------------------------
```

.

5.7 Conditional Marginal Effects

```
mfx compute, predict(e(0,.))

Marginal effects after tobit
      y  = E(taxevasion|taxevasion>0) (predict, e(0,.))
         =   27.35197
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
 taxrate |   .8187267       .2293    3.57   0.000   .369308  1.26815   2.79845
trusti~t |  -.2464179      .12671   -1.94   0.052  -.494759  .001924   3.87141
trusti~m |  -.4070116      .16883   -2.41   0.016  -.737913  -.07611   3.45234
corrup~1 |   2.268175      .13741   16.51   0.000   1.99886  2.53749   2.57208
compli~t |   .0427308      .01454    2.94   0.003   .014234  .071228   6.15457
 foreign*|  -1.971206      .46032   -4.28   0.000  -2.87343 -1.06899   .133539
  medium*|  -2.332676      .40617   -5.74   0.000  -3.12876 -1.53659   .180938
   large*|  -3.085644      .57869   -5.33   0.000  -4.21985 -1.95144   .086038
indivi~l*|   2.288587       .6725    3.40   0.001   .970515  3.60666   .410407
partne~p*|   .9543686      .70823    1.35   0.178  -.433732  2.34247   .293869
mining~g*|  -2.967922     1.14983   -2.58   0.010  -5.22155  -.71429   .010304
constr~n*|   -.972332      .59935   -1.62   0.105  -2.14704  .202378   .110768
manufa~g*|  -.8979125       .4335   -2.07   0.038  -1.74755  -.04827   .349304
transp~t*|  -2.181919      .61308   -3.56   0.000  -3.38353 -.980309   .062133
wholes~s*|  -1.064486       .4938   -2.16   0.031  -2.03231 -.096662    .27594
reales~s*|  -.9141985      .57859   -1.58   0.114  -2.04822  .219824   .090881
hotels~s*|   1.551541      .79011    1.96   0.050   .002946  3.10014   .052962
dummyy~r*|  -3.452167      .96195   -3.59   0.000  -5.33755 -1.56678   .644513
    dum1*|   3.335085      .19748   16.89   0.000   2.94804  3.72213   .021535
    dum2*|     1.1858      .14238    8.33   0.000   .906744  1.46486   .028233
    dum3*|   3.727407      .19842   18.79   0.000   3.33851  4.11631   .028027
    dum4*|  -1.243191      .32652   -3.81   0.000  -1.88317 -.603216   .027718
    dum5*|   1.883588      .18778   10.03   0.000   1.51555  2.25163   .019474
    dum6*|   .9170989       .3703    2.48   0.013   .191328  1.64287   .028954
    dum7*|  -1.450527      .23779   -6.10   0.000  -1.91659  -.98446   .102215
    dum8*|  -3.836141      .20061  -19.12   0.000  -4.22933 -3.44295   .072128
    dum9*|  -4.522605      .31231  -14.48   0.000  -5.13471  -3.9105   .037609
   dum10*|  -.0991705      .38446   -0.26   0.796  -.852697  .654356   .060072
   dum11*|   .7224751      .36282    1.99   0.046   .011365  1.43359   .042143
   dum12*|  -2.556077      .33819   -7.56   0.000  -3.21893 -1.89323   .021432
   dum13*|  -2.740167       .4406   -6.22   0.000  -3.60372 -1.87661   .054302
   dum14*|  -.2113972      .17896   -1.18   0.237  -.562148  .139354   .041216
   dum15*|   .7242956      .31893    2.27   0.023   .099196  1.34939   .029985
   dum16*|  -2.524356      .22166  -11.39   0.000  -2.95881 -2.08991   .019681
   dum17*|  -1.012378      .42299   -2.39   0.017  -1.84141 -.183342   .024008
   dum18*|  -2.051143      .36923   -5.56   0.000  -2.77482 -1.32746   .018032
   dum19*|   5.945726      .42124   14.11   0.000   5.12011  6.77134   .022257
   dum20*|    -5.5065       .1788  -30.80   0.000  -5.85695 -5.15605   .039979
   dum21*|  -4.382539      .14736  -29.74   0.000  -4.67137 -4.09371   .061515
   dum22*|  -2.160765      .17829  -12.12   0.000   -2.5102 -1.81133   .036682
   dum23*|  -7.049995      .18526  -38.05   0.000   -7.4131 -6.68689   .038125
   dum24*|  -.2877206      .14184   -2.03   0.043  -.565726 -.009715   .072025
   dum25*|   .0710943      .12889    0.55   0.581   -.18153  .323719   .026172
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
```

5.8 Unconditional Marginal Effects

```
mfx compute, predict(ystar(0,.))

Marginal effects after tobit
      y  = E(taxevasion*|taxevasion>0) (predict, ystar(0,.))
         =  11.402314
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
 taxrate |   1.066103      .29484    3.62   0.000   .488219  1.64399   2.79845
trusti~t |  -.3208724      .16532   -1.94   0.052  -.644888  .003143   3.87141
trusti~m |   -.529989      .21982   -2.41   0.016  -.960827 -.099151   3.45234
corrup~1 |   2.953498       .1733   17.04   0.000   2.61383  3.29316   2.57208
compli~t |   .0556418      .01878    2.96   0.003   .018832  .092451   6.15457
 foreign*|  -2.511111      .57198   -4.39   0.000  -3.63218 -1.39005   .133539
  medium*|  -2.969302      .51134   -5.81   0.000  -3.97152 -1.96709   .180938
   large*|  -3.853171      .69313   -5.56   0.000  -5.21168 -2.49466   .086038
indivi~l*|   2.995635      .88222    3.40   0.001   1.26652  4.72475   .410407
partne~p*|   1.249209      .93196    1.34   0.180  -.577407  3.07583   .293869
mining~g*|  -3.680506     1.33419   -2.76   0.006  -6.29548 -1.06553   .010304
constr~n*|  -1.252346       .7575   -1.65   0.098  -2.73701  .232322   .110768
manufa~g*|  -1.164774      .55815   -2.09   0.037  -2.25873 -.070813   .349304
transp~t*|  -2.757387      .74092   -3.72   0.000  -4.20957  -1.3052   .062133
wholes~s*|  -1.376743      .63539   -2.17   0.030  -2.62208 -.131403    .27594
reales~s*|  -1.177634      .73423   -1.60   0.109  -2.61669  .261424   .090881
hotels~s*|   2.055389      1.0663    1.93   0.054  -.034512  4.14529   .052962
dummyy~r*|  -4.550184     1.26575   -3.59   0.000  -7.03101 -2.06936   .644513
    dum1*|   4.497016      .27684   16.24   0.000   3.95442  5.03961   .021535
    dum2*|   1.566091      .19051    8.22   0.000   1.19269  1.93949   .028233
    dum3*|   5.039505       .2701   18.66   0.000   4.51013  5.56888   .028027
    dum4*|    -1.5908      .41257   -3.86   0.000  -2.39941 -.782187   .027718
    dum5*|   2.506799      .25756    9.73   0.000   2.00199  3.01161   .019474
    dum6*|   1.207558      .48823    2.47   0.013   .250654  2.16446   .028954
    dum7*|   -1.85668      .30338   -6.12   0.000  -2.45129 -1.26207   .102215
    dum8*|  -4.720367      .21209  -22.26   0.000  -5.13605 -4.30468   .072128
    dum9*|   -5.45376       .3343  -16.31   0.000  -6.10897 -4.79855   .037609
   dum10*|  -.1289795      .49969   -0.26   0.796  -1.10835  .850395   .060072
   dum11*|   .9489324      .47855    1.98   0.047   .010986  1.88688   .042143
   dum12*|   -3.19857      .40732   -7.85   0.000  -3.99689 -2.40025   .021432
   dum13*|  -3.429158      .53011   -6.47   0.000  -4.46816 -2.39015   .054302
   dum14*|  -.2745304      .23224   -1.18   0.237  -.729716  .180655   .041216
   dum15*|   .9515529      .42182    2.26   0.024   .124792  1.77831   .029985
   dum16*|  -3.160171      .26664  -11.85   0.000  -3.68277 -2.63757   .019681
   dum17*|  -1.299786      .53516   -2.43   0.015  -2.34867   -.2509   .024008
   dum18*|  -2.589091      .45962   -5.63   0.000  -3.48993 -1.68825   .018032
   dum19*|   8.156944      .60594   13.46   0.000   6.96932  9.34457   .022257
   dum20*|  -6.495289       .1905  -34.10   0.000  -6.86867 -6.12191   .039979
   dum21*|  -5.326852      .17415  -30.59   0.000  -5.66818 -4.98552   .061515
   dum22*|  -2.726219      .22149  -12.31   0.000  -3.16034  -2.2921   .036682
   dum23*|  -7.978962      .14189  -56.23   0.000  -8.25707 -7.70086   .038125
   dum24*|  -.3733717      .18395   -2.03   0.042    -.7339 -.012844   .072025
   dum25*|   .0926603      .16801    0.55   0.581  -.236631  .421951   .026172
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
```

5.9 BEEPS 2005 Heckman Two Step "Truthfulness"

```
heckman  taxevasion taxrate  audit trustingovernment trustinjudicalsystem corruption1
compliancecost foreign medium large  individual partnership miningandquarrying construction
manufacturing transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dum1 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12 dum13 dum14 dum15
dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25 dum26, select ( external = taxrate
audit trustingovernment trustinjudicalsystem corruption1 compliancecost foreign medium large
individual partnership miningandquarrying construction manufacturing
transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dum1 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12 dum13 dum14 dum15
dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25 dum26  intaccountingstandards)
twostep

Heckman selection model -- two-step estimates   Number of obs      =      5647
(regression model with sample selection)        Censored obs       =      3112
                                                Uncensored obs     =      2535

                                                Wald chi2(43)      =    474.63
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
taxevasion   |
     taxrate |   1.082361   .3453932     3.13   0.002     .4054024    1.759319
       audit |  -.0398291   .0522976    -0.76   0.446    -.1423304    .0626723
trustingov~t |  -.9110314    .249606    -3.65   0.000     -1.40025   -.4218127
trustinjud~m |  -.5849976   .2642078    -2.21   0.027    -1.102835   -.0671598
 corruption1 |   2.269378   .2486284     9.13   0.000     1.782076    2.756681
compliance~t |   .0443287   .0337694     1.31   0.189    -.0218581    .1105155
     foreign |   -1.16512   1.064721    -1.09   0.274    -3.251935    .9216949
      medium |  -1.953573   1.217973    -1.60   0.109    -4.340756     .433609
       large |  -1.878331   1.706532    -1.10   0.271    -5.223073    1.466411
  individual |   3.112289    1.26744     2.46   0.014     .6281523    5.596425
 partnership |   2.108325   1.029751     2.05   0.041     .0900511      4.1266
miningandq~g |   2.613152   3.558559     0.73   0.463    -4.361495      9.5878
construction |   2.731706   2.364248     1.16   0.248    -1.902135    7.365548
manufactur~g |   2.891185   2.216141     1.30   0.192    -1.452373    7.234742
transports~t |  -.7492301   2.514336    -0.30   0.766    -5.677237    4.178777
wholesaler~s |   1.378015   2.234837     0.62   0.537    -3.002186    5.758215
realestate~s |   3.691817   2.431404     1.52   0.129    -1.073648    8.457282
hotelsandr~s |   6.656521   2.656185     2.51   0.012     1.450494    11.86255
        dum1 |   10.97091   3.488148     3.15   0.002     4.134269    17.80756
        dum3 |   13.80477   3.192148     4.32   0.000     7.548272    20.06126
        dum4 |   2.121496   2.976494     0.71   0.476    -3.712325    7.955317
        dum5 |   3.603861   3.428061     1.05   0.293    -3.115016    10.32274
        dum6 |   4.673857   3.011015     1.55   0.121    -1.227623    10.57534
        dum7 |   .9617943   2.467069     0.39   0.697    -3.873571     5.79716
        dum8 |    1.26198   2.589085     0.49   0.626    -3.812534    6.336493
        dum9 |   .1538692   2.867289     0.05   0.957    -5.465914    5.773652
       dum10 |   5.364128   2.798099     1.92   0.055    -.1200457     10.8483
       dum11 |   11.37728   2.833876     4.01   0.000     5.822985    16.93157
       dum12 |   .7990337    3.18462     0.25   0.802    -5.442707    7.040774
       dum13 |    3.78479   2.756252     1.37   0.170    -1.617364    9.186944
       dum14 |   6.996191   2.795181     2.50   0.012     1.517737    12.47464
       dum15 |   3.265609   4.287015     0.76   0.446    -5.136786      11.668
       dum16 |   3.030264   3.127464     0.97   0.333    -3.099452    9.159981
       dum17 |   1.792731   3.222725     0.56   0.578    -4.523693    8.109155
       dum18 |   2.863195   3.321852     0.86   0.389    -3.647515    9.373905
       dum19 |    7.14985   3.392616     2.11   0.035     .5004444    13.79926
       dum20 |  -3.064164   2.755914    -1.11   0.266    -8.465657    2.337329
       dum21 |  -4.518068   2.606912    -1.73   0.083    -9.627521    .5913858
       dum22 |   7.151427   2.884197     2.48   0.013     1.498505    12.80435
       dum23 |  -3.824209   2.877701    -1.33   0.184      -9.4644    1.815982
       dum24 |   6.389724   2.528666     2.53   0.012      1.43363    11.34582
       dum25 |   2.603916   3.409467     0.76   0.445    -4.078516    9.286348
       dum26 |   .5415033   3.109862     0.17   0.862    -5.553714    6.636721
       _cons |  -1.015683   4.625374    -0.22   0.826    -10.08125    8.049883
```

external						
taxrate	-.0217553	.0188255	-1.16	0.248	-.0586526	.015142
audit	.0029972	.0032395	0.93	0.355	-.0033521	.0093465
trustingov~t	.0306914	.0135179	2.27	0.023	.0041968	.057186
trustinjud~m	.0096319	.014518	0.66	0.507	-.018823	.0380867
corruption1	.0173954	.013742	1.27	0.206	-.0095384	.0443291
compliance~t	.0036986	.0019324	1.91	0.056	-.0000888	.007486
foreign	.4246407	.0634565	6.69	0.000	.3002683	.5490131
medium	.595339	.0498258	11.95	0.000	.4976824	.6929957
large	.9499785	.0807413	11.77	0.000	.7917285	1.108228
individual	-.4745594	.0552385	-8.59	0.000	-.5828249	-.3662938
partnership	-.178754	.0595997	-3.00	0.003	-.2955671	-.0619408
miningandq~g	.3464428	.2112387	1.64	0.101	-.0675776	.7604631
construction	.1923781	.1141881	1.68	0.092	-.0314265	.4161826
manufactur~g	.3069781	.1031147	2.98	0.003	.104877	.5090792
transports~t	.2571918	.123484	2.08	0.037	.0151675	.499216
wholesaler~s	.1930369	.1045496	1.85	0.065	-.0118766	.3979504
realestate~s	.1010751	.1167047	0.87	0.386	-.127662	.3298122
hotelsandr~s	.1429465	.1306507	1.09	0.274	-.1131241	.3990172
dum1	.1466274	.180529	0.81	0.417	-.2072028	.5004577
dum3	1.676472	.1687296	9.94	0.000	1.345768	2.007176
dum4	.2113019	.1599012	1.32	0.186	-.1020986	.5247025
dum5	.3685738	.1805097	2.04	0.041	.0147812	.7223664
dum6	.3313764	.158922	2.09	0.037	.0198949	.6428579
dum7	.3707714	.1296401	2.86	0.004	.1166814	.6248614
dum8	.2668357	.1347718	1.98	0.048	.0026879	.5309835
dum9	.583011	.1544349	3.78	0.000	.2803241	.8856979
dum10	1.349074	.1435874	9.40	0.000	1.067648	1.6305
dum11	.369973	.1495896	2.47	0.013	.0767829	.6631632
dum12	.5317204	.1772906	3.00	0.003	.1842372	.8792035
dum13	-.2319706	.1393565	-1.66	0.096	-.5051043	.0411631
dum14	.3671246	.1465603	2.50	0.012	.0798717	.6543775
dum15	-.848285	.1671207	-5.08	0.000	-1.175836	-.5207344
dum16	1.089677	.1715195	6.35	0.000	.7535054	1.425849
dum17	.1967163	.1707262	1.15	0.249	-.1379009	.5313334
dum18	1.299069	.2188641	5.94	0.000	.8701031	1.728035
dum19	1.355448	.2015424	6.73	0.000	.9604318	1.750463
dum20	.4142466	.1397879	2.96	0.003	.1402674	.6882259
dum21	.1136692	.1336845	0.85	0.395	-.1483477	.375686
dum22	1.120639	.1457686	7.69	0.000	.8349382	1.406341
dum23	.707248	.1548582	4.57	0.000	.4037315	1.010764
dum24	.3845521	.13393	2.87	0.004	.122054	.6470501
dum25	.015325	.16327	0.09	0.925	-.3046783	.3353282
dum26	-.0528246	.1602122	-0.33	0.742	-.3668347	.2611855
intaccount~s	.5154269	.0546864	9.43	0.000	.4082435	.6226104
_cons	-1.000848	.1814274	-5.52	0.000	-1.356439	-.6452568
mills						
lambda	2.011209	2.470163	0.81	0.416	-2.830221	6.852639
rho	0.12088					
sigma	16.638501					
lambda	2.0112089	2.470163				

5.10 BEEPS 2005 Heckman FIML "Truthfulness"

```
REJECT; TAXRATE=-999$
REJECT; TAXEVASI=-999$
REJECT; TRUSTING=-999$
REJECT; TRUSTINJ=-999$
REJECT; COMPLIAN=-999$
REJECT; CORRUPTI=-999$
REJECT; FOREIGN=-999$
REJECT; MEDIUM=-999$
REJECT; LARGE=-999$
REJECT; INTACCOU=-999$
REJECT; EXTERNAL=-999$
REJECT; AUDIT=-999$

PROBIT;Lhs=EXTERNAL;Rhs=ONE,TAXRATE,AUDIT,TRUSTING,TRUSTINJ,CORRUPTI,COMPLIAN,FOREIGN,MEDIUM,LARG
E,INDIVIDU,PARTNERS,MININGAN,CONSTRUC,MANUFACT,TRANSPOR,WHOLESAL,REALESTA,HOTELSAN,INTACCOU,DUM1,
DUM3,DUM4,DUM5,DUM6,DUM7,DUM8,DUM9,DUM10,DUM11,DUM12,DUM13,DUM14,DUM15,DUM16,DUM17,DUM18,DUM19,DU
M20,DUM21,DUM22,DUM23,DUM24,DUM25,DUM26;Hold$

Normal exit from iterations. Exit status=0.

+---------------------------------------------+
| Binomial Probit Model                       |
| Maximum Likelihood Estimates                |
| Model estimated: Apr 20, 2013 at 03:00:34AM.|
| Dependent variable              EXTERNAL    |
| Weighting variable                  None    |
| Number of observations              5647    |
| Iterations completed                   5    |
| Log likelihood function        -3103.576    |
| Number of parameters                  45    |
| Info. Criterion: AIC =           1.11513    |
|   Finite Sample: AIC =           1.11526    |
| Info. Criterion: BIC =           1.16804    |
| Info. Criterion:HQIC =           1.13356    |
| Restricted log likelihood      -3884.672    |
| McFadden Pseudo R-squared       .2010712    |
| Chi squared                     1562.192    |
| Degrees of freedom                    44    |
| Prob[ChiSqd > value] =          .0000000    |
| Results retained for SELECTION model.       |
| Hosmer-Lemeshow chi-squared =  12.02188     |
| P-value=  .15023 with deg.fr. =       8     |
+---------------------------------------------+
+--------+--------------+----------------+--------+--------+----------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+--------+--------------+----------------+--------+--------+----------+
---------+Index function for probability
 Constant|   -1.00084799       .18142741    -5.517   .0000
 TAXRATE |    -.02175528       .01882550    -1.156   .2478   2.79157075
 AUDIT   |     .00299723       .00323950      .925   .3549   2.49389056
 TRUSTING|     .03069140       .01351790     2.270   .0232   3.88578006
 TRUSTINJ|     .00963189       .01451805      .663   .5070   3.45369223
 CORRUPTI|     .01739538       .01374196     1.266   .2056   2.44891093
 COMPLIAN|     .00369863       .00193238     1.914   .0556   5.25650788
 FOREIGN |     .42464070       .06345649     6.692   .0000    .11244909
 MEDIUM  |     .59533904       .04982575    11.948   .0000    .19072074
 LARGE   |     .94997846       .08074126    11.766   .0000    .07774039
 INDIVIDU|    -.47455935       .05523853    -8.591   .0000    .43456703
 PARTNERS|    -.17875395       .05959966    -2.999   .0027    .28298211
 MININGAN|     .34644276       .21123874     1.640   .1010    .01027094
 CONSTRUC|     .19237807       .11418808     1.685   .0920    .09739685
 MANUFACT|     .30697808       .10311471     2.977   .0029    .41455640
 TRANSPOR|     .25719177       .12348403     2.083   .0373    .05914645
 WHOLESAL|     .19303691       .10454963     1.846   .0648    .24845050
 REALESTA|     .10107508       .11670474      .866   .3864    .08340712
 HOTELSAN|     .14294652       .13065069     1.094   .2739    .04816717
```

```
 INTACCOU|     .51542693       .05468644     9.425   .0000     .19284576
 DUM1    |     .14662742       .18052895      .812   .4167     .01823977
 DUM3    |    1.67647183       .16872961     9.936   .0000     .02780237
 DUM4    |     .21130193       .15990119     1.321   .1864     .02638569
 DUM5    |     .36857381       .18050974     2.042   .0412     .01611475
 DUM6    |     .33137641       .15892204     2.085   .0371     .02886488
 DUM7    |     .37077136       .12964014     2.860   .0042     .11067824
 DUM8    |     .26683569       .13477177     1.980   .0477     .06605277
 DUM9    |     .58301099       .15443495     3.775   .0002     .03010448
 DUM10   |    1.34907427       .14358742     9.395   .0000     .05826102
 DUM11   |     .36997304       .14958956     2.473   .0134     .04002125
 DUM12   |     .53172035       .17729057     2.999   .0027     .01912520
 DUM13   |    -.23197057       .13935648    -1.665   .0960     .06569860
 DUM14   |     .36712460       .14656030     2.505   .0122     .04037542
 DUM15   |    -.84828500       .16712074    -5.076   .0000     .03470869
 DUM16   |    1.08967740       .17151945     6.353   .0000     .02036480
 DUM17   |     .19671625       .17072617     1.152   .2492     .02036480
 DUM18   |    1.29906880       .21886408     5.936   .0000     .01540641
 DUM19   |    1.35544763       .20154239     6.725   .0000     .01522933
 DUM20   |     .41424661       .13978790     2.963   .0030     .04976094
 DUM21   |     .11366915       .13368453      .850   .3952     .07526120
 DUM22   |    1.12063935       .14576860     7.688   .0000     .04161502
 DUM23   |     .70724796       .15485819     4.567   .0000     .02992740
 DUM24   |     .38455206       .13393003     2.871   .0041     .06800071
 DUM25   |     .01532496       .16326996      .094   .9252     .02673986
 DUM26   |    -.05282461       .16021219     -.330   .7416     .02656278

+----------------------------------------+
| Fit Measures for Binomial Choice Model |
| Probit   model for variable EXTERNAL   |
+----------------------------------------+
| Proportions P0= .551089   P1= .448911  |
| N =    5647 N0=    3112   N1=    2535  |
| LogL=    -3103.576 LogL0=   -3884.672  |
| Estrella = 1-(L/L0)^(-2L0/n) = .26571  |
+----------------------------------------+
|     Efron |  McFadden  |  Ben./Lerman  |
|    .25743 |    .20107  |        .63027  |
|    Cramer | Veall/Zim. |      Rsqrd_ML  |
|    .25268 |    .37419  |        .24167  |
+----------------------------------------+
| Information  Akaike I.C. Schwarz I.C.  |
| Criteria        1.11513      1.16804   |
+----------------------------------------+
+-------------------------------------------------------------+
|Predictions for Binary Choice Model.  Predicted value is |
|1 when probability is greater than  .500000, 0 otherwise.|
|Note, column or row total percentages may not sum to     |
|100% because of rounding. Percentages are of full sample.|
+------+---------------------------------+----------------+
|Actual|         Predicted Value         |                |
|Value |       0                1        | Total Actual   |
+------+----------------+----------------+----------------+
|  0   |   2553 ( 45.2%)|    559 (  9.9%)|   3112 ( 55.1%)|
|  1   |    970 ( 17.2%)|   1565 ( 27.7%)|   2535 ( 44.9%)|
+------+----------------+----------------+----------------+
|Total |   3523 ( 62.4%)|   2124 ( 37.6%)|   5647 (100.0%)|
+------+----------------+----------------+----------------+

=======================================================================
Analysis of Binary Choice Model Predictions Based on Threshold =  .5000
-----------------------------------------------------------------------
Prediction Success
-----------------------------------------------------------------------
Sensitivity = actual 1s correctly predicted                     61.736%
Specificity = actual 0s correctly predicted                     82.037%
Positive predictive value = predicted 1s that were actual 1s    73.682%
Negative predictive value = predicted 0s that were actual 0s    72.467%
Correct prediction = actual 1s and 0s correctly predicted       72.924%
-----------------------------------------------------------------------
Prediction Failure
```

```
----------------------------------------------------------------------
False pos. for true neg. = actual 0s predicted as 1s           17.963%
False neg. for true pos. = actual 1s predicted as 0s           38.264%
False pos. for predicted pos. = predicted 1s actual 0s         26.318%
False neg. for predicted neg. = predicted 0s actual 1s         27.533%
False predictions = actual 1s and 0s incorrectly predicted     27.076%
======================================================================
```

```
SELECTION;Lhs=TAXEVASI;Rhs=ONE,TAXRATE,AUDIT,TRUSTING,TRUSTINJ,CORRUPTI,COMPLIAN,FOREIGN,MEDIUM,L
ARGE,INDIVIDU,PARTNERS,MININGAN,CONSTRUC,MANUFACT,TRANSPOR,WHOLESAL,REALESTA,HOTELSAN,DUM1,DUM3,D
UM4,DUM5,DUM6,DUM7,DUM8,DUM9,DUM10,DUM11,DUM12,DUM13,DUM14,DUM15,DUM16,DUM17,DUM18,DUM19,DUM20,DU
M21,DUM22,DUM23,DUM24,DUM25,DUM26;MLE;Tobit$
```

```
+------------------------------------------------------------+
| Sample Selection Model                                      |
| Probit selection equation based on EXTERNAL                 |
| Selection rule is: Observations with EXTERNAL =  1          |
| Results of selection:                                       |
|                   Data points     Sum of weights            |
| Data set              5647             5647.0               |
| Selected sample       2535             2535.0               |
+------------------------------------------------------------+

+-----------------------------------------------------+
| Sample Selection Model                              |
| Two step    least squares regression                |
| Model was estimated Apr 20, 2013 at 03:03:15AM      |
| LHS=TAXEVASI Mean                 =   9.961736      |
|              Standard deviation   =   18.10082      |
| WTS=none     Number of observs.   =       2535      |
| Model size   Parameters           =         45      |
|              Degrees of freedom   =       2490      |
| Residuals    Sum of squares       =   683848.2      |
|              Standard error of e  =   16.57220      |
| Fit          R-squared            =   .1614382      |
|              Adjusted R-squared   =   .1466203      |
| Model test   F[ 44,  2490] (prob) =  10.89 (.0000)  |
| Diagnostic   Log likelihood       =  -10691.89      |
|              Restricted(b=0)      =  -10937.76      |
|              Chi-sq [ 44]  (prob) = 491.73 (.0000)  |
| Info criter. LogAmemiya Prd. Crt. =   5.633049      |
|              Akaike Info. Criter. =   5.633045      |
| Not using OLS or no constant. Rsqd & F may be < 0.  |
| Standard error corrected for selection..  16.63850  |
| Correlation of disturbance in regression            |
| and Selection Criterion (Rho)...........    .12088  |
+-----------------------------------------------------+
+--------+--------------+----------------+--------+--------+----------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]| Mean of X|
+--------+--------------+----------------+--------+--------+----------+
 Constant|   -1.01568321      4.62537400      -.220   .8262
 TAXRATE |    1.08236059       .34539316      3.134   .0017   2.76883629
 AUDIT   |    -.03982909       .05229757      -.762   .4463   2.82169625
 TRUSTING|    -.91103139       .24960598     -3.650   .0003   4.04930966
 TRUSTINJ|    -.58499759       .26420781     -2.214   .0268   3.55226824
 CORRUPTI|    2.26937844       .24862844      9.128   .0000   2.44457594
 COMPLIAN|     .04432866       .03376940      1.313   .1893   5.94753452
 FOREIGN |   -1.16511981      1.06472095     -1.094   .2738    .18106509
 MEDIUM  |   -1.95357333      1.21797257     -1.604   .1087    .27337278
 LARGE   |   -1.87833128      1.70653238     -1.101   .2710    .13846154
 INDIVIDU|    3.11228880      1.26743989      2.456   .0141    .31913215
 PARTNERS|    2.10832540      1.02975072      2.047   .0406    .35897436
 MININGAN|    2.61315245      3.55855924       .734   .4627    .01459566
 CONSTRUC|    2.73170616      2.36424835      1.155   .2479    .10216963
 MANUFACT|    2.89118467      2.21614132      1.305   .1920    .45246548
 TRANSPOR|    -.74923015      2.51433556      -.298   .7657    .06193294
 WHOLESAL|    1.37801471      2.23483721       .617   .5375    .22721893
 REALESTA|    3.69181681      2.43140423      1.518   .1289    .07416174
 HOTELSAN|    6.65652139      2.65618519      2.506   .0122    .04220907
```

```
 DUM1    |    10.9709124      3.48814768     3.145   .0017    .01459566
 DUM3    |    13.8047673      3.19214798     4.325   .0000    .05167653
 DUM4    |    2.12149585      2.97649389      .713   .4760    .02721893
 DUM5    |    3.60386059      3.42806117     1.051   .2931    .01577909
 DUM6    |    4.67385659      3.01101452     1.552   .1206    .02564103
 DUM7    |     .96179432      2.46706866      .390   .6966    .09033531
 DUM8    |    1.26197964      2.58908494      .487   .6260    .05798817
 DUM9    |     .15386921      2.86728890      .054   .9572    .03353057
 DUM10   |    5.36412792      2.79809917     1.917   .0552    .10098619
 DUM11   |    11.3772792      2.83387585     4.015   .0001    .03353057
 DUM12   |     .79903372      3.18462000      .251   .8019    .02169625
 DUM13   |    3.78479041      2.75625166     1.373   .1697    .04930966
 DUM14   |    6.99619108      2.79518077     2.503   .0123    .03589744
 DUM15   |    3.26560928      4.28701512      .762   .4462    .01065089
 DUM16   |    3.03026441      3.12746380      .969   .3326    .02958580
 DUM17   |    1.79273121      3.22272458      .556   .5780    .01932939
 DUM18   |    2.86319509      3.32185186      .862   .3887    .02998028
 DUM19   |    7.14985023      3.39261631     2.107   .0351    .02682446
 DUM20   |   -3.06416435      2.75591444    -1.112   .2662    .04615385
 DUM21   |   -4.51806751      2.60691184    -1.733   .0831    .05719921
 DUM22   |    7.15142653      2.88419677     2.480   .0132    .06035503
 DUM23   |   -3.82420908      2.87770119    -1.329   .1839    .03392505
 DUM24   |    6.38972441      2.52866616     2.527   .0115    .06548323
 DUM25   |    2.60391634      3.40946680      .764   .4450    .01656805
 DUM26   |     .54150331      3.10986205      .174   .8618    .02209073
 LAMBDA  |    2.01120894      2.47016263      .814   .4155    .69268225

Maximum iterations reached. Exit iterations with status=1.

+----------------------------------------------+
| ML Estimates of Selection Model              |
| Maximum Likelihood Estimates                 |
| Model estimated: Apr 20, 2013 at 03:03:32AM.|
| Dependent variable             TAXEVASI      |
| Weighting variable                 None      |
| Number of observations             5647      |
| Iterations completed                101      |
| Log likelihood function       -8325.288      |
| Number of parameters                 91      |
| Info. Criterion: AIC =          2.98080      |
|   Finite Sample: AIC =          2.98133      |
| Info. Criterion: BIC =          3.08778      |
| Info. Criterion:HQIC =          3.01807      |
| LHS is CENSORED. Tobit Model fit by MLE.     |
| FIRST 45 estimates are probit equation.      |
+----------------------------------------------+
+--------+--------------+----------------+--------+--------+
|Variable| Coefficient  | Standard Error |b/St.Er.|P[|Z|>z]|
+--------+--------------+----------------+--------+--------+
---------+Selection (probit) equation for EXTERNAL
 Constant|    -.99886899       .16851123    -5.928   .0000
 TAXRATE |    -.02133718       .01804459    -1.182   .2370
 AUDIT   |     .00299630       .00343368      .873   .3829
 TRUSTING|     .03065367       .01288411     2.379   .0174
 TRUSTINJ|     .00926866       .01405222      .660   .5095
 CORRUPTI|     .01741253       .01307026     1.332   .1828
 COMPLIAN|     .00374170       .00196101     1.908   .0564
 FOREIGN |     .42554258       .07082903     6.008   .0000
 MEDIUM  |     .59579062       .05281045    11.282   .0000
 LARGE   |     .95093777       .10109298     9.407   .0000
 INDIVIDU|    -.47639172       .05439071    -8.759   .0000
 PARTNERS|    -.18135917       .06077959    -2.984   .0028
 MININGAN|     .33986388       .23203454     1.465   .1430
 CONSTRUC|     .19358779       .10369483     1.867   .0619
 MANUFACT|     .30598766       .09203951     3.325   .0009
 TRANSPOR|     .25807391       .11287438     2.286   .0222
 WHOLESAL|     .19252649       .09309007     2.068   .0386
 REALESTA|     .10155871       .10463068      .971   .3317
 HOTELSAN|     .14319340       .11831051     1.210   .2262
 INTACCOU|     .51409423       .05898221     8.716   .0000
 DUM1    |     .14697867       .17199902      .855   .3928
```

```
 DUM3     |    1.67595409       .20165859      8.311   .0000
 DUM4     |     .21620212       .15594238      1.386   .1656
 DUM5     |     .36962062       .17275876      2.140   .0324
 DUM6     |     .32985724       .15106361      2.184   .0290
 DUM7     |     .36966879       .12267597      3.013   .0026
 DUM8     |     .26557787       .12740784      2.084   .0371
 DUM9     |     .58186879       .14975386      3.886   .0001
 DUM10    |    1.34804793       .15131137      8.909   .0000
 DUM11    |     .36410659       .14303356      2.546   .0109
 DUM12    |     .53382659       .17691826      3.017   .0025
 DUM13    |    -.23257625       .13274505     -1.752   .0798
 DUM14    |     .36824122       .13857441      2.657   .0079
 DUM15    |    -.84929387       .14421538     -5.889   .0000
 DUM16    |    1.09388436       .17657083      6.195   .0000
 DUM17    |     .19719323       .16259162      1.213   .2252
 DUM18    |    1.30568174       .29962319      4.358   .0000
 DUM19    |    1.35648828       .24335007      5.574   .0000
 DUM20    |     .41622212       .13210430      3.151   .0016
 DUM21    |     .11369863       .12531526       .907   .3642
 DUM22    |    1.11934548       .14711980      7.608   .0000
 DUM23    |     .70824704       .15167238      4.670   .0000
 DUM24    |     .38345881       .12637584      3.034   .0024
 DUM25    |     .01855111       .14683309       .126   .8995
 DUM26    |    -.05171453       .14921683      -.347   .7289
---------+Corrected regression, Regime 1
 Constant|   -47.5495239      12.1191125     -3.924   .0001
 TAXRATE |    3.86331206       .97062834      3.980   .0001
 AUDIT   |    -.13589448       .16812074      -.808   .4189
 TRUSTING|   -1.91552038       .64432755     -2.973   .0030
 TRUSTINJ|   -1.26738023       .70838694     -1.789   .0736
 CORRUPTI|    7.04528871       .69209831     10.180   .0000
 COMPLIAN|     .04457023       .08612601       .518   .6048
 FOREIGN |   -3.64031196      2.93196421     -1.242   .2144
 MEDIUM  |   -5.78997811      3.28787161     -1.761   .0782
 LARGE   |   -8.42370423      4.41650588     -1.907   .0565
 INDIVIDU|    7.66075617      3.49043044      2.195   .0282
 PARTNERS|    5.66119448      2.79191564      2.028   .0426
 MININGAN|    5.96412275      10.5220898       .567   .5708
 CONSTRUC|    6.73600415      6.44840794      1.045   .2962
 MANUFACT|    5.93416416      5.99464900       .990   .3222
 TRANSPOR|   -4.01091081      7.05802717      -.568   .5698
 WHOLESAL|    1.74179182      6.10704477       .285   .7755
 REALESTA|    7.89747368      6.49810130      1.215   .2242
 HOTELSAN|    15.7606934      7.02419280      2.244   .0248
 DUM1    |    23.7783725      7.60412726      3.127   .0018
 DUM3    |    28.6480930      8.35212033      3.430   .0006
 DUM4    |    8.58002371      8.13987511      1.054   .2918
 DUM5    |    9.29941138      8.61781943      1.079   .2805
 DUM6    |    19.0256427      7.79128679      2.442   .0146
 DUM7    |    7.74369413      6.22789930      1.243   .2137
 DUM8    |   -1.58580045      6.33800352      -.250   .8024
 DUM9    |   -5.91474816      7.72341518      -.766   .4438
 DUM10   |    16.2885795      7.02907097      2.317   .0205
 DUM11   |    26.9788212      6.75760646      3.992   .0001
 DUM12   |     .59650352      8.94626563       .067   .9468
 DUM13   |    8.36650585      6.95247022      1.203   .2288
 DUM14   |    17.1532029      6.85154685      2.504   .0123
 DUM15   |    16.7988519      11.4948949      1.461   .1439
 DUM16   |    8.13261971      7.92250843      1.027   .3046
 DUM17   |    3.90547977      7.90808528       .494   .6214
 DUM18   |    16.3241627      9.40031626      1.737   .0825
 DUM19   |    19.0945349      8.54981166      2.233   .0255
 DUM20   |   -3.00089747      7.37658253      -.407   .6841
 DUM21   |   -17.8834609      7.12884741     -2.509   .0121
 DUM22   |    14.9437383      7.25995528      2.058   .0396
 DUM23   |   -26.0214523      8.86832635     -2.934   .0033
 DUM24   |    13.1134262      6.06644402      2.162   .0306
 DUM25   |    12.5622624      8.92336295      1.408   .1592
 DUM26   |    2.60963584      7.35324414       .355   .7227
 SIGMA(1)|    35.2199789      1.19953292     29.361   .0000
 RHO(1,2)|     .12280959       .19115401       .642   .5206
```

5.11 BEEPS 2005 Tobit Corner Solution

```
tobit  taxevasion taxrate audit trustingovernment  trustinjudicalsystem corruption1
compliancecost foreign medium large individual  partnership miningandquarrying construction
manufacturing transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dum1 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12 dum13 dum14 dum15
dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25 dum26, ll robust cluster(country)

Tobit regression                                  Number of obs   =       6218
                                                  F(  19,    6175) =          .
                                                  Prob > F        =          .
Log pseudolikelihood = -13809.691                 Pseudo R2       =     0.0338

                               (Std. Err. adjusted for 26 clusters in country)
------------------------------------------------------------------------------
             |               Robust
  taxevasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     taxrate |   2.547028   .9215525     2.76   0.006     .7404645    4.353592
       audit |  -.0033529    .087451    -0.04   0.969    -.1747873    .1680815
trustingov~t |  -.6256212   .5221981    -1.20   0.231    -1.649311     .398069
trustinjud~m |  -1.193904   .7567963    -1.58   0.115    -2.677488      .28968
 corruption1 |   7.712147   .5493653    14.04   0.000       6.6352    8.789094
compliance~t |   .0369278   .0590321     0.63   0.532    -.0787956    .1526512
     foreign |  -4.828175   1.993884    -2.42   0.015    -8.736881   -.9194686
      medium |  -7.412127   1.394213    -5.32   0.000    -10.14527   -4.678983
       large |  -8.764426   2.278816    -3.85   0.000     -13.2317   -4.297153
  individual |   7.769038    2.18717     3.55   0.000     3.481424    12.05665
 partnership |   3.251064   2.415536     1.35   0.178    -1.484228    7.986356
miningandq~g |  -6.997909   7.167731    -0.98   0.329    -21.04916     7.05334
construction |   -1.04808   3.370546    -0.31   0.756    -7.655523    5.559364
manufactur~g |  -1.936433   2.603906    -0.74   0.457    -7.040995    3.168129
transports~t |  -6.094228   3.344149    -1.82   0.068    -12.64992     .461469
wholesaler~s |  -2.440725   2.782917    -0.88   0.380     -7.89621    3.014761
realestate~s |  -2.726097   2.998783    -0.91   0.363    -8.604757    3.152563
hotelsandr~s |   5.061127   3.135663     1.61   0.107    -1.085864    11.20812
        dum1 |   19.32006   .7669571    25.19   0.000     17.81656    20.82357
        dum3 |   22.09245   1.026669    21.52   0.000     20.07982    24.10508
        dum4 |   4.376236   .9752726     4.49   0.000     2.464362     6.28811
        dum5 |   4.351167   .6620877     6.57   0.000     3.053244    5.649089
        dum6 |   6.780565   1.287368     5.27   0.000     4.256876    9.304254
        dum7 |    8.31282   .9245482     8.99   0.000     6.500384    10.12526
        dum8 |  -4.613645   .8626196    -5.35   0.000     -6.30468    -2.92261
        dum9 |  -4.357904   1.084488    -4.02   0.000    -6.483877    -2.23193
       dum10 |   11.94528   1.436141     8.32   0.000     9.129944    14.76062
       dum11 |   14.15485   1.026354    13.79   0.000     12.14283    16.16686
       dum12 |  -4.488137   1.251416    -3.59   0.000    -6.941349   -2.034925
       dum13 |  -.4756348   1.549509    -0.31   0.759    -3.513211    2.561942
       dum14 |   11.43168   .8915484    12.82   0.000     9.683931    13.17942
       dum15 |    9.76497   .8786979    11.11   0.000     8.042416    11.48752
       dum16 |   .1550242   .6540673     0.24   0.813    -1.127175    1.437224
       dum17 |   4.906085   1.301196     3.77   0.000     2.355287    7.456882
       dum18 |   4.853863   1.843691     2.63   0.008     1.239586     8.46814
       dum19 |   12.50473   1.530809     8.17   0.000     9.503814    15.50565
       dum20 |  -11.67524   .9546973   -12.23   0.000    -13.54678   -9.803702
       dum21 |  -11.87159   .8693175   -13.66   0.000    -13.57576   -10.16743
       dum22 |   3.508364    .820465     4.28   0.000     1.899967    5.116761
       dum23 |  -29.76343    1.15958   -25.67   0.000    -32.03661   -27.49025
       dum24 |    10.2555   .5589436    18.35   0.000     9.159772    11.35122
       dum25 |   .0173738    .668297     0.03   0.979    -1.292721    1.327469
       dum26 |   2.797135   .5027906     5.56   0.000      1.81149     3.78278
       _cons |  -33.90083   6.165756    -5.50   0.000    -45.98786    -21.8138
-------------+----------------------------------------------------------------
      /sigma |   35.94228   2.022317                      31.97784    39.90673
------------------------------------------------------------------------------
  Obs. summary:       3856  left-censored observations at taxevasion<=0
                      2362     uncensored observations
                         0 right-censored observations
```

5.12 BEEPS 2005 Probit

```
probit taxevasion taxrate audit trustingovernment  trustinjudicalsystem corruption1
compliancecost foreign medium large individual  partnership miningandquarrying construction
manufacturing transportstorageandcommunicat wholesaleretailrepairs realestaterentingandbusines
hotelsandrestaurants dum1 dum3 dum4 dum5 dum6 dum7 dum8 dum9 dum10 dum11 dum12 dum13 dum14 dum15
dum16 dum17 dum18 dum19 dum20 dum21 dum22 dum23 dum24 dum25 dum26

Iteration 0:   log likelihood = -4128.7393
Iteration 1:   log likelihood =  -3681.197
Iteration 2:   log likelihood = -3679.4656
Iteration 3:   log likelihood = -3679.4641
Iteration 4:   log likelihood = -3679.4641

Probit regression                                 Number of obs   =       6218
                                                  LR chi2(43)     =     898.55
                                                  Prob > chi2     =     0.0000
Log likelihood = -3679.4641                       Pseudo R2       =     0.1088

------------------------------------------------------------------------------
  taxevasion |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     taxrate |   .0876338   .0175844     4.98   0.000      .053169    .1220987
       audit |  -.0016078   .0030611    -0.53   0.599    -.0076074    .0043918
trustingov~t |  -.0152967   .0123665    -1.24   0.216    -.0395347    .0089412
trustinjud~m |  -.0246177    .013394    -1.84   0.066    -.0508696    .0016341
 corruption1 |   .2380428   .0127679    18.64   0.000     .2130182    .2630673
compliance~t |  -.0000496   .0017486    -0.03   0.977    -.0034768    .0033777
     foreign |  -.1229585   .0589133    -2.09   0.037    -.2384265   -.0074906
      medium |  -.2044408   .0469839    -4.35   0.000    -.2965276    -.112354
       large |  -.2394889   .0723469    -3.31   0.001    -.3812862   -.0976916
  individual |   .2204935   .0514382     4.29   0.000     .1196765    .3213106
 partnership |   .0884211   .0559526     1.58   0.114     -.021244    .1980861
miningandq~g |  -.1421312   .1956602    -0.73   0.468    -.5256182    .2413559
construction |  -.0078471   .1003584    -0.08   0.938     -.204546    .1888517
manufactur~g |  -.0481602   .0890572    -0.54   0.589    -.2227092    .1263887
transports~t |  -.1351397   .1100713    -1.23   0.220    -.3508754     .080596
wholesaler~s |  -.0763794   .0904023    -0.84   0.398    -.2535647    .1008059
realestate~s |  -.1323894   .1022681    -1.29   0.195    -.3328312    .0680524
hotelsandr~s |   .0567592   .1139931     0.50   0.619    -.1666631    .2801815
        dum1 |   .4749216   .1547669     3.07   0.002      .171584    .7782593
        dum3 |   .8594087   .1489665     5.77   0.000     .5674398    1.151378
        dum4 |   .2740602   .1455786     1.88   0.060    -.0112685     .559389
        dum5 |   .0415339   .1553776     0.27   0.789    -.2630005    .3460684
        dum6 |   .3922763   .1434347     2.73   0.006     .1111493    .6734032
        dum7 |   .4510105   .1139035     3.96   0.000     .2277638    .6742572
        dum8 |   -.232734   .1232763    -1.89   0.059    -.4743512    .0088832
        dum9 |  -.1867653    .147705    -1.26   0.206    -.4762619    .1027312
       dum10 |   .4547049   .1224198     3.71   0.000     .2147664    .6946434
       dum11 |   .5687966   .1316051     4.32   0.000     .3108555    .8267378
       dum12 |  -.0044807   .1634595    -0.03   0.978    -.3248553     .315894
       dum13 |    .085011   .1264052     0.67   0.501    -.1627388    .3327607
       dum14 |   .3298041   .1308409     2.52   0.012     .0733607    .5862475
       dum15 |   .4072904   .1359778     3.00   0.003     .1407789     .673802
       dum16 |   .0739524   .1553904     0.48   0.634    -.2306072    .3785121
       dum17 |   .2766815   .1531558     1.81   0.071    -.0234982    .5768613
       dum18 |   .4967208   .1666233     2.98   0.003     .1701451    .8232965
       dum19 |   .4005524   .1719112     2.33   0.020     .0636125    .7374922
       dum20 |  -.1371715   .1302434    -1.05   0.292    -.3924438    .1181009
       dum21 |  -.3004999   .1225211    -2.45   0.014     -.540637   -.0603629
       dum22 |   .0512301   .1289979     0.40   0.691    -.2016012    .3040615
       dum23 |  -.7304029   .1550789    -4.71   0.000    -1.034352   -.4264539
       dum24 |   .2284742   .1191481     1.92   0.055    -.0050518    .4620002
       dum25 |   .0851313   .1452697     0.59   0.558    -.1995921    .3698546
       dum26 |   .0814812   .1437938     0.57   0.571    -.2003495    .3633118
       _cons |  -1.177972   .1623015    -7.26   0.000    -1.496077   -.8598674
------------------------------------------------------------------------------
```

5.13 Conditional Marginal Effects

```
mfx compute, predict(e(0,.))

Marginal effects after tobit
      y  = E(taxevasion|taxevasion>0) (predict, e(0,.))
         =  24.835606
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.	]	X
taxrate	.76094	.26981	2.82	0.005	.232114	1.28977	2.78948
audit	-.0010017	.02612	-0.04	0.969	-.052196	.050193	2.41605
trusti~t	-.1869081	.156	-1.20	0.231	-.492666	.11885	3.87874
trusti~m	-.3566861	.22551	-1.58	0.114	-.798681	.085308	3.45288
corrup~1	2.30405	.14777	15.59	0.000	2.01443	2.59367	2.454
compli~t	.0110324	.01761	0.63	0.531	-.023477	.045542	5.23631
foreign*	-1.397504	.55887	-2.50	0.012	-2.49287	-.302136	.108395
medium*	-2.130923	.38076	-5.60	0.000	-2.87721	-1.38464	.187681
large*	-2.460964	.60452	-4.07	0.000	-3.6458	-1.27613	.074622
indivi~l*	2.342978	.66529	3.52	0.000	1.03903	3.64692	.433741
partne~p*	.9829668	.7374	1.33	0.183	-.462306	2.42824	.284336
mining~g*	-1.974327	1.90351	-1.04	0.300	-5.70513	1.75648	.010454
constr~n*	-.3108991	.99151	-0.31	0.754	-2.25422	1.63242	.097137
manufa~g*	-.5768755	.77423	-0.75	0.456	-2.09434	.940587	.411547
transp~t*	-1.740769	.90937	-1.91	0.056	-3.5231	.041559	.059505
wholes~s*	-.7217011	.81578	-0.88	0.376	-2.32059	.87719	.248151
reales~s*	-.7991033	.86209	-0.93	0.354	-2.48877	.890561	.085236
hotels~s*	1.572069	1.00764	1.56	0.119	-.402878	3.54702	.047925
dum1*	6.775751	.2329	29.09	0.000	6.31928	7.23222	.01946
dum3*	7.911332	.34124	23.18	0.000	7.24251	8.58016	.026375
dum4*	1.354282	.29885	4.53	0.000	.768551	1.94001	.026536
dum5*	1.34684	.20724	6.50	0.000	.940664	1.75302	.020585
dum6*	2.139453	.40657	5.26	0.000	1.34259	2.93631	.027501
dum7*	2.625601	.29516	8.90	0.000	2.0471	3.2041	.109199
dum8*	-1.332422	.23327	-5.71	0.000	-1.78961	-.875231	.061756
dum9*	-1.257932	.30507	-4.12	0.000	-1.85586	-.66001	.029592
dum10*	3.901268	.50834	7.67	0.000	2.90494	4.8976	.065938
dum11*	4.730834	.34208	13.83	0.000	4.06036	5.40131	.039402
dum12*	-1.293257	.35192	-3.67	0.000	-1.983	-.60351	.019942
dum13*	-.1416065	.45971	-0.31	0.758	-1.04261	.759402	.067707
dum14*	3.738429	.2703	13.83	0.000	3.20865	4.26821	.038919
dum15*	3.153241	.29531	10.68	0.000	2.57445	3.73203	.034738
dum16*	.0463725	.1959	0.24	0.813	-.337583	.430329	.021068
dum17*	1.525511	.41542	3.67	0.000	.711308	2.33971	.020746
dum18*	1.509104	.58313	2.59	0.010	.366188	2.65202	.016886
dum19*	4.145818	.53914	7.69	0.000	3.08912	5.20251	.014635
dum20*	-3.194833	.23403	-13.65	0.000	-3.65353	-2.73613	.045995
dum21*	-3.25967	.21416	-15.22	0.000	-3.67941	-2.83993	.07028
dum22*	1.076999	.25741	4.18	0.000	.572476	1.58152	.044066
dum23*	-7.115183	.20721	-34.34	0.000	-7.5213	-6.70906	.032486
dum24*	3.306248	.16398	20.16	0.000	2.98485	3.62765	.067063
dum25*	.0051913	.19968	0.03	0.979	-.386165	.396548	.02541
dum26*	.854685	.15358	5.56	0.000	.553665	1.1557	.02541

(*) dy/dx is for discrete change of dummy variable from 0 to 1

.

5.14 Unconditional Marginal Effects

```
mfx compute, predict(ystar(0,.))

Marginal effects after tobit
      y  = E(taxevasion*|taxevasion>0) (predict, ystar(0,.))
         =  9.2642287
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
 taxrate |   .9500977      .33249    2.86   0.004   .298423  1.60177   2.78948
   audit |  -.0012507      .03261   -0.04   0.969  -.065161   .06266   2.41605
trusti~t |  -.2333705      .19481   -1.20   0.231  -.615184  .148443   3.87874
trusti~m |  -.4453526      .28116   -1.58   0.113  -.996411  .105705   3.45288
corrup~1 |   2.876801      .17482   16.46   0.000   2.53416  3.21944     2.454
compli~t |   .0137749      .02196    0.63   0.530  -.029267  .056817   5.23631
 foreign*|  -1.706233      .66621   -2.56   0.010  -3.01198 -.400483   .108395
  medium*|  -2.588043      .44539   -5.81   0.000  -3.46099  -1.7151   .187681
   large*|  -2.934862      .68792   -4.27   0.000  -4.28317 -1.58656   .074622
indivi~l*|   2.942018      .84032    3.50   0.000   1.29503  4.58901   .433741
partne~p*|    1.23693      .93368    1.32   0.185  -.593055  3.06691   .284336
mining~g*|  -2.363797     2.16654   -1.09   0.275  -6.61013  1.88254   .010454
constr~n*|  -.3863095     1.22491   -0.32   0.752  -2.78709  2.01447   .097137
manufa~g*|  -.7188706      .96354   -0.75   0.456  -2.60737  1.16963   .411547
transp~t*|  -2.104268     1.05704   -1.99   0.047  -4.17603 -.032502   .059505
wholes~s*|  -.8947469     1.00527   -0.89   0.373  -2.86503  1.07554   .248151
reales~s*|  -.9846866     1.04748   -0.94   0.347  -3.03771  1.06834   .085236
hotels~s*|   2.011478     1.31478    1.53   0.126  -.565448   4.5884   .047925
    dum1*|   9.161127      .31851   28.76   0.000   8.53686  9.78539    .01946
    dum3*|    10.7622      .46984   22.91   0.000   9.84134  11.6831   .026375
    dum4*|   1.729056      .37973    4.55   0.000   .984796  2.47332   .026536
    dum5*|   1.719801      .26761    6.43   0.000    1.1953   2.2443   .020585
    dum6*|   2.762043      .52591    5.25   0.000   1.73129   3.7928   .027501
    dum7*|   3.390783      .38643    8.77   0.000   2.63339  4.14818   .109199
    dum8*|  -1.624128      .27081   -6.00   0.000   -2.1549 -1.09335   .061756
    dum9*|  -1.532792      .36508   -4.20   0.000  -2.24833 -.817249   .029592
   dum10*|   5.125195       .6967    7.36   0.000    3.7597   6.4907   .065938
   dum11*|    6.28075      .46112   13.62   0.000   5.37698  7.18452   .039402
   dum12*|  -1.573782      .42084   -3.74   0.000  -2.39861 -.748952   .019942
   dum13*|  -.1763936      .57128   -0.31   0.757  -1.29608   .94329   .067707
   dum14*|   4.915208       .3457   14.22   0.000   4.23764  5.59277   .038919
   dum15*|   4.120549      .39847   10.34   0.000   3.33956  4.90153   .034738
   dum16*|   .0579487      .24501    0.24   0.813  -.422265  .538163   .021068
   dum17*|   1.953162      .54073    3.61   0.000   .893344  3.01298   .020746
   dum18*|   1.932037      .75424    2.56   0.010   .453748  3.41032   .016886
   dum19*|   5.486064      .73607    7.45   0.000   4.04338  6.92874   .014635
   dum20*|  -3.729512      .24922  -14.97   0.000  -4.21796 -3.24106   .045995
   dum21*|   -3.81596      .23018  -16.58   0.000  -4.26711 -3.36481    .07028
   dum22*|   1.368362      .33204    4.12   0.000   .717583  2.01914   .044066
   dum23*|  -7.283205      .13622  -53.47   0.000   -7.5502 -7.01621   .032486
   dum24*|   4.316297      .21134   20.42   0.000   3.90209  4.73051   .067063
   dum25*|   .0064823      .24933    0.03   0.979  -.482188  .495153    .02541
   dum26*|   1.082805      .19519    5.55   0.000   .700236  1.46537    .02541
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
```

6.1 Tobit Corner Solution - with Tax Morale

```
tobit taxevasion taxmorale, ll vce(robust)

Tobit regression                                  Number of obs   =        536
                                                  F(   1,    535) =       9.07
                                                  Prob > F        =     0.0027
Log pseudolikelihood = -2281.7491                 Pseudo R2       =     0.0017

------------------------------------------------------------------------------
             |               Robust
  taxevasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   taxmorale |  -3.627592   1.204852    -3.01   0.003    -5.994413   -1.260771
       _cons |   49.47079   4.196897    11.79   0.000     41.22637     57.7152
-------------+----------------------------------------------------------------
      /sigma |   31.83661   1.101588                      29.67264    34.00058
------------------------------------------------------------------------------
  Obs. summary:         89  left-censored observations at taxevasion<=0
                       447     uncensored observations
                         0 right-censored observations
```

6.2 Tobit Corner Solution - with Tax Morale and Deterrence

```
tobit  taxevasion taxmorale taxrate audit, ll vce(robust)

Tobit regression                                  Number of obs   =        431
                                                  F(   3,    428) =       7.62
                                                  Prob > F        =     0.0001
Log pseudolikelihood = -1831.0797                 Pseudo R2       =     0.0071

------------------------------------------------------------------------------
             |               Robust
  taxevasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   taxmorale |   -3.39693   1.300137    -2.61   0.009    -5.952378   -.8414814
     taxrate |   3.988205    1.30404     3.06   0.002     1.425085    6.551325
       audit |  -.4916104   .2060812    -2.39   0.017    -.8966677   -.0865532
       _cons |   41.52878   6.003272     6.92   0.000     29.72922    53.32834
-------------+----------------------------------------------------------------
      /sigma |     30.878   1.143219                      28.63098    33.12503
------------------------------------------------------------------------------
  Obs. summary:         69  left-censored observations at taxevasion<=0
                       362     uncensored observations
                         0 right-censored observations
```

6.3 Tobit Corner Solution - Full

```
Tobit taxevasion taxmorale taxrate audit size partn corp yrs fall, ll vce(robust)

Tobit regression                                  Number of obs   =        395
                                                  F(   8,    387) =       7.26
                                                  Prob > F        =     0.0000
Log pseudolikelihood = -1675.7305                 Pseudo R2       =     0.0174

------------------------------------------------------------------------------
             |               Robust
  taxevasion |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   taxmorale |  -4.186252   1.237718    -3.38   0.001    -6.619745   -1.752759
     taxrate |   4.046366   1.255296     3.22   0.001     1.578313    6.514418
       audit |  -.4483375    .171642    -2.61   0.009     -.785805     -.11087
        size |  -.1653065   .1564768    -1.06   0.291    -.4729576    .1423446
       partn |  -10.61013   5.495287    -1.93   0.054    -21.41448    .1942283
        corp |  -42.93088   14.44878    -2.97   0.003     -71.3388   -14.52295
         yrs |  -.5008992   .1905623    -2.63   0.009    -.8755661   -.1262322
        fall |   3.056189   3.371469     0.91   0.365    -3.572499    9.684877
       _cons |   51.45922   6.067794     8.48   0.000     39.52925    63.38919
-------------+----------------------------------------------------------------
      /sigma |   28.89121    1.10619                      26.71631     31.0661
------------------------------------------------------------------------------
  Obs. summary:         57  left-censored observations at taxevasion<=0
                       338     uncensored observations
                         0 right-censored observations

.
```

6.4 Probit – for Tobit Diagnostics

```
probit  dummyte taxmorale taxrate audit size partn corp yrs fall, vce(robust)


Iteration 0:   log pseudolikelihood = -163.01644
Iteration 1:   log pseudolikelihood = -135.20379
Iteration 2:   log pseudolikelihood =  -134.3286
Iteration 3:   log pseudolikelihood = -134.32562
Iteration 4:   log pseudolikelihood = -134.32562

Probit regression                                 Number of obs   =        395
                                                  Wald chi2(8)    =      48.90
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -134.32562                 Pseudo R2       =     0.1760

------------------------------------------------------------------------------
             |               Robust
     dummyte |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   taxmorale |  -.1488821   .0829345    -1.80   0.073    -.3114306    .0136664
     taxrate |   .3652953   .0865835     4.22   0.000     .1955948    .5349958
       audit |  -.0140819   .0062091    -2.27   0.023    -.0262516   -.0019123
        size |  -.0099937   .0062551    -1.60   0.110    -.0222534     .002266
       partn |  -.4279767   .3153213    -1.36   0.175    -1.045995    .1900418
        corp |  -1.895707   .5304877    -3.57   0.000    -2.935443   -.8559697
         yrs |  -.0144349   .0077561    -1.86   0.063    -.0296366    .0007668
        fall |  -.0839415   .1916016    -0.44   0.661    -.4594738    .2915907
       _cons |   1.265542   .3626057     3.49   0.000     .5548474    1.976236
------------------------------------------------------------------------------

.
```

6.5 Tobit Conditional Marginal Effects

```
mfx compute, predict(e(0,.))

Marginal effects after tobit
      y  = E(taxevasion|taxevasion>0) (predict, e(0,.))
         =  43.262559
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
taxmor~e |  -3.015739      .89338   -3.38   0.001  -4.76673 -1.26475    3.3038
 taxrate |   2.914966      .88884    3.28   0.001   1.17286  4.65707   2.32658
   audit |  -.3229784      .12346   -2.62   0.009  -.564959 -.080998   4.89114
    size |  -.1190854      .11241   -1.06   0.289  -.339407  .101236    5.5519
   partn*|  -7.146348     3.44772   -2.07   0.038  -13.9038 -.388942   .060759
    corp*|  -22.38612     4.97173   -4.50   0.000  -32.1305 -12.6417   .025316
     yrs |  -.3608434      .13811   -2.61   0.009  -.631538 -.090148   10.3494
    fall*|   2.221822     2.48215    0.90   0.371   -2.6431  7.08674   .278481
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
```

6.6 Tobit Unconditional Marginal Effects

```
mfx compute, predict(ystar(0,.))

Marginal effects after tobit
      y  = E(taxevasion*|taxevasion>0) (predict, ystar(0,.))
         =  39.153531
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
taxmor~e |  -3.788646      1.1195   -3.38   0.001  -5.98282 -1.59447    3.3038
 taxrate |   3.662046     1.12534    3.25   0.001   1.45642  5.86767   2.32658
   audit |  -.4057549      .15509   -2.62   0.009  -.709721 -.101789   4.89114
    size |  -.1496059      .14141   -1.06   0.290   -.42676  .127548    5.5519
   partn*|  -9.267693     4.60483   -2.01   0.044   -18.293   -.2424   .060759
    corp*|  -30.49375      6.5846   -4.63   0.000  -43.3993 -17.5882   .025316
     yrs |  -.4533243       .1728   -2.62   0.009  -.792009  -.11464   10.3494
    fall*|   2.777522     3.08127    0.90   0.367  -3.26165  8.81669   .278481
------------------------------------------------------------------------------
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
```

6.7 Ordered Probit

```
oprobit taxmorale gov  legalenv corravrg  compcosts sec terciary ownergender ownerage
memberofasc, vce(robust)

Iteration 0:   log pseudolikelihood = -304.60513
Iteration 1:   log pseudolikelihood = -281.93351
Iteration 2:   log pseudolikelihood = -281.75639
Iteration 3:   log pseudolikelihood =  -281.7563
Iteration 4:   log pseudolikelihood =  -281.7563

Ordered probit regression                         Number of obs   =        340
                                                  Wald chi2(9)    =      34.11
                                                  Prob > chi2     =     0.0001
Log pseudolikelihood =  -281.7563                 Pseudo R2       =     0.0750

------------------------------------------------------------------------------
             |               Robust
   taxmorale |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.2661231   .0732138    -3.63   0.000    -.4096195   -.1226267
    legalenv |   .1071464   .0611989     1.75   0.080    -.0128011     .227094
    corravrg |    .255984   .0773329     3.31   0.001     .1044144    .4075537
   compcosts |  -.1551281   .0488427    -3.18   0.001    -.2508581   -.0593981
         sec |  -.4066541   .2505181    -1.62   0.105    -.8976605    .0843524
    terciary |  -.5098887   .2762344    -1.85   0.065    -1.051298    .0315208
 ownergender |  -.1735304   .2351472    -0.74   0.461    -.6344105    .2873496
    ownerage |   .0007856   .0069179     0.11   0.910    -.0127733    .0143445
 memberofasc |   .2374481   .2516517     0.94   0.345    -.2557801    .7306764
-------------+----------------------------------------------------------------
       /cut1 |  -1.804593   .5804915                     -2.942335   -.6668507
       /cut2 |  -1.492886   .5811834                     -2.631985   -.3537876
       /cut3 |  -1.114378   .5794638                     -2.250107    .0213499
------------------------------------------------------------------------------
```

6.8 Probit

```
probit    dummytm gov  legalenv corravrg  compcosts sec terciary ownergender ownerage
memberofasc, vce(robust)

Iteration 0:   log pseudolikelihood = -202.35504
Iteration 1:   log pseudolikelihood = -185.48838
Iteration 2:   log pseudolikelihood = -185.39604
Iteration 3:   log pseudolikelihood = -185.39604

Probit regression                                 Number of obs   =        340
                                                  Wald chi2(9)    =      27.19
                                                  Prob > chi2     =     0.0013
Log pseudolikelihood = -185.39604                 Pseudo R2       =     0.0838

------------------------------------------------------------------------------
             |               Robust
     dummytm |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |   -.248365   .0734376    -3.38   0.001       -.3923   -.1044299
    legalenv |   .1207974   .0658579     1.83   0.067    -.0082817    .2498764
    corravrg |   .1811721   .0735363     2.46   0.014     .0370436    .3253006
   compcosts |  -.1333491   .0499063    -2.67   0.008    -.2311637   -.0355346
         sec |  -.4597072   .2470935    -1.86   0.063    -.9440016    .0245872
    terciary |  -.5792637    .272149    -2.13   0.033    -1.112666   -.0458615
 ownergender |  -.1625768   .2565745    -0.63   0.526    -.6654535    .3402999
    ownerage |   .0006794   .0072586     0.09   0.925    -.0135472     .014906
 memberofasc |    .257301   .2596702     0.99   0.322    -.2516432    .7662452
       _cons |   1.274203   .6282801     2.03   0.043     .0427967     2.50561
------------------------------------------------------------------------------
```

6.9 Linktest

```
linktest

Iteration 0:   log likelihood = -202.35504
Iteration 1:   log likelihood = -184.82398
Iteration 2:   log likelihood =  -184.7387
Iteration 3:   log likelihood = -184.73866
Iteration 4:   log likelihood = -184.73866

Probit regression                                 Number of obs   =        340
                                                  LR chi2(2)      =      35.23
                                                  Prob > chi2     =     0.0000
Log likelihood = -184.73866                       Pseudo R2       =     0.0871

------------------------------------------------------------------------------
     dummytm |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        _hat |   1.328208   .3391164     3.92   0.000     .6635516    1.992864
      _hatsq |  -.3000729   .2603679    -1.15   0.249    -.8103847    .2102388
       _cons |  -.0360276   .1288077    -0.28   0.780     -.288486    .2164309
------------------------------------------------------------------------------
```

6.10 Likelihood Ratio Test

```
lrdrop1

Likelihood Ratio Tests: drop 1 term
probit regression
number of obs = 340
------------------------------------------------------------------------
 dummytm     Df      Chi2      P>Chi2    -2*log ll   Res. Df   AIC
------------------------------------------------------------------------
Original Model                            370.79      330      390.79
-gov           1     11.44      0.0007    382.23      329      400.23
-legalenv      1      3.17      0.0749    373.96      329      391.96
-corravrg      1      6.35      0.0118    377.14      329      395.14
-compcosts     1      9.40      0.0022    380.20      329      398.20
-sec           1      3.26      0.0709    374.06      329      392.06
-terciary      1      4.21      0.0402    375.00      329      393.00
-ownergender   1      0.38      0.5355    371.18      329      389.18
-ownerage      1      0.01      0.9236    370.80      329      388.80
-memberofasc   1      1.14      0.2851    371.93      329      389.93
------------------------------------------------------------------------
Terms dropped one at a time in turn.
```

6.11 Hosmer and Lemeshow's Goodness of Fit Test

```
estat gof

Probit model for dummytm, goodness-of-fit test

       number of observations =       340
 number of covariate patterns =       331
            Pearson chi2(321) =       351.03
                  Prob > chi2 =         0.1197
```

6.12 Hosmer and Lemeshow's Grouped

```
estat gof, group(10)


Probit model for dummytm, goodness-of-fit test

  (Table collapsed on quantiles of estimated probabilities)

       number of observations =       340
             number of groups =        10
      Hosmer-Lemeshow chi2(8) =         7.31
                  Prob > chi2 =         0.5034
```

6.13 Classification Test

```
estat classification

Probit model for dummytm

              -------- True --------
Classified |         D            ~D  |      Total
-----------+--------------------------+-----------
     +     |       236            77  |        313
     -     |         8            19  |         27
-----------+--------------------------+-----------
   Total   |       244            96  |        340

Classified + if predicted Pr(D) >= .5
True D defined as dummytm != 0
--------------------------------------------------
Sensitivity                     Pr( +| D)   96.72%
Specificity                     Pr( -|~D)   19.79%
Positive predictive value       Pr( D| +)   75.40%
Negative predictive value       Pr(~D| -)   70.37%
--------------------------------------------------
False + rate for true ~D        Pr( +|~D)   80.21%
False - rate for true D         Pr( -| D)    3.28%
False + rate for classified +   Pr(~D| +)   24.60%
False - rate for classified -   Pr( D| -)   29.63%
--------------------------------------------------
Correctly classified                        75.00%
--------------------------------------------------

.
```

6.14 Probit Average Marginal Effects (AME)

```
margins, dydx(*)

Average marginal effects                          Number of obs     =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage
               memberofasc

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0768738   .0215463    -3.57   0.000    -.1191038   -.0346438
    legalenv |   .0373891   .0201059     1.86   0.063    -.0020177     .076796
    corravrg |   .0560763   .0218443     2.57   0.010     .0132622    .0988904
   compcosts |  -.0412742   .0147572    -2.80   0.005    -.0701978   -.0123506
         sec |  -.1422884   .0761365    -1.87   0.062    -.2915131    .0069364
    terciary |  -.1792934   .0830369    -2.16   0.031    -.3420428   -.0165441
 ownergender |  -.0503207    .079475    -0.63   0.527    -.2060888    .1054474
    ownerage |   .0002103   .0022471     0.09   0.925    -.0041939    .0046144
 memberofasc |   .0796397   .0796293     1.00   0.317    -.0764309    .2357102
------------------------------------------------------------------------------

.
```

6.15 Probit Marginal Effects at Mean (MEM)

```
margins, dydx(*) atmean



Conditional marginal effects                      Number of obs    =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage
               memberofasc
at           : gov             =    2.482353 (mean)
               legalenv        =    3.382353 (mean)
               corravrg        =    4.288235 (mean)
               compcosts       =    5.282353 (mean)
               sec             =    .6294118 (mean)
               terciary        =    .2441176 (mean)
               ownergender     =    .8941176 (mean)
               ownerage        =    41.02941 (mean)
               memberofasc     =    .1382353 (mean)

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |   -.081448   .0239641    -3.40   0.001    -.1284168   -.0344793
    legalenv |   .0396139   .0215703     1.84   0.066    -.0026632     .081891
    corravrg |    .059413   .0239084     2.49   0.013     .0125534    .1062727
   compcosts |  -.0437301   .0161583    -2.71   0.007    -.0753998   -.0120604
         sec |  -.1507549   .0811593    -1.86   0.063    -.3098243    .0083144
    terciary |  -.1899619   .0889743    -2.14   0.033    -.3643484   -.0155755
 ownergender |  -.0533149   .0842005    -0.63   0.527    -.2183448    .1117149
    ownerage |   .0002228   .0023806     0.09   0.925    -.0044431    .0048887
 memberofasc |   .0843785   .0846986     1.00   0.319    -.0816278    .2503847
------------------------------------------------------------------------------

.
```

6.16 Logit Average Marginal Effects (AME)

```
Average marginal effects                          Number of obs   =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage
               memberofasc

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0770067    .021179    -3.64   0.000    -.1185167   -.0354966
    legalenv |   .0376953   .0200731     1.88   0.060    -.0016473    .0770378
    corravrg |   .0589708   .0213465     2.76   0.006     .0171324    .1008092
   compcosts |  -.0441519   .0155422    -2.84   0.005     -.074614   -.0136899
         sec |  -.1343246   .0786508    -1.71   0.088    -.2884775    .0198282
    terciary |  -.1790365   .0848726    -2.11   0.035    -.3453837   -.0126892
 ownergender |  -.0430654   .0818245    -0.53   0.599    -.2034384    .1173076
    ownerage |   .0000784   .0023045     0.03   0.973    -.0044383    .0045951
 memberofasc |   .0974975   .0852489     1.14   0.253    -.0695872    .2645822
------------------------------------------------------------------------------

.
```

6.17 OLS

```
regress  dummytm gov  legalenv corravrg  compcosts sec terciary ownergender ownerage
memberofasc, vce(robust)



Linear regression                                      Number of obs =     340
                                                       F(  9,   330) =    3.88
                                                       Prob > F      =  0.0001
                                                       R-squared     =  0.0982
                                                       Root MSE      =   .4339

------------------------------------------------------------------------------
             |               Robust
     dummytm |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0818317   .0237036    -3.45   0.001    -.1284609   -.0352026
    legalenv |   .0378377   .0209086     1.81   0.071    -.0032934    .0789687
    corravrg |   .0649852   .0248572     2.61   0.009     .0160867    .1138837
   compcosts |  -.0435682   .0145347    -3.00   0.003    -.0721606   -.0149757
         sec |   -.125464   .0627588    -2.00   0.046    -.2489218   -.0020062
    terciary |  -.1633283   .0718796    -2.27   0.024    -.3047284   -.0219283
 ownergender |  -.0402784   .0693848    -0.58   0.562    -.1767708    .0962139
    ownerage |   1.41e-07   .0023158     0.00   1.000    -.0045554    .0045557
 memberofasc |   .0747493   .0682363     1.10   0.274    -.0594838    .2089823
       _cons |   .8887874   .1979724     4.49   0.000     .4993403    1.278234
------------------------------------------------------------------------------

.
```

6.18 Secondary=1

```
margins, dydx(*) at(  sec=1 terciary=0)

Average marginal effects                          Number of obs   =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage memberofasc
at           : sec             =           1
               terciary        =           0

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0785539   .0218636    -3.59   0.000    -.1214057    -.035702
    legalenv |   .0382063   .0204814     1.87   0.062    -.0019365     .078349
    corravrg |   .0573018    .022217     2.58   0.010     .0137573    .1008464
   compcosts |  -.0421762   .0150257    -2.81   0.005     -.071626   -.0127263
         sec |   -.145398   .0817862    -1.78   0.075    -.3056959    .0148999
    terciary |  -.1832118   .0861549    -2.13   0.033    -.3520723   -.0143513
 ownergender |  -.0514204   .0812445    -0.63   0.527    -.2106568    .1078159
    ownerage |   .0002149   .0022958     0.09   0.925    -.0042849    .0047147
 memberofasc |   .0813802   .0806223     1.01   0.313    -.0766367     .239397
------------------------------------------------------------------------------

.
```

6.19 Tertiary=1

```
margins, dydx(*) at(  sec=0 terciary=1)

Average marginal effects                          Number of obs   =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage
               memberofasc
at           : sec             =           0
               terciary        =           1

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0830399   .0241382    -3.44   0.001      -.13035   -.0357299
    legalenv |   .0403882   .0218692     1.85   0.065    -.0024747     .083251
    corravrg |   .0605742   .0239604     2.53   0.011     .0136127    .1075358
   compcosts |  -.0445848   .0163082    -2.73   0.006    -.0765483   -.0126213
         sec |  -.1537014   .0834165    -1.84   0.065    -.3171949     .009792
    terciary |  -.1936747   .0976897    -1.98   0.047     -.385143   -.0022065
 ownergender |   -.054357    .085723    -0.63   0.526    -.2223711    .1136571
    ownerage |   .0002272   .0024275     0.09   0.925    -.0045307     .004985
 memberofasc |   .0860277   .0868984     0.99   0.322      -.08429    .2563453
------------------------------------------------------------------------------

.
```

6.20 Gender=1

```
margins, dydx(*) at( ownergender=1)

Average marginal effects                          Number of obs   =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage
               memberofasc
at           : ownergender     =           1

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0777579   .0216008    -3.60   0.000    -.1200946   -.0354212
    legalenv |   .0378192   .0203235     1.86   0.063    -.0020141    .0776524
    corravrg |   .0567212   .0219461     2.58   0.010     .0137076    .0997348
   compcosts |  -.0417488   .0148591    -2.81   0.005    -.0708722   -.0126255
         sec |  -.1439248   .0769213    -1.87   0.061    -.2946877    .0068382
    terciary |  -.1813554    .083824    -2.16   0.031    -.3456475   -.0170634
 ownergender |  -.0508994   .0813251    -0.63   0.531    -.2102937    .1084949
    ownerage |   .0002127   .0022729     0.09   0.925    -.0042421    .0046675
 memberofasc |   .0805556   .0806304     1.00   0.318    -.0774771    .2385883
------------------------------------------------------------------------------
```

6.21 Member=1

```
margins, dydx(*) at( memberofasc=1)

Average marginal effects                          Number of obs   =        340
Model VCE    : Robust

Expression   : Pr(dummytm), predict()
dy/dx w.r.t. : gov legalenv corravrg compcosts sec terciary ownergender ownerage
               memberofasc
at           : memberofasc     =           1

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         gov |  -.0670503   .0222291    -3.02   0.003    -.1106185   -.0234821
    legalenv |   .0326113    .018516     1.76   0.078    -.0036794    .0689019
    corravrg |   .0489105   .0206788     2.37   0.018     .0083807    .0894402
   compcosts |  -.0359998   .0139333    -2.58   0.010    -.0633086   -.0086911
         sec |  -.1241057   .0729042    -1.70   0.089    -.2669952    .0187839
   terciary |   -.156382   .0770706    -2.03   0.042    -.3074375   -.0053264
 ownergender |  -.0438903   .0693964    -0.63   0.527    -.1799047    .0921241
    ownerage |   .0001834   .0019663     0.09   0.926    -.0036704    .0040372
 memberofasc |   .0694627   .0583976     1.19   0.234    -.0449945      .18392
------------------------------------------------------------------------------
```

6.22 QUESTIONNAIRE

QUESTIONNAIRE

No of questionnaire	Date of the survey	Duration of the survey
__________________	_____/______/2012	__________ minutes
Name of enumerator _____________________	**Optional comments from enumerator**	

FOR RIINVEST ONLY		
Logical Control YES NO	Name of Controller __________________	Name of Processor __________________

Dear Entrepreneurs,

Institute for Development Research RIINVEST is implementing a project with an aim to understand better several of the characteristics related to business environment in Kosovo**;** most importantly few issues related to **tax evasion**. These data will later serve to draw conclusions and policy recommendations that will promote a better and more sustainable business environment. Through thus survey, we aim to interview 600 Small and Medium Sized Enterprises in Kosovo, amongst which, your company has been randomly selected.

We truly hope to find your understanding in answering positively to our request. Your valuable time dedicated to this questionnaire will enable us to obtain more credible results and hence provide better policy recommendations. We want to ensure you that this questionnaire will remain anonymous to the public, so your name or the name of your company will not, in any case and in any circumstance, be presented to public or any other disclosed party. Your answers, once stored and grouped with other answers, will be treated anonymously only for the purpose this study.

Riinvest Institute and its long and credible background ensures for you and your company the highest standards in survey implementation and interpretation.

We thank you in advance!
RIINVEST INSTITUTE
Prishtina, 2012

SECTION A: GENERAL INFORMATION

I would like to start this survey by asking some general questions about your business.

Q.1	**NAME OF ENTERPRISE**	____________________
Q.2	**LOCATION**	____________________
Q.3	**MUNICIPALITY**	____________________

Q.4	**What is your job title? Please note that even if you have more than one job title we are interested in the title/responsibilities that you regard as the most important**		
1	Chief Executive/Manager/President/Vice President		☐
2	Owner/proprietor		☐
3	Partner		☐
4	Owner and Manager		☐
5	None of the above	**THANK AND TERMINATE**	☐

Q.5	**What is the legal status of your business? ONLY ONE ANSWER**	
1	Single Proprietorship	☐
2	Partnership	☐
3	Corporation	☐
4	Other (Specify) …………………………	☐

Q.6	**How many full-time employees work for this company today, including the owner?**	
1	None – 1	☐
2	____________________	☐
3	10000 - more	☐

Q.7	**What year was your firm established? WRITE YEAR**
1	☐ ☐ ☐ ☐

Q.8	**Can you tell me the following information about you:**	Gender		Age	Education		
		M	**F**		Primary	Sec	Tertiary
1	Owner / Top Manager	☐	☐		☐	☐	☐

Q.9	Can you tell me, over the past 12 months your sales have:	
1	Increased	☐
2	Decreased	☐
3	Remained same	☐

Q.10	What percentage of your sales comes from the following sectors in which your establishment operates?				
1	Agriculture, forestry and fishing	___%	12	Real estate activities	___%
2	Mining and quarrying	___%	13	Professional, scientific and technical activities	___%
3	Manufacturing	___%	14	Administrative and support service activities	___%
4	Electricity, gas, steam and air condition supply	___%	15	Public administration and defence; compulsory social security	___%
5	Water supply, sewerage, waste management and remediation activities	___%	16	Education	___%
6	Construction	___%	17	Human health and social work activities	___%
7	Wholesale and retail trade; repair of motor vehicles and motorcycles	___%	18	Arts, entertainment and recreation	___%
8	Transportation and storage	___%	19	Other service activities	___%
9	Accommodation and food service activities	___%	20	Activities of household as employers	___%
10	Information and Communication	___%	21	Activities of extraterritorial organizations and bodies	___%
11	Financial and insurance activities	___%			

Q.11	Is your firm a member of any business Association or Chamber?				
1	YES	☐	2	NO (move to Q.14)	☐

Q.12	Is YES which one?				
1	Kosovo Chamber of Commerce	☐	3	American Chamber of Commerce	☐
2	Alliance of Kosovan Businesses	☐	4	Other (Specify) …………………………	☐

Q.13	If YES					
		Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
1	On what scale are you satisfied with business	**1**	**2**	**3**	**4**	**5**

SECTION B: UNFAIR COMPETITION AND UNOFFICIAL PAYMENTS

We are interested in your opinions in a personal capacity. We do not imply in any way that your company evades nor makes unofficial payments/gifts. We recognize that your company neither approves of nor condones tax evasion nor the use of unofficial payments/gifts. The responses that you give will be aggregated and presented in purely statistical terms; any comments you give me cannot be attributed to either you or your company

Q.14	Thinking about officials, would you say it is common for a business similar to yours to pay "bribes/gift" for:					
		Always	Often	Neutral	Rarely	Never
1	To get connected to and maintain public services	**1**	**2**	**3**	**4**	**5**
2	To obtain business licenses and permits	**1**	**2**	**3**	**4**	**5**
3	To obtain government contracts	**1**	**2**	**3**	**4**	**5**
4	To evade taxes	**1**	**2**	**3**	**4**	**5**
5	To avoid customs	**1**	**2**	**3**	**4**	**5**

Q.15	Recognizing the difficulties that many firms face in fully complying with taxes and regulations, what percentage of total annual sales would you estimate the typical firm in your area of business reports for tax purposes?
1	☐☐☐ %

Q.16	Please tell me, over the past 12 months how many times your business was inspected or was asked to meet with tax/custom officials/administration?
1	___ times

Q.17	**Please tell me whether you think that cheating on taxes if you have a chance is:**	
1	Completely Justified	☐
2	Partly Justified	☐
3	Partly Unjustified	☐
4	Completely Unjustified	☐

Q.18	**Can you tell me, how do you consider tax rates applicable to your business:**	
1	Very Low	☐
2	Low	☐
3	Moderate	☐

Q.19	Please tell me, how much do you trust the government?	
1	Always	☐
2	Often	☐
3	Neutral	☐
4	Rarely	☐
5	Never	☐

Q.20	To what degree do you agree with this statement: "*I am confident that the legal system will uphold my contract property rights in business disputes*"	
1	Strongly Disagree	☐
2	Disagree	☐
3	Neutral	☐
4	Agree	☐
5	Strongly Agree	☐

Q.21	How many days of senior management's time within a week is spent in dealing with public officials about the application and interpretation of laws and regulations, and to get or to maintain access to public services?
1	___ days

THANK AND TERMINATE