CORRUPTION, THE UNOFFICIAL ECONOMY AND THE
PROVISION OF PUBLIC GOODS IN TRANSITION COUNTRIES

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Graduate Studies and Research
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For more than a decade, the countries of Central and Eastern Europe and the former Soviet Union have been trying to transform their centrally planned economy to a market economy. For some of these countries the considerably large unofficial economy has become a serious obstacle for their economic growth and public finances. The purpose of this dissertation is to examine how corruption affects the unofficial economy in transition countries with a particular focus on the unofficial economy that results from tax noncompliance. More specifically, the study examines tax cheating as it relates to corruption in tax administration, to the business culture in the economy and to the policy making process of tax regulation.

The research is conducted along three lines. First, the thesis examines the nature and the extent of corruption in Albania with a particular focus on the informal sector and corruption in customs and tax administration. Second, the thesis develops a number of theoretical models to examine some of the issues raised in the analysis of Albania. The theoretical models examine the feedback effects of decisions of different agents in the economy and the implications of these decisions for the provision of public goods. More specifically, thesis examines the feedback effects between the decision of tax inspectors to engage in corruption and firms’ cheating activities; the firms’ tax compliance as tax cheating and corruption become more acceptable practices when they are widespread; how government affects the degree of cheating and corruption through auditing; and how corruption affects the policymakers’ decision to allocate the revenue obtained from tax collection between public education and infrastructure. Third, the thesis explores whether the results of government revenue allocation between education and infrastructure are applicable in the Albanian case.

Results from the theoretical models show that widespread bureaucratic corruption among tax inspectors can perpetuate an unofficial economy that in turn sustains corrupt practices. In this situation, tax cheating may not be deterred only by increasing the likelihood of detection or by increasing the severity of punishment. To be successful this approach needs to be associated by measures that increase the transaction/moral costs of cheating and corruption. As cheating and corruption becomes more acceptable practices, there is a sort of a multiplier effect in the economy that gives rise to Pareto-ranked multiple equilibria. In an economy with a widespread tolerance of corrupt tax enforcers, tax noncompliance and a low enforcement of penalties, the Pareto inferior (large unofficial economy and an under provision of public goods) stable equilibrium can prevail. Changes that will move an economy from an inferior equilibrium to a superior equilibrium have a strong political dimension and are complex.

Results from modeling how policy makers affect the unofficial economy show that with costly auditing, only if a government views illicit activities as a “public bad” and is willing to eliminate these activities at any cost, will it choose to perform very intense auditing. The government’s allocation of revenues between education and infrastructure depend on the returns generated by these public goods in the economy and on the private benefits from corruption. A government will allocate funds to education only if education generates relatively higher returns and the government favours at the margin the provision of public
goods relative to private benefits from corruption. If at the margin government favours the private benefits from corruption and cheating, then all revenues are allocated to infrastructure even though education generates higher relative returns in the economy. When infrastructure generates higher social returns in the economy, the government commits revenues to infrastructure either to provide the most beneficial public good or to facilitate opportunities for corruption benefits. These results could apply to the Albanian case. Overall, the research support the notion that illicit activities (cheating, political and bureaucratic corruption) can sustain each another regardless which actors in the economy (firms, enforcers, and politicians) undertake them.
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ABSTRACT

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For more than a decade, the countries of Central and Eastern Europe and the former Soviet Union have been attempting to transform their centrally planned economies into market economies. In some of these countries, a considerably large unofficial economy has become a serious obstacle to economic growth and public finances. Studies by Johnson et al. (1997), Johnson et al. (1998), and Johnson et al. (2000) show that transition countries with large unofficial economies tend to have excessive regulations, high levels of taxation and high incidence of corruption. As well, bureaucratic corruption in tax and customs administrations appears to be an important element in defining the underground economy in some transition countries.

Given the potential impact of the unofficial economy on public finances and the provision of public goods, the purpose of this dissertation is to examine how corruption affects the unofficial economy in transition countries, with a particular focus on the unofficial economy that results from tax non-compliance. More specifically, the study examines tax cheating as it relates to corruption in tax administration, to the business culture in the economy and to the tax-regulation policy-making process. The thesis looks at the feedback effects of decisions of different agents in the economy, and the implications of these decisions for the provision of public goods.

The research is conducted along two lines. First, the thesis examines the nature and the extent of corruption in Albania, focusing particularly on the informal sector and corruption in customs and tax administrations. The thesis also examines the implications of the informal economy on the tax revenues available for the provision of public goods. Then the thesis examines the pattern of government spending in public
education and transport infrastructure in Albania to reveal the priorities that these sectors are being given during the transition period. Second, the thesis develops a number of theoretical models to examine some of the issues raised in the analysis of Albania. The theoretical models provide a framework to examine the incentives for different agents in the economy to engage in tax cheating and corruption. More specifically, this section of the thesis examines: the feedback effects between the decision of tax inspectors to engage in corruption and firms’ cheating activities, the firms’ tax compliance as tax cheating and corruption are more accepted practices when they become increasingly widespread; how government affects the degree of cheating and corruption through auditing; and how corruption affects policy-makers’ decisions to allocate the revenue obtained from tax collection between public education and infrastructure.

Results from the theoretical models show that widespread bureaucratic corruption among tax inspectors can perpetuate an unofficial economy that in turn sustains these and other corrupt practices. In such situations, intense auditing and penalties serve as cheating deterrents only if cheating and engaging in corruption is very costly for both firms and tax inspectors. When cheating becomes cheaper as the size of the unofficial economy grows, a multiplier effect in the economy gives rise to Pareto-ranked multiple equilibria. In an economy with a widespread tolerance of corrupt tax enforcers, tax non-compliance and a low enforcement of penalties, the Pareto inferior (large unofficial economy and an under-provision of public goods) stable equilibrium can prevail. Changes that will move an economy from an inferior equilibrium to a superior equilibrium have a strong political dimension and are complex.

Modeling the ways in which policy-makers affect the unofficial economy indicates that, due to the high cost of auditing, the government must allow for some cheating and corruption in order to maximize the revenues available for the provision of public goods. Only if a government views illicit activities as a “public bad,” and is willing to eliminate these activities at any cost, will it choose to perform very intense auditing. The government’s decision to allocate revenues between education and infrastructure
depends on the returns generated by these public goods in the economy and on the private benefits from corruption. A government will allocate funds to education only if education generates relatively higher returns, and if the government favours at the margin the provision of public goods relative to private benefits from corruption. If at the margin government favours the private benefits from corruption and cheating, then all revenues are allocated to infrastructure even though education generates higher relative returns in the economy. When infrastructure generates higher social returns in the economy, the government commits revenues to infrastructure either to provide the most beneficial public good, or to facilitate opportunities for corruption benefits. Overall, the thesis shows that illicit activities (cheating, and political and bureaucratic corruption) can sustain each another regardless which actors in the economy (firms, enforcers, and politicians) undertake them.
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CHAPTER I
INTRODUCTION

1.1 BACKGROUND AND PROBLEM STATEMENT

For more than a decade, the countries of Central and Eastern Europe and the former Soviet Union have been attempting to transform their political economies. The complexity of this transformation has manifested itself in different outcomes across these countries. Central and Southeastern Europe\(^1\) and the Baltic countries have been more successful in engineering economic growth and in controlling inequality and poverty than have the Commonwealth of Independent States (CIS). There is also a division in the development of the political landscape. The Central European countries and Baltic States have established a more competitive democratic process than have the CIS and Southeastern Europe (The World Bank, 2002a).

It is not surprising then that this separation is also manifested in other indicators that affect economic growth, such as the unofficial economy.\(^2\) Schneider (2002) shows that the shadow economy varies considerably among transition countries.\(^3\) Some transition CIS countries are estimated to have a significantly large unofficial economy, such as Georgia (67.3% of GNP), Azerbaijan (60.6% of GNP) and Ukraine (52.2% of GNP). Other transition countries are estimated to have a much smaller informal sector, such as

\(^1\) The Southeastern European countries include Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Slovenia, Serbia and Montenegro.
\(^2\) In the literature, the “unofficial economy” is called interchangeably the “hidden economy,” “shadow economy,” “informal sector,” “underground economy,” and “cash sector.” Although it is hard to define the unofficial economy precisely, there is a consensus that it refers to “the unreported incomes received from production of legal goods and services... that... would be taxable were they reported to the state authorities” (Schneider, 2002, p. 4). Other definitions also consider illegal activities, such as smuggling, drug dealing, and prostitution, as part of the unofficial economy (Schneider, 2002).
\(^3\) Schneider measures the unofficial economy in terms of value added of legal activities. He estimates that on average in 1999 and 2000, 38 per cent of GNP in 23 transition countries was produced in the shadow economy.
the Slovak Republic (18.9% of GNP) and the Czech Republic (19.1% of GNP).
Johnston et al. (1997) argue that a large unofficial economy imposes a serious burden to
public finances and, as a result, negatively affects the provision and the quality of public
goods.

Johnston et al. (1997), Johnson et al. (1998), and Johnson et al. (2000) show that the
greater the extent of the unofficial economy in transition countries, the more excessive
the regulations, the higher the taxation and the greater the corruption. Nevertheless, the
typology and the extent of corruption in transition countries vary considerably (The
Perception Indexes (CPIs) for selected transition countries indicate this variability.4
Corruption incidence is perceived to be high in some transition countries such as
Azerbaijan (2002 CPI = 2.0; 2003 CPI = 1.8), Ukraine (2002 CPI = 2.4; 2003 CPI =
2.3), Georgia (2002 CPI = 2.4; 2003 CPI = 1.8), Moldova (2002 CPI = 2.1; 2003 CPI =
2.4), and Albania (2002/2003 CPI = 2.5), and more moderate in others such as Slovenia
(2002 CPI = 6.0; 2003 CPI = 5.9), Estonia (2002 CPI = 5.6; 2003 CPI = 5.5) and
Hungary (2002 CPI = 4.9; 2003 CPI = 4.8).

Although studies from Johnson et al. identify a strong association between corruption
and the unofficial economy, they do not elaborate on what type of corruption has the
largest effect on the unofficial economy, or through which mechanisms. It is important
to recognize how specific corruption activities shape the incentives to operate
underground.

For instance, bureaucratic corruption in tax and customs administration appears to be an
important element in defining the underground economy. In some transition countries, it
is a common practice for firms to pay bribes to customs officers in exchange for
avoiding payment of customs duties, as well as to tax inspectors to avoid paying taxes

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4 In 2002, the average CPI for 19 transition countries was 3.4, while the average value for the nine most
corrupt countries was 2.4 (Transparency International, 2002). (Note: Values of CPI close to 10 indicate a
highly clean country, while values close to zero indicate a highly corrupt country.) In 2003, the average
CPI for 26 transition countries was 3.2, while the average for the fourteen most corrupt countries was 2.3
and penalties for tax evasion. A survey in seven transition counties in the Balkans ranks the customs offices and tax inspectorates as the most corrupt state institutions. On average in these countries, 69.6 per cent of customs officers and 63.9 per cent of tax inspectors were believed to be corrupt in 2002 (SELDI, 2002).

The widespread corruption in customs offices and tax inspectorates has promoted smuggling and tax evasion, and hence has facilitated firms’ operation in the unofficial economy. Therefore, there is an indication that the size of the unofficial economy in transition countries is related not only to the burden of tax and other regulations, but also to the effectiveness of enforcing tax regulations. Given this relationship, it is important to explore how corruption in tax enforcement affects and is affected by the unofficial economy. How can we explain the persistence of a large unofficial economy in certain transition countries? What impact do governments have on the unofficial economy? How does corruption affect the provision of public goods? This study tries to answer these questions.

1.2 Objectives of the Study
Given the importance of the unofficial economy for public finances and the provision of public goods, the overall objective of this study is to examine how corruption affects the unofficial economy in transition countries. Recognizing that the unofficial economy takes many forms, each of which has its specific causes and implications, the focus of this study is on tax cheating and the unofficial economy that results from this cheating. More specifically, the study examines tax compliance as it relates to corruption in tax administration, to the business culture in the economy, and to the tax-regulation policy-making process. The study looks at how policy-makers, corrupt tax enforcers, and firms make decisions regarding tax cheating and corruption, and the feedback effects of these decisions on other players and on the provision of public goods.
1.3 Methodology

To achieve the above objective, this thesis uses two different approaches. First, the thesis examines the nature and the extent of corruption in Albania, using existing literature and the results of various surveys. Albania represents an interesting case since it is perceived to be one of the most corrupt among the transition countries, and it has a considerable informal sector. In particular, we focus on analyzing corruption in the tax and customs administrations, since these public sectors are characterized by a high incidence of corruption in Albania, and their performance determines the tax revenues available for the provision of public goods in that country. The thesis also examines government spending in public education and transport infrastructure in Albania during the period 1997 to 2001. This examination attempts to identify whether corruption has affected the allocation of resources to these two activities.

Second, since corruption and the unofficial economy are shown to be prevalent in Albania and the majority of other transition economies, the thesis then examines the incentives at work in tax cheating and corruption by developing a number of theoretical models. Specifically, these models examine the decisions that are made by agents in the economy such as firms, bureaucrats (tax inspectors) and policy-makers, which are crucial to the generation of an unofficial economy and the provision of public goods. The analysis in this thesis illustrates the interdependence that exists among the decisions of these three agents. Although it would provide a more comprehensive perspective to build a model that examines all the interactions among these agents, this is not a feasible task. Instead, insights regarding agents’ behaviours are obtained by focusing on one relationship at a time.

Firms’ decisions regarding tax compliance are critical to the size of the unofficial economy. The thesis starts by examining such decisions by firms. The firms’ problem, whether to comply with tax payment or not, is visited from three different angles. These
three angles differ with respect to the interactions that firms have with other players in the economy.

First, decisions by firms regarding tax compliance is examined in consideration of the decision of tax inspectors to engage in corruption, so that the degree of corruption among tax inspectors and the degree of cheating in the economy is determined simultaneously. Second, it is acknowledged that each firm’s decision to comply with taxes is part of a collective decision that creates feedback effects on decisions by other firms. To capture these feedback effects, the study uses a coordination game framework, the key characteristic of which is the prevalence of multiple equilibria.

Third, the study examines how government can affect the degree of cheating in the economy through the auditing of a firm’s tax compliance. Thus, a firm’s decision to comply with taxes is examined as a response to the government’s choice of tax regulations (auditing). A key outcome of the analysis is the derivation of a transformation curve, which represents the efficiency of transferring corruption and cheating rents into funds available for the provision of public goods. The government’s preference structure – i.e., the importance that the government attaches to different groups in the economy – is also an important determinant of its decision regarding tax auditing. This model is then extended to examine the government’s decision to allocate funds that are available for the provision of public goods between infrastructure and education.

1.4 Organization of the Study

The remaining chapters of the thesis are organized as follows. Chapter II analyzes the general causes and consequences of corruption in Albania. Chapter III examines the corruption in customs and tax administration in Albania, as well as issues surrounding the informal economy. Chapter III also examines government spending on public education and infrastructure in transitional Albania, in order to identify the government’s priority in relation to these sectors.
Chapter IV, Chapter V and Chapter VI are theoretical chapters that examine how tax compliance is affected by corruption in tax administration, and the implications of this corruption for the provision of public goods. Chapter IV examines how corrupt tax inspectors affect firms’ incentives to cheat on tax payments, and how this cheating behaviour affects the size of the unofficial economy. Chapter IV also analyzes how the unofficial economy, in turn, provides opportunities to sustain corrupt practices. Chapter V examines cheating behaviour and the extent of the unofficial economy when cheating and corruption become more acceptable business practices – and hence less costly, as more firms engage in these activities. In other words, the chapter examines what happens to tax cheating when the cost of cheating and engaging in corruption is endogenous. Chapter VI examines how government, as policy-maker, affects the degree of corruption, tax evasion and the provision of public goods through the auditing of business-firm taxation. This chapter also analyzes how government allocates revenues between different public goods such as education and infrastructure that could generate different private benefits for government. Chapter VII summarizes the major findings of the study and concludes this dissertation.
CHAPTER II

CAUSES AND CONSEQUENCES OF CORRUPTION IN ALBANIA

2.1 DEFINITION AND DIFFERENT MEANINGS OF CORRUPTION

The search for definitions of corruption is an integral feature of the analysis of corruption (Johnston, 2001). The classical notion of corruption had a wider dimension than it has today. In the past, corruption was strongly related to the moral health of society rather than to individual actions. As societies have become more fragmented and secularized with groups of competing interests, politics has focused more on maintaining the fairness of competition between and among groups than striving for a coherent system of values. On this basis, corruption relates to individual actions of various participants in political life, and has a strong behaviour approach (Johnston, 1996).

Heidenheimer (1989) identifies three different behavioural approaches for defining corruption, creating definitions that are public-office-centered, public-interest-centered and market-centered. The public-office-centered definition concentrates on the phenomenon itself, while the public-interest-centered approach defines corruption in terms of consequences or effects on the public interest. The market-centered definition is preoccupied with the mechanisms of corruption exchange, and treats the public office as a “maximizing unit.” Although this approach contributes to understanding corruption and provides a model to explain the incidence of corruption, it does not define it (Philp, 1997).
A commonly used definition for the public-office-centered behaviour approach is that of Nye (1967):

Corruption is behavior which deviates from the formal duties of a public role because of private regarding (personal, close family, private clique) pecuniary or status gain; or violates rules against the exercise of certain types of private regarding influence. This includes such behavior as bribery (use of reward to pervert the judgment of a person in a position of trust); nepotism (bestowal of patronage by reason of ascriptive relationship rather than merit); and misappropriation (illegal appropriation of public resources for private regarding uses) (p. 419).

There are two reasons why this definition is widely used. First, with the public-interest approach involving identification of norms and principles, there was a tendency to refer to western standards as the central values of democracy. Lately, however, scholars have increasingly attempted to avoid imposing cultural prejudices. As a result, the public-interest-centered definition varies from situation to situation depending on the standards accepted by certain communities, and therefore lacks consistency (Philp, 1997). Consequently, the public-office-centered definition seems to have been cited more widely in the literature. Second, as Philp (1997) points out, Nye’s definition captures to some extent the consequences of corruption, and expresses a dimension of the public-interest approach as a result.

Another definition of corruption, similar to Nye’s, views corruption as “the misuse of public power for private gain” (Rose-Ackerman, 1999, p. 91) to which Jain (2001) adds that this misuse is carried out “in a manner that contravenes the rules of the game” (p. 73). A similar behaviour-focused definition describes corruption as “the abuse of public office, powers or resources for private benefit” (Johnston, 2001, p. 17). However, Johnston stresses the importance of remembering that the words “abuse,” “private,” and “public” can take on a range of meanings in practice.
Another approach for defining corruption focuses on the principal-agent-client framework. This approach is primarily used by economists. The framework concentrates on interactions between actors rather than defining the categories of corrupt actions themselves (Johnston, 1996). Jain (2001) presents three types of corruption identified in relevant literature that are based on the principal-agent-client framework.

The first type of corruption is “grand corruption” or “political corruption.” This type of corruption involves exploitation of the relationship between the populace and the political elite. Grand corruption occurs when the political elite exploits its discretionary power in economic policy-making or the policy-implementation processes to serve its own interests.

The second type of corruption is “bureaucratic corruption.” This type of corruption involves exploitation of the relationship between appointed bureaucrats and the public consumers of government goods and services. Bureaucratic corruption occurs when appointed bureaucrats exploit their discretionary power, in exchange for some personal benefits, to “speed up” bureaucratic procedures, to overlook violations of existing regulations, or to provide services which are not easily accessible.

The third form of corruption identified by Jain (2001) is “legislative corruption.” This type of corruption involves exploitation of the relationship between legislators and different interest groups of the populace. Legislative corruption occurs when the interest groups bribe the legislators to enact laws in such a way that economic rents accrue to them (Jain, 2001).

Johnston (1996) points out that the principal-agent-client approach is better suited to explaining bureaucratic corruption than other broad-based forms of corruption, such as extended-patronage networks, cronyism and nepotism. Jain’s categorization reflects this drawback of the principal-agent-client framework. Note that the types of corruption provided by Jain (2001) are mainly given in the context of corrupt exchange, such as
bribery, and less in association with other political aspects of corruption, such as patronage, cronyism and nepotism.

Many international risk-assessment agencies have developed measures of corruption; these measures and indexes are based primarily on the perception and the interpretation of corruption with respect to bribery. As a result, the empirical work based on these measurements implicitly treats corruption in terms of exchange, and could under-represent the prevalence of corruption in more developed countries (Atkinson and Bierling, 2003). Although, particularly in the empirical research, there is a tendency to treat corruption primarily in terms of corrupt exchange (bribery), there are also efforts to revisit the debate about the definition of corruption and its various meanings.

In Johnston (1996), Dennis Thompson’s notion of “mediated corruption” is considered as an effort to revive the classical notion of corruption (the moral health of the society). This notion goes beyond the conventional meaning of extortion and bribery. “Mediated corruption” refers to actions that are mediated by the political process and are called “corrupt” because they harm the democratic process. In Johnston’s elaboration on Thompson’s concept, transactions are considered to be corrupt not due to exchanges between politicians and citizens and the motives behind these exchanges, but due to their damage to such major democratic values as representation, accountability, open debate and equity.

Scholars who have carefully analyzed the disputes surrounding the definition of political corruption emphasize that such definition is strongly related to the character and vitality of politics (Johnston, 1996; Johnston, 2001; Philp, 1997). Philp (1997) argues that “One line definitions of political corruption are inherently misleading because they obscure the extent to which the concept is rooted in ways of thinking about politics – that is, of there being some ‘naturally sound condition’ (variously described) from which corrupt acts deviate” (p. 30).
The analysis of corruption, particularly the theoretical models developed in this thesis, view corruption in terms of exchange (bribery) and as other forms of malfeasance. In Chapter IV and Chapter V, corruption of tax enforcers – a bureaucratic type of corruption – is considered in terms of bribery. More specifically, in exchange for bribes, corrupt tax inspectors do not enforce penalties for non-compliance. However, in Chapter VI, the interpretation of political corruption in government, which designs the tax regulations, is considered in a wider interpretation than bribery. It is acknowledged that government decisions can be a function of side payments and bribes, campaign contributions, the interests of cronies, the rewards of political patronage and kinship, and/or the direct business interests of politicians.

2.2 Types and Measures of Corruption in Albania

All types of corruption acknowledged in the literature appear to be present in the Albanian political system. However, bureaucratic corruption and political/ grand corruption have a particularly high incidence in Albania due to the fact that power is concentrated primarily in the executive branch. These types of corruption can take many forms, such as bribes, theft of public funds, vote-buying, extended networks of patronage, nepotism, political influence and favour exchange.

Political corruption is generally associated with the financing of political campaigns and the vote-buying process, but can also extend into other black-market activities. Problems relating to conflict of interest are quite prominent in Albania. Direct involvement of politicians in economic activities and businesses, which garners influence without side-payments, is commonplace. Albania’s “pyramidal schemes” crisis, and the involvement in it of political elites, represents a dark moment in the country’s modern (democratic) history.5

5 The “pyramidal schemes” had dramatic impacts on the social, economic and political life of Albania. Their development and collapse presents a clear example of a situation where politicians are captured, paralyzed and prevented from acting properly, and therefore the consequences of corruption go far beyond the direct impact of the simple act (See Jarvis [2000] and Bezemer [2001] for an extended analysis of the pyramidal schemes in Albania).

The pyramidal schemes were a result of an inadequate formal financial system during a period of dramatic private-property reforms. The existing banks in Albania were not reliable intermediaries for
In terms of other black-market activities, the Head of the Albanian Informative Service (Sherbimi Informativ Shqiptar, SHISH) reporting in April, 2002 to the Parliamentary Commission of Public Order and SHISH, expressed concerns that certain political segments were involved in activities such as the trafficking of drugs, goods and humans (Koha Jone, April 25, 2002).

Examples of bureaucratic corruption in Albania include bribe payments to judges in commercial and criminal courts, payoffs to official inspectors for overlooking violations of existing regulations such as those relating to tax evasion, and “grease” payments to obtain licenses, to obtain property rights in the privatization process, to smooth customs procedures, to win public-procurement contracts, or to be given priority in the provision of public services such as health and education. As surveys show, bribe-giving is a standard business practice in Albania, and is a considerable expense for most private

both savings and lending activities. As a result, businesses explored the emerging informal credit alternatives. At this time, the informal credit market was widely tolerated and was viewed by both the authorities and foreign observers as benign, and a significant contributor to economic growth. Relative to the formal financial institutions, this market indeed offered more efficient intermediaries for savings and funded investments than the banks, being among the most profitable companies in Albania at the time (Jarvis, 2000).

However, along with these informal intermediaries, another set of companies began to operate under the guise of borrowing money to support investments, and these later operated as pyramidal schemes. While they engaged in some productive investments, thus keeping up the appearance of legitimacy, it is believed that they offered a much more lucrative money-laundering function. Unfortunately, in analyzing the situation in Albania at that time, it is very difficult to make much of a distinction between these two sets of companies (Jarvis, 2000).

Despite this difficulty, it is clear that the second set of companies had numerous reasons to be involved in rent-seeking and corrupt deals with high-level politicians, in order to maintain their position in the informal financial market. The campaign contributions to the Democratic Party made by some of these companies during the1996 parliamentary elections (Jarvis, 2000) are now recognized as undeniable evidence of political capture, but it is possible that they are only the “tip of the iceberg.” Claims and counterclaims of political involvement in pyramidal schemes activity are still heard from politicians of both main parties (Shekulli, May 15, 2002).

Political capture could explain the apathy and negligence that was in evidence toward pyramidal-schemes operations. For instance, while the Bank of Albania proposed a new banking law (which passed in February, 1996), its efforts to ban the activities of the informal financial entities remained isolated. The General Prosecutor of the Republic took the view that the law does not apply to lending companies, which were defined in a way that fit the description of the second set of companies. Furthermore, the Ministry of Justice did not even offer an interpretation of the law. The IMF’s suggestion that companies could be investigated and closed down for tax evasion and maybe later for fraud was almost completely dismissed (Jarvis, 2000).

After the fall of the pyramidal schemes, the process of liquidation of these collapsed companies turned out to be very problematic. An investigation by a parliamentary commission was expected to shed light on the pyramidal-schemes activity, but reports were too general and did not make any serious contribution, leaving the pyramidal-schemes case still unresolved.

12
Investigations of high-level officials, such as former ministers, with regard to corrupt affairs in the granting and procurement of large contracts are underway, and indicate that bureaucratic corruption has spread to the highest levels of the executive government.

The remainder of this section presents some measurements of corruption in Albania. These measurements have been derived from the rankings developed by a number of international risk-assessment agencies and from the corruption indexes assembled from different surveys conducted in Albania in recent years. It should be noted that the data set spans a very narrow time frame; thus it is difficult to obtain a reliable trend around the indicators. Nevertheless, the indices give an idea of the perceived corruption incidence in Albania.

Transparency International (TI) has published the Corruption Perception Index (CPI) each year for the period 1998 to 2003. The CPI captures the public’s perceived level of corruption among public officers and politicians for a group of countries. TI defines corruption as the abuse of public office for private gain. The CPI Score relates to perceptions of the degree of corruption as seen by business people, academics, and risk analysts, and ranges between zero (highly corrupt) and ten (highly clean) (Transparency International, 2002). The CPI was published for Albania in 1999, 2002 and 2003 only. In 1999, TI ranks Albania 84 out of 99 countries; the CPI Score is 2.3 with a standard deviation of 0.3 and five surveys were run. In 2002, TI ranks Albania 81 out of 102 countries; the CPI Score is 2.5 with a standard deviation of 0.8 and three surveys were run. In 2003, TI ranks Albania 92 out of 133 countries; the CPI Score is 2.5 with a standard deviation 0.6 and five surveys were run. Although there is an improvement of the CPI Score in 2002 compared to 1999, the standard deviation in this year is substantially larger, while no improvement is indicated in 2003. TI ranks Albania as a

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6 Estimates of the share of bribes is that they were around 7.0% of annual revenues in 1998 (The World Bank, 2000a), 4.0% in 1999 (The World Bank, 2000b) and 3.3% in 2002 (IMF, 2003a). The National Bank of Albania reported that bribes amounted to 10.0% of profits in 2001 (America’s Accountability Anti-Corruption Project News, 2002).
highly corrupt country, and as the most corrupt country among the Southeastern European countries.

Freedom House has published an annual report called "Nations in Transition" since 1998. This report gives a score for Democratization, Rule of Law, and Economic Liberalization for approximately 27 transition countries. The Rule of Law Score is an average of two indicators: the Constitutional, Legislative and Judicial Framework, and the Corruption Score. Table 2.1 summarizes these scores for Albania for the period 1997 to 2002.

The Corruption Score represents the perception of corruption in the civil service, the business interests of top policy-makers, the strength of the laws on financial disclosure and conflict of interest, and the performance of anti-corruption initiatives. Ratings are based on a scale of one to seven, with one representing the highest level of democratic progress and seven representing the lowest level of democratic progress (Freedom House, 2002). As Table 2.1 indicates, Albania is perceived as a highly corrupt country, with some improvement shown in the most recent years.

Albania is also a participant in the 1999 Business Environment and Enterprise Performance (BEEP) Survey. This survey provided the core data necessary for creating measurements for Administrative Corruption\(^7\) and State Capture\(^8\) for several studies (Hellman et al.; 2000; Hellman and Kaufmann, 2001), as well as for the World Bank (2000b) report, "Anticorruption In Transition: A Contribution to Policy Debate."

According to the research, Albania is characterized by high administrative corruption. It

\(^7\) "Administrative Corruption" is defined as "the intentional imposition of distortions in the prescribed implementation of existing laws, rules, and regulations to provide advantages to either state or non-state actors in exchange for illicit and non-transparent personal gains to public officers" (The World Bank, 2000b, p. 2). The discretionary power of public officials to grant exemptions, to discriminate in the application of rules, and to prioritize the delivery of the public services is at the heart of Administrative Corruption.

\(^8\) "State Capture" behaviour is defined as "the actions of individuals, groups, or firms in both the public and private sectors to influence the formation of laws, regulations, decrees, and other government policies (i.e., the basic rules of the game) to their own advantage by means of the illicit and non-transparent provision of private benefits to public officials" (The World Bank, 2000b, p. 1).
Table 2.1. Albania’s Rule-of-Law Score

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<tr>
<td>1. Constitutional, Legislative and Judicial Framework</td>
<td>4.75</td>
<td>5.25</td>
<td>5.00</td>
<td>4.50</td>
<td>4.50</td>
</tr>
<tr>
<td>2. Corruption Rule of Law (average of 1&amp;2)</td>
<td>na</td>
<td>na</td>
<td>6.00</td>
<td>5.50</td>
<td>5.25</td>
</tr>
<tr>
<td></td>
<td>na</td>
<td>na</td>
<td>5.50</td>
<td>5.00</td>
<td>4.88</td>
</tr>
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was estimated that Albanian firms spend around 4.0 per cent of their annual revenues on bribes for public officials in order to influence the implementation of state policies, regulations and laws. In contrast, the average indicator is 2.2 per cent across the Central and Eastern European Countries (CEECs), and 3.7 per cent in the Commonwealth of Independent States (CIS).

In 1999, 46.7 per cent of BEEPS participants admitted to making bribes frequently; the figure is 36.4 per cent for 2002. In 2002, these firms paid on average 3.3 per cent of their annual revenues as bribes. The latter figure ranks Albania the second worst among 26 transition countries (IMF, 2003a).

The State Capture Index is used as a measure of State Capture behaviour. According to the research, the State Capture Index has a value of 16 for Albania, while the overall average for 22 transition countries is 20. Since the Albanian value is lower than the overall average, Albania’s economy would be considered a medium state-capture economy.

Another survey that reveals some interesting results was conducted in 2000 by the Vitosha Center.⁹ In 2001 and 2002, the Southeast European Legal Development

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⁹ This study focused on Albania, Bulgaria and Macedonia. The survey was conducted by the Vitosha Center, in cooperation with the Center for the Study of Democracy in Bulgaria, The Albanian Center for Economic Research in Albania and The Forum-Center for Strategic Research and Documentation in Macedonia. Four categories of Corruption Indices are developed based on the data collected from this face-to-face survey. These Corruption Indices yield the perception of the participants with regard to “attitudes toward corruption,” “corrupt practices,” “assessment of the spread of corruption,” and “corruption-related expectations.”
Initiative (SELDI) adopted the same methodology as the Vitosha Center study and conducted the survey again in seven Balkan countries, Albania included. According to the SELDI surveys, more than 60 per cent of people surveyed (around 1000 each year) consider corruption as the gravest problem in Albania, along with political instability, unemployment, low incomes and poverty. In 2002 this percentage is higher, suggesting that public opinion does not seem to detect any tangible result from the Anti-Corruption Plan launched by the government in year 2000.

Respondents consistently indicate that corruption pervades the public arena, and they rank customs agencies, tax-collection agencies, the central government, the judiciary, municipal government and privatization agencies as the most corrupted public institutions. Corruption is considered morally unacceptable, but seen as an efficient way to get things done. Expectations that the society will be able to control corruption are not high (SELDI, 2001; SELDI, 2002).

2.3 CAUSES AND CONSEQUENCES OF CORRUPTION IN ALBANIA

This section analyzes some of the major causes and consequences of corruption in Albania. The causes of corruption are related to the transformation of the political economy from a centrally planned to a market economy, and from a dictatorship to a democratic governing structure. Corruption has affected Albania’s economic performance, as well as its business and political culture.

2.3.1 Origins and Causes of Corruption in Albania

The culture of corruption in Albania has origins in several centuries of rule by the Ottoman Empire, as well as in the communist era from 1944 to 1990, and the transformation of the political economy in Albania in recent years has created a fertile ground for its development. When examining the causes of corruption in transitional

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10 The respondents of the survey are national representatives, 18 years of age or older. Hence the corruption indexes that resulted from these surveys represent the perception of a broader category of population than just business people. They also give insight into the corruption related to the provision of public goods such as health and education, which is shown to have a very high incidence in Albania.

11 Albania attained the independence from the Ottoman Empire in November 1912.
Albania, it is necessary to understand the unprecedented and ongoing nature of its political, economic and social transformation. Albania experienced a rigid form of communist dictatorship, and as a result the transformation of the political system from a totalitarian rule to a democratic rule has been radical and extreme. Huntington (1968) argued that periods of political modernization are associated with increasing incidences of corruption, because institutions that support the new government structures are not in place. On this basis, the causes of corruption in Albania are closely related to the absence of some institutions and the lack of development of others that can support the democratic governing structure and the market economy. The following sections present some institutional changes that facilitated a high incidence of corruption in Albania.

**Constitution and Legal Framework**

The establishment of a new constitution in Albania and the introduction of an unprecedented number of new laws, regulations and policies created opportunities for corruption in state administration and the judicial system. Albania abolished the 1976 Constitution and the laws that derived from it in the early 1990s, but the new constitution did not come into force until November 1998. In the meantime, a package of laws enacted in 1991 known as the Constitutional Dispositions, which were founded on principles of human rights, temporarily played the role of a constitution. A new draft constitution was rejected in a 1993 referendum due to the unlimited powers it assigned to the president. As a result, until 1998 the Constitutional Dispositions continued to apply, and the limitations of this system caused inconsistencies to arise in laws and policies.

Albania adapted codes and promulgated hundreds of new laws and regulations in a very short period of time. As problems arose, changes were required, increasing the likelihood of inconsistency among laws. As a result, regulations were left mainly to bureaucrats for interpretation (Konda, 2001). When the laws do not have an exact interpretation, opportunities for corruption arise.
In addition to the inconsistency among some laws, the inability to enforce these laws due to their inherent procedural complexity was a systematic problem. From the beginning of the transition period, the institutional gap between a core institution, such as the legal framework, and complementary institutions with the capacity to implement the laws, created significant opportunities for corruption in the judicial system.

**Private Property Rights and Privatization**

When the communists took power in Albania after the Second World War, private property rights were abandoned and the private sector was made nonexistent through confiscations and the collectivization process. With the 1976 Constitution, private property rights were totally abolished. The reestablishment of private property rights with the 1991 Constitutional Dispositions created what is generally considered the most essential institution of a market economy. In addition to new initiatives for business activities, the redistribution of assets through the privatization program was a crucial aspect of transition. However, privatization of public assets and the redistribution of wealth also created opportunities for corruption.

Hashi and Xhillari (1999) show that the privatization of land and housing in Albania during this period appears to have been successful and fair, while the privatization of state-owned enterprises was more difficult and controversial. Some Albanian-specific factors influenced the disposition process, leading to “give-away” and “insider” privatization schemes. This was especially evident in the disposition of small- and medium-sized enterprises that were represented as contributing little to the state budget, and this led to allegations of political favouritism. This allegation of favouritism extended to the privatization boards, which at their discretion and under certain specified conditions, could reject those who had been successful bidders in auction scenarios. When auction results were disregarded, opportunities for corruption were significant.

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12 See Seddon et al. 1996a for more details.
Mass privatization of some medium- and large-sized enterprises started in early 1995. Due to negligence regarding issues of corporate governance, mass privatization mostly resulted in the increased power of insiders (Hashi and Xhillari, 1999). This means that, unlike entrepreneurs involved in new initiatives, the management of formerly state-owned enterprises reflected a fusion of boundary issues between private and public sectors that was inherited from the communist era – particularly when it came to dealings with the state. Furthermore, the mass-privatization process did not appear to be very open and transparent. Investors or privatization voucher-holders were given minimal information on the enterprises being offered. No financial data were provided, and notification of shareholdings was not a convenient and open process (Artemiev and Fine, 1997). The result was that opportunities for corruption in the mass-privatization process were high: Insiders had an advantage compared to the public, and individuals who were interested in taking control of enterprises had strong incentives to engage in corrupt deals.

The privatization program was halted in 1997 along with other reforms, due to the pyramid crisis. Privatization returned to the government agenda in 1998, when parliament passed a new comprehensive privatization strategy for Sectors of Particular Importance. These sectors included second-degree banks, telecommunications, energy, post-office services and oil (Freedom House, 2001). Even though the privatization procedures have tended to be conducted by means of open bidding, and therefore to be more transparent than previous initiatives, in most of these cases special privatization laws have been applied. Considering that most of the enterprises are in a monopoly
position, the opportunities for rent-seeking behaviour during the process of enacting the special privatization have been high.\textsuperscript{13}

Therefore, the privatization process, not only in the way it was designed but also in how it was implemented, created opportunities for corruption of all types. The privatization of small enterprises that took place in the first years of transition has facilitated benefits mainly for privatization boards in local-level governments – a bureaucratic type of corruption. Mass privatization of medium- and large-sized enterprises has also facilitated corrupt affairs between privatization boards and insiders who assumed control of enterprises. Privatization of strategic-sector enterprises by special privatization laws has facilitated grand corruption at the ministerial and parliamentary levels where these laws are drafted and enacted.

**Underdeveloped Democratic Institutions that Control Political Power**

A well-established democracy contains characteristics that naturally deter corruption. Albania is new to democracy. The former Albanian state was a Stalinist-type dictatorship and therefore extremely oppressive. The 1976 Constitution abolished fundamental civil and political rights such as: property rights and freedoms; the right to practice religion; the right to privacy; and the freedom to organize political groups.

In the very late 1980s, as most central European countries embarked on a new political-economic era, Albania was also caught up in the current of change. Albanians embraced the multi-party-system concept, and intellectuals, students and workers staged demonstrations calling for more substantial political changes (Seddon et al., 1996b).

\textsuperscript{13} For instance, in May 2002 the Albanian Parliament was slated to pass the privatization law for INSIG, the only insurance company in Albania. According to the draft, INSIG was to be privatized in two stages, which would allow for restructuring and hence an increase in its value in the second stage. The law was designed to realize the highest privatization revenue for the budget, and was drafted with the assistance of World Bank (WB) experts. However, the draft did not initially pass, due to the strong objection of a group of MPs. It turned out that this group, which was led by a former minister about whom there were allegations of corrupt affairs during his ministerial tenure, was acting in the interest of “Interamerikan,” a company that was willing to buy INSIG only in one stage and for a significantly lower price. The regional manager of the WB publicly expressed concerns that this hold-up would affect the approval of the coming WB agreement for financial support. The parliament passed the law shortly afterward (Shekulli, May 17 and May 19, 2002)
This movement led to the foundation of a new opposition party called the Democratic Party of Albania (DPA) in December 1990, and later other new parties were established. The former communist Labor Party, known today as the Socialist Party of Albania (SPA), has also undergone considerable changes. Despite the explosion of political alternatives, politics in Albania has remained highly polarized between the two main political parties throughout the transition period (EIU, 2002a).

The current state of Albanian democracy contains many dysfunctional aspects that allow room for corrupt behaviour to flourish. This incubation space is created by the fact that it is difficult to establish and maintain limits on political power and political institutions. One particularly dysfunctional aspect of Albanian democracy pertains to the representation of the political will of the populace in the People’s Assembly due to election irregularities. Society’s ability to exercise its political will is of paramount importance in fighting political/bureaucratic corruption. If corruption is socially unacceptable to citizens, and corruption can be made a competitive political commodity, then citizens will be empowered to create responsible government. When the political will of the populace is misrepresented due to electoral fraud, however, then voting ceases to provide a check for political power.

Direct and free elections have repeatedly shown irregularities during the transition years of Albanian democracy. The 1992 parliamentary election was acknowledged as free and its results were accepted by the SPA, despite the fact that the party lost the election. Since then, accusations of electoral fraud have led to boycotts and a perennial reluctance to accept the results of elections.

Another dysfunctional aspect of Albanian democracy is that although the separation of powers between legislative and executive branches of government and the independence of the judicial system are understood in principle, these significant cornerstones of a balanced government do not exist in practice. Continuing issues with political patronage and a general lack of professionalism in the judicial system have not helped this problem.
A free independent press is a crucial check in political power and governance. The typical treatment of corruption in the Albanian media differs significantly from the kind of professional investigative journalism that generates public awareness and trust, and promotes positive change. The International Research and Exchanges Board (IREX) ProMedi/Albania (2001) has produced the Media Sustainability Indices, a scoring system of important issues related to the Fourth Estate. Due to financial constraints, the emergence of an independent media has been slow during Albania's transition and, primarily due to better funding, the partisan media of the political parties is better developed. "The Fourth Estate is split between right and left political factions: the oligarchs are in control and disinclined to change. Print media are divided and divisive, run either directly by politicians or their friends in business. A Code of Ethics exists but hardly anyone adheres to it as the political interest prevails over national 'fair' editorial policies" (IREX, 2001, p. 1).

Stories reporting political/bureaucratic corruption in the Albanian media tend to have little impact on their readers, because it is common knowledge that corruption issues are used as means of political fighting. The Human Rights Watch (2001) mentions that journalists are often induced or bribed to investigate the "other" party. Thus, the media themselves appear to be captured by political influence and therefore fail to become the means of controlling power and curbing corruption. In essence, they cease to be the eyes and ears of citizens, and become the hands and mouths of politicians. The lack of independent media in Albania has seriously hampered the quest to increase government accountability, and therefore contributes to opportunities for corruption.

In its current stage of development, Albanian civil society is severely limited in its ability to demand accountability from government and maintain a balance in political power. The communist dictatorship that oppressed all human rights did not allow the development of an active civil society. While participation in civil society in the original democratic movements was broad, and crucial in embarking on this period of transformation, it was not sustained. In general, Albanian non-governmental organizations (NGOs) lack strong organizational capacities and face significant
financial constraints (Freedom House, 2001). As a result, Albania’s civil society has not been very active with regard to anti-corruption activity, and only recently has it begun to “push back” against corruption.

In the spring of 2001, the Albanian Coalition Against Corruption (ACAC), an umbrella group of NGOs interested in fighting corruption, was established. These NGOs have been active in conducting surveys, offering policy recommendations and drafting laws. In the fall of 2000, representatives of civil society, along with other groups, were involved in drafting the Revised Anti-Corruption Plan of the Albanian government (SPAI, 2001a).

**Market-Supporting Institutions**

Albania began its market-reform process with no market memory. Prior to World War II, Albania was an underdeveloped, predominately agrarian, economy, with heavily concentrated land ownership. Industry accounted for only 5 to 10 per cent of national incomes, and the manufacturing sector was mainly supported by foreign investment (Seddon et al., 1996a). The original owners of expropriated land and industry were looked down upon and stigmatized for generations as “the enemy of the labour class.” Unlike other Eastern European countries, Albania did not experiment with a combination of a centrally planned economy and a market economy during socialism, before the transition began (Artemiev and Fine, 1997). Thus, Albania entered the transition period not only on the edge of economic collapse, but also with no memory of formal and informal (business-culture) market institutions. This made the transformation of a centrally planned economy into a market economy a highly challenging task.

It is widely understood that the design and implementation of market institutions can create opportunities for rent-seeking behaviour and corruption. Market institutions that do not create these opportunities are generally recognized for their ability to decrease the discretionary power of public office, to reduce economic rents by enhancing competition, to alleviate problems of asymmetric information and transparency, and to
facilitate low-cost economic transactions. This is essentially the observation of Broadman and Recanatini (2000), who found that a well established system of market institutions reduces incentives for corruption.\textsuperscript{14}

However, when some of these institutions are ineffective, or are simply not in place, the corruption-suppression dynamic is weak. The institutional gaps are compensated for by informal arrangements and illicit transactions, which in turn breed corruption. In the case of transition economies where market institutions are not well established, there is a very real danger that corruption will itself become an institution within the system. When this occurs, it becomes increasingly difficult to strengthen existing institutions or establish new ones to collectively weed corruption out of the system.

To gain a better insight into the causes of corruption in Albania, the underdeveloped market-supporting institutions need to be examined. Table 2.2 presents some of the transition indicators of the European Bank for Reconstruction and Development (EBRD). These indicators provide an estimate of the private-sector and market-institution development in Albania during the transition period.

In 1992 the new opposition party, the Democratic Party of Albania (DPA), launched economic reforms with a strong neo-classical approach known as “Shock Therapy.” Its primary consideration was macroeconomic stabilization and the extreme liberalization of prices and trade (Konda, 2001). Policies that liberalized trade and prices, along with those that established private property rights, were designed to promote private-sector growth. The positive growth in the GDP from the first year of reform implementation (9.6% in 1993) and beyond can be attributed to these policies.

\footnote{In their empirical work on transition countries, Broadman and Recanatini used indicators of reform performance in liberalization, competition policy, corporate governance and the corporate legal framework as measures of market institutions. They observed that the development of these institutions reduced the propensity for corruption.}
Table 2.2. Transition Indicators

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<td>Price Liberalization</td>
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<tr>
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<td>2.0</td>
<td>2.0</td>
<td>1.7</td>
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</table>

Source: EBRD, 2001

High values of the indicators (close to four) indicate a successful performance, while low values indicate a poor performance. A close look at the indicators in Table 2.2 reveals some of the existing institutional gaps in Albania. While price and trade liberalization policies are regarded as reasonably successful reforms, the financial institutions needed to support these initiatives have developed at a much slower pace. Hence, even today, financial institutions in Albania are not fulfilling their roles as efficient financial-market intermediaries, which is an expected and necessary function for them within an advanced market economy. Table 2.2 also indicates that the breadth of the corporate legal framework remains quite small since the launch of the reform process, and its effectiveness rates very low; this mirrors the problems experienced in the enforcement of property rights. Finally, the competition-policy shortcomings illustrated in Table 2.2 also provide insight into the creation of corruption incentives.
Absence of Effective Checks and Balances

The poor quality of public administration, the inability to create effective new institutions such as administrative courts and external audits, and the lack of internal audit mechanisms to effectively check the performance of public office, have contributed to the high incidence of administrative/bureaucratic corruption during the transition period in Albania. Not surprisingly, as the 1998 World Bank Diagnostic Survey points out, the theft of public funds and assets was one of the major forms of corruption at the time (Kaufmann et al., 1998; The World Bank, 2000a).

Albania’s inability to create effective institutions that check the abuse of public office has been partly due to the country’s poor legacy of public administration. For almost five centuries, until 1912, Albania was part of the Ottoman Empire. A monarchic system was created in 1928 and lasted until the Second World War. During the subsequent period of socialism, Albania, like other socialist countries, experienced the omnipresence of the communist party in all public institutions. There was no separation between executive, legislative and judicial powers, and the boundaries between politics and the administration were almost nonexistent. High-level bureaucrats (also called “the red nomenclature”) enjoyed certain privileges and access to services unavailable to others. Oppression and rigid internal controls were the main means used to manage the behaviour of public officers. Complaints were handled internally within administrative structures by party units. Albania began the post-communist period essentially without a code of administrative procedures (OECD, 1997).

The controlling structure of the communist state was formally dismantled at the outset of transition. New public institutions to control the power of public office – based on models designed around the separation of powers – were slow to emerge, as were institutions providing good-quality public administrative functions. The public-expenditure management system was inadequate, and was not reformed until recently. Even today, the legislation governing this system is generally unsatisfactory and still needs upgrading, with financial controls having both legal and constitutional
shortcomings. As of late 2001, a new Internal Audit Law, designed to address some of these deficiencies, had not yet been enacted (SPAI, 2001b).

The State Audit Institution is the only external, independent audit institution in Albania. It was established in 1992 and has since undergone several transformations. Its initial role has evolved over time and was not clearly defined (either court or office model) until April, 2000. Since then, the State Audit Institution has operated as a monocratic office-audit institution (SPAI, 2001b). The effectiveness of the State Audit Institution has been jeopardized by its lack of autonomy, especially in the early period of transition, and the ambiguity of its scope of power between 1998 and 2000.

2.3.2 Consequences of Corruption in Albania

When analyzing the consequences of corruption, there are two important considerations. First, there are many forces that affect a country’s well being. It is important to acknowledge that corruption is not to blame for all the dysfunctional aspects of a political economy. The best approach is to look at what would occur without corruption in an existing situation, rather than comparing the present state – which might have several dysfunctional aspects – to an ideal political and economic circumstance. However, determining what would occur without corruption is a difficult task since the effects of corruption are very difficult to isolate and measure (Johnston, 1997). Second, important corruption-feedback effects occur between corruption and the economy, corruption and politics, and corruption and society. Understanding these feedback relationships is crucial to evaluating whether the impact of corruption will move a country into a vicious spiral leading to further decay or move it into a virtuous cycle with controlled corruption.

In Albania, corruption, in any form, compromises the hope for building a decent society and a sustainable democracy. This compromising effect is not directly related to the illicit nature of corruption as a deviation from the “rules of the game,” but rather to the undermining of democracy in terms of the values that it embodies, such as
representation, open debate, accountability and equality (Rose-Ackerman, 1997; Johnston, 1997; Johnston 2001).

Rose-Ackerman (1997) acknowledged that systematic corruption leads citizens to believe that “government is for sale to the highest bidder” (p. 45). Corruption in Albania has undermined state credibility and the trust that citizens have in state institutions. The lack of trust in politicians has, in turn, diminished the support and participation of citizens in the reform process in general, and the Anti-Corruption Plan in particular. Hope that these reforms can succeed has faded, and the 2001 and 2002 SELDI surveys showed that Albanians had low expectations that the state can deal effectively with corruption problems.

Corruption has aggravated the problem of inequality and poverty in Albania, and has further marginalized socially vulnerable groups. Poverty trends in Albania have been made worse by skewed income distributions during the transition. One third of Albanians live in poverty and one fifth live in extreme poverty (Treichel, 2002).

The burden of corruption is heavier on the poor (Rose-Ackerman, 1997; Gupta et al., 1998; The World Bank, 2000b). In a society where corruption is a pervasive problem and characterizes most interactions with public offices, poor and unprotected social groups are deprived of basic public goods such as social assistance, justice, health services and education, and are therefore further marginalized.

Substantial literature provides empirical evidence that corruption hampers the investment climate, and in particular foreign direct investments (FDI) (Mauro, 1995; Tanzi and Davoodi 1997; Wei, 1997a and Wei, 1997b). In Albania, the poor capacity to protect and enforce property rights and basic contracts that results from corruption in the judicial system is a serious impediment to attracting FDI. There are other factors that have contributed to the modest level of FDI during the transition period in Albania, such as general political instability, poor infrastructure and the energy crises. While infrastructure and energy issues can be handled in a relatively short period of time,
dealing with the corruption that characterizes a large part of the business culture is more complex and takes longer. As a result, corruption is a more persistent obstacle in attracting FDI.

Table 2.3 presents the level of FDI in Albania during the transition period. Although privatization in strategic sectors such as mobile telecommunications and the Commercial Bank boosted FDI in 2000, progress has been uneven.\textsuperscript{15} At US$ 174 as of year 2000, Albania still ranked among the lowest recipients of cumulative FDI per capita in Eastern European countries, ahead of Bosnia and Herzegovina (US$ 79) and Yugoslavia (US$ 116), but significantly behind other countries in the region such as Romania (US$ 301), Bulgaria (US$ 404), and Macedonia (US$ 219) (EIU, 2002a). Albania has very lax FDI legal provisions and could likely have received a much higher level of FDI if the incidence of corruption had not been so high.

Murphy et al. (1991) showed how corruption alters entrepreneurs’ incentives to engage in rent-seeking activities instead of productive activities, thereby reallocating labour talent and affecting investments and growth in the economy. The entrepreneur is more vulnerable in a corrupt economy due to the clandestine nature of the corruption activity (Murphy, 1993). The pervasive corruption in Albania has dampened the business climate, distorted the sense of fairness and competitiveness, driven resources away from productive activities, and slowed wealth creation. In other words, corruption has affected economic growth.

Albania has experienced a high rate of growth during the transition, but its growth performance continues to be heavily dependent on remittances and official capital

<table>
<thead>
<tr>
<th>Table 2.3. Foreign Direct Investment in Albania</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI (Million $US)</td>
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<tr>
<td>20.0</td>
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</tbody>
</table>


\textsuperscript{15} The privatization of the Savings Bank has been postponed several times (Shekulli, July 2, 2002).
inflows, which are potentially volatile and susceptible to political and economic shocks (Treichel, 2002). As Mauro (1995) showed, corruption impacts the growth rate of the economy through its influence over investment. A low level of FDI is a serious threat to Albania’s sustainable growth, and higher levels of growth could have been realized if corruption were under control.

In terms of policy development in the presence of corruption, Ades and Di Tella (1997) show that corrupt governments pursue policies that encourage investments in private sectors of the economy that are characterized by high potential rents, in order to extract part of these rents. More specifically, Ades and Ti Tella analyze the effectiveness of industrial policies in the presence of corruption. Their empirical results indicate that active industrial policies are less effective in the presence of corruption and are a “warning of the dangers associated with enthusiastically pursuing interventionist industrial policies” (p.1041). Others have shown that under-investment of public funds in low-rent sectors such as education and health are commonplace in governments where corruption is pervasive (Shleifer and Vishny 1993; Mauro, 1995; Mauro, 1997; Mauro, 1998).

In Albania, where corruption is widespread, government appears to have paid greater investment attention to the development of sectors with higher rents, such as infrastructure (See Chapter III for more details). Meanwhile, socially important but low-rent sectors such as health care and education are among the most seriously neglected. All three sectors – health care, education and infrastructure – are underdeveloped and require public investment. However, the quality of health and education has been constantly deteriorating throughout the transition period, suggesting that they are in more need of attention than they are actually receiving, while in contrast, road infrastructure improvement appears to have received high priority, especially during the 1997 to 2002 period.

Health and education are plagued by bureaucratic corruption. The internal corruption within these sectors is due to improper regulation and a lack of monitoring, which leads
to further deterioration in the quality of these public goods. The net result is more limited opportunities for poor and vulnerable groups to invest in human capital and participate in the economy.
CHAPTER III

CORRUPTION IN CUSTOMS AND TAX ADMINISTRATION, THE UNOFFICIAL ECONOMY, AND THE PROVISION OF PUBLIC EDUCATION AND INFRASTRUCTURE IN ALBANIA

3.1 INTRODUCTION

Customs and tax administration are perceived to be among the most corrupt agencies in Albania. This chapter analyzes bureaucratic corruption in the country’s customs and tax administration, and the implications of that corruption for the unofficial economy and the provision of public education and road infrastructure. First, the chapter introduces some measurements that illustrate the extent of the corruption in customs and tax administration in Albania. Then the chapter analyzes causes and consequences of this widespread corruption. The analysis focuses particularly on the informal economy and the tax revenues available for the provision of public goods.

Finally, the chapter examines the pattern of government spending when corruption is prevalent. Shleifer and Vishny (1993) suggest that in poor countries where the governments are known to be corrupt, those governments tend to spend their limited resources on sectors where opportunities for corruption are relatively abundant. In this vein, studies by Mauro (1995; 1997; 1998) show that corruption negatively affects a country’s expenditures in education. Based on this argument, the chapter examines the patterns of expenditures in public education and road infrastructure by the government of Albania during the period 1997 to 2001. Analysis of these expenditure patterns is found to be consistent with the arguments of Mauro, and provides the motivation for developing the theoretical model in Section 6.5.
3.2 Causes of Corruption in Customs and Tax Administration

Bureaucratic corruption is rampant in the customs and tax-collection agencies of Albania. The 1998 World Bank Diagnosing Survey showed that more than 50 per cent of the firms dealing with the Customs, Tax and Financial Police admitted that bribes were a part of the delivery of services (The World Bank, 2000a). The Vitosha (2000) and SELDI (2001 and 2002) surveys ranked officials in customs and tax services as the most corrupt groups among public officials. Table 3.1 summarizes the results of the Vitosha and SELDI surveys with regard to customs and tax-collection agencies.

The numbers in Table 3.1 show that Customs and Tax services are perceived to be highly corrupt, while the pressure to take bribes is significant. The slight decline in indicator values in 2001 for Customs Services is likely the result of the new customs code and the VAT reform that were adopted in recent years. However, the value of the overall corruption index still remains quite high in 2002, the most recent year for which data is available (8.99 for Customs Services and 8.59 for Tax Services).

The causes of corruption among customs and tax inspectors are closely related to the nature of their activities, and to the fact that these activities are inadequately monitored. Weak monitoring and detection of corruption in customs and tax services in Albania is related to several factors. First, the internal control and audit functions have been very lax and disciplinary actions almost nonexistent during the transition period, especially up until the time of the adoption of the new customs code starting in 1999. Efforts to strengthen the investigative and internal functions of the agency and to swiftly impose discipline where necessary have improved customs administration in recent years, as evidenced by the increased volume of declared excisable commodities such as petroleum, coffee, cigarettes, alcohol and beer (Treichel, 2002; EIU 2002a; EIU 2002b; EIU 2002c). However anecdotal evidence about corruption in customs is still plentiful.

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16 Import-tax revenue as a percentage of GDP has increased from 5.8% in 1996 to 8.7% in 2001, and the volume of imports of excisable commodities has increased substantially during the most recent years – coffee from 668 tonnes in 1996 to 3,603 tonnes in 2000; fuels from 80,649 tonnes in 1996 to 230,289 tonnes in 2000; beer from 12,082 tonnes in 1996 to 32,686 tonnes in 2000; and cigarettes from 942 tonnes in 1996 to 2,267 tonnes in 2000 (Treichel, 2002).
Table 3.1. Corruption Indexes in Customs and Tax Services in Albania

<table>
<thead>
<tr>
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<th>Customs Services</th>
<th>Tax Services</th>
</tr>
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<tr>
<td>Corruption Index a</td>
<td>9.72  8.84  8.99</td>
<td>8.86  8.36  8.59</td>
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<tr>
<td>Widespread Corruption</td>
<td>95.2  86.6  89.8</td>
<td>79.5  79.0  80.1</td>
</tr>
<tr>
<td>Perception b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corruption Pressure c</td>
<td>n.a.  55.6  54.88</td>
<td>n.a.  56.8  50.43</td>
</tr>
</tbody>
</table>


a The Corruption Index takes values from zero to ten and ranks the institution from corruption-free (0) to the most corrupt (10).

b The Widespread Corruption Perception Index indicates the rate of perception of how widespread corruption is among the groups of public officials.

c The Corruption Pressure indicates the relative share of those dealing with the respective groups and were asked for cash, gifts and favours.

and indicates that operational infrastructure in accounting and registration is poor, and monitoring is still weak.

Second, it is well known that the appointment of officials in the customs and tax offices is based on either patronage and kinship or bribes, thus totally circumventing any merit system. Nepotism and political patronage are now almost taken for granted. The lists of candidates for the customs and tax offices are sometimes prepared during the electoral campaigns as part of a vote-buying process. Patronage jobs are commonplace, and are rarely denounced in the media; media coverage generally occurs only if there is some resistance in the appointment process.

Since customs and tax positions generate high payoffs from corrupt deals, the market for buying positions in these offices has become highly developed. The 1998 World Bank survey pointed out that around 60 per cent of customs inspectors and 54 per cent of tax inspectors are believed to have purchased their positions (The World Bank,

17 The daily newspaper Koha Jone reported in April 17, 2002 that during the electoral campaigns both major parties, the SPA and DPA, compiled lists for jobs in the customs and tax administration in case they won the elections.

18 For instance, the head of the Commissariat in Devoll was dismissed with no explanation in April 2002. In an interview with the daily newspaper Koha Jone (April 17, 2002), he outlined the real reasons for his dismissal. As a person in charge of appointing the police force in the customs office in Kapshtice, he was asked by the prefect of the region, the socialist party leader of the local branch and the MP of Devoll, to hire candidates that did not meet the job requirements. He ignored such requests and as a result was moved to another position.
The price of a position in bribes is considerable, which means that inspectors who buy their positions are highly motivated to engage in additional corruption in order to make high returns on their “investments” in a very short timeframe. Berberi wrote in an editorial commentary in the Albanian daily newspaper Shekulli (June 18, 2002) of the tendency to leave administration positions in customs vacant for long periods of time in order to attract higher payoffs when they are sold.

When customs and tax-administration officials have support from their supervisors or other influential people, corruption can go undetected or unpunished and can permeate many levels. As the power in the central government shifts and ministers are changed, the reappointment of positions at higher levels takes place first and makes its way to the lower levels later. Since corruption problems and abusive actions are commonplace, it is very easy to find reasons to change the personnel, with corruption itself sometimes being used as a reason for dismissal. A series of reappointments following a government reshuffle has become more or less a general rule. However, for the public, the real motivation for appointments and dismissals often becomes confusing.

Another reason why corruption in customs and tax agencies is so widespread and persistent is related to the nature of these activities. The definition of “corruption with theft” given by Shleifer and Vishny (1993) applies to the nature of corruption in tax and customs agencies in Albania. Corruption in these agencies is a popular practice because generally it is mutually beneficial for both parties. Firms can pay bribes valued at less than the official amount of the customs duties, licensing fees, or taxes, while the incomes that customs or tax officers receive from these bribes are considerably higher than their base salaries. As a result, both parties (firms and bureaucrats) have no incentive to denounce the violations. There is little chance of detecting this corruption.

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19 The General Director of Customs was replaced two months after a new government came to power in February 2002, with the change allegedly motivated to bring about “a better organization of the work.” This dismissal in fact came about as a result of complaints of 13 members of parliament with regard to violation of custom regulations. Then Prime Minister Pandeli Majko asked the prosecutorial office to investigate the issues. In May, directors of custom offices in Durres and Kakavije were dismissed with the same explanation (Korrieri April 10, 2002; Shekulli May 14, 2002).

20 In “corruption with theft” the bureaucrat embezzles the public-service fee (or a portion of it) paid by firms that are provided with the government service.
because it is in neither party's interest to reveal the other's activities. If both parties benefit in this situation, then who are the losers? The following sections present the major consequences of corruption in custom and tax services.

3.3 CORRUPTION IN TAX AND CUSTOMS AGENCIES AND THE BUSINESS CULTURE

Corruption in tax services in Albania has promoted a general attitude of acceptance toward non-compliance with laws. This attitude can undermine a healthy business climate. A healthy business culture and a high level of trust in the economy are crucial to the enhancement of economic performance. As Casson (1991) points out, "An effective (business) culture has a strong moral content" (p.3). In Albania, corruption in tax services has undermined the business climate that attracts new investment, and has created an unfair competitive playing field among existing firms. A system has developed that rewards business people on how successful they are at capitalizing on corruption opportunities, and not on how well they run their businesses.

Firms that comply with tax regulations find themselves at a cost disadvantage. These firms incur greater costs due to the tax they pay, and the level of benefits they receive as a result of the under-provision of public goods is substantially reduced. These conditions create incentives for firms to join the unofficial economy and to engage in corrupt practices, even when that might not be their preference.

For instance, 53 per cent of the Albanian firms that participated in the 1998 World Bank survey indicated that they were willing to pay higher taxes (an additional 11% of their annual revenues) if corruption were controlled. 21 Overall, firms were willing to pay an additional 6 per cent of their annual revenues as taxes if corruption were eliminated (Kaufmann et al., 1998). This willingness to pay higher taxes for a corruption-free environment indicates that corruption practices are often imposed on firms. In other words, some firms engage in corruption because that is the expected way to conduct

21 The managers of 356 firms participated in the World Bank survey that was administered by the Albanian Center for Economic Research (ACER).
business and get things done. Therefore, tax evasion and corrupt practices become commonplace, and an unhealthy business culture prevails.

There is a danger that corruption can become persistent when corrupt practices are institutionalized and entrenched in the business culture. In such a case, addressing the issues around corruption and the unofficial economy by changing only tax regulations may not be sufficient to reduce the unofficial economy and corruption. This might explain, for instance, why the smuggling of cigarettes in Albania is still significant, despite the efforts to facilitate more registered imports by decreasing the customs duty for cigarettes from 30 per cent in 1996 to 10 per cent in 2001 (Treichel, 2002).

Persistent corruption and cheating behaviours are very dangerous for the future growth of the official economy. With corruption and cheating behaviours rooted in the business culture, the unofficial economy grows at the expense of the official economy. This factor, along with a constant threat from organized crime and other black-market activities, seriously threatens the prospects for foreign investment and sustainable growth in Albania.

3.4 The Informal Economy and Tax Revenues in Albania

Corruption in tax and customs administration has a negative effect on the official economy. In Albania, the informal sector is prevalent, and manifests itself in two forms. First, there are businesses that operate totally underground, and second there are businesses which operate in both the official and unofficial sectors, forming the “gray” economy. Regardless of its form, there are transaction costs associated with operating in the unofficial economy, such as the costs of double bookkeeping and the costs of arranging corrupt deals.

The extent of the informal sector that operates totally underground is considerable, especially among small- to medium-sized businesses. While it is very difficult to estimate the size of the unofficial economy, the following statistics give an idea of its
prevalence. Treichel (2002) reports that during the period 1997 to 2001, the number of registered small businesses (mainly traders) in Albania increased from 25,000 to about 40,000. These firms were previously operating in the informal sector. On June 11, 2002, the Albanian daily newspaper Koha Jone reported that a routine check performed by the Police of Economic and Financial Crime at the regional office in Berat found 307 unlicensed private entities in the region. The report pointed out that the regional fiscal department’s neglect of the issue had occurred for the private benefit of tax inspectors. The loss of revenues from uncollected licensing fees was estimated to be 9 million Lek (around US$ 60,000). This example indicates that despite some improvements in registering businesses, the size of the underground economy is still large.

In regard to the extent of the “gray” economy, it is common practice for businesses in Albania to have two different bookkeeping systems.22 The “gray” market activity is recorded separately from the “official” records of business. The first record is kept for the benefit of the company as it operates as a going concern. The second is kept for the State, and forms the basis for income taxation and application of the VAT.

Schneider (2002) develops an estimate of the shadow economy in 110 countries, Albania being one. The estimate for Albania is derived using the dynamic approach model based on data in the demand for cash and on the physical input (electricity). Schneider’s estimate of Albania’s shadow economy for the years 1999/2000 is 33.4 per cent of total output, although he regards this figure as unreliable due to data limitations. However, the Albanian media have often offered estimates that are far higher than 30 per cent. The Albanian daily newspaper Dita reported in December 16, 2002 that 50 to 60 per cent of the Albanian economy is informal, primarily due to the smuggling of import commodities. The IMF Albania Country Report considers the problem of the informal sector in Albania as “severe” and as an obstacle to the country’s sustainable

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22The misrepresentation practice is so widely known that in May 2002, then Prime Minister Majko discussed it openly in a meeting with senior tax-administration officials. Majko criticized the apathy of tax-inspection agencies that take no action when large successful businesses report losses or pay ridiculously small amounts as VAT (Shekulli, May 18, 2002)
growth. Some arguments in this report also suggest that Schneider’s tentative estimation of unofficial economy in Albania could be low (IMF, 2003a).

Support for the argument that the unofficial economy is large comes from the observation that Albania has the lowest rate of tax collected as a percentage of Gross Domestic Product (GDP) among the South Eastern European countries over the 1993 to 2001 period, even after taking into account a much lower GDP per capita. For instance, while other countries with comparable tax rates, such as Romania, Bulgaria and Macedonia, succeeded in collecting taxes at a rate around 30 per cent of GDP in 2001, the Albanian figure was approximately 20 per cent, despite the improvement of the tax-collection rate in the last few years (Treichel, 2002; IMF, 2003a). Figure 3.1 presents the tax revenues as a percentage of GDP.

The argument is also supported by the demand for cash. The increase in the demand for cash between 1998 and 2001 is estimated to be about 5 per cent of GDP. Since the

![Graph showing tax revenues as a percentage of GDP in Albania]


**Figure 3.1. Tax Revenues as a Percentage of GDP in Albania**

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23 This also includes social contributions.
informal economy is cash-based, the increase in the demand for cash is a good indicator of an increase in the size of the informal sector. Further evidence for a large unofficial economy is based on the discrepancy between registered cigarette imports and cigarette consumption in 2001. While the Albanian authorities report registered imports of 2,425 tonnes of cigarettes in 2001, consumption is estimated to be around 8,000 tonnes. This discrepancy coincides with the estimate of the daily newspaper Koha Jone (May 28, 2002) that smuggling accounts for 70 per cent of the market for cigarettes. It is estimated that smuggling accounts for 1.5 per cent of GDP in lost budget revenues (IMF, 2003a).

Why do firms choose to operate in the unofficial economy? There are a number of reasons that could drive a firm to operate in the underground or the "gray" economy. The high statutory tax rate, which imposes a burden to firms, is one of them. In a series of studies, Johnson et al. (1997; 1998; 2000) argue that over-regulation, corruption in the economy and a weak legal system are primarily to blame. While all of these factors apply in the case of Albania, it is safe to say that widespread corruption among tax and customs inspectors during the years of transition has further encouraged and sustained the unofficial economy. This corruption has affected firms' incentives to cheat on taxes and to smuggle imported commodities. The weak enforcement of tax regulation due to tax-inspector corruption has undermined the penalties for tax evasion, and further promoted cheating.

In turn, the unofficial and "gray" economy has continuously contributed to the problem of corruption in tax administration and in other parts of the system. Firms that operate in the unofficial economy pay bribes not only to escape penalties of tax evasion, but also

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25 The article refers to Mrs. Makhmuudova, the manager of one of the biggest importers of the cigarettes in Albania, for this evaluation.
26 According to the EBRD Transition Report 2001, expenditures on both health and education accounts for 5.1% of GDP in 1999 and 6.1% of GDP in 2000. This means that the above loss in revenues from cigarette smuggling would have financed respectively 29.4% in 1999 and 24.5% in 2000 of national expenditures in health and education if the GDP had been constant during 1999-2001. (The real GDP growth rate was 7.8% in 2000 and 7.0% in 2001).
27 The example of unregistered businesses in Berat provides some evidence for this (see earlier discussion, above).
to obtain other public services. Clearly, corruption is both a cause and a consequence of an unofficial economy.

Tanzi and Davoodi (1997) showed that corruption adversely affects the volume of public funds that is obtained via tax collection, and that is available for allocation in the economy. In Albania, corruption of customs and tax inspectors and the prevalence of a substantial unofficial economy have had a direct effect on government revenues and therefore have handicapped public investment. As shown in Figure 3.1, there has been some improvement in tax collection (1997-2001), but tax evasion is still a significant problem for the government.

The Albanian government has been running a considerable deficit over the years of transition. Figure 3.2 presents the overall deficit as a percentage of GDP during 1993 to 2002, and shows a declining trend of the deficit as a percentage of GDP. With low levels of tax revenues and a commitment to reduce the deficit, the Albanian government has been unable to commit more funding to public investments.


Figure 3.2. The Government Deficit in Albania
Data show that public investments or capital expenditures have not increased at the same pace as current expenditures. More specifically, during the period 1993 to 2002, capital expenditures have increased on average 7.9 per cent each year, while current expenditures have increased on average 14.1 per cent each year (IMF, 2003a).

3.5 Public Education and Road Infrastructure during Transition in Albania

The literature suggests that public expenditures are related to the corruption rents with which they are associated. More specifically, Shleifer and Vishny (1993) suggest that governments of poor countries which are also known to be corrupt, tend to spend their limited resources on sectors where corruption opportunities are relatively abundant. Mauro’s 1995 research on corruption and growth supports the same argument. In later empirical work, Mauro (1997; 1998) studied whether corruption affects the composition of government spending. Particular interest was paid to determining whether corruption adversely affected expenditures in education. The cross-country empirical results provided strong evidence that corruption is negatively associated with public expenditure in education, with the relationship robust to a number of specifications.

A number of indicators like enrollment rates, class size and student-teacher ratio show that, as a result of reduced spending, the quality of public education in Albania has deteriorated substantially during the transition period. The next sections of this chapter examine this deteriorating quality of education, and present the pattern of government expenditures in public education and transport infrastructure during transitional Albania as facts of the governmental priority of public investment.

3.5.1 Indicators of Public Education in Transitional Albania

Under the communist post-war development program, education was made a priority of the state. In 1920, 80 per cent of Albania’s population was illiterate. In the 1980s, illiteracy was virtually wiped out as a result of the priority that had been placed on education: Everyone was entitled to primary education, and it was free. However, the
education system was highly politicized towards communist ideology, and academic standards were compromised. The reforms that took place in 1991 removed politics, ideology and non-academic training from the curriculum (EIU, 1997).

Despite the politicization, broad access to basic and upper-secondary education before the transition in Albania resulted in significant educational attainment. The 1996 Living Standard Measurement Survey indicated that about 45 per cent of the population aged 25 to 35 had at least an upper-secondary education degree (Rashid and Dobrawila, 1999).

It is widely reported that during transition in Albania the quality of education has deteriorated, and equitable access to education has suffered. Such factors as low attendance, high dropout rates, insufficient budget, inadequate educational infrastructure, outdated teaching methods, fewer qualified teachers and bigger class sizes have all contributed to a declining quality of public education during the first decade of transition (Palomba and Vodopivec, 2001; De Soto et. al., 2002; EIU, 2002a; The World Bank, 2000d).

During the transition period, particularly in the early years, school attendance declined significantly, particularly at pre-primary and upper-secondary education levels. For instance in 1990, 130,000 children were enrolled in pre-primary public education, while in 2001 the figure was 78,473 – the lowest in 12 years. Similarly, 206,000 students were attending high schools in 1990, compared to 89,895 in 1995. Although there was a slight and steady increase in enrollment in upper-secondary education during 1995-2001, this increase has not been enough to offset the rapid decline in the 1990-1995 period (INSTAT, 2003; Palomba and Vodopivec, 2001).

The declining enrolment numbers and the increasing youth population translate into a greater number of students being left out of the educational system. Table 3.2 presents the gross enrollment rates during 1989 to 1998, and indicates a decline in the gross enrollment rates in all levels of education excluding tertiary education (Palomba and
Table 3.2. Gross Enrollment Rates (Per cent)

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<tbody>
<tr>
<td>Pre-Primary</td>
<td>56.3</td>
<td>57.9</td>
<td>48.9</td>
<td>36.8</td>
<td>36.1</td>
<td>36.8</td>
<td>39.2</td>
<td>38.9</td>
<td>36.0</td>
<td>35.8</td>
</tr>
<tr>
<td>Primary</td>
<td>100.9</td>
<td>102.1</td>
<td>99.3</td>
<td>97.3</td>
<td>99.4</td>
<td>100.4</td>
<td>100.3</td>
<td>99.5</td>
<td>97.1</td>
<td>93.9</td>
</tr>
<tr>
<td>Lower Secondary</td>
<td>103.4</td>
<td>102.5</td>
<td>96.2</td>
<td>90.8</td>
<td>90.7</td>
<td>92.5</td>
<td>91.4</td>
<td>91.6</td>
<td>91.1</td>
<td>90.1</td>
</tr>
<tr>
<td>Upper Secondary</td>
<td>78.6</td>
<td>78.0</td>
<td>57.3</td>
<td>47.0</td>
<td>42.4</td>
<td>38.1</td>
<td>36.6</td>
<td>38.5</td>
<td>40.3</td>
<td>41.0</td>
</tr>
<tr>
<td>Tertiary</td>
<td>8.2</td>
<td>9.0</td>
<td>9.3</td>
<td>11.9</td>
<td>11.7</td>
<td>11.1</td>
<td>11.8</td>
<td>13.1</td>
<td>13.6</td>
<td>13.3</td>
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Vodopivec, 2001). In the most recent years, the gross enrollment rate for the age group 6 to 18 years is 80 per cent compared to 93 per cent in 1990, and the pre-school gross enrollment rate is 26 per cent of eligible children (EIU, 2002a).

With the exception of basic education, school attendance in rural areas has been particularly low, indicating that access to education has changed so that students in rural areas are now more marginalized than students in urban areas. The reduction of enrollment rates has generally been proportional by gender, thus preserving gender equality in education. However, a higher proportion of female students is enrolled in tertiary education than male students (Palomba and Vodopivec, 2001).

Pressure to cut educational spending has resulted in the total number of teachers (excluding tertiary education) falling from 44,170 in 1990 to 39,417 in 1998. As well, the number of schools decreased from 5,979 in 1990 to 4,539 in 1998, and the number of classes decreased from 37,675 in 1990 to 26,245 in 1998. The average class size in Albania increased from 23.7 in 1990 to 28.1 in 1998. In rural areas the class size increased considerably for basic education, from 18.9 in 1990 to 27.8 in 1998, while in urban areas the class size in the upper-secondary level increased from 23.6 in 1990 to 34.1 in 1998 (Palomba and Vodopivec, 2001; De Soto et al., 2002).

Progression rates tend to be lower in rural areas and especially in northern Albania. The percentage of unqualified teachers is also higher in rural areas, and particularly in the

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28 The gross enrollment rate is determined by calculating the ratio between the number of children, regardless of age, enrolled at a given level of education and the total number of children at the age group specified for that level of education (Palomba and Vodopivec, 2001).
north. Overall the quality of education has suffered more in the rural areas than in the urban areas (Palomba and Vodopivec, 2001; De Soto et al., 2002).

3.5.2 Road Infrastructure in Transitional Albania

Due to the structural changes in the Albanian economy, the demand for transportation has changed radically since the start of transition. There has been a significant increase in road transportation (an estimated 185,161 vehicles were on the road in 2000), air and water transportation (the number of flights has increased substantially, and traffic in Durres port has doubled since 1995), while rail transportation is at about 10 per cent of its pre-1991 peak (The World Bank, 2002b).

Albania inherited an underdeveloped transport network from the communist regime. Private car ownership was prohibited during the communist era, and during the first years of transition the expansion of private transportation (as well as the increase in freight-truck transportation) resulted in the deterioration of the road network.

The improvement of road infrastructure, with the participation of the private sector, has been a priority in the government’s agenda for the period 1997 to 2003. Projects for road rehabilitation and construction were generally financed by foreign funds and credits from the European Union (EU), and they concentrated on the major east-west and north-south transportation corridors (EIU, 2002c). Just before the 2001 national elections, the government went to great efforts to rebuild and repair the segments of the network that were in the poorest condition (EIU, 2002a). The Medium-Term Expenditure Framework of 2000 included projections for 2001 to 2003, and indicated a projected increase in transportation expenditures from about 2 per cent of GDP in 2000 to 3 per cent of GDP in the future (IMF, 2003b). In recent years, in addition to new construction and rehabilitation, priority has been given to maintaining the previously built and rehabilitated network (The World Bank, 2002b).
3.6 Financing Public Education and Road Infrastructure

This section presents statistics on expenditures in public education and transport infrastructure, in order to provide a better picture of the comparative priorities given to these sectors during the transition period. Since no infrastructure data were available for the first years of the transition period, the section presents data on government expenditures in public education and transport infrastructure for the period 1997 to 2001.

As indicated in Section 3.5.1, the quality of education in Albania deteriorated markedly during the first decade of transition. This deterioration can be strongly related to the amount of resources allocated to education. The study by Palomba and Vodopivec (2001) provided a rigorous examination of the real and financial resources devoted to education, and the results indicate the extent to which the education sector in Albania was under-financed during the first decade of transition. The study concluded that:

Education spending has been limited to bare essentials, at the expense of important needs with no immediate return such as maintenance and teacher training. This policy of minimal education spending reduces the value of physical assets and human capital, thus jeopardizing the quality of education as a whole. Moreover, low education expenditures do not necessarily bring savings. Insufficient public spending simply becomes higher private costs for participating in education and the transfer for long-run costs to future generations. (p. 49)
Figure 3.3 presents real public spending in education (in Million Lek) and real spending per student (in Lek) for the period 1989 to 1998. It indicates a decline in real spending in education in the first and the last years of the period. As well, per-student spending in real terms has generally declined, even given the fact that student enrollment rates declined considerably during the period. Albania’s per-student spending as a percentage of per capita GDP is much lower than the Organization for Economic Co-operation and Development (OECD) average, particularly over the period 1993 to 1998 (around 15 per cent in Albania, compared to 26 per cent in OECD countries).

By contrast, there was a significant increase in transport and road infrastructure expenditures over the period 1997 to 2001. Specifically, road expenditures increased steadily from 0.67 per cent of GDP in 1997 to 2.21 per cent of GDP in 2001; in terms of the share of total public expenditures, this was an increase from 1.74 per cent in 1997 to 6.4 per cent in 2001. The highest increase was reported in 1999, when road expenditures accounted for 2.41 per cent of GDP, or 6.67 per cent of total public expenditures.


**Figure 3.3. Real Spending in Education**
Figure 3.4 presents expenditures in education and transport as a percentage of total public expenditures during 1997 to 2001. Over these five years, the government allocated on average 15 per cent of total expenditures to the provision of both public education and transportation. In the first three years (1997-1999), the share of expenditures allocated to education decreased, while the share that went toward transportation increased. In 1997, the government spent approximately 3 times more on education than on transportation (the difference accounts for 7.6 per cent of total expenditures), while in 1999 the government spent almost equal amounts on education and transportation (7.9 per cent versus 7.4 per cent of total expenditures). In the last three years (1999 to 2001), the share allocated to education has increased, while transport expenditures have remained relatively stable. However, there has been an upward trend in the proportional commitment to transportation over the period, while education has been flat to slightly downward.

Figure 3.5 presents expenditures in education and transport as a percentage of GDP. Government expenditures over the period 1997 to 2001 have consistently accounted for about 30 per cent of GDP (IMF, 2003a). With a consistent share of total public expenditures on GDP, the expenditures in education or transport as a percentage of GDP follow a similar pattern as the education and transport expenditures as a share of total public expenditures. Education expenditures as a percentage of GDP decrease over the period 1997 to 2000 and then increase in the last two years, while transportation expenditures have generally increased or been steady over the years. Although spending in education increased to 3.4 per cent of GDP in 2002 (IMF, 2003b), education spending has not yet reached the 1991 level (5.0 per cent of GDP).
Figure 3.4. Education and Transport Expenditures as a Percentage of Total Public Expenditures


Figure 3.5. Expenditures in Education and Transportation as a Percentage of GDP

Public funding committed to transport infrastructure, and particularly capital expenditures in that sector, have been generally increasing in recent years. Figure 3.6 presents the capital expenditures on education and transportation as a percentage of GDP for the period 1997 to 2000. The figure indicates a significant increase in capital expenditures for transportation infrastructure and a decrease in capital expenditures for education over those years. In 1997, the government spent 0.6 per cent of GDP in public investments in both areas. In 2000, the government's capital expenditures on education accounted for 0.1 per cent of GDP. The capital expenditure on transportation was 1.9 per cent of GDP – or 19 times more than the amount spent on education. This expenditure pattern indicates that government has paid significantly more attention to transport infrastructure than to education.

The structure of foreign aid influences to some extent the pattern of government expenditures in various sectors, and this is especially true for cash-strapped transition countries. For instance in Albania about 62 per cent of transportation expenditures were foreign-financed in 1999, while only 35 per cent of education expenditures were foreign


Figure 3.6 Capital Expenditures in Education and Transport
financed (The World Bank, 2001). Although government is responsible for soliciting foreign aid and ultimately maintains a strong ownership in public-investment projects financed by foreign funds, the actual allocation of foreign aid among various investment alternatives is a complex process. Important considerations in this process include, but are not limited to, commitments to market-oriented reforms, encouragement of private-sector participation, and other reforms in the political economy.

Foreign-financed public investments in the transportation sector have totaled about Euro 500 million during the transition period (The World Bank, 2002b). The EU contribution accounts for Euro 160 million (mainly during 1994-1999), while other major donors include: International Development Agency (Euro 115 million)\(^\text{29}\); European Investment Bank (Euro 105 million); Italy (Euro 46 million); Arab funds (Euro 31 million); Germany (Euro 24 million); Kuwait (Euro 15 million); and European Bank for Reconstruction and Development (Euro 10 million) (The World Bank, 2002b).

With only 10 per cent of the Albanian transportation network estimated to be in good condition and another 22 per cent in fair condition (The World Bank, 2002b), the government has been successful in making the case for foreign financial support on road maintenance as well. The World Bank Road Maintenance Project provided a loan of US$ 17 million in June 2002, while a Supplemental Credit of US$ 13 million was approved in June 2003 (The World Bank, 2003).

International donors have also played a role in reversing the decline in spending on education in recent years. Since 1999 the Albanian government has been paying more attention to education and has reversed to some extent the trend of declining expenditures in education. In 2000, the Albanian government launched the Growth and Poverty Reduction Strategy (GPRS) as part of structural adjustment reforms that were strongly supported by the international donors (The World Bank 2001; IMF, 2003b).\(^\text{30}\) One of the integral parts of GPRS is educational reform. This reform is mainly financed

\(^{29}\) The World Bank projects are included here.

\(^{30}\) IMF, the World Bank and the EBRD have provided significant technical and financial support for the design and the implementation of structural and institutional reforms in Albania.
by the World Bank Education Reform Project, which has contributed US$ 12 million
for 3.5 years (The World Bank 2000d). Since 2001, the Albanian Ministry of
Education and Science is also implementing the School Rehabilitation Project (US$ 5
million), which is primarily financed by a US$ 4.5 million contribution from OPEC

3.7 PERFORMANCE OF INFRASTRUCTURE PROJECTS IN ALBANIA

The pattern and composition of government expenditures during the period 1997 to
2001 suggests that the Albanian government places a higher priority on public
investments in infrastructure than it does on education. Opportunities for corruption are
generally associated with procurements or the allocation of contracts to realize
government public investments. In other words, the level of capital expenditures or
public investments generally indicates the level of opportunities for extracting
corruption rents. As Figure 3.6 shows, in Albania education appears to offer fewer
opportunities for corruption than does infrastructure, because the major portion of
education expenditures is recurrent expenditures such as teacher salaries. In 1999 for
example, 86 per cent of educational expenditures were recurrent expenditures, while 12
per cent of total expenditures in the transport and communication sector were recurrent
(The World Bank, 2001).

In Albania, public investments in infrastructure and education (as indicated by
governmental capital expenditures) are typically fulfilled through private contracting.
These government contracts create opportunities for corruption both in contract
allocation and in implementation. As described above, a considerable amount of foreign
funding has been allocated to construction and the continuation of rehabilitation of
Albania's infrastructure. An independent consultancy report to the EU in December

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31 The Education Reform Project components took into account the recommendations of the education
study by Palomba and Vodopivec (World Bank Education Unit) conducted in 1999 and published in
32 The World Bank credit is used for the Milot-Lezhe, Librazhd-Qukes and Tirana region roads. The
European Investment Bank funding is used for roads such as Pogradec-Korce, Pogradec-Qafe e Thanes,
Fier-Vlore, Fier-Tepelenë. The PHARE program (EU) funding is used for the segments Vore-Sukth and
Rogozhine-Lushnje (EIU, 2002b).
2001 showed that there has been serious mishandling of these funds. The report stated that six of the seven road-building tenders financed by the EU at the time were awarded to contractors whose bids were not the lowest. Furthermore, the performance of these contractors in some cases had been seriously deficient (EIU, 2002b).

Some of this lack of performance is related to the inability, or unwillingness in some cases, of the government to enforce service contracts. For instance, the construction of the Rogozhine-Elbasan road experienced serious delays due to the foreign contractor's abandonment of the project. These types of hold-ups impose a high cost on the completion of road-infrastructure renewal projects. The Road General Directorate (RGD), the government department responsible for road repairs and renewal, was criticized for its poor performance in executing road reconstruction projects. While project abandonment and poor contract enforcement is part of their lack of success, numerous irregularities and violations in tender procedures are also being investigated.

3.8 CONCLUDING REMARKS

The weak enforcement of tax regulation due to widespread corruption in customs and tax-collection agencies has promoted the informal economy which in turn has created more opportunities for corrupt activities in Albania. Both tax cheating and corruption activities have adversely affected the business culture in Albania. The large informal sector in Albania may also have important implications for public finances. The low tax

33 BE-HA-SE, a Turkish firm, won the tender of Rogozhine-Fier construction in 2000. The progress during the first two years was very slow and the firm totally withdrew in January 2002 without meeting its obligations. The Roads General Directorate organized another tender to complete construction of the road. The funding for the new contract was based on the money guarantee frozen in the bank account, the unused investment funds and the incomes that will be generated from the court penalties and selling of equipment and machinery confiscated from BE-HA-SE (Gazeta Shqiptare, July 9, 2002).

34 In a meeting with the directors of the sectors in RGD in June 2002, the prime minister at the time, Mr. Majko, pointed out the poor contractual performance. In most of the cases the contractual value was 30 per cent higher than the realized value (Korrieri, June 4, 2002).

35 Those under investigation for abusive actions in conducting roads' tenders include Adi Shamku, the former director of RGD and a member of the Socialist Youth. Shamku was also charged for forging official documents for private benefits (EIU, 2002c).
revenues have hampered public investments in areas such as health, education, infrastructure and public order.

Corruption is also believed to be an important factor in determining the composition of public expenditures (Shleifer and Vishny, 1993; Mauro 1995; 1997; 1998). As shown in the latter part of this chapter, although education and road infrastructure are both sectors in serious need of financing, investments to improve these sectors have received different priorities in the Albanian government’s agenda.

Given the importance of the matters raised in the above analysis, the following chapters develop a number of theoretical models that explore these matters. More specifically, the model developed in Chapter IV examines the feedback effects between widespread corruption among tax inspectors and firms operating in the unofficial economy. Chapter V develops a model that examines what happens to the unofficial economy if corrupt practices and tax cheating become part of the business culture. Chapter VI examines how the government’s decision on tax regulation affects the unofficial economy and revenues for the provision of public goods, while the extension of this latter model explores the allocation of public expenditures between areas such as road infrastructure and education.
CHAPTER IV
CORRUPT TAX ENFORCERS AND THE UNOFFICIAL ECONOMY

4.1 INTRODUCTION

Chapter II outlined some of the issues around corruption in Albania, while Chapter III focused on bureaucratic corruption in customs and tax inspection agencies. Widespread corruption in these agencies has important implications for the informal economy and the provision of public goods. This chapter develops a theoretical model to explore how widespread corruption among enforcers of tax regulation affects the informal economy, and how the unofficial economy in turn sustains corrupt practices. More specifically, the model examines the decisions of firms to operate in the informal economy, and the corruption of tax inspectors as enforcers of tax regulation.

Although both tax cheating and corruption are illicit activities, it is important to distinguish between them. Tax cheating is the failure by a firm to comply with a mandatory tax payment. Corruption can take many forms, but in this model it takes the form of bribery. Specifically it is the misuse of the discretionary power of the tax inspector to enforce penalties for non-compliance in exchange for bribes. The following section briefly reviews the literature on the unofficial economy and on law enforcement, and outlines the contributions of this study. The chapter then moves to an extension of the theoretical model.

4.2 THE LITERATURE REVIEW

The literature relating to the unofficial economy focuses primarily on developing measures for the informal sector. Several empirical studies examine issues surrounding the unofficial economy, while theoretical models for this sector have been constructed
mainly in the context of labour allocation. These models identify general determinants of the unofficial economy, such as taxation levels and regulatory burdens, but they do not account for important firm characteristics such as the individualized cost structure of operating in the unofficial economy.

Johnson et al. (1997) developed a simple labour-allocation model to illustrate the relationship between the unofficial economy in countries in transition and excessive taxation and regulation – or, as they called it, “the politicization of economic life” (p. 159). They showed that tax and regulatory policies affect the size of the unofficial economy and, in turn, public finances and the quality of public services. Although corruption of the public office was not part of the conceptual model, the argument was made that firms would pay bribes to avoid excessive regulation and taxation. On this basis, bureaucratic corruption was used as a proxy for burdens relating to taxation and regulation. To validate this argument, the authors undertook cross-country empirical work on transition economies. The results provided some evidence that excessive regulation, taxation and corruption are positively correlated with the unofficial economy.

In a later empirical work, Johnson et al. (1998) extended the investigation to countries in Latin America and Organisation for Economic Co-operation and Development (OECD). Once more, they found evidence to support the idea that the greater the regulation, taxation and corruption, the larger a country’s unofficial economy. Johnson et al. (2000) attempted to validate the reasons provided in the literature as to why firms hide in the unofficial economy. Using firm-level data collected from surveys in five transition countries, they found a strong association between corruption and the size of the unofficial economy. They argued that firms in transition countries choose to go underground to avoid widespread bureaucratic corruption in the economy.

Although empirical work based on macro-level and micro-level data has shown a strong association between corruption and unofficial economies, the causality of this relationship remains unexplained. For example, the type of corruption involved, the part
of the system (official vs. unofficial) in which corruption takes place, and the channels and mechanisms through which corruption functions have typically not been identified. The studies also do not recognize that the lax enforcement of tax regulations due to widespread corruption in customs and tax administration is a major contributor to the prevalence of the informal sector in transition countries.

The literature on corruption-law enforcement has focused primarily on incentives that must be offered to law enforcers to avoid malfeasance. The initial literature in this field contributed to the identification of several ways in which the quality of enforcement could be improved. Studies by Becker (1968), Becker and Stigler (1974) and Klitgaard (1988) considered the decision of law enforcers to engage in malfeasance in a dynamic cost-benefit framework, with a focus on the enforcement cost functions. Becker and Stigler (1974) paid attention to the structure of enforcement costs, and suggested that the quality of enforcement can be improved either by raising the salaries of the public enforcers or by encouraging private enforcement to take over.

Subsequent literature in this field acknowledged that the compensation policy that deters the corrupt behaviour of public enforcers is more complex than what the earlier literature had suggested. For instance, Besley and McLaren (1993) looked at wage incentives for tax inspectors. They showed that an efficiency wage approach is the best strategy to combat corruption among tax inspectors under certain conditions, such as an evenly distributed tax burden and strong monitoring of tax enforcers.

Mookherjee and Png (1995) looked at the compensation policy for environmental law enforcers in the presence of corruption. They showed that penalties for corruption do not always deter bribery. Furthermore, they found that an increase in rewards for environmental inspectors could have an ambiguous effect on the number of environmental offenders reported, penalties collected, and the extent of bribery.

Since the main objective of the studies described above was the compensation policy of law enforcers, the studies assumed the behaviour of agents who should be complying
with the law to be exogenous. Mookherjee and Png (1995) were an exception. They modeled the firm’s choice of pollution (environmental law compliance) as part of corruption. However, the decision of the agent to comply with the law is crucial in creating opportunities for corruption by law enforcers. As well, this decision is likely to depend on the quality of enforcement.

With the exception of Besley and McLaren (1993), who introduced two kinds of tax inspectors (honest and dishonest) in their analysis, the studies considered law enforcers as homogenous agents. However, in reality, agents differ in their inclination toward engaging in illicit activities such as corruption.

This chapter develops a model that analyzes the unofficial economy and its implications for the provision of public goods, and also analyzes the corruption of the enforcers of tax regulation. By incorporating the corrupt behaviour of tax inspectors, the model contributes to an understanding of the firm’s choice to operate in the unofficial economy and provides insights into the opportunities of law enforcers to engage in corruption. As outlined above, the firm’s decision to comply with tax payment is central in the model, and therefore the corruption of tax enforcers is examined as it affects the firm’s decision to comply with tax payment.

The model also acknowledges that both individual firms and individual tax inspectors differ in their propensity to engage in cheating and corruption, and in the personal costs involved. Modeling agents in the economy as heterogeneous is no longer a new development in economics. For instance, literature relating to the economics of asymmetric information (adverse selection) is built on the premise that agents are of different types (Akerlof, 1970). The assumption that agents differ in their willingness to accept certain attributes of goods and services is at the core of the economics of differentiated products (Mussa and Rosen, 1978). The individualized cost structure makes the analysis of the unofficial economy and corruption of law enforcers much richer, and provides valuable insights as to why some agents engage in corrupt and
cheating activities and others do not. It also gives some insights as to why the size of the unofficial economy can differ among economies with similar tax regulations.

4.3 Basic Model: Modeling the Firm’s Decision to Cheat on Taxes

In any group of firms that participate in an economy, each must decide whether to pay taxes levied by the government or to cheat and not pay the taxes. It is assumed that firms differ in their ability or inclination to cheat on taxes and engage in corruption. This differentiated inclination is related to a number of factors, such as the agent’s value system, the agent’s attitudes toward the state and its rules and laws, and the agent’s personalized cost of engaging in cheating.

The inclination to engage in cheating is a concept that is used in the analysis of the unofficial economy. For instance, in a discussion of the shadow economy, Schneider (2002) considers the “tax morality” as one of the causes of operating in the shadow economy. “The ‘tax morality’ (citizens’ attitudes toward the state) … describes the readiness of individuals (at least partly) to leave their official occupation and enter the shadow economy” (pp. 44-45).

It is expected that agents differ in their value systems and hence in their “tax morality.” These value systems and attitudes, which are a product of individuals’ upbringings, educations and other cultural and religious factors, affect the agent’s inherent degree of honesty. As a result agents differ in their inclination to engage in illicit activities such as cheating and corruption.

More explicitly, the model recognizes that the inclination to operate in the unofficial economy is a function of the individualized costs of engaging in cheating. As outlined above, individual firms differ in their ability or inclination to engage in cheating and corruption. These differences in inclination are captured by a parameter $\beta \in [0,1]$, which can be also viewed as an “honesty index.” A low value of $\beta$ (close to zero) indicates a low degree of honesty or a high ability (inclination) to engage in cheating and
corruption, while a high $\beta$ (close to one) indicates a high degree of honesty or a low ability (inclination) to engage in cheating and corruption.

Each firm incurs a cost of cheating according to its inherent inclination to cheat and engage in corruption ($\beta$). The individualized cost of cheating is given by $\mu \beta$, where $\mu$ is a non-negative cost factor that is constant across all firms. Firms with a low $\beta$ have a low individualized cost of cheating, while firms that have a high $\beta$ have a high cost. The individualized cost of cheating ($\mu \beta$) can be interpreted in a number of ways. One interpretation is that $\mu \beta$ captures the moral cost to firms of engaging in unlawful activities such as tax evasion. A second interpretation is that $\mu \beta$ captures the transaction costs involved in cheating and corruption — i.e., the costs over and above the normal costs of business. These costs are associated with activities such as double bookkeeping, as well as arrangement and enforcement costs of corrupt deals. The arrangement costs could include signaling costs incurred by firms that engage in corrupt practices with tax inspectors. The enforcement costs result from ex-post “opportunistic” behaviour of tax inspectors. In the situation of an implicit contract such as a corrupt deal, there is a possibility that any of the parties may choose to not honour this implicit contract and to revisit its provisions.

The distribution of firms with respect to the differentiated characteristic $\beta$ is likely to vary from one economy to another. For instance, there could be an economy where the majority of firms is characterized by a moderate value of $\beta$—a distribution that resembles the normal distribution. In another situation, the majority of agents could be characterized by the extreme values of the index. Since it is difficult to obtain analytical results when a general distribution is used, this model assumes that firms are uniformly distributed with respect to the honesty index $\beta$. While this assumption affects the quantitative results of the model, the qualitative results will not be significantly affected as long as the distribution of firms that could potentially shift between cheating and not cheating appears to resemble a uniform distribution.

---

36 Casson (1991) uses the same assumption in his model of leadership.
A firm’s decision to cheat on taxes or not depends on the benefits and costs from these activities. If a firm complies and pays the taxes, its net returns are given by:

\[(4.1) \quad R^{NC} = \Pi(1 - t)\]

where \(\Pi\) is the before-tax profit of the firm, and \(t\) is the nominal tax rate.\(^{37}\)

If a firm cheats on its taxes, its expected net returns depend on the likelihood of its being audited (\(\delta\)) by a tax inspector, the penalty (\(\rho\)) paid if it is caught cheating, as well as the individualized cost of cheating given by \(\mu \beta\). If all tax inspectors are honest, the expected returns from cheating \(E[R^C]\) are given by:

\[(4.2) \quad E[R^C] = \delta \{\Pi[1 - (t + \rho)]\} + (1 - \delta)\Pi - \mu \beta\]

Note that since firms differ with respect to \(\beta\), and as a result in their individualized cost of cheating, the expected returns from cheating differ across firms.

If a portion (\(\alpha\)) of the tax inspectors are corrupt and can be bribed at a cost \(\Theta \Pi(t + \rho)\), then the expected returns from cheating are:

\[(4.3) \quad E[R^C] = \delta \{\alpha \Pi[1 - \Theta(t + \rho)]\} + (1 - \alpha)\Pi[1 - (t + \rho)]\} + (1 - \delta)\Pi - \mu \beta\]

\(^{37}\) Note that a firm’s profits are considered to be fixed. In the presence of cheating and corruption, a firm’s profits could well be a function of cheating and corruption activities. The model does not pursue this consideration for two reasons. First, the assumption of exogenous profits is made to facilitate the analysis of the size of the unofficial economy and better focus on the other features of the model such as the agents’ individualized returns due to non-monetary costs. Second, it is not obvious the way in which profits and corruption and cheating activities are related. Profits could be a positive function of the cheating and corruption activities since these activities are undertaken to capture additional rents. However, in the long term, an increase in cheating and corruption could negatively affect the investment climate and profits could be a negative function of the corruption and cheating activities.
A firm chooses to cheat on taxes if the expected returns from doing so exceed the returns from not cheating. The firm with characteristic $\beta^*$ is indifferent between complying and cheating, where $\beta^*$ is given by:

$$\beta^* : E[R^C] = R^{NC} \Rightarrow \beta^* = \frac{\prod [t - \delta(t + \rho)(1 - \alpha)(1 - \theta)]}{\mu}.$$ 

Firms with $\beta$ less than $\beta^*$ choose to cheat on taxes and hence to operate in the unofficial economy, while firms with $\beta$ greater than $\beta^*$ choose to pay taxes and operate in the official economy.

Since firms are uniformly distributed with respect to $\beta$ and $\beta \in [0,1]$, the unofficial economy’s share of the total economy is:

$$(4.4) \quad x^* = \beta^* = \frac{\prod [t - \delta(t + \rho)(1 - \alpha)(1 - \theta)]}{\mu}$$

Figure 4.1 illustrates firms’ decision to cheat on taxes and provides a graphical representation of the determination of the size of the unofficial economy. The horizontal axis measures the differentiation characteristic $\beta$, while firms’ expected returns are measured on the vertical axis. The distance $0\Pi$ indicates each firm’s before-tax profit – the area $0\Pi\Pi'1$ thus represents aggregate profits in the economy. The line $EE'$ represents the returns from complying with taxes $R^{NC} = \Pi(1 - t)$. These returns are independent of the differentiating characteristic $\beta$. The distance $E\Pi$ represents the tax to be paid by each firm $\Pi r$, with area $E\Pi\Pi'E'$ representing tax total revenues in the absence of cheating. The line $CC'$ represents the expected returns from cheating $E[R^C]$. The distance $0C$ represents the expected gross returns from cheating $\Pi - \delta \Pi(t + \rho)(1 - \alpha)(1 - \theta)$ The downward slope of line $CC'$ indicates that the individualized cost of cheating increases with $\beta$. 

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The intersection of $CC'$ and $EE'$ at $E^*$ determines the firm that is simply indifferent between cheating and not cheating on taxes. Firms located to the "left" of the firm with characteristic $\beta^*$ engage in cheating, while those to the "right" do not. The size of the unofficial economy is $\beta^*$, while the size of the official economy is $1 - \beta^*$.

4.4 Comparative Static Results in the Basic Model

Equation (4.4) indicates that the size of the unofficial economy is a function of the firm's profits $\Pi$, the tax rate $t$, the auditing probability $\delta$, the penalty rate $\rho$, the extent of corruption among tax inspectors $\alpha$, the fraction of the penalty paid as a bribe $\theta$ and the cost of cheating and engaging in corruption $\mu$. Table 4.1 summarizes the
Table 4.1. Comparative Static Results for the Basic Model

<table>
<thead>
<tr>
<th>Exogenous parameter</th>
<th>$\Pi$</th>
<th>$t$</th>
<th>$\delta$</th>
<th>$\rho$</th>
<th>$\alpha$</th>
<th>$\theta$</th>
<th>$\mu$</th>
</tr>
</thead>
<tbody>
<tr>
<td>The size of the unofficial economy $\beta^*$</td>
<td>(+)</td>
<td>(+)</td>
<td>(-)</td>
<td>(-)</td>
<td>(+)</td>
<td>(-)</td>
<td>(-)</td>
</tr>
</tbody>
</table>

comparative static results and indicates whether an increase in the parameters encourages firms to cheat on taxes or serves as a deterrent to cheating.

As Table 4.1 indicates, an increase in profits and an increase in the tax rate increases the amount of cheating, *ceteris paribus*. As a result, the size of the unofficial economy increases. When the government undertakes a more intense auditing of tax compliance, the size of the unofficial economy decreases, *ceteris paribus*. The higher the penalty rate, the smaller the size of the unofficial economy.

The greater the extent of corruption among tax inspectors, the greater the size of the unofficial economy. As corruption increases among tax inspectors, so does the incentive for firms to cheat on taxes, since corruption provides an alternative to penalties for tax evasion. As the amount of the bribe received by a tax inspector increases, the smaller the incentive to cheat, which leads to a decline in the size of the unofficial economy. The higher the cost $\mu$ of cheating and engaging in corruption, the lower the incentive to cheat on taxes, and therefore the smaller the size of the unofficial economy.

4.5 Corruption and Cheating Rents, Tax Revenues, Bribes and Cheating and Corruption Costs

The size of the unofficial economy has important implications for the distribution of rents in the economy. This section examines the distribution of rents in the system when cheating and corruption are considered.

In the absence of cheating and corruption, the tax rate $t$ determines the distribution of the total rents in an economy. Firms receive after-tax profits of $(1-t)\Pi$ and the
government receives tax revenues of \( t\Pi \). These tax revenues are available for the provision of public goods.

In the presence of cheating and corruption, all firms receive after-tax profits \((1 - \tau)\Pi\), regardless of whether they decide to cheat on taxes or not. The potential tax revenues \( t\Pi \) are then available for distribution to firms, tax inspectors and the government—depending on the amount of cheating and corruption.

In the presence of cheating the government collects taxes only from the \( 1 - \beta^* \) firms that choose to operate in the official economy. The rest of the potential tax revenues \( t\Pi \) are distributed between the cheating firms and the corrupt tax inspectors. Firms that operate in the unofficial economy obtain cheating rents in addition to after-tax profits \( \Pi(1 - \tau) \).

However, those firms that are caught cheating by corrupt tax inspectors and engage in corrupt practices obtain corruption rents. The corrupt tax inspectors receive bribes in exchange for not enforcing the penalties, while the honest tax inspectors enforce and collect penalties when cheating is detected. There are also cheating and corruption costs that are incurred by the firms engaged in cheating and corruption. The reminder of this section derives the analytical expression for each rent component. Figure 4.2 illustrates graphically the distribution of rents.

**Tax revenues** \( T^* \) are equal to the tax paid by the firms that operate in the official economy. Thus, \( T^* = (1 - \beta^*)\Pi t \) where \((1 - \beta^*)\) is the size of the official economy.

Substituting \( \beta^* \) from equation (4.4), \( T^* \) becomes:

\[
T^* = \Pi t \frac{\Pi^2 \mu - \mu t - \delta t - \delta(\Pi + \theta)(1 - \alpha(1 - \theta))}{\mu}
\]

The second term in equation (4.5) represents the loss in tax revenues due to cheating and corruption. In Figure 4.2 the tax revenues are represented by area \( E^* E T \Pi^* \).

**Total Penalties Collected by Honest Tax Inspectors** \( P^* \) are determined by the amount of the penalty \( \Pi(t + \rho) \) multiplied by the number of cheating firms audited by honest tax
inspectors $\delta \beta^*(1-\alpha)$. Thus the total penalties are $P^* = \delta \beta^*(1-\alpha)\Pi(t+\rho)$. Substituting $\beta^*$ from equation (4.4) gives:

$$p^* = \frac{\Pi^2 (t+\rho)(1-\alpha)\delta [t-\delta(t+\rho)(1-\alpha(1-\theta))]}{\mu}$$

**Cheating and Corruption Rents** $CCR^*$ accrue to the firms that operate in the unofficial economy. A portion of these rents accrues to the firms that cheat on taxes and engage in corrupt activities to avoid penalties when they are audited by corrupt tax inspectors, while the remainder accrues to the firms that cheat on taxes and are not caught doing so. The cheating and corruption rents are given as follows:
$$CCR^* = \int_0^\beta \{ E[R^C] - R^{NC} \} \beta = \frac{\beta^* \mu}{2} \mu^2$$

Substituting the value of $\beta^*$ from equation (4.4) gives:

$$CCR^* = \frac{\Pi(t - \delta(t + \rho)(1 - \alpha(1 - \theta)))}{2\mu}$$

(4.7)

Graphically $CCR^*$ is represented by the area below the "expected return from cheating and corruption" curve $CC'$ and above the "returns for complying with taxes" line $EE'$. This area is represented by triangle $CEE^*$.

**Cheating and Corruption Costs** $CCC^*$ are borne by all firms that operate in the unofficial economy and can be interpreted as either transaction costs or moral costs. These costs are given as:

$$CCC^* = \int_0^\beta \mu \beta = \frac{\beta^* \mu}{2} \mu^2$$

Substituting the value of $\beta^*$ from equation (4.4) results in:

$$CCC^* = \frac{\Pi^2 [t - \delta(t + \rho)(1 - \alpha(1 - \theta))]^2}{2\mu}$$

(4.8)

Graphically, the cheating and corruption costs in the economy are represented by the area below the "expected gross returns from cheating and corruption" line $CC^*$ and above the "expected returns from cheating and corruption" line $CC'$. In Figure 4.2, this area is represented by the triangle $CC^*E^*$. Triangle $CC^*E^*$ is equal to triangle $CEE^*$ since equations (4.7) and (4.8) are identical.

**Bribes Received by Corrupt Tax Inspectors** $B^*$ are determined by multiplying the bribe received by a corrupt tax inspector by the number of cheating firms that are audited by a corrupt inspector. Total bribes are given as follows by:

$$B^* = \delta \beta^* \alpha \theta \Pi(t + \rho)$$

where $\delta \beta^*$ is the number of audited cheating firms, $\alpha$ is the number of corrupt tax inspectors and $\theta \Pi(t + \rho)$ is the bribe received by a corrupt tax inspector. Substituting the value of $\beta^*$ in equation (4.4), the bribes are given as follows:
(4.9) \[ B^* = \frac{\Pi^2 \alpha \delta(t + \rho)[t - \delta(t + \rho)(1 - \alpha(1 - \theta))]}{\mu} \]

The bribes received and the total penalties collected by tax inspectors are given:

(4.10) \[ B^* + P^* = \delta \beta^* \Pi(t + \rho)(1 - \alpha(1 - \theta)) \]

This amount is illustrated by the area of the rectangle \( \Pi \Pi \times C \times C \) in Figure 4.2. The distance \( \Pi C \) in Figure 4.2 is equal to \( 0 \Pi - 0C \) minus the distance \( 0C \). Therefore the height of the rectangle \( \Pi \Pi \times C \times C \) is given by \( \Pi C = \delta \Pi(t + \rho)(1 - \alpha(1 - \theta)) \). The base of the rectangle \( \Pi \Pi \times C \times C \) is \( \beta^* \). Thus, area \( \Pi \Pi \times C \times C = B^* + P^* \).

4.6 DISTRIBUTION OF RENTS AND THE EXTENT OF CORRUPTION AMONG TAX INSPECTORS

The comparative statics indicate that an increase in the extent of corruption (\( \alpha \)) among tax inspectors leads to a larger unofficial economy. As a result, the distribution of rents in the economy is also affected. As corruption becomes more widespread among tax inspectors (i.e., as \( \alpha \) increases), fewer taxes and penalties are collected and hence fewer revenues are available for the provision of public goods, larger cheating and corruption rents are obtained by firms in the unofficial economy, more bribes are collected, and higher cheating and corruption costs are imposed on the system.

Figure 4.3 depicts the size of the unofficial economy and the rent distribution for three scenarios depicting varying degrees of corruption among tax inspectors (\( \alpha = 0 \); \( 0 < \alpha < 1 \); \( \alpha = 1 \)). In the absence of corruption among tax inspectors (\( \alpha = 0 \)), the size of the unofficial economy is \( \beta_0 \). In the presence of some corruption among tax inspectors (\( 0 < \alpha < 1 \)), the size of the unofficial economy is \( \beta^* \). In the presence of full corruption among tax inspectors (\( \alpha = 1 \)), the size of the unofficial economy is \( \beta_1 \).
Figure 4.3. The Distribution of Rents in the Case of Absence, Presence and Full Presence of Corruption among Tax Inspectors
As Figure 4.3 illustrates, an increase in $\alpha$ shifts the “expected returns from cheating” curve $E[r^C]$ upwards from $DD'$ to $CC'$ and eventually to $BB'$. This shift affects the distribution of rents in the economy in two ways: firstly by transforming penalties collected into bribes, and secondly by affecting the size of the unofficial economy as a result of altering firms’ incentives to cheat on taxes.

In the case of absence of corruption among tax inspectors ($\alpha = 0$), penalties are always enforced. Therefore, all penalties collected are destined for the state budget (area $\Pi IDD_0 \Pi_0$) and no bribes are collected. If some corrupt tax inspectors are present ($\alpha > 0$) they receive bribes, while honest tax inspectors enforce and collect penalties. The bribes are a portion of the total penalties that would potentially be collected (area $\Pi ICC \ast \Pi \ast$). Thus, the penalties are partially enforced (area $FCC \ast F \ast$) and partially embezzled (area $\Pi FF \ast \Pi \ast$). The relative size of these areas ($P$ and $B$) depends on the extent of corruption (the value of $\alpha$). When corruption among tax inspectors becomes widespread ($\alpha$ approaches 1), more and more bribes are collected and fewer and fewer penalties are enforced. Finally, when all tax inspectors are corrupt ($\alpha = 1$), all the penalties are waived in exchange for bribes. Thus, only bribes are collected (area $\Pi BBB_1 \Pi_1$). In this extreme case tax inspectors simply transfer money from the government budget to themselves and the cheating firms, with no contribution actually resulting from inspection.

The theft of public funds by bureaucrats is not a one-to-one transfer from the government budget to corrupt bureaucrats. As corruption becomes more widespread, the potential penalties to be collected are transformed not only into bribes but also into corruption rents that accrue to firms. Corrupt tax inspectors share potential penalties with firms through corrupt deals. Hence, corruption affects a firm’s incentive to cheat on taxes. As more cheating is encouraged, the size of the unofficial economy grows (from $\beta_0$ to $\beta \ast$ and eventually to $\beta_1$). An expanding unofficial economy has a direct impact on the amount of tax collected in the economy. As a result, fewer taxes are collected (area $\Pi cE_0 E\Pi'$ shrinks to area $\Pi \ast E \ast E\Pi'$, and eventually to area $\Pi_1 E_1 E\Pi'$), fewer revenues are available for the provision of public goods, and higher
transaction (or moral) costs occur in the economy (i.e., area $DD_0E_0$, increases to area $CC^*E^*$ and eventually to $BB_1E_1$).

4.7 Extending the Basic Model: Endogenizing the Extent of Tax-Inspection Corruption

Equation (4.4) indicates that the size of the unofficial economy $\beta^*$ depends on the extent of corruption among tax inspectors $\alpha$. While the degree of corruption among tax inspectors was considered exogenous in the previous section, $\alpha$ likely depends on the size of the unofficial economy $\beta^*$. This section examines the size of the unofficial economy when the extent of corruption among tax inspectors $\alpha$ is endogenous.

Every tax inspector must decide whether to enforce penalties to firms for tax non-compliance or to engage in corrupt deals. Like firms, different tax inspectors have different degrees of honesty. Their differentiated ability to engage in corruption is captured by an index $\alpha(\alpha \in [0,1])$, where a low $\alpha$ (close to 0) indicates a low honesty and a high corruption ability, and a high $\alpha$ (close to 1) indicates a high degree of honesty and a low ability to corrupt. For simplicity, it is assumed that tax inspectors are uniformly distributed with respect to $\alpha$.

If the tax inspector enforces the penalties when she detects tax cheating, her returns consist of a wage $\omega$:

$$R^{NCo} = \omega$$

(4.11)

If the tax inspector detects tax cheating and waives the penalties $\Pi(\theta + \rho)$ in exchange for embezzling a portion $(\theta)$, she incurs an individualized cost of corruption. Since tax inspectors are differentiated with respect to their ability to engage in corrupt activities $(\alpha)$, they also differ in their individualized cost of corruption $\lambda \alpha$. The parameter $\lambda$ is a non-negative cost factor that is constant across all tax inspectors. The net returns from engaging in corruption are given as follows:
(4.12) \[ E[R^{Co}] = \omega + \delta \beta \Theta \Pi (t + \rho) - \lambda \alpha \]

where \( \beta \) is the size of the unofficial economy, and \( \delta \beta \) represents the probability that a tax inspector encounters a firm that cheats on taxes, and \( \Theta \Pi (t + \rho) \) is the amount of bribes received in exchange for waiving the penalty.

The individualized cost of corruption (\( \lambda \alpha \)) can be interpreted in a similar fashion as the firm's cheating and corruption costs (\( \mu \beta \)). The first interpretation is a moral cost or a reputational cost of abusing the responsibility for enforcing tax regulations. Depending on the individual value systems of tax inspectors, engaging in corruption could have various meanings in the moral context and as a result could induce varying degrees of guilt in different individuals for abusing their power. Tax inspectors with a low \( \alpha \) (low degree of honesty) incur a low moral cost of corruption, while tax inspectors with a high \( \alpha \) (high degree of honesty) incur a high moral cost of corruption. The cost of corruption also can be considered as a transaction cost, and can include illicit arrangements for waiving penalties.

A tax inspector chooses to engage in corruption as long as the expected bribes to be received exceed the cost of engaging in corruption. Since the cost of corruption \( \lambda \alpha \) varies among tax inspectors according to their ability to engage in corruption \( \alpha \), some tax inspectors will find it profitable to engage in corruption while others will not. The tax inspector with characteristic \( \alpha^* \) is indifferent between engaging in corruption and enforcing the penalties, where \( \alpha^* \) is given by:

(4.13) \[ \alpha^*: E[R^{Co}] = R^{NCo} \Rightarrow \alpha^* = \frac{\delta \beta \Theta \Pi (t + \rho)}{\lambda} \]

Tax inspectors with \( \alpha \) lower than \( \alpha^* \) choose not to enforce tax regulations and to collect bribes, while tax inspectors with \( \alpha \) higher than \( \alpha^* \) chose to enforce tax
regulations and collect penalties for tax evasion. With tax inspectors uniformly distributed with respect to the characteristic $\alpha$, $\alpha^*$ also represents the extent of corruption among tax inspectors.

Figure 4.4 presents the decision of tax inspectors to engage in corruption. The characteristic $\alpha$ is depicted by the horizontal axis, while the returns are represented by the vertical axis. Line $\omega\omega'$ represents the return from enforcing the penalties $R^{NCo}$. Line $AA'$ represents the expected net returns from corrupt activities $E[R^{Co}]$ with an intercept at gross returns from corruption $\delta\beta\Theta(1 + \rho)$. The downward sloping $E[R^{Co}]$ curve indicates the increasing cost of corruption as $\alpha$ increases. The intersection of $E[R^{Co}]$ and $\omega\omega'$ at $\omega^*$ determines the extent of corruption among tax inspectors, $\alpha^*$. Tax inspectors located to the "right" of $\alpha^*$ will enforce penalties, while tax inspectors located to the "left" of $\alpha^*$ will waive penalties in exchange for bribes.

![Figure 4.4. The Decision of Tax Inspectors to Engage in Corruption](image)

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In their decision to engage in corruption, tax inspectors take into consideration the cheating activities that take place in the economy. Firms are willing to offer bribes to tax inspectors in relation to tax cheating only if they are caught. Therefore only the unofficial economy given by equation (4.4) represents a source of potential bribes for tax inspectors.

The relationship between the size of the unofficial economy and the extent of corruption among tax inspectors has a two-way causality. Corruption among tax inspectors induces more firms to cheat. In turn, the unofficial economy creates opportunities for corrupt activities and breeds more corruption among tax inspectors. Both tax inspectors and firms make their decisions simultaneously, by taking into account the other's decision. This implies that the size of the unofficial economy $\beta^*$ and the extent of corruption among tax inspectors $\alpha^*$ can be determined by simultaneously solving the following system of equations:

\[
\begin{align*}
\alpha^* &= -\frac{[t-\delta(t+\rho)]}{\delta(t+\rho)(1-\theta)} + \frac{\mu}{\delta\Pi(t+\rho)(1-\theta)}\beta^* \quad \text{(from equation 4.4)} \\
\alpha^* &= \frac{\delta\theta\Pi(t+\rho)}{\lambda} \beta^* \quad \text{(from equation 4.13)}
\end{align*}
\]

The equations in the system represent the firms' activity function and tax inspectors' activity function respectively, since the expression provides an indication of the cheating and corruption activity undertaken by two groups. The solution of the system is as follows:

---

38 Equation (4.4), which represents the size of the unofficial economy, is transformed so that $\alpha^*$ is given in terms of $\beta^*$. 

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\[
\begin{align*}
\beta^* &= \frac{\Pi \lambda [1 - \delta(t + \rho)]}{\mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta (1 - \theta)} \\
\alpha^* &= \frac{\Pi^2 \delta \theta (t + \rho) [1 - \delta(t + \rho)]}{\mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta (1 - \theta)}
\end{align*}
\]

(4.15)

For an interior solution for $\alpha^*$ and $\beta^*$, both $\mu \lambda > \delta^2 \Pi^2 (t + \rho) \theta (1 - \theta)$ and $t > \delta(t + \rho)$ must hold. The inequalities $\alpha \leq 1$ and $\beta \leq 1$ must also hold.

The activity functions of firms and tax inspectors (equations in 4.14) are depicted in Figure 4.5. The intersection of the firms’ activity function $FF'$, and the tax inspectors’ activity function $TT'$ determines the size of the unofficial economy $\beta^*$ and the extent of corruption among tax inspectors $\alpha^*$. The slope of the tax inspectors’ activity function ($TT'$) is the ratio of amount of bribes received by a corrupt tax inspector to the cost of corruption weighted by the auditing probability. Similarly, the slope of the firms’ activity function ($FF'$) gives an adjusted cost-benefit of cheating and corruption ratio for firms. Both these activity functions have positive slopes, which indicate the complementary nature of cheating by firms and corruption by tax inspectors. Thus, increases in either $\alpha$ or $\beta$ will lead to an increase in the other variable.

The tax inspectors’ activity function passes through the origin, while the firms’ activity function has a negative intercept. For an interior solution, the firms’ activity function should increase faster than the bureaucrats’ activity function and should cut it from below. Since the slopes of the activity functions give the adjusted relative benefits of corruption and cheating for each of the agents (firms and bureaucrats), the relative benefits from illicit activities are crucial in determining the size of the unofficial economy and the extent of corruption among tax inspectors.
Figure 4.5. The Determination of the Size of the Unofficial Economy and the Extent of Corruption among Tax Inspectors

Comparative statics can be performed to isolate the effects of the exogenous parameters on the size of the unofficial economy and on the extent of corruption among tax inspectors. These static results are summarized in Table 4.2, while the calculations are presented in Appendix 4. The results show that endogenizing the behaviour of both groups results in a much richer set of results compared to what was presented when only the firms’ decisions were examined.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Exogenous $\alpha$</th>
<th>Endogenous $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta^*$</td>
<td>$\frac{\Pi\beta(t+\rho)(1-\theta)}{\mu}$</td>
<td>$\frac{\Pi^2\beta(t+\rho)(1-\theta)}{\mu\lambda - \delta^2\Pi(t+\rho)^2 \theta(1-\theta)}$</td>
</tr>
<tr>
<td>$\Pi$</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>$\lambda$</td>
<td>na</td>
<td>(-)</td>
</tr>
<tr>
<td>$\mu$</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td>$\tau$</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>$\delta$</td>
<td>(-)</td>
<td>(+) for $\delta \in \left[0, \frac{t}{2(t+\rho)}\right]$</td>
</tr>
<tr>
<td></td>
<td>(+) for $\delta \in \left[\frac{t}{2(t+\rho)}, \frac{t}{t+\rho}\right]$ and</td>
<td>$\mu\lambda &lt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
</tr>
<tr>
<td></td>
<td>$\mu\lambda [2\delta(t+\rho) - 1] &lt; \delta^2\Pi^2(t+\rho)^2 \theta(1-\theta)$</td>
<td>$\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
</tr>
<tr>
<td></td>
<td>(-) for $\delta \in \left[\frac{t}{2(t+\rho)}, \frac{t}{t+\rho}\right]$ and</td>
<td>(-) when $\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
</tr>
<tr>
<td></td>
<td>$\mu\lambda [2\delta(t+\rho) - 1] &gt; \delta^2\Pi^2(t+\rho)^2 \theta(1-\theta)$</td>
<td>$\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
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<tr>
<td>$\rho$</td>
<td>(-)</td>
<td>(+) for $\rho \in \left[0, \frac{t(1-2\delta)}{2\delta}\right]$</td>
</tr>
<tr>
<td></td>
<td>(+) for $\rho \in \left[\frac{t(1-2\delta)}{2\delta}, +\infty\right]$ and</td>
<td>$\mu\lambda &lt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
</tr>
<tr>
<td></td>
<td>$\mu\lambda [2\delta(t+\rho) - 1] &lt; \delta^2\Pi^2(t+\rho)^2 \theta(1-\theta)$</td>
<td>$\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
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<td></td>
<td>(-) for $\rho \in \left[\frac{t(1-2\delta)}{2\delta}, +\infty\right]$ and</td>
<td>(-) when $\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
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<td>$\mu\lambda [2\delta(t+\rho) - 1] &gt; \delta^2\Pi^2(t+\rho)^2 \theta(1-\theta)$</td>
<td>$\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta(1-\theta)$</td>
</tr>
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<td>$\theta$</td>
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</tr>
<tr>
<td></td>
<td>(+) for $\theta &gt; \frac{1}{2}$ and $\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta$</td>
<td>(-) for $\theta &gt; \frac{1}{2}$ and $\mu\lambda &lt; \delta^2\Pi(t+\rho)^2 \theta$</td>
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<tr>
<td></td>
<td>(-) for $\theta &gt; \frac{1}{2}$ and $\mu\lambda &gt; \delta^2\Pi(t+\rho)^2 \theta$</td>
<td>(-) for $\theta &gt; \frac{1}{2}$</td>
</tr>
</tbody>
</table>
As an example of this greater richness, consider the auditing rate $\delta$. In the basic model, an increase in $\delta$ always leads to less cheating. This result does not hold in the richer model. As Table 4.2 shows, $\delta$ serves as a cheating deterrent only if
\[ \mu\lambda - \delta\Gamma^2(t + \rho)\theta(1 - \theta)[2t - \delta(t + \rho)] > 0. \]

The condition for an interior solution
\[ \mu\lambda - \delta\Gamma^2(t + \rho)\theta(1 - \theta) > 0 \]
implies that $\mu\lambda - \delta\Gamma^2(t + \rho)\theta(1 - \theta)[2t - \delta(t + \rho)]$ could be either positive or negative. Only high costs of cheating and corruption for both agents – i.e., a high $\mu\lambda$ – will assure that condition $\mu\lambda - \delta\Gamma^2(t + \rho)\theta(1 - \theta)[2t - \delta(t + \rho)] > 0$ is satisfied. This implies that auditing is a cheating deterrent only if it becomes very costly for both firms and tax inspectors to undertake cheating and corruption. The same condition must also hold for the punishment rate $\rho$. Increasing the severity of punishment – increasing the penalty rate $\rho$ – will deter cheating only if engaging in cheating and corruption is costly for both firms and tax inspectors.

The reason for these paradoxical results is the complementary relationship between cheating and corruption. If we view the penalty rate as the discretionary power of the tax enforcers, a higher penalty rate means a higher incentive to override it and to embezzle part of it. As comparative static results show, an increase in the penalty rate will encourage more corruption among tax inspectors if it is not costly to engage in corruption and cheating. In turn, more corruption leads to more cheating. Thus, higher penalties for cheating may result in more cheating.

Similarly, auditing creates opportunities for tax inspectors to practice corruption. With low cost of cheating and corruption, a more intense auditing can lead to more corruption among tax inspectors, which in turn breeds more cheating. Therefore an increase in the likelihood of cheating detection may increase cheating.

When cheating and corruption costs are high, the effect of intense auditing and higher penalties on the corruption of tax inspectors is reversed. As comparative static results show, if engaging in cheating and corruption is very costly, an increase in the penalty
rate beyond \( \rho = \frac{\sqrt{1 - 2\delta}}{2\delta} \) or an increase in the auditing rate beyond \( \delta = \frac{\sqrt{1}}{2(r + \rho)} \), will decrease the corruption among tax inspectors. Thus, when cheating and corruption costs are high, even incentives for corruption can work as disincentives.

In the basic model, an increase in \( \theta \) (the share of the penalty paid as a bribe) lowers the size of the unofficial economy \( \beta^* \). In this extension, this behaviour – i.e., where an increase in bribes will suppress firms’ incentive to cheat – holds only if \( \theta \) is greater than one half – i.e. \( \theta > \frac{\sqrt{2}}{2} \). As long as the bribe that a cheating firm will pay will ultimately remain less than half of the penalty for tax evasion, incentives to cheat are not deterred by an increase in the bribe.

On the inspector’s side, an increase in bribes increases the corruption of tax inspectors only if the bribe is less than half of the penalty (\( \theta < \frac{\sqrt{2}}{2} \)). If \( \theta > \frac{\sqrt{2}}{2} \) the relationship between the bribe and the extent of corruption among tax inspectors is more involved. If a tax inspector asks for a bribe that is larger than half of the penalty, then higher bribes may result in less corruption. Although this result does not appear to be very rational, one should recall the interdependence between cheating and corruption. An increase in \( \theta \) (in the high range) will decrease the firm’s incentive to cheat. Less cheating leads to less corruption among tax inspectors.

4.8 CONCLUDING REMARKS

The unofficial economy and the weak enforcement of tax compliance are important issues in most transition countries. This chapter developed a differentiating characteristic model to examine firms’ cheating behaviour in the presence of corrupt enforcers of tax compliance. As expected, the analytical results indicate that high statutory taxes and widespread corruption among tax inspectors encourage cheating behaviour, while intense auditing, high penalties, high bribes and high cheating and corruption costs deter cheating behaviour.
To examine the impact of corruption among tax inspectors on the unofficial economy and the impact of this economy on the opportunities for corruption by tax inspectors, the behaviour of the tax inspectors was endogenized. The results support the notion that corruption breeds cheating, which in turn creates more opportunity for corruption in tax collection. Therefore, widespread bureaucratic corruption among tax inspectors can perpetuate an unofficial economy that in turn sustains these and other corrupt practices. In a situation where cheating and corruption breed more of one another, relationships between the unofficial economy or corruption and other exogenous variables are not straightforward.

For instance, intense auditing and penalties serve as cheating deterrents only if cheating and engaging in corruption is very costly for both firms and tax inspectors. More cheating occurs due to more corruption among tax inspectors. Since auditing is the avenue to collecting bribes for tax inspectors, an increase in the auditing intensity will increase corruption among tax inspectors. Similarly, an increase in the penalty rate, especially when it is low, will increase tax-inspector corruption. As a result, more cheating will take place. An increase in the bribe paid by the firm will suppress the firms’ incentive to cheat, but only if the bribe is high. As a result, high bribes may result in less corruption of tax inspectors. If engaging in cheating and corruption is costly for both firms and tax inspectors, an increase in the penalty and auditing rates in the high ranges may even decrease corruption among tax inspectors.
CHAPTER V

THE UNOFFICIAL ECONOMY WITH ENDOGENOUS COSTS OF CHEATING ON TAXES AND ENGAGING IN CORRUPTION

5.1 INTRODUCTION

The discussion in Chapter III suggests that widespread corruption in tax administration and the operation of businesses in the informal economy have affected the general business culture in Albania. As cheating and corruption become more widespread, it is hypothesized that they become more acceptable as business practices. This chapter examines the cheating behaviour of firms and the extent of the unofficial economy when cheating and corruption become less costly and more acceptable as business practices, and hence greater numbers of firms engage in these activities. More specifically, the model developed in Chapter IV assumed that the cost of cheating and engaging in corruption $\mu$ is independent of the amount of cheating that occurs. This chapter examines the implications of making $\mu$ endogenous.

This chapter combines the elements of the model developed in Chapter IV with a model by Hoff and Stiglitz (2002) which examines the demand for the Rule of Law in transition countries in a coordination game framework. A coordination game framework is required because firms face a coordination problem when they decide whether or not to cheat on taxes. The decision by each firm to pay taxes determines the amount of taxes collected in the economy. Tax revenues are used to provide public goods such as the Rule of Law, health, education and infrastructure. In turn, these public goods benefit all firms in the economy. If firms can coordinate their decisions to pay taxes, the impact is two-fold – the provision of public goods is enhanced (thus providing benefits to the firms) and the cost of cheating is increased (thus making it more costly to cheat) since,
as suggested above, the cost of cheating is likely to be inversely related to the amount of cheating that goes on.

With the cost of cheating dependent on the degree of cheating and corruption, the firms’ decisions to cheat on taxes are complementary strategies. For instance, one firm’s choice to cheat on taxes contributes to making cheating cheaper, which induces other firms to cheat. Conversely, one firm’s decision to pay taxes helps to make cheating more expensive, hence causing fewer firms to cheat. As other firms follow suit, their collective decision can exhibit stable multiple equilibria. These equilibria are Pareto ranked. The inefficient equilibrium is characterized by a high incidence of cheating and corruption, which limits the extent of benefits from the provision of public goods. The efficient equilibrium is characterized by a low incidence of cheating that results in greater benefits from the provision of public goods. Pessimistic expectations about other firms’ tax payments might lead the remaining firms to choose to operate in the unofficial economy. The results of the model developed in this chapter show that the inefficient outcome of a large unofficial economy that is associated with corrupt activities can be a stable equilibrium.

5.2 The Unofficial Economy with Constant $\mu$

This section translates the model developed in Chapter IV into the framework used by Hoff and Stiglitz (2002). Recognizing that the firm’s decision to cheat on taxes is part of a collective decision that gives rise to the unofficial economy, the determination of the unofficial economy is presented in terms of the firms’ ability to engage in cheating and corruption, and the honesty threshold to engage in these practices.

The firms that participate in an economy differ with respect to their honesty characteristic/index $\beta(\beta \in [0,1])$. The honesty characteristic $\beta$ captures the firm’s ability to engage in cheating and corruption, where a low $\beta$ translates into a high ability to engage in cheating and corruption, and a high $\beta$ translates into a low ability to engage in cheating and corruption. A firm’s decision to cheat on taxes depends on its own
ability to cheat and engage in corruption, and the value of $\beta$ at which a firm is indifferent between cheating and paying taxes. This latter value is called the switching value $\beta_{sw}$.

The switching value is given by equation (4.4) in Chapter IV:

$$
\beta_{sw} = \beta^* = \frac{\mu}{\Pi [t - \delta(t + \rho)(1 - \alpha(1 - \theta))]} 
$$

where $\Pi$ is the firm’s profits, $t$ is the nominal tax rate, $\rho$ is the penalty rate that a firm should pay when it is caught cheating with a probability $\delta$, $\mu$ is the cost of cheating, $\alpha$ is the extent of corruption among tax inspectors and $\theta$ determines the amount of bribe.

Equation (5.1) also represents the switching line SWL or the locus of the switching values at any given $x$. In Figure 5.1, the SWL is a horizontal line with an intercept at $\beta_{sw}$. The SWL divides the plane into two areas. Firms whose $\beta$ locates them in the area above the SWL pay taxes. By contrast, firms whose $\beta$ locates them under the SWL cheat on taxes.

As long as a firm has a higher ability to cheat than the switching value, i.e., $\beta < \beta_{sw}$, the firm will choose to cheat on taxes and operate in the unofficial economy. Thus, at a given switching value $\beta_{sw}$, all firms that have a higher ability to cheat ($\beta$ lower than $\beta_{sw}$) will choose to cheat on taxes. In general, the number of firms that cheat and engage in corruption (the size of the unofficial economy $x$) is given by the cumulative distribution of firms with respect to the honesty index at a given value of $\beta$ that it is denoted by $\beta_{cca}$ — i.e. $x(\beta) = H(\beta_{cca})$. We call this function the Cheating and Corruption Ability Curve (CCAC).

With firms uniformly distributed with respect to $\beta$ — i.e., $H(\beta_{cca}) = \beta_{cca}$ — and with a normalized size of the economy to one (i.e., $x(x \in [0,1])$), the CCAC is given by:

$$
\beta_{cca} = x \quad \text{ (CCAC)} 
$$
The CCAC is shown graphically in Figure 5.1 as the 45 degree line. The CCAC line divides the plane into two areas. For any given $x$, firms whose $\beta$ positions them under CCAC have a comparative advantage in cheating and engaging in corruption compared to firms whose $\beta$ locates them above the CCAC.

As outlined above, the number of firms that cheat on taxes at the honesty value equal to the switching value – i.e., $\beta_{CCA} = \beta_{SW}$ – is given by:

$$x^* = \beta_{CCA}^* = \beta_{SW}^* = \frac{\Pi \left[ 1 - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right]}{\mu}$$

![Diagram](image)

**Figure 5.1. The Size of the Unofficial Economy with Constant $\mu$**
In Figure 5.1 the intersection between the CCAC and the SWL at point E represents the unique equilibrium and determines the size of the unofficial economy at $x^*$ and the size of the official economy at $1-x^*$.

### 5.3 Endogenous Cost of Cheating

In Chapter IV, the cost of cheating and corruption $\mu$ was assumed to be constant. However, the cheating cost is likely to depend on the extent of cheating and corruption activities that take place in the economy – i.e., $\mu$ is a function of $x$. For instance, the cost of cheating is low if the incidence of cheating is high, while the cost of cheating would be high in an economy where the majority of firms comply with taxes. Figure 5.2 depicts the cost of cheating $\mu(x)$.

![Graph showing the relationship between $\mu$ and $x$](image)

**Figure 5.2. The Cost of Cheating and Corruption**
We consider $\mu(x)$ to be a decreasing and convex function of the extent of cheating and corruption that occurs in the economy – i.e., $\mu'(x) < 0$ and $\mu''(x) < 0$. If the cost of cheating and engaging in corruption $\mu(x)$ represents a transaction cost, one would expect that the networks and channels required to make cheating less visible and to help firms escape penalties would become more established as more and more firms engaged in these activities. As a result, it should become less expensive to engage in these activities as more of the activities are carried out. Thus when very few firms in the economy cheat on taxes, the transaction cost of cheating is high. As additional firms join the unofficial economy, the cost of cheating falls rapidly. However, as more and more firms join, their participation contributes less and less to a fall in costs. At some point the cost of cheating and engaging in corruption reaches its lowest level.

In the case where $\mu$ is viewed as the moral cost of engaging in unlawful activities, $\mu$ can also be expected to fall with an increase in $x$. In a society where very few firms cheat on taxes and engage in corruption, it is typically unacceptable to engage in these practices and therefore very costly in a moral sense. As more firms engage in cheating and corruption, the moral cost declines as these practices become more widespread. When cheating is widespread the moral cost is typically low and fairly constant over a wide range of cheating.

5.4 Coordination Games

A firm's decision regarding whether or not to comply with taxes with an endogenous cost of cheating is the natural setting for a coordination game. Coordination games are powerful settings in which to examine the implications of an individual agent's strategic choices on aggregate-level variables. Coordination games are non-cooperative games in which the players' expectations and levels of confidence play a crucial role in their strategic choices. In these games, outcomes that give higher payoffs result when players undertake the same (coordinated) actions (Cooper, 1999).
A key aspect of coordination games is the strategic complementarity of players’ actions. The interactions of agents are strategic complements when a choice by one agent leads to similar responses from other agents. Cooper (1999) identifies the strategic complementarity of players’ actions as the basis for multiple equilibria, which is one of the most important properties that coordination games may exhibit. Multiple equilibria are Pareto ranked with efficient and inefficient outcomes. An inefficient outcome is called a “coordination failure.” It arises due to agents’ pessimistic beliefs, and hence their inability to coordinate choices toward a superior outcome.

Experimental evidence from Van Huyck et al. (1990, 1991) reported systematic coordination failures in repeated coordination games. Crawford (1991) proposed an adaptive model to interpret the result of this empirical evidence. The outcome of the initial stages of the repeated games shaped the agents’ expectations about the future choices of other agents, and thus allowed for learning in the context of evolutionary stability. In other words, history matters in the equilibrium selection of the coordination games. Nevertheless, the Pareto-dominant outcome did result when elements that reduced the strategic uncertainty of the players were introduced in the experiment (Cooper et al., 1992; Van Huyck et al., 1993).

A firm’s tax-cheating choice can be put into the coordination game framework. When faced with a coordination problem, firms can obtain better payoffs if they coordinate their choices. Firms can privately coordinate their choices in two ways: either by complying with taxes or by cheating on taxes. If firms coordinate their actions so that the majority of the firms comply with taxes, the unofficial economy will be small and the cost of cheating will be high. A small unofficial economy translates to high tax revenues available for the provision of public goods. Since benefits received from the provision of public goods are positively related to the amount of tax collected, firms obtain the largest benefits from public goods provision in the “pay taxes” (PT) coordination outcome. If firms are coordinated to pay taxes they also avoid the cheating costs they would otherwise incur.
If firms coordinate their choices so that the majority of firms cheat on taxes (CT), the benefits from public goods are substantially smaller due to the low amount of taxes collected. Nevertheless, no firms are disadvantaged vis-à-vis one another because all firms enjoy the cost avoidance of withholding taxes, and their cheating cost is lower.

With the cost of cheating $\mu$ dependent on $x$, each firm's decision creates an externality. Although each firm independently decides whether to cheat or not to cheat on its taxes, the aggregate amount of cheating that occurs affects the cheating cost and as a result the amount of cheating that occurs in the economy. More specifically, the switching value $\beta_{sw}$ becomes dependent on the extent of cheating and corruption that occurs in the economy $x$. Thus, the SWL is given by:

$$
\beta_{sw}(x) = \frac{\prod[t - \delta(t + \rho)(1 - \alpha(1-\theta))]}{\mu(x)}
$$

With $\mu'(x) < 0$, $\beta_{sw}'(x) = \frac{\partial\beta_{sw}(x)}{\partial x} = -\frac{\prod[t - \delta(t + \rho)(1 - \alpha(1-\theta))]\mu'(x)}{[\mu(x)]^2} > 0$, implying that the switching value $\beta_{sw}(x)$ is an increasing function of the size of the unofficial economy $x$ and the SWL has a positive slope. In other words, as more and more firms engage in cheating and corruption, the cost of cheating is lowered; ceteris paribus the increase in the switching value entices more firms to practice cheating and corruption.

The positive relationship between the switching value and the number of cheating firms means that the decision made by the firms in the economy creates spillover effects. In other words, each firm affects and is affected by other firms' decisions to cheat on taxes and to engage in corrupt activities. This kind of strategic interaction among firms - i.e., one firm's cheating on taxes induces more firms to follow suit - implies that the firms' choices are strategic complements. The decreasing cost of cheating and engaging in corruption $\mu(x)$ embodies the complementary nature of each firm's choice. As firms' responses are similar, their actions could coordinate to either "pay taxes" private coordination or "cheat on taxes" private coordination. Therefore, the complementary
nature of firms' choices leads to the existence of the multiple equilibria that are Pareto ranked.

A firm's benefit from public goods provision in the PT private coordination is denoted as $g^p$, and the benefit from public goods provision in the CT private coordination is denoted as $g^c$. Assuming that the benefit in the PT coordination is high enough to satisfy the condition $g^p - \Pi t > g^c$, then the PT coordination outcome is the Pareto-superior outcome. This condition is not unrealistic. The term $\Pi t$ can be considered as the firm's share in the cost of a higher level of public goods provision. Since public goods by their inherent nature cannot feasibly be provided privately, it should be expected that each firm's benefit from public goods is much higher than the firm's share of the cost – i.e. $g^p - \Pi t \gg 0$. Since the benefits in the PT coordination outcome are clearly strictly greater than the benefits in the CT coordination $(g^p \gg g^c)$, condition $g^p - \Pi t > g^c$ could easily hold.

5.5 THE SIZE OF THE UNOFFICIAL ECONOMY WITH ENDGENOUS $\mu$

In a world of perfect information, the size of the unofficial economy $x^*$ is determined by the number of firms with an ability to cheat at the switching point $\beta_{sw}(x^*)$ that results at that size of the unofficial economy $x^*$. In other words, the size of the unofficial economy $x^*$ is the solution of equations (5.2) and (5.3):

\[
\begin{align*}
\beta_{CCA} &= x \\
\beta_{sw}(x) &= \frac{\Pi [t - \delta(t + \rho)(1 - \alpha(1-\theta))]}{\mu(x)}
\end{align*}
\]

The size of the unofficial economy in the equilibrium is given by the solution of the equation $x^* = \beta_{CCA} = \beta_{sw}(x^*) = \frac{\Pi [t - \delta(t + \rho)(1 - \alpha(1-\theta))]}{\mu(x^*)}$ or

\[
x^* = \frac{\Pi [t - \delta(t + \rho)(1 - \alpha(1-\theta))]}{\mu(x^*)}
\]

Graphically the size of the unofficial economy $x^*$ and the switching value of the characteristic $\beta^*$ are determined at the intersection of the CCAC and the SWL. Both
unique and multiple equilibria are possible. The following sections outline the conditions under which unique equilibrium and multiple equilibria occur (Hoff and Stiglitz, 2002).

5.5.1 The Unique Equilibrium
There is a unique and stable equilibrium when one of two conditions holds. The first condition occurs when the CCAC lies everywhere above the SWL – i.e., $\beta_{CCA} > \beta_{SW}(x)$ for all $x > 0$. This means that all firms in the economy have a lower ability to cheat and engage in corruption than the switching values, and the CCAC lies in the non-cheating region defined by the SWL. In this case no firm will cheat on taxes and there is no corruption – i.e., there is a corner solution at $\beta^* = x^* = 0$. Figure 5.3 represents such a case, where the unique equilibrium is given at E.

![Figure 5.3. The Unique Equilibrium with Corner Solution](image)

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The second condition for a unique and stable equilibrium occurs when the CCAC cuts the SWL and at this point is steeper than the SWL – i.e., \( \frac{\partial \beta_{C} \partial \beta_{S}}{\partial x} > \frac{\partial \beta_{S}}{\partial x} \). With a slope of the CCAC equal to one, the second condition is given by \( \frac{\partial \beta_{S}(x)}{\partial x} < 1 \). This means that the change in the cheating and corruption ability \( \frac{\partial \beta_{C}}{\partial x} \) that is required for an additional firm to operate in the unofficial economy is higher than the change in the switching value \( \frac{\partial \beta_{S}(x)}{\partial x} \). Since firms cheat only if their ability to cheat is higher than the switching value, the ability to cheat of the additional firm to \( x^{*} \) will not be high enough, and so it will not cheat. Therefore, this equilibrium is a stable equilibrium. Figure 5.4 illustrates the case of unique equilibrium (at E) characterized by the second condition.

![Figure 5.4. The Unique Equilibrium](image-url)
Since \( x^* \) is a stable equilibrium, any perturbation that changes the number of firms operating in the unofficial economy will lead to changes and adjustments that will bring the size of the unofficial economy back to \( x^* \). For instance, a perturbation that will cause more firms to switch from non-cheating to cheating – i.e., causing the number of firms in the unofficial economy to increase from \( x^* \) to \( x' \) (\( x' > x^* \)) – generates a new switching value \( \beta_{sw} (x') = \beta' \). However, the number of firms \( x'' \) that are able to cheat at the new switching value is smaller than the number of firms \( x' \) that generated the switching value – i.e., \( x'' < x' \). Therefore, only \( x'' \) firms will cheat. The new switching value generated by \( x'' \) cheating firms is now \( \beta_{sw} (x'') = \beta'' \). Fewer firms than \( x'' \) are able to cheat and engage in corruption at \( \beta'' \). Eventually, adjustments that result in fewer and fewer firms cheating will take place until \( x^* \) is once again reached. A similar mechanism restores the equilibrium if a perturbation causes fewer firms to cheat on taxes.

### 5.5.2 Multiple Equilibria

As outlined in Section 5.5.1, a stable equilibrium occurs when the CCAC is steeper than the SWL at their intersection point. However, if the SWL is steeper than the CCAC at an intersection point [i.e., \( \frac{\partial \beta_{sw} (x)}{\partial x} > 1 \) at \( x^* \)], then there is an unstable equilibrium which implies the existence of multiple equilibria. The stable equilibria can be either interior solutions or corner solutions. The corner solutions describe extreme cases with either no unofficial economy or an entire economy operating underground. The interior solutions describe cases with either a small unofficial economy or, alternatively, a large unofficial economy.

At the stable equilibrium, firms have coordinated their choices. For instance, at the small/no unofficial economy, firms are at the “pay taxes” coordination outcome, while at the large/total unofficial economy, firms are at the “cheat on taxes” coordination. As outlined before, these outcomes are Pareto ranked where the small/no unofficial economy is the superior outcome.
The unstable equilibrium is characterized by a moderate incidence of cheating and corruption. At the unstable equilibrium, firms fail to coordinate their choices. Perturbations at this equilibrium will drive the outcome toward one of the stable equilibria at which firms coordinate their individual choices. The remainder of this section presents two examples of multiple equilibria that arise from different costs of cheating. In Example 1, the cost of cheating is given by an exponential functional form, while in Example 2 the cheating cost has a hyperbolic specification. Figures 5.5 and 5.6 illustrate the multiple equilibria examined in these examples. The stable equilibria are given at E1 and E3, while the unstable equilibrium is presented at E2.

**Example 1**

The cheating and corruption cost in this example is given by $\mu(x) = 1 + e^{-\frac{x-\eta}{\gamma}}$ where $e$ is the exponential base and $\eta$ and $\gamma$ are positive constants whose ratio captures the occurrence rate of spillover effects. This specification of the cost of cheating and corruption generates an S-shape SWL given by $\beta_{SW}(x) = \frac{\Pi[t - \delta(t + \rho)(1 - \alpha(1 - \theta))]^{x-\eta}}{1 + e^{-\frac{x-\eta}{\gamma}}}$. Figure 5.5 illustrates this case for given values of the parameters $\Pi$, $\delta$, $\theta$, $\rho$, $\alpha$, and $t$.

The outcome at point E2 represents the unstable equilibrium; perturbations at this equilibrium will drive the outcome toward one of the stable equilibria at either E1 or E3. For instance, a perturbation that will make some firms switch from non-cheating to cheating (the number of cheating firms increases from $x^*$ to $x'$) generates a switching value of $\beta'$. At this new switching value $\beta'$, the number of firms that are able to cheat on taxes is $x''$ and this number is higher than $x'$, i.e., $x'' > x'$. In turn the new number of cheating firms generates a new switching point $\beta''(\beta_{SW}(x'') = \beta'')$. The number of firms able to cheat and engage in corruption at $\beta''$ is $x'''(x''' > x'')$. This means that a rise in the number of cheating firms $x$ is self-sustained and the adjustments in response to the perturbation will induce firms to coordinate their choices (cheat on taxes and engage in corruption) at a stable equilibrium $E_3$ that is characterized by a high incidence of cheating and corruption. Since the size of the unofficial economy is large ($x_3*$), the
amount of tax collected is very low. As a result the realized benefits from public goods $g_3$ at this outcome are small.

Similarly, a perturbation that will make some firms switch from cheating to non-cheating gives rise to a sustained fall in the number of cheating firms $x$. Adjustment in response to this perturbation will induce firms to coordinate their choices at the stable equilibrium $E_1$. This "pay taxes" coordination outcome is characterized by a low level of cheating $x_1^*$, low corruption and therefore high tax revenues. The realized benefits from the provision of public goods $g_f$ are large.

Assuming that the benefits at $E_1$ are significantly larger than benefits at $E_3$ i.e., $g_1 - \Pi_t > g_3$, the outcomes can be Pareto ranked. The interior solution at $E_1$ is a Bad Equilibrium and is a Pareto-inferior equilibrium due to the substantially smaller benefits from the under-provision of public goods. The interior solution at $E_3$ is a Good Equilibrium and is a Pareto-superior equilibrium due to the larger benefits from public goods provision.
Figure 5.5. The Unofficial Economy and the Cheating and Corruption Costs with Multiple Equilibria
Example 2

In Figure 5.6 the cheating and corruption cost function \( \mu(x) = \frac{1}{0.025 + x^2} \) generates a quadratic form of the SWL given by:

\[
\beta_{sw} (x) = 0.025 \Pi \left[ t - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right] + \Pi \left[ t - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right] x^2
\]

For given values of the parameters \( \Pi, \delta, \rho, t, \alpha, \theta \) there are stable equilibria at \( E_1 \) and at \( E_3 \) and an unstable equilibrium at \( E_2 \). The Pareto-superior stable outcome at \( E_1 \) is characterized by a small unofficial economy \( x_1^* \), while the Pareto-inferior outcome at \( x_3^* \) is a corner solution where all the firms operate in the unofficial economy. The size of the unofficial economy at the unstable equilibrium \( E_2 \) is \( x_2^* \).

Figure 5.6. The Size of the Unofficial Economy with Multiple Equilibria and Corner Solution
As these examples demonstrate, the specification of the cheating and corruption cost is crucial in determining whether a stable equilibrium is an interior solution or a corner solution. This is to be expected since the cost of cheating \( \mu(x) \) embodies the complementary nature of firms' choices, and is the basis for the existence of the multiple equilibria.

5.6 Equilibrium Selection

One would expect that the Pareto-superior equilibrium would prevail in the situation of Pareto-ranked multiple stable equilibria, since agents receive higher payoffs at this outcome. The coordination game literature shows that this might not be the case (Van Huyck et al., 1990; Van Huyck et al., 1991; Crawford, 1991; Cooper, 1999). Due to a collective coordination failure, the agents might choose actions that bring about an inefficient outcome. In our model, there are two driving forces that result in collective coordination failure.

Insights provided in the literature indicate that one major driving force that would bring about the Pareto-inferior solution is the strategic uncertainty that any firm faces about the actions of other firms. In an environment where tax non-compliance is tolerated and penalties for this violation are not enforced, firms can be expected to believe that other firms will not pay their taxes. When a firm expects that the majority of other firms will not pay their taxes, it also chooses not to comply with taxes in order to avoid being disadvantaged.

Strategic uncertainty is combined with the incentive of firms to free ride when making contributions to public goods. Cheating firms receive the same benefits from public goods as do firms that pay taxes. For this reason, \( \text{ex ante} \), the benefits \( g \) do not affect a firm's decision to comply with taxes. However, collectively the firm's decision affects the size of the unofficial economy and the revenues available for the provision of public goods, and the realized benefits from the public goods as a result. Both the uncertainty about the choices made by others and the incentive to free ride might encourage a firm
to cheat on taxes, which results in an even larger unofficial economy. Thus Bad Equilibrium (high levels of cheating/corruption) could prevail.

The emergence of an inefficient outcome represents a collective coordination failure. As mentioned before, firms would be better off to coordinate their actions at the Good Equilibrium, due to substantially larger benefits they would accrue in public goods. Benefits from the provision of public goods such as the Rule of Law, health, education, a sound legal system and infrastructure compensate for firms’ cost of obtaining these benefits – i.e., the amount of tax to be paid. Nevertheless, firms may choose to operate in the unofficial economy and to engage in illicit activities to support this operation, and hence to receive low quality public services, due to their low expectations about the fairness of the tax administration.

5.7 MOVING FROM A BAD TO A GOOD EQUILIBRIUM

It is important to understand and identify how an economy operating at a Bad Equilibrium could move to a Good Equilibrium. As discussed, firms’ expectations about other firms’ actions are crucial in determining the prevailing equilibrium. In an economy characterized by poor governance of the tax-collection system due to nepotism, political patronage and corruption, firms expect that the enforcement of tax regulations is unlikely to be fair and unbiased. With low expectations for proper functioning of the tax system, Bad Equilibrium prevails. Therefore, changing agents’ expectations is crucial in moving from a Bad Equilibrium to a Good Equilibrium.

For instance, a change in the tax regulation – i.e., either in the tax rate or in the penalty rate for non-compliance – is unlikely to dramatically change the amount of cheating, as long as customs and tax agencies are perceived to be corrupt and the enforcement of tax regulation is believed to be weak and biased. When customs and tax agencies have good reputations – as agencies where employment is open and competitive and based on merit – this contributes to high expectations about the credibility of effective tax-regulation enforcement. Credible enforcement translates into low uncertainty about
firms' choices regarding tax compliance, and therefore could result in firms coordinating their actions toward an efficient outcome – the Good Equilibrium.

To acquire a good reputation, customs and tax agencies need to undergo changes that might compromise the interests of some of the individuals within these agencies. There could be strong pressure from bureaucrats to maintain the status quo that serves their private benefits. In addition, cheating firms that are reaping short-term gains from operating in the unofficial economy, or have paid to establish networks for illicit activities, would be interested in maintaining the status quo. It is paradoxical then to expect that changes would originate from the agencies themselves. As long as some firms are not willing to make the move, there is the possibility for a collective coordination failure.

Shocks that will move an outcome from a Bad Equilibrium to a Good Equilibrium have a strong political dimension. High-level politicians who design tax regulations and appoint bureaucrats in tax and customs agencies could initiate a shock. However, agents who are interested in maintaining the status quo have reasons to engage in rent-seeking activities (e.g., the payment of campaign contributions or bribes) in order to capture the government and assure the status quo. Elected officials in governments could themselves also be interested in maintaining the status quo to fulfill self-serving interests in terms of power and wealth. For instance, politicians may reward their followings by means of patronage jobs in order to strengthen their positions. Politicians as well could be directly involved in business activities in the informal sector, and hence be interested in maintaining the status quo which allows them to generate private benefits. With high-level politicians involved in corruption and other illicit activities, the prospect of changes initiated at high levels of government is bleak. Even if such change was initiated, it would be difficult for those at high government levels to convey their serious commitment to firms that would support a positive change.
Clearly, an economy that operates in a stable Bad Equilibrium can face considerable resistance to changes that might move it to a Good Equilibrium. Considering that many agents in the economy must be involved in these changes, and that there is a political dimension to such changes, the characteristics of the shocks required to bring about an efficient outcome are quite complex. The model in this chapter provided some insights as to why tax cheating and corrupt practices persist.
CHAPTER VI

AUDITING CHOICES AND THE ALLOCATION OF GOVERNMENT REVENUES TO THE PROVISION OF PUBLIC GOODS

6.1 INTRODUCTION
As was shown in Chapter IV, firms’ decisions to cheat on taxes, and hence the extent of cheating in the economy, is affected by the intensity of government auditing. In a corrupt environment, firms that cheat on taxes may affect government decisions regarding auditing rates, either through rent-seeking activities or by influence-peddling due to political connection and cronyism. This chapter examines how a government affects, through auditing, the size of the unofficial economy and hence the funds available for the provision of public goods. More specifically the chapter explores the trade-off between the rents that accrue to those engaged in corruption and cheating and the rents available for public goods provision. This trade-off relationship serves as the basis for understanding how the government might make a decision regarding its auditing activities. The chapter also examines a government’s decision to allocate revenues between infrastructure and education.

6.2 THE MODEL
The basic model developed in Chapter IV examined a firm’s decision to comply with taxes given an auditing rate $\delta$. Using this basic model, this chapter examines the government’s decision of the choice of $\delta$ – i.e., this chapter endogenizes the probability of detecting tax cheating. In this model, “the government” is understood to be the agency or agencies that set tax-enforcement policy and that allocate the tax revenues in the provision of various public goods. “Tax inspectors” are the appointed bureaucrats who implement the tax regulations and perform the auditing functions. Since the model
developed in this chapter builds on the basic model of Chapter IV, the extent of cheating among firms is considered endogenous, while the extent of corruption by tax inspectors is considered exogenous.

The degree of corruption and tax cheating with an endogenous auditing probability is determined in a two-stage game structure. In the first stage of the game, the government chooses the level of auditing that it will undertake, knowing the firms’ response to this choice of auditing. In the second stage of the game, firms decide whether or not to cheat on their tax payments based on the degree of auditing that has been undertaken. This game is solved using backward induction (Kreps, 1990). The firms’ problem was examined in Chapter IV; the government’s decision is thus the focus of this chapter.

The government’s choice of a policy instrument provides different groups in society with different benefits (Gardner, 1983; Grossman and Helpman, 1994). In our model, the government’s choice of the auditing rate $\delta$ affects firms’ decisions to operate in the unofficial economy, and as a result determines the distribution of rents in the system. More specifically, the choice of auditing rate $\delta$ allocates revenues between two different components. The first component is the cheating and corruption rents obtained by firms and the bribes received by tax inspectors, while the second component is the funding available for the provision of public goods.

As outlined in Chapter IV, the cheating and corruption rents that accrue to cheating firms and the bribes received by tax inspectors are part of the potential tax revenues to be realized in the absence of cheating and corruption. The total cheating and corruption rents, $TCCR$, are given by:

$$TCCR = \frac{\Pi t - \delta(t + \rho)(1 - \alpha(1 - \theta))}{2 \mu} + \frac{\Pi^2 \alpha \delta(t + \rho)(1 - \delta(t + \rho)(1 - \alpha(1 - \theta)))}{\mu}$$

Calculations in Appendix 6.1 show that the $TCCR$ is a decreasing and a convex function of the auditing rate $\delta$. The $TCCR$ is maximized when the auditing rate is zero, while
\[ \delta_D = \frac{t}{(t + \rho)(1 - \alpha(1 - \theta))} \] totally dissipates the TCCR. Figure 6.1 presents the TCCR(\delta) function.

The funds available for public goods provision, which comprise the second component outlined above, provide benefits to all firms in the economy. The revenues available for public goods provision \( PG \) are determined by tax revenues \( T^* \) and the punishment fees collected by honest tax inspectors \( P^* \) less the cost of auditing \( C_A \). The funding available for the provision of public goods is given by:

\[
(6.2) \quad PG = T + P - C_A = \Pi t - \frac{\Pi^2 t}{\mu} \left[ (t - \delta(t + \rho)(1 - \alpha(1 - \theta))) \frac{\rho^2}{2} \delta^2 \right]
\]

where the cost of auditing \( C_A = \frac{\rho^2}{2} \delta^2 \) is an increasing and convex function of the auditing intensity \( \delta \).

Figure 6.1. Total Cheating and Corruption Rents
Calculations in Appendix 6.2 show that the $PG$-maximizing auditing rate is $\delta_c$

$$\delta_c = \arg \max_{\delta} PG = \frac{\Pi^2 (t + \rho)(2(1 - \alpha) + \alpha \theta)}{\mu \rho + 2 \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta))}.$$  

Thus, for $\delta < \delta_c$, the $PG$ is an increasing and concave function of $\delta$, while for $\delta > \delta_c$ the $PG$ is a decreasing and concave function of $\delta$. Figure 6.2 presents the $PG(\delta)$ function.

---

**Figure 6.2. Revenues Available for the Provision of Public Goods**

\[\delta_c = \frac{\Pi^2 (t + \rho)(2(1 - \alpha) + \alpha \theta)}{\mu \rho + 2 \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta))} \quad \delta_D = \frac{t}{(t + \rho)(1 - \alpha(1 - \theta))}\]
For auditing rates less than $\delta_c$, an increase in $\delta$ affects the two components in opposite ways. While a higher auditing rate brings in more revenues for the provision of public goods, it also results in a lower level of total corruption and cheating rents. Thus, as the auditing intensity increases, the corruption and cheating rents are transformed into revenues for the provision of public goods. This trade-off between revenues available for public goods provision and corruption and cheating rents is captured by a transformation curve (TC), which is derived in the next section. Since the government’s choice of the auditing rate will be on the TC, an analysis of the shape of the TC provides valuable insights into decisions by the government in regard to auditing rates.

6.3 Transformation Curve

The transformation curve TC represents the locus of points along which revenues available for the provision of public goods $PG$ can be transformed into total cheating and corruption rents $TCCR$. In other words, the TC presents the $TCCR$ as a function of $PG$ as the auditing rate changes. The slope of the TC gives the marginal rate of transformation as a result of change in the auditing intensity $\delta$. Therefore, the slope of the TC captures the efficiency of the redistribution of rents in the system. As an efficiency frontier, the TC assumes that the rent redistribution is made in the most efficient manner. In other words, the model assumes that there is no rent dissipation in the system from activities like lobbying and influence-peddling.

As outlined earlier, the auditing rate generally affects the $TCCR$ and $PG$ in opposite ways. More specifically, for auditing rates in the range $\delta \in [0, \delta_c]$, the $TCCR$ is a decreasing function of $\delta$ while $PG$ is an increasing function of $\delta$. When the auditing rate $\delta$ increases beyond $\delta_c$, the $TCCR$ continues to fall and $PG$ declines as well (the decline in $PG$ occurs because of the increasing cost of auditing $C_A$). Thus, TC is initially downward-sloping and then becomes upward-sloping. The change in the slope from negative to positive occurs at the auditing rate $\delta_c$. 

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Figure 6.3. Derivation of the TC
Figure 6.3 presents the derivation of the TC. A mirror image of the TCCR curve (see Figure 6.1) is depicted in the first quadrant, where the auditing rate is presented on the horizontal axis and the TCCR is presented on the vertical axis. The third quadrant depicts the PG function with the auditing rate presented on the vertical axis and PG on the horizontal axis (which is a 90-degrees clockwise rotation). The values of the auditing rate $\delta$ are connected through a 45-degree transfer line. Using this line, it is possible to obtain the TCCR and PG values that correspond to any given value of $\delta$. Transferring these values to the second quadrant gives the TC.

For instance at $\delta = 0$ we obtain from the TCCR and PG functions their respective values $TCCR_A$ and $PG_A$, which maps onto Point A on the TC. Similarly, from $\delta = \delta_c$ we obtain $PG_C$ through the PG function and $TCCR_C$ through the TCCR function; the result is Point C on the TC. Other important points on the TC are Point D, at which TCCR is totally dissipated, and Point B, at which the total rents in the system $TCCR + PG$ are maximized.

Table 6.1 presents the auditing rates that maximize different rents in the system; the size of the unofficial economy at these auditing rates; the values of rents that result at these auditing rates; and the slope of TC. The calculations are presented in detail in Appendix 6.1, Appendix 6.2 and Appendix 6.3.
Table 6.1. Transformation Curve

<table>
<thead>
<tr>
<th>( \delta )</th>
<th>A: Max ( TCCR ) Relative to ( \frac{\mu}{\Pi^2} )</th>
<th>B: Max (( TCCR+PG )) Relative to ( \frac{\mu^2}{\Pi} )</th>
<th>C: Max PG Relative to ( \frac{\mu^2}{\Pi} )</th>
<th>D: ( TCCR=0 ) Relative to ( \frac{\mu^2}{\Pi} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
</tr>
<tr>
<td>( \frac{\mu}{\Pi} )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
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<tr>
<td>( \frac{\Pi}{\mu} )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
</tr>
<tr>
<td>( \frac{TCCR}{\mu} )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
</tr>
<tr>
<td>( \frac{PG}{\mu} )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
</tr>
<tr>
<td>( \frac{(TCCR+PG)}{\mu} )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
</tr>
<tr>
<td>( \frac{DWL}{\mu} )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
<td>( \frac{1}{\mu^2} \Pi^2 \phi' )</td>
</tr>
<tr>
<td>Slope of ( TC ) Smaller than (-1/2)</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>Curvature of ( TC )</td>
<td>Concave</td>
<td>Concave</td>
<td>Concave</td>
<td>Concave</td>
</tr>
</tbody>
</table>
As Table 6.1 shows, the slope of the TC becomes steeper and steeper as one moves from Point A \( \left( \frac{dTCCR}{dPG} \right)_A = -\frac{1}{2} \), to Point B \( \left( \frac{dTCCR}{dPG} \right)_B = -1 \) and eventually to Point C \( \left( \frac{dTCCR}{dPG} \right)_C = -\infty \). The concavity of the TC indicates that the transformation rate (the rent-redistribution efficiency) varies along the AC portion of the TC. \(^{39}\) More specifically, at Point B (where total rents in the system \( TCCR + PG \) are maximized), the auditing rate \( \delta_g \) produces a one-to-one transfer from \( PG \) to \( TCCR \). In the portion of the TC to the left of Point B \( \left( \delta \in [0, \delta_g] \right) \), each dollar reduction in \( PG \) produces less than a dollar increase in the \( TCCR \). In the portion of the TC to the right of Point B \( \left( \delta \in (\delta_g, \delta_c) \right) \), more than a dollar of \( TCCR \) must be given up in order to transfer a dollar to \( PG \). Therefore, the transformation of \( PG \) into \( TCCR \) (or transformation of \( TCCR \) into \( PG \)) is associated with dead-weight losses (DWLs). These DWLs are a direct result of the cost of cheating and corruption (recall that this cost can be interpreted either as a transaction cost or a moral cost that firms must incur when cheating and engaging in corruption).

The upward-sloping portion (CD) of the TC is caused by the reduction in \( PG \) that occurs when \( \delta > \delta_c \). An increase in the auditing rate beyond \( \delta_c \) (where \( PG \) is maximized) will decrease both the \( TCCR \) and \( PG \). The increase in the auditing intensity beyond \( \delta_c \) makes auditing so expensive that the cost of auditing \( C_A \) outweighs the benefits of auditing (i.e., the increased revenues available for the provision of public goods).

The shape of the TC allows a number of conclusions to be drawn about the various decisions that government may make in regard to the auditing rate. A choice of an auditing rate to the left of B (in the AB portion of the TC) favours at the margin the cheating firms and the corrupt tax inspectors over the provision of public goods. For instance, the choice of an auditing rate at Point B' favours at the margin the cheating

\(^{39}\) See Appendix 6.5 for the calculations of the TC curvature.
firms and corrupt tax bureaucrats relative to the provision of public goods – i.e., $PG$ is reduced by more than the increase in $TCCR$ ($O'B' < OB$). By contrast, the choice of an auditing rate to the right of Point B (in the BC portion of the TC) favours at the margin the provision of public goods over the private benefits of cheating firms and corrupt tax inspectors.

Another implication of the shape of the TC is that the auditing activity that maximizes $PG$ is associated with positive levels of $TCCR$ – i.e., to maximize the revenues available for the provision of public goods, the government must allow for some cheating and corruption to occur. The CD portion of the TC implies that total eradication of cheating and corruption from the system by increasing the auditing intensity is counterproductive, since the cost of eliminating this activity is greater than the rents that can be transferred from the unofficial economy. Only if a government views illicit activities as a “bad” and is willing to eliminate these activities, at almost any cost, will it choose to perform a very intense auditing ($\delta_\ast$).

6.4 Government Choice of Auditing Activity

As the preceding discussion suggests, a government’s preference structure is a crucial determinant in its choice of auditing rate $\delta$. This preference structure can be expected to involve both $PG$ and $TCCR$. Governments provide benefits to different groups not only for altruistic considerations, but also for self-serving reasons. A government’s concern to stay in power shapes its preference structure (Bueno de Mesquita et. al., 2002; Grossman and Helpman, 1994), and therefore determines the importance that the government attaches to the benefits provided to different groups in society.

Net tax revenues $PG$ are used in the provision of public goods such as the rule of law, enforcement of property rights, and health and education. These revenues provide benefits to all firms in the economy, which in turn increases the government’s chances for reelection. Hence, the provision of public goods is not a selfless act. Overall, public
goods are an essential element of the government preference structure for both altruistic and self-serving reasons.

The TCCR are also part of the government preference structure, generally for two self-serving reasons. The first reason is that government can be captured by the cheating firms and corrupt tax inspectors, either by intense lobbying or by influence-peddling. The second reason is that government provides rewards to its political following through patronage – one interpretation of TCCR (particularly the bribes portion of TCCR) is as patronage payments. Regardless of the reason, the government generates private benefits from TCCR either in terms of payments or in terms of power.

One instance of lobbying or influence-peddling by firms is the scenario where a government receives part of the cheating and corruption rents through side payments in the form of bribes or political-campaign contributions. In this case, the informal economy feeds grand corruption. Another example of lobbying or influence-peddling by firms occurs when owners of the cheating firms are government cronies, or when high-level politicians are directly involved in business activities in the informal economy. In such cases, cheating firms influence the government without the need for rent-seeking. This phenomenon is particularly commonplace in most transition economies where issues of conflict of interest are not properly addressed.

Governments can also be influenced by corrupt tax inspectors and, hence, attach importance to the private benefits they can provide (bribes). The motivation to incorporate bribes received by corrupt tax inspectors in the government preference structure comes from observations identified by surveys (see Chapter III). Corrupt tax inspectors have typically obtained their positions either through political patronage or by purchasing them. When tax inspectors have purchased their positions, a portion of received bribes is often passed on to the higher level of government, and hence bureaucratic corruption sustains grand corruption. When tax inspectors are appointed through patronage or nepotism, their financial enrichment improves their stature in the community enhances the government's power.
The government preference structure, or more explicitly the relative importance that government attaches to $PG$ over $TCCR$, is crucial to a government's choice of auditing rate. If the government attaches higher importance to corruption and cheating rents than to public goods provision, then its choice of auditing level will be low; this will result in corruption and cheating activities being quite extensive, and revenues available for public goods provision being reduced accordingly. On the contrary, if government attaches greater importance to the provision of public goods, then its auditing choice will lead to larger revenues for the provision of public goods, and reduced cheating and corruption rents.

Figure 6.4 depicts government auditing-rate decisions for two different situations. In the first case, the government attaches more relative importance to the provision of public goods than to the acquisition of cheating and corruption rents. The government preference structure is given by the curve $PP'$. The greater the importance the government attaches to the provision of public goods, the steeper the government utility function, and the more "south-easterly" are the locations of the government utility curves. The tangency point of the $PP'$ curve to the TC at $E^*$ determines the choice of the auditing rate $\delta^* \in [\delta_b, \delta_c]$. At this choice the revenues available for the provision of public goods are given by $PG^*$, while total cheating and corruption rents are given by $TCCR^*$.

In the second case, the government preference structure is given by the linear function $SS'$. The more importance the government attaches to $TCCR$ relative to $PG$, the flatter the government utility function, and the more "north-westerly" the location of the government's utility curve. The tangency point $\bar{E}$ of $SS'$ is on the AB portion of the TC – i.e., $\bar{\delta} \in [0, \delta_2]$, a reflection of the greater importance attached to $TCCR$ than to $PG$. Revenues available for the provision of public goods are $\bar{PG}$, and the cheating and corruption rents are $\bar{TCCR}$. 
Figure 6.4. Determination of the Auditing Rate
6.5 ALLOCATION OF REVENUES BETWEEN EDUCATION AND INFRASTRUCTURE

This section examines how the government allocates its revenues in the provision of different public goods. The literature suggests that the government decision to allocate resources among public goods depends on private benefits to the government associated with the various public goods (Shleifer and Vishny, 1993; Mauro, 1995; Mauro, 1997; Mauro, 1998).

Since education is known as a sector that has little to no tangible rents compared to defense or infrastructure spending, this section focuses on examining the government decision to allocate resources between education and infrastructure. Although both education and infrastructure benefit all firms in the economy, the nature of these benefits differs. For instance, public investments in education, unlike public-infrastructure investments, might not offer immediate, observable social returns, but they tend to provide more sustained benefits to society.

As argued above, various public goods are associated with different rents and hence they also differ in terms of the extent to which they generate side payments for the government. Infrastructure projects tend to be much larger than education projects and to involve fewer agents than education projects. Thus, government-awarded contracts to realize infrastructure projects create more opportunities for lucrative side payments for the government than do projects in education.

Modeling a government’s decision regarding allocation of revenues between education and infrastructure builds on the previous model of the government’s choice of auditing level. The government decides simultaneously on the level of auditing to be performed and the allocation of revenues between education and infrastructure. The government’s auditing decision determines that a certain amount of public goods revenues will be available for allocation. In turn, the allocation of revenues affects the composition of the two components considered by government, \( TCCR \) and \( PG \), since the infrastructure funding generates side payments for the government. To capture these changes in the
composition of the \( TCCR \) and \( PG \), we introduce the adjusted components, denoted respectively by \( PG^A \) and \( TCCR^A \).

Suppose revenues available for the provision of public goods \( PG \) are allocated according to an allocation factor \( \psi(\psi \in [0,1]) \) into education funds \( \psi PG \) and infrastructure funds \((1 - \psi)PG \). Each dollar spent in these public sectors creates a multiplier effect which generates positive returns in the economy. Thus, a dollar used in the provision of education generates \( \sigma_E (\sigma_E > 1) \) dollars in the economy, while a dollar used in the provision of infrastructure generates \( \sigma_I (\sigma_I > 1) \) dollars in the economy.\(^{40}\)

Government derives private benefits in the form of kickbacks only from contracting projects in infrastructure. More specifically, firms awarded contracts for infrastructure projects pay to government a fraction \( \theta \) of revenues allocated to infrastructure \((1 - \psi)PG \) in the form of bribes to obtain the contracts.\(^{41}\) Since this part of revenues \( \theta(1 - \psi)PG \) is privately seized by the government, unlike revenues spent in the provision of public goods, it does not have the multiplier effect and does not generate positive returns in the economy.

With this background, adjusted government revenues \( PG^A \) are

\[
PG^A = \psi PG \sigma_E + (1 - \theta)(1 - \psi)PG \sigma_I
\]

Thus, \( PG^A \) is given by:

\[
(6.3) \quad PG^A = PG \left\{ \psi [\sigma_E - \sigma_I (1 - \theta)] + \sigma_I (1 - \theta) \right\}
\]

where \( PG \) are public goods revenues given in equation (6.2).

The adjusted total cheating and corruption rents are given by:

\[
(6.4) \quad TCCR^A = TCCR + \theta(1 - \psi)PG
\]

where \( TCCR \) is given in equation (6.1).

\(^{40}\) In a dynamic approach, \( \sigma_E \) and \( \sigma_I \) could represent the present value of the returns generated by investment in education and infrastructure respectively.

\(^{41}\) For simplicity we assume that the share of rents paid as a bribe \( \theta \) prevails in all corrupt deals in the economy.
Similarly to a government decision regarding \( \delta \), a TC can be derived that captures the transformation of \( PG^d \) into \( TCCR^d \) even when both the auditing rate \( \delta \) and the share of revenues allocated to education \( \psi \) are varied. We first generate the \( PG^d \) and \( TCCR^d \) curves for various values of \( \psi \); based on these curves, a TC can be derived for each given \( \psi \). The envelope of these TC curves presents the overall function by which \( PG^d \) are transformed into \( TCCR^d \) when both \( \delta \) and \( \psi \) change. The government decision regarding \( \delta \) and \( \psi \) is then made along this Envelope TC.

Figure 6.5 presents the family of \( TCCR^d \) curves at various given values of \( \psi \).

Appendix 6.6 examines in detail the shifts of the \( TCCR^d \) curves as \( \psi \) increases from zero to one – i.e., as funds allocated to education increase. The \( TCCR^d \) curves differ from one another in both their intercepts and their slopes. As \( \psi \) increases – i.e., as more revenues are allocated to education – the \( TCCR^d \) curves shift down and to the left. As \( \psi \) increases, the \( TCCR^d \) curves are steeper when the auditing rate is low – i.e., \( \delta < \arg \max_{\delta} PG \) – and flatter when the auditing rate is high – i.e., \( \delta > \arg \max_{\delta} PG \). Note that \( TCCR^d_{\psi=1} = TCCR \) since no side payments occur when all revenues are allocated to education.

Figure 6.6 presents the family of \( PG^d \) curves obtained for various values of \( \psi \). Panel A presents the case of higher relative benefits from education, while Panel B presents the case of higher relative benefits from infrastructure. Appendix 5.6 examines in detail the location of the \( PG^d \) curves as \( \psi \) increases. As more funding is allocated to education (\( \psi \) increases), the two elements of \( PG^d \) (recall that

\[
PG^d = \psi PG_\sigma + (1-\theta)(1-\psi)PG_\sigma_i
\]

change in different directions. The education element \( \psi PG_\sigma \) increases, while the infrastructure element \( (1-\theta)(1-\psi)PG_\sigma_i \) decreases. When education provides higher relative benefits than does infrastructure – i.e., \( \frac{\sigma_E}{\sigma_I} > (1-\theta) \) – an increase in \( \psi \) results in an overall increase in the adjusted public
Figure 6.5. $TCCR^4$ Curves

goods revenues $PG^4$. Graphically this increase in $PG^4$ is presented by the upward shift of $PG^4$ curves, which also become steeper. When infrastructure provides higher relative returns than does education – i.e., $\frac{\sigma_E}{\sigma_I} < (1 - \theta)$ – an increase in $\psi$ results in a smaller increase of education element $\psi PG \sigma_E$ relative to the decrease in the infrastructure element $(1 - \theta)(1 - \psi)PG\sigma_I$. In other words, with higher relative returns from infrastructure, an increase in $\psi$ results in an overall decrease in the adjusted public goods revenues $PG^4$. Graphically, the overall decrease in $PG^4$ is presented by an inward shift of the $PG^4$ curves, which also become flatter.

Figure 6.7 depicts the derivation of the TC curves in the case of relatively higher returns from education. As $\psi$ increases, the $TCCR^4$ curves shift inward and to the right. With $PG^4$ shown on the horizontal axis, an increase in $\psi$ shifts the $PG^4$ curves to the right (recall that with $PG^4$ in the vertical axis this shift was upwards). Therefore, an increase in $\psi$ shifts the respective TC curves downward and to the right.
Figure 6.6. A. $TCCR^A$ Curves with Relatively Higher Returns from Education

Figure 6.6. B. $TCCR^A$ Curves with Relatively Higher Returns from Infrastructure
Figure 6.7. Derivation of TC Curves
The family of TC curves forms the Envelope TC. Figure 6.8, Panel A presents the Envelope TC in the case of higher relative returns from education, while Figure 6.8 Panel B presents the Envelope TC in the case of higher relative returns from infrastructure. There are three important portions of these Envelope TC curves. The \( ab \) portion of the Envelope TC belongs to \( TC^A_0 \), the transformation curve obtained for \( \psi = 0 \). The \( cd \) portion of the Envelope TC belongs to the \( TC^A_1 \), the transformation curve obtained for \( \psi = 1 \). The \( bc \) portion of the Envelope TC is a straight line, which results from the shift of TC curves, as \( \psi \) increases in the range \( \psi \in (0,1) \). The slope of the \( bc \) portion of the Envelope TCs captures the ratio at which \( TCCR^A \) are transformed into \( PG^A \) (the marginal rate of transformation) as more revenues are allocated to education (\( \psi \) increases). As calculations in Appendix 6.6 show, the slope of the Envelope TC in the \( bc \) portion is a constant and is given by:

\[
(6.5) \quad \frac{dTCCR^A}{dPG^A} = -\frac{\theta}{[\sigma_e - \sigma_f (1-\theta)]}
\]

When the relative returns from education are higher \( \left( \frac{\sigma_e}{\sigma_f} > (1-\theta) \right) \), the slope of the \( bc \) portion of the Envelope TC is negative as presented in Panel A. This negative slope of the \( bc \) portion results from the "downward and to the right" shift of TC curves as \( \psi \) increases. It also indicates that with higher relative returns from education, there is a trade-off between \( TCCR^A \) and \( PG^A \) as more funds are allocated to education.
Figure 6.8.A. The Envelope TC with Relatively Higher Returns from Education

Figure 6.8.B. The Envelope TC with Relatively Higher Returns from Infrastructure
When relative returns from infrastructure are higher \( \left( \frac{\sigma_k}{\sigma_j} < (1 - \theta) \right) \), the slope of the \( bc \) portion of the Envelope TC is positive as presented in Panel B. As outlined above, an increase in \( \psi \) will shift \( PG^d \) curves to the left (recall this shift is inwards with \( PG \) presented on the vertical axis). Thus, an increase in \( \psi \) will move the TC downward and to the left, suggesting that allocating more funds to the less productive activity (education) is associated with a decrease in both \( TCCR^d \) and \( PG^d \). Point \( B^* \) on both Envelope TC curves (note that \( B^* \) is on the \( TC^A_1 \) portion of the Envelope TC in Panel A, while it is on the \( TC^A_0 \) portion of the Envelope TC in Panel B) presents the point at which there is a one-to-one transfer from \( PG^d \) to \( TCCR^d \) and government favours the groups equally at the margin.

The shapes of the Envelope TC curves in Figure 6.8 have important implications for government decisions on the allocation factor \( \psi \) and the auditing rate \( \delta \). If education has higher relative returns (Panel A) and government favours at the margin public goods rather than private benefits from corruption, then its choice will be on the \( B^*d \) portion of the Envelope TC, which means all revenues are allocated to education (\( \psi = 1 \)). However, if government favours cheating and corruption rents at the margin, its choice will be on the \( aB^* \) portion of the Envelope TC. In a special case, when government attaches a relative importance equal to \( \frac{\theta}{\sigma_k - \sigma_j (1 - \theta)} \) (this is the slope of the Envelope TC in its \( bc \) portion), government will allocate revenues to both education and infrastructure (\( \psi \in (0,1) \)). Otherwise, the government will commit revenues totally to infrastructure (\( \psi = 0 \)).

When infrastructure generates higher relative returns the story is different. The shape of the Envelope TC (Panel B) suggests that in this situation the government will most likely allocate all its revenues to infrastructure no matter which group it favours at the margin. Government will allocate some funds to education only if it favours at the margin the provision of public goods, and is willing to accept the counterproductive effect (i.e., the reduction in \( PG^d \)) associated with the reduction in the \( TCCR \). In this
case there will be a choice on the $C_d$ portion of the Envelope TC. If government avoids the counterproductive effect associated with the reduction in the $TCCR$, it will commit all funds to infrastructure and will accept some corruption as a side effect in the provision of a public good that generates relatively higher returns in the economy.

6.7 CONCLUDING REMARKS

This chapter examined government decisions in relation to the auditing rate. The government's preference structure, or more explicitly the relative importance that government attaches to revenues available for the provision of public goods $PG$ relative to the total cheating and corruption rents $TCCR$, is crucial to its choice of auditing rate. The government's choice of auditing rate is made along the transformation curve, which captures the trade-offs between $TCCR$ and $PG$. Hence, the shape of the TC provides valuable insights into the choices governments make in relation to the auditing rate.

The transfer of rents is associated with dead-weight losses due to cost of cheating and corruption. To maximize the revenues available for the provision of public goods, the government must allow for some cheating and corruption to occur. Only if a government views illicit activities as "bad," and is willing to eliminate these activities at any cost, will it choose to perform very intense auditing.

The government's allocation of revenues between education and infrastructure is highly dependent on the returns generated by these public goods in the economy. If education generates relatively higher returns and the government favours at the margin the provision of public goods relative to private benefits from corruption, then all revenues are allocated to education. If at the margin government favours the private benefits from corruption and cheating, then all revenues are allocated to infrastructure, even though education generates higher relative returns in the economy.

When the relative returns from infrastructure are higher than those from education, governments will generally commit revenues to infrastructure, no matter which groups
they favour at the margin. Thus, government will accept some corruption as a side
effect in the provision of a public good that generates relatively higher returns in the
economy. A government will allocate some of its funds to education, only if it is willing
to accept the counterproductive effect (i.e., the reduction in revenues available for the
provision of public goods) associated with the reduction in TCCR.
CHAPTER VII

SUMMARY AND CONCLUSIONS

Corruption and the unofficial economy are important issues in most transition countries. The literature points out an association between a high incidence of corruption and a large unofficial economy. This dissertation examined the effect of corruption in tax enforcement on the unofficial economy that results from tax non-compliance, and the implications of the unofficial economy for the provision of public goods in transition countries. The research was conducted along two lines.

First, Chapter II and Chapter III examined the nature and the extent of corruption in Albania with a particular focus on the informal sector and corruption in customs and tax administration. Chapter III also examined the pattern of government spending in public education and transport infrastructure in order to identify the priority given to these sectors in Albania during the transition period. Analysis of the data from this country raised several issues around the unofficial economy and the provision of public goods as they relate to a weak enforcement of tax regulations, the business culture in the economy, the ability of policy-makers to control the unofficial economy, and the opportunities for corruption that are associated with the provision of public education and infrastructure.

Second, the thesis developed a number of theoretical models to examine some of the issues raised in the analysis of Albania. The theoretical models examined the incentives for different agents in the economy to engage in tax cheating and corruption. More specifically, Chapter IV examined how corrupt tax inspectors (the enforcers of tax compliance) affect firms’ incentives to cheat on taxes, and how in turn the unofficial economy creates opportunities to sustain corrupt practices. Chapter V examined the
unofficial economy by considering that tax cheating and corruption become more acceptable as they are increasingly widespread. Chapter VI examined how government affects the degree of cheating and corruption by determining the extent of auditing, and how policy-makers allocate revenues obtained from tax collection to the sectors of education and infrastructure.

The theoretical models offered a number of insights with regard to corruption and the unofficial economy. The results of the differentiating-characteristic model replicated standard results in the cheating and corruption literature, which indicates that high statutory taxes and widespread corruption among tax inspectors encourages cheating behaviour, while intense auditing, high penalties, large bribes, and high cheating and corruption costs deter cheating behaviour.

Endogenizing the behaviour of the tax inspectors produced results that showed that corruption breeds cheating, which in turn creates more opportunity for corruption in tax collection. Therefore, widespread bureaucratic corruption among tax inspectors can perpetuate an unofficial economy that in turn sustains these and other corrupt practices.

In a situation where corruption in tax enforcement breeds similar behaviour by firms (cheating) and vice versa, the implications of more intense auditing and higher penalties are not straightforward. For instance, the standard result that intense auditing and penalties serve as cheating deterrents holds only if cheating and engaging in corruption is very costly for both firms and tax inspectors. If cheating and corruption are not costly for firms and tax inspectors, then an increase in the auditing intensity, especially when auditing is relatively low, will increase corruption among tax inspectors. An increase in the penalty rate, especially when it is low, will also increase the extent of the corruption among tax inspectors. This result occurs because a higher penalty rate means the inspectors can demand larger bribes in exchange for waiving the penalty enforcement. The result is a greater incentive for tax inspectors to engage in corruption.
These results shed some light on why a crackdown on cheating that consists of greater penalties and more intense auditing appears to be ineffective. The analysis suggests these types of measures may only be effective if they are accompanied by activities that raise the individual cost of cheating and engaging in corruption. These activities include such measures as strengthening banking laws and banking infrastructure, which make engaging in cheating and corruption more costly, as well as reducing society's willingness to accept corruption.

Chapter V examined the tax-compliance behaviour of firms in a coordination framework. The cost of cheating and engaging in corruption was considered to depend on the degree of cheating and corruption that takes place in the economy. On this basis, the cheating and corruption cost creates a sort of spillover effect that entices more firms to operate either in the unofficial or the official economy. This analysis pointed out several results relating to unofficial economies.

First, when cheating becomes cheaper as the size of the unofficial economy grows, firms coordinate their action by cheating on taxes or by complying with taxes so that multiple equilibria may arise. The model showed that these stable equilibria can be Pareto ranked. The Pareto-superior equilibrium (the Good Equilibrium) is characterized by a low incidence of cheating and corruption and large benefits from the provision of public goods, while the Pareto-inferior equilibrium (the Bad Equilibrium) is characterized by a high incidence of cheating and corruption and the under-provision of public goods. This outcome sheds light on why economies with similar tax regulations may have significantly different levels of incidence of corruption, and varying sizes of unofficial economies.

Second, in an economy experiencing lax enforcement of tax regulations due to the widespread corruption of tax enforcers, expectations about the fairness of the tax system will be low. With low expectations about a fair and unbiased tax administration and a belief that the tax system does not work properly, the Pareto-inferior outcome can prevail. This finding suggests that a large unofficial economy, which is supported by a
high incidence of corruption and generates low-quality public services, could be a stable equilibrium. It also provides insight as to why some transition economies appear to languish for a considerable period of time with little progress in economic reforms.

One can conclude, therefore, that moving from a Bad Equilibrium to a Good Equilibrium is not a matter of simply changing the tax regulations, such as the penalties for non-compliance, the tax rates or the auditing intensity. In an economy characterized by poor governance of the tax-collection system due to nepotism, political patronage and corruption, firms expect that the enforcement of tax regulations is unlikely to be fair and unbiased. Thus, corruption in the tax inspectorates shapes low expectations about the fairness of the tax administration and compromises the credibility that tax regulation is enforced properly. As long as these low expectations remain, changes in other tax regulations will be ineffective in moving the economy to a better outcome.

The customs and tax agencies will gain credibility if their employment practices are open, competitive and based on merit, which will shape high expectations about tax-regulation enforcement. However, changes that would establish a good reputation for the customs and tax agencies might compromise the private benefits of some agents who are interested in maintaining the status quo. Resistance to positive changes could be expected from agents such as corrupt bureaucrats; firms that have already established networks for illicit activities in the unofficial economy; and high-level politicians who are either captured by firms or involved in the unofficial economy. As a result, shocks that will move an outcome from a Bad Equilibrium to a Good Equilibrium have a strong political dimension. This political dimension and the many agents involved in these changes increase the complexity of the shocks that are required. This complexity makes the prospect of moving an economy to a better outcome even less encouraging.

Chapter VI examined how government, through tax regulation, affects the size of the unofficial economy and as a result the tax revenues available for the provision of public goods. The first part of the chapter examined how a government sets the auditing rate. The government's preference structure, or more explicitly the relative importance that a
government attaches to revenues available for the provision of public goods relative to the total cheating and corruption rents, is crucial to the government’s choice of the auditing rate. This relative importance reflects to some extent the political process and government concerns for power and wealth. Strongly related to the government preference structure are lobbying activities, political-campaign contributions, direct business involvement in the informal economy, and patronage jobs.

The government’s choice of auditing rate is made along a transformation curve, an efficiency frontier, which captures the trade-off between cheating and corruption rents and the funding available for the provision of public goods. The transfer of the rents is associated with dead-weight losses due to the cost of cheating and corruption. With costly auditing, the government must allow for some cheating and corruption to occur in order to maximize the revenues available for the provision of public goods. Only if a government views illicit activities as a “bad,” and is willing to eliminate these activities at any cost, will it choose to perform very intense auditing.

The government’s allocation of revenues between education and infrastructure is highly dependent on the returns generated by these public goods in the economy. If education generates relatively higher returns and the government favours at the margin the provision of public goods relative to private benefits from corruption, then all revenues are allocated to education. If at the margin government favours the private benefits from corruption and cheating, then all revenues are allocated to infrastructure, even though education generates higher relative returns in the economy. Therefore, when education provides higher social returns in the economy than infrastructure, the results of the model reinforce arguments presented by Shleifer and Vishny (1993), Mauro (1995), Mauro (1997) and Mauro (1998).

This model also explored the case in which infrastructure generated higher social returns in the economy. In such a case the government commits revenues to infrastructure no matter which groups it favours at the margin. If government favours at the margin the provision of public goods, government will accept some corruption as a
side effect in the provision of a public good that generates relatively higher returns in the economy. Government will only allocate funding to education if it is willing to accept the counterproductive effect (i.e., the reduction in the provision of public goods) associated with the reduction in total cheating and corruption rents. If government favours at the margin the private benefits from corruption, then it will commit revenues to infrastructure primarily to facilitate opportunities for corruption benefits.

Overall, a key conclusion of this thesis is that illicit activities (cheating, and political and bureaucratic corruption) can sustain each another regardless which actors in the economy (firms, enforcers, and politicians) undertake them. With the level of corruption among tax inspectors determined simultaneously with the degree of cheating in the economy and low cheating and corruption costs, an increase in auditing will not necessarily deter cheating. This implies that that transformation of rents from public goods to firms in the unofficial economy has a different pattern than what was examined in Chapter VI. This different pattern of rent transformation means different policy implications with regard to auditing. Thus, it would be interesting to examine how a government can affect the unofficial economy through auditing, when the extent of corruption among tax inspectors is determined simultaneously with the size of the unofficial economy. Does government incur counterproductive effects if it undertakes intense auditing?

As outlined in the discussion of moving an economy from a Bad Equilibrium to a Good Equilibrium, the political elite have an important role to play in this process. A subject of future interest would be to incorporate government actions into the coordination games of firms. Particular attention should be paid to the process that can influence the expectations and beliefs about enforcement rather than to changing the instruments of tax regulation. It would also be interesting to consider how the distribution of differentiated agents affects the outcome of the model. As outlined in Chapter V, it is important to identify and understand the ways that an economy can move from an inferior equilibrium to a superior outcome, particularly in relation to the distribution of agents.
Although data on corruption and the unofficial economy are limited due to the illicit nature of these activities, empirical work could be undertaken in the future to validate the theoretical models that have been developed in this thesis. It would be of interest to create a firm-level survey that provided insights into the extent of bribery and corruption among tax inspectors, examined firms’ characteristics such as the inclination to engage in cheating and corruption, and assessed the moral or transactions costs associated with these activities.
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Gazeta Shqiptare  http://www.balkanweb.com/gazeta/gazeta.htm
Koha Jone        http://www.kohajone.com/
Korrieri         http://www.korrieri.com/
Shekulli         http://www.shekulli.com.al/
APPENDIX
APPENDIX 4: THE COMPARATIVE STATIC RESULTS WITH ENDOGENOUS $\alpha$

A4.1 The size of the unofficial economy

$$
\frac{\partial \beta^*}{\partial \lambda} = \frac{\lambda [t-\delta(t+\rho)] \left( \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right) + 2 \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2}
$$

$$
\frac{\partial \beta^*}{\partial \lambda} = \frac{\mu \lambda^2 [t-\delta(t+\rho)] + \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} > 0
$$

Since profits are the base for taxation, an increase in profits will increase the firm’s incentive to cheat and hence the size of the unofficial economy.

$$
\frac{\partial \beta^*}{\partial \Pi} = \frac{\Pi [t-\delta(t+\rho)] \left( \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right) - \Pi \mu \lambda [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2}
$$

$$
\frac{\partial \beta^*}{\partial \Pi} = \frac{\delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} < 0
$$

If engaging in corruption is expensive for tax inspectors then firms’ opportunities to escape penalties are reduced as well as their incentives to cheat.

$$
\frac{\partial \beta^*}{\partial \mu} = \frac{0 \left( \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right) - \Pi \lambda^2 [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2}
$$

$$
\frac{\partial \beta^*}{\partial \mu} = \frac{\lambda \beta}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} < 0
$$

An increase in the costs of cheating and engaging in corruption will decrease the firm’s incentive to cheat and as a result the size of the unofficial economy.
\[
\frac{\partial \beta^*}{\partial \tau} = \frac{\Pi(1-\delta)[\mu \lambda - \delta^2 \Pi^3 (t+\rho)^2 \theta(1-\theta) + 2 \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} \\
\frac{\partial \beta^*}{\partial \tau} = \frac{\mu \lambda^2 \Pi(1-\delta) + \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} \\
\frac{\partial \beta^*}{\partial \tau} = \frac{\mu \lambda^2 \Pi(1-\delta) + \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)] - \rho \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} \\
\frac{\partial \beta^*}{\partial \tau} = \frac{\Pi \lambda [\mu \lambda (1-\delta) - \rho \delta^2 \Pi^2 (t+\rho) \theta(1-\theta)] + \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} > 0 \\
\frac{\partial \beta^*}{\partial \tau} = \frac{\Pi \lambda [\mu \lambda (1-\delta) - \rho \delta^2 \Pi^2 (t+\rho) \theta(1-\theta)] + \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} > 0
\]

We know that \(\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) > 0 \Rightarrow \mu \lambda (1-\delta) - \rho \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)(1-\delta)\). By transforming the condition for solution \(t > \delta(t+\rho)\) into

\[
t > \delta(t+\rho) \Rightarrow \frac{t(1-\delta)}{\delta} > \rho \Rightarrow t(1-\delta) + \rho(1-\delta) > \rho \delta + \rho(1-\delta) \Rightarrow (t+\rho)(1-\delta) > \rho
\]

we have

\(\delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)(1-\delta) > \rho \delta^2 \Pi^2 (t+\rho) \theta(1-\theta)\) which implies that

\(\mu \lambda (1-\delta) > \rho \delta^2 \Pi^2 (t+\rho) \theta(1-\theta)\). Therefore it can be concluded that \(\frac{\partial \beta^*}{\partial \tau} > 0\). This result suggests that an increase in the tax rate will increase the firm's tax burden as well as the firm's incentive to cheat on taxes, and hence the size of the unofficial economy.

\[
\frac{\partial \beta^*}{\partial \rho} = -\frac{\Pi \lambda \delta [\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)] + 2 \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} \\
\frac{\partial \beta^*}{\partial \rho} = -\frac{\Pi \mu \lambda^2 \delta + \delta^3 \Pi^3 (t+\rho)^2 \theta(1-\theta) + 2 \delta^2 \Pi^3 (t+\rho) \theta(1-\theta) \lambda [t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} \\
\frac{\partial \beta^*}{\partial \rho} = -\frac{\Pi \mu \lambda^2 \delta + \delta^3 \Pi^3 (t+\rho)^2 \theta(1-\theta) [2t-\delta(t+\rho)]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} \\
\frac{\partial \beta^*}{\partial \rho} = -\frac{\Pi \lambda \delta [\mu \lambda - \delta^2 \Pi^2 (t+\rho) \theta(1-\theta) [2t-\delta(t+\rho)]]}{\left[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\right]^2} > 0
\]

Since \(\delta \Pi^2 (t+\rho) \theta(1-\theta) [2t-\delta(t+\rho)] > \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\), the conditions for an interior solution \(\mu \lambda > \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta)\) and \(t > \delta(t+\rho)\) do not guarantee that
\[ \mu \lambda > \delta \Pi^2 (t + \rho) \theta (1 - \theta) [2t - \delta (t + \rho)] \]. Depending on the sign of the term in brackets in the numerator we have \( \{ \mu \lambda - \delta \Pi^2 (t + \rho) \theta (1 - \theta) [2t - \delta (t + \rho)] \} > 0 \Rightarrow \frac{\partial \beta^*}{\partial \rho} < 0 \). Only if costs of cheating and engaging in corruption \((\mu \lambda)\) are substantially large, an increase in the penalty rate will serve as a deterrent of cheating behavior.

\[
\frac{\partial \beta^*}{\partial \delta} = -\Pi \lambda (t + \rho) \left[ \frac{\mu \lambda - \delta^2 \Pi^2 (t + \rho) \theta (1 - \theta) + 2\delta \Pi^3 (t + \rho)^2 \theta (1 - \theta) \lambda [t - \delta (t + \rho)]}{[\mu \lambda - \delta^2 \Pi^2 (t + \rho) \theta (1 - \theta)]^2} \right]
\]

\[
\frac{\partial \beta^*}{\partial \delta} = -\Pi \mu \lambda^2 (t + \rho) + \delta \Pi^2 \lambda (t + \rho)^2 \theta (1 - \theta) [2t - \delta (t + \rho)]
\]

\[
\frac{\partial \beta^*}{\partial \delta} = -\Pi \lambda (t + \rho) \left[ \frac{\mu \lambda - \delta \Pi^2 (t + \rho) \theta (1 - \theta) [2t - \delta (t + \rho)]}{[\mu \lambda - \delta^2 \Pi^2 (t + \rho) \theta (1 - \theta)]^2} \right]< 0
\]

As in the case of \( \frac{\partial \beta^*}{\partial \rho} \), the sign of \( \frac{\partial \beta^*}{\partial \delta} \) depends on the sign of the term in curly brackets in the numerator \( \{ \mu \lambda - \delta \Pi^2 (t + \rho) \theta (1 - \theta) [2t - \delta (t + \rho)] \} \). When the cheating and corruption costs \((\mu \lambda)\) are large enough to assure that

\( \{ \mu \lambda - \delta \Pi^2 (t + \rho) \theta (1 - \theta) [2t - \delta (t + \rho)] \} > 0 \), then \( \frac{\partial \beta^*}{\partial \delta} < 0 \). In other words, for the auditing to be a cheating deterrent, engaging in cheating and corruption should be very costly for firms and tax inspectors. If costs of cheating and engaging in corruption are low, we might have a paradoxical result, at which a more intense auditing results in a larger unofficial economy \( \frac{\partial \beta^*}{\partial \delta} > 0 \).

\[
\frac{\partial \beta^*}{\partial \theta} = \frac{\mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta (1 - \theta)}{[\mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta (1 - \theta)]^2}
\]

\[
\frac{\partial \beta^*}{\partial \theta} = \frac{\delta^3 \Pi^2 (t + \rho)^2 (1 - 2\theta)}{[\mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta (1 - \theta)]^2}
\]

\[
\frac{\partial \beta^*}{\partial \theta} = \beta \frac{\delta^2 \Pi^2 (t + \rho)^2 (1 - 2\theta)}{[\mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta (1 - \theta)]^2} > 0
\]

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The sign of \( \frac{\partial \beta^*}{\partial \theta} \) depends on whether \( \theta > \frac{1}{2} \). For \( \theta < \frac{1}{2} \) we have \( \frac{\partial \beta^*}{\partial \theta} > 0 \). This implies that as long as bribes are less than half of the penalty, an increase in bribes will not deter the firms’ cheating behaviors. For \( \theta > \frac{1}{2} \) we have \( \frac{\partial \beta^*}{\partial \theta} < 0 \) as in the basic model. When firms pay a bribe that is more than half of the penalty they should pay, then an increase in the bribe will suppress the firms’ incentives to cheat resulting in a smaller size of the unofficial economy.

### A4.2 The Extent of Corruption among Tax Inspectors

\[
\frac{\partial \alpha^*}{\partial \Pi} = \frac{2 \lambda \Pi (t+\rho) \delta [t-\delta(t+\rho)] \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) + 2 \delta^3 \Pi^3 (t+\rho)^3 \theta^2 (1-\theta)[t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2}
\]

\[
\frac{\partial \alpha^*}{\partial \Pi} = \frac{2 \Pi \mu \lambda (t+\rho) \delta [t-\delta(t+\rho)] - 2 \delta^3 \Pi^3 (t+\rho)^3 \theta^2 (1-\theta)[t-\delta(t+\rho)] + 2 \delta^3 \Pi^3 (t+\rho)^3 \theta^2 (1-\theta)[t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2}
\]

\[
\frac{\partial \alpha^*}{\partial \Pi} = \frac{2 \Pi \mu \lambda (t+\rho) \theta (t-\delta(t+\rho))}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} > 0
\]

Since profits are the base for the bribes received an increase in profits will increase the corruption.

\[
\frac{\partial \alpha^*}{\partial \lambda} = \frac{0 \left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right] - \mu \Pi^2 \delta (t+\rho) \theta [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} = -\frac{\mu \Pi^2 \delta (t+\rho) \theta [t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} < 0
\]

The more costly is for the tax inspector to engage in corruption, less corruption takes place.

\[
\frac{\partial \alpha^*}{\partial \mu} = \frac{0 \left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right] - \lambda \Pi^2 (t+\rho) \theta[t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} = -\frac{\lambda \Pi^2 (t+\rho) \theta[t-\delta(t+\rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta(1-\theta) \right]^2} < 0
\]

The more costly is for the firm to engage in cheating and corruption the smaller is the unofficial economy, the more limited are the opportunities for corruption.
\[
\frac{\partial \alpha^*}{\partial t} = \frac{\Pi^2 \delta \left[ (1-\delta)(t+r) \right] + (t+r)(1-\delta) \left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right] + 2\delta^3 \Pi^4 (t+r)^3 \theta^2 (1-\theta) \left[ t-\delta(t+r) \right]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]^2}
\]

\[
\frac{\partial \alpha^*}{\partial t} = \frac{\Pi^2 \delta \left[ 2(1-\delta)(t+r) \right] + \rho \left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right] + 2\delta^3 \Pi^4 (t+r)^3 \theta^2 (1-\theta) \left[ t-\delta(t+r) \right]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]^2}
\]

\[
\frac{\partial \alpha^*}{\partial t} = \frac{\Pi^2 \delta \left[ 2\mu \lambda (t-\delta(t+r)) \right] + \rho \left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]^2} > 0
\]

Since the tax rate is the base for bribes paid, an increase in the tax rate will increase the corruption among tax inspectors.

\[
\frac{\partial \alpha^*}{\partial \delta} = \frac{\Pi^2 \theta (t+r) - 2\delta \Pi \theta (t+r)^2 \left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right] + 2\delta^2 \Pi^4 (t+r)^3 \theta^2 (1-\theta) \left[ t-\delta(t+r) \right]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]^2}
\]

\[
\frac{\partial \alpha^*}{\partial \delta} = \frac{\mu \lambda \Pi \theta (t+r) \left[ t-2\delta(t+r) \right] - \Pi \delta^2 (t+r)^3 \theta^2 (1-\theta) t + 2\delta^3 \Pi^4 (t+r)^4 \theta^2 (1-\theta) t - 2\delta^3 \Pi^4 (t+r)^4 \theta^2 (1-\theta) t + 2\Pi^4 \delta^2 (t+r)^3 \theta^2 (1-\theta) t}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]^2} = \frac{\Pi^2 \theta (t+r) \left\{ \mu \lambda \left[ 2\delta(t+r) - t \right] - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) t \right\}}{\left[ \mu \lambda - \delta^2 \Pi^2 (t+r)^2 \theta (1-\theta) \right]^2} > 0
\]

For \(2\delta(t+r) - t < 0 \Rightarrow \delta < \frac{t}{2(t+r)} \) we have \(\frac{\partial \alpha^*}{\partial \delta} > 0\). Thus, an increase in the auditing activity in the range \(\delta \in \left[ 0, \frac{t}{2(t+r)} \right] \), the extent of corruption among tax inspectors will increase. This is not a surprising result, since the auditing is the avenue for the tax inspectors to collect bribes. When the increase in the auditing is in the range \(\delta \left( \delta \in \left[ \frac{t}{2(t+r)}, \frac{t}{(t+r)} \right] \right) \), the sign of the partial derivative \(\frac{\partial \alpha^*}{\partial \delta} \) depend on the firm’s cost of cheating and corruption and the tax inspector’s cost of corruption \(\mu \lambda \). We know that
\( \mu \lambda > \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta) \) must hold for an interior solution. Since \( t<1 \) then
\( \mu \lambda > \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta) > \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta) t \). However, when condition \( t > \delta (t+\rho) \) holds, then \( 2\delta (t+\rho) - t < 1 \Rightarrow \mu \lambda > \mu \lambda [2\delta (t+\rho) - t] \). We also have \( [2\delta (t+\rho) - t] < t \), which implies that the first term in the curly brackets \( (\mu \lambda) \) is multiplied by a smaller number than the second term in the bracket \( (\delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta)) \) is multiplied. Only a substantially large \( \mu \lambda \) will assure that condition \( \{ \mu \lambda [2\delta (t+\rho) - t] - \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta) t \} > 0 \) is satisfied. In other words, when the cost of cheating and engaging in corruption are substantially high then \( \frac{\partial \alpha^*}{\partial \delta} < 0 \). This indicates that an increase on the auditing activity on the range \( \delta \in \left[ \frac{t}{2(t+\rho)}, \frac{t}{t+\rho} \right] \), ceteris paribus, will decrease the extent of corruption among tax inspectors, only if engaging in cheating and corruption is very costly.

\[
\frac{\partial \alpha^*}{\partial \rho} = \frac{[\Pi^2 \delta \psi - 2\Pi^2 \delta^2 (t+\rho)] [\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta)] + 2\Pi^4 (t+\rho)^2 \theta^2 (1-\theta) \delta^3 [t - \delta (t+\rho)]}{[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta)]^2}
\]

\[
\frac{\partial \alpha^*}{\partial \rho} = \frac{\Pi^2 \delta \mu \lambda [2\delta (t+\rho) - t] - \delta^3 \Pi^4 (t+\rho)^2 \theta^2 (1-\theta) t}{[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta)]^2}
\]

\[
\frac{\partial \alpha^*}{\partial \rho} = -\frac{\Pi^2 \delta^3 \{ \mu \lambda [2\delta (t+\rho) - t] - \delta^2 \Pi^2 (t+\rho)^2 \theta^2 (1-\theta) t \}}{[\mu \lambda - \delta^2 \Pi^2 (t+\rho)^2 \theta (1-\theta)]^2} > 0
\]

An increase in the penalty rate, in the range \( \rho \left( \rho \in \left[ 0, \frac{t(1-2\delta)}{2\delta} \right] \right) \), will increase the extent of the corruption among tax inspectors. Depending on the magnitude of \( (\mu \lambda) \), an increase in the penalty rate in the range \( \rho \left( \rho \in \left[ \frac{t(1-2\delta)}{2\delta}, +\infty \right] \right) \), could either increase or decrease the extent of corruption among tax inspectors i.e. \( \frac{\partial \alpha^*}{\partial \rho} > 0 \). Only if cheating
end engaging in corruption are very costly to firms and tax inspectors, an increase in the penalty rate serves as a deterrent of corruption among tax inspectors $\frac{\partial \alpha^*}{\partial \rho} < 0$. If cheating and corruption are not very costly, an increase in the penalty rate in the high range will increase the extent of corruption among tax inspectors. The penalty represents the discretionary power of tax inspectors to enforce the regulation. A higher penalty translates into a higher incentive to embezzle part of it in corrupt deals.

$$\frac{\partial \alpha^*}{\partial \theta} = \frac{\Pi^2 \delta(t + \rho)[t - \delta(t + \rho)]^2 \theta(1 - \theta) + [(1 - \theta) - \theta] \delta^3 \Pi^4 (t + \rho)^3 \theta [t - \delta(t + \rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta(1 - \theta) \right]^2}$$

$$\frac{\partial \alpha^*}{\partial \theta} = \frac{\Pi^2 \delta(t + \rho)[t - \delta(t + \rho)] \mu \lambda - \delta^3 \Pi^4 (t + \rho)^3 \theta^2 [t - \delta(t + \rho)]}{\left[ \mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta(1 - \theta) \right]^2}$$

$$\frac{\partial \alpha^*}{\partial \theta} = \frac{\Pi^2 \delta(t + \rho)[t - \delta(t + \rho)] \mu \lambda - \delta^3 \Pi^2(t + \rho)^2 \theta^2}{\left[ \mu \lambda - \delta^2 \Pi^2 (t + \rho)^2 \theta(1 - \theta) \right]^2}$$

For $\theta < (1 - \theta) \Rightarrow \theta < \frac{1}{2}$, an increase in the bribe received by the tax inspector increases the extent of corruption among tax inspectors i.e., $\frac{\partial \alpha^*}{\partial \theta} > 0$. When $\theta > (1 - \theta) \Rightarrow \theta > \frac{1}{2}$, an increase in the bribe received by the bureaucrat can have either a positive or a negative effect on the extent of corruption among tax inspectors. Although the rationale that an increase in bribes may decrease the extent of corruption is not very appealing, one should recall the complementarity nature of firms and tax inspectors activities. For $\theta > \frac{1}{2}$ firms were discouraged to cheat on taxes thus resulting in a smaller unofficial economy, as well as in a lower degree of corruption.
APPENDIX 6: DISTRIBUTION OF RENTS

A6.1 Total Cheating and Corruption Rents \( TCCR \)
The total cheating and corruption rents are given by:

\[
(A6.1.1) \quad TCCR = \frac{\mu}{2} \beta^2 + \beta \delta \Pi(t + \rho) \alpha \theta
\]

where \( \beta = \frac{\Pi(t - \delta(t + \rho)(1 - \alpha(1 - \theta)))}{\mu} \). The \( TCCR \) is a decreasing and convex function of the auditing rate \( \delta \) i.e., \( TCCR_\delta < 0 \) and \( TCCR^*_\delta < 0 \).

\[
TCCR_\delta = \mu \beta^2 + \alpha \delta \Pi(t + \rho)(\beta^2 \delta + \beta)
\]
\[
= -\frac{\Pi^2 \left[ t - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right](t + \rho)(1 - \alpha(1 - \theta))}{\mu} - \frac{\Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))\delta \alpha \theta}{\mu}
\]
\[
+ \frac{\Pi^2 \left[ t - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right] (t + \rho) \alpha \theta}{\mu}
\]
\[
= -\frac{\Pi^2 \left[ t - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right](t + \rho)(1 - \alpha(1 - \theta)) - \alpha \theta}{\mu} - \frac{\Pi^2(t + \rho)^2(1 - \alpha (1 - \theta))\delta \alpha \theta}{\mu}
\]

\[
(A6.1.2) \quad TCCR_\delta = -\frac{\Pi^2 \left[ t - \delta(t + \rho)(1 - \alpha(1 - \theta)) \right](t + \rho)(1 - \alpha)}{\mu} - \frac{\Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))\delta \alpha \theta}{\mu} < 0
\]

\[
TCCR^*_\delta = -\frac{\Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))(1 - \alpha) + \Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))\alpha \theta}{\mu}
\]
\[
= \frac{\Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))(1 - \alpha) - \alpha \theta}{\mu} - \frac{\Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))(1 - \alpha)}{\mu}
\]

The term \( \left[ (1 - \alpha(1 + \theta)) \right] < 0 \Rightarrow TCCR^*_\delta < 0 \) which implies the convexity of the \( TCCR \) and satisfies the SOC for maximizing \( TCCR \). Therefore, the auditing rate that maximizes the \( TCCR \) is given by the corner solution at \( \delta = 0 \).

\[
(A.6.1.3) \quad \delta_A = 0
\]
The size of the unofficial economy at no auditing is \( \beta_A = \frac{\Pi t}{\mu} \) and the total cheating and corruption rents \( TCCR \) are given by \( TCCR_A = \frac{\Pi t^2}{2\mu} \). Revenues available for the public goods provision \( PG \) are \( PG_A = \Pi t - \frac{\Pi t^2}{\mu} \). These values determine point A on the TC.

The auditing rate such that dissipates the \( TCCR \) is the auditing that does not allow firms to operate in the unofficial economy i.e. \( TCCR_D = 0 \) and \( \beta_D = 0 \).

This means that \( t - \delta(t + \rho)(1 - \alpha(1 - \theta)) = 0 \) or

\[
\delta_D = \frac{t}{(t + \rho)(1 - \alpha(1 - \theta))}
\]

Revenues available for the provision of public goods that result at this auditing rate \( PG_D \) are given by:

\[
PG_D = (1 - \beta_D) \Pi t + \delta_D \beta_D \Pi (t + \delta)(1 - \alpha) - \frac{\phi}{2} \delta_D
\]

\[
= \Pi t - \frac{\phi t^2}{2(t + \rho)(1 - \alpha(1 - \theta))^2}
\]

These values determine point D on the TC.

### A6.2 Revenues for the Provision of Public Goods \( PG \)

The government revenue available for the provision of public goods are given by:

\[
PG = (1 - \beta) \Pi t + \delta \beta(1 - \alpha) \Pi (t + \rho) - \frac{\phi}{2} \delta^2
\]

\( PG \) is an increasing and later a decreasing function of the auditing rate \( \delta \). The auditing rate that maximizes \( PG \) is obtained from the problem:

\[
\max_{\delta} PG = (1 - \beta) \Pi t + \delta \beta(1 - \alpha) \Pi (t + \rho) - \frac{\phi}{2} \delta^2
\]

The FOC is given by:

\[
\frac{\partial PG}{\partial \delta} = -\beta \Pi t + \Pi (t + \rho)(1 - \alpha)(\beta' \delta + \beta) - \phi \delta = 0
\]

Substituting \( \beta' \) and \( \beta \) we have:
\[
\frac{\partial PG}{\partial \delta} = \Pi^2(t + \rho)(1 - \alpha(1 - \theta)) + \Pi^2(t + \rho)(1 - \alpha)t
\]

\[
- \Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) \delta - \Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) \delta - \mu \phi \delta
\]

\[
= \Pi^2(t + \rho)[2(1 - \alpha) + \alpha \theta] - 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) \delta - \mu \phi \delta \Pi^2(t + \rho)[2(1 - \alpha) + \alpha \theta]
\]

\[
= \Pi^2(t + \rho)[2(1 - \alpha) + \alpha \theta] - \left[2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) + \mu \phi \delta \right]
\]

\[\text{(A6.2.3)}\]

\[
\frac{\partial PG}{\partial \delta} = \Pi^2(t + \rho)[2(1 - \alpha) + \alpha \theta] - \left[2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) + \mu \phi \delta \right] \delta = 0
\]

Denoting the \( PG \) maximizing auditing rate by \( \delta_c \) and solving obtains:

\[\text{(A6.2.4)}\]

\[
\delta_c = \frac{\Pi^2(t + \rho)[2(1 - \alpha) + \alpha \theta]}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))}
\]

The \( SOC = -2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) \delta - \mu \phi \delta < 0 \) is satisfied which implies the concavity of \( PG \) function.

The unofficial economy at the auditing rate \( \delta_c \) is:

\[
\beta_c = \frac{\Pi}{\mu} \left[ \frac{t - \left(\frac{\Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))[2(1 - \alpha) + \alpha \theta]}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))} \right)}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))} \right]
\]

\[
= \frac{\Pi}{\mu} \left[ \frac{\mu \phi t + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta)) - \Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))[2(1 - \alpha) + \alpha \theta]}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))} \right]
\]

\[
= \frac{\Pi}{\mu} \left[ \frac{\mu \phi t + \Pi^2(t + \rho)^2(1 - \alpha(1 - \theta))[2(1 - \alpha) - 2(1 - \alpha) - \alpha \theta]}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))} \right]
\]

\[
= \frac{\Pi}{\mu} \left[ \frac{\mu \phi t - \Pi^2(t + \rho)^2(1 - \alpha(1 - \theta)) \alpha \theta}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))} \right]
\]

\[\text{(A6.2.5)}\]

\[
\beta_c = \frac{\Pi\left|\mu \phi - \Pi^2(t + \rho)^2(1 - \alpha(1 - \theta)) \alpha \theta \right|}{\mu \phi + 2\Pi^2(t + \rho)^2(1 - \alpha)(1 - \alpha(1 - \theta))}
\]

Government revenues available for the provision of public goods \( PG \) are:
\[ \Pi_t = \frac{\Pi_t^2 \left[ \mu \left( t + \rho \right)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{\Pi_t^4 (1 - \alpha)(t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ \mu \left( t + \rho \right)^2 \left( 1 - \alpha(1 - \theta) \right) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \frac{\varphi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ \Pi_t^2 \left[ \mu \varphi - \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right] \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right] \]

\[ - \frac{2 \mu \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ \mu \varphi - \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \Pi_t^2 \left( \mu \varphi \right)^2 - \Pi_t^4 (t + \rho)^2 \left[ (1 - \alpha(1 - \theta)) \alpha \theta \varphi + 4 \Pi_t^4 (t + \rho)^2 i \varphi (1 - \alpha(1 - \theta)) \right] - \]

\[ - \frac{2 \mu \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \Pi_t^2 \left( \mu \varphi \right)^2 + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]

\[ + \frac{2 \mu \Psi \Pi_t^4 (t + \rho)^2 \left[ 2(1 - \alpha) + \alpha \theta \right] \left[ 2(1 - \alpha) + \alpha \theta \right]}{2 \left[ \mu \varphi + 2 \Pi_t^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \right]^2} \]
By simplifying terms in the curly brackets we have:

\[ PG_c = \Pi_t - \frac{2\Pi^2 t^2 (\mu \phi)^2 - 2\Pi^6 t^2 (t + \rho)^4 (1 - \alpha)(1 - \alpha (1 - \theta)) (\alpha \theta)^2}{2 \mu \left[ \mu \phi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \right]^2} \]

\[ + \frac{4\Pi^4 (t + \rho)^2 \mu \phi (1 - \alpha)(1 - \alpha (1 - \theta)) - \Pi^4 (t + \rho)^2 t^2 \mu \phi (\alpha \theta)^2}{2 \mu \left[ \mu \phi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \right]^2} \]

\[ = \Pi_t - \frac{\Pi^2 t^2 \mu \phi \left[ 2\mu \phi - \Pi^2 (t + \rho)^2 (\alpha \theta)^2 \right] + 2\Pi^4 (t + \rho)^2 t^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \left[ 2\mu \phi - \Pi^2 (t + \rho)^2 (\alpha \theta)^2 \right]}{2 \mu \left[ \mu \phi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \right]^2} \]

By simplifying further we have:

\[ PG_c = \Pi_t - \frac{\Pi^2 t^2 \left[ 2\mu \phi - \Pi^2 (t + \rho)^2 (\alpha \theta)^2 \right] \left[ \mu \phi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \right]}{2 \mu \left[ \mu \phi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \right]^2} \]

\[ = \Pi_t - \frac{\Pi^2 t^2 \left[ 2\mu \phi - \Pi^2 (t + \rho)^2 (\alpha \theta)^2 \right]}{2 \mu \left[ \mu \phi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha (1 - \theta)) \right]} \]

The total cheating and corruption rents \( TCCR \) at the auditing rate \( \delta_c \) result to be:

\[ TCCR_c = \frac{\mu}{2} \beta_c \delta_c + \delta_c \beta_c \Pi (t + \rho) \alpha \theta \]
\[ TCCR_C = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) \Pi^4 (t + \rho)^2 [2(1 - \alpha) + \alpha \theta]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ TCCR_C = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

\[ = \frac{\Pi^2 t^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]^2}{2\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} + \frac{\alpha \varphi \Sigma(t + \rho) t^2 \left[ 2(1 - \alpha) + \alpha \theta \right]^2 \left[ \mu \varphi - \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta)) \alpha \theta \right]}{\mu \left[ \mu \varphi + 2\Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \alpha(1 - \theta)) \right]^2} \]

PGC and TCCR_C determine point C on the TC.

A6.3 Total Rents in the System TCCR+PG

Another point of critical importance on the transformation curve TC is obtained by the auditing rate that maximizes the total rents in the system TCCR + PG. Denote the auditing rate that maximizes the total rents in the system by \( \delta_B \). This auditing rate is obtained by solving the problem:

(A6.3.1) \[ \max_{\delta} TCCR + PG = \frac{\mu}{2} \beta^2 + \delta \varphi \Sigma(t + \rho) \alpha \theta + (1 - \beta) \Pi t + \delta \beta (1 - \alpha) \Pi (t + \rho) - \frac{\delta^2}{2} \]

The FOC is:
\[
\frac{\partial(TCCR + PG)}{\partial \delta} = \frac{\partial TCCR}{\partial \delta} + \frac{\partial PG}{\partial \delta} = 0
\]

\[
= \mu \beta' + \alpha \Pi (t + \rho) (\beta' \delta + \beta) - \beta \Pi t + \Pi (t + \rho) (1 - \alpha) (\beta' \delta + \beta) - \varphi \delta
\]

\[
= \mu \beta' + \Pi (t + \rho) (1 - \alpha (1 - \theta)) (\beta' \delta + \beta) - \beta \Pi t - \varphi \delta = 0
\]

Substitute \( \beta = \frac{\Pi [t - \delta (t + \rho) (1 - \alpha (1 - \theta))]}{\mu} \) and \( \beta' = -\frac{\Pi (t + \rho) (1 - \alpha (1 - \theta))}{\mu} \) to give:

\[
\frac{\partial(TCCR + PG)}{\partial \delta} = -\Pi^2 \left[ t - \delta (t + \rho) (1 - \alpha (1 - \theta)) \right] (t + \rho) (1 - \alpha (1 - \theta)) - \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2 \delta
\]

\[
+ \Pi^2 \left[ t - \delta (t + \rho) (1 - \alpha (1 - \theta)) \right] (t + \rho) (1 - \alpha (1 - \theta)) + \Pi^2 t (t + \rho) (1 - \alpha (1 - \theta)) - \mu \varphi \delta = 0
\]

By simplifying terms and solving for \( \delta \) we have:

\[
\delta \left[ \mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2 \right] = \Pi^2 t (t + \rho) (1 - \alpha (1 - \theta)) \text{ or}
\]

(A6.3.2) \[ \delta_B = \frac{\Pi^2 t (t + \rho) (1 - \alpha (1 - \theta))}{\mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2} \]

The unofficial economy at \( \delta_B \) is:

\[
\beta_B = \frac{\Pi \left[ t - \frac{\Pi^2 t (t + \rho) (1 - \alpha (1 - \theta))}{\mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2} (t + \rho) (1 - \alpha (1 - \theta)) \right]}{\mu}
\]

\[
= \frac{\Pi \left[ t - \frac{\Pi^2 t (t + \rho)^2 (1 - \alpha (1 - \theta))^2}{\mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2} \right]}{\mu} = \frac{\Pi t}{\mu} \frac{\Pi^3 t (t + \rho) (1 - \alpha (1 - \theta))^2}{\mu \left[ \mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2 \right]}
\]

\[
= \frac{\Pi t (t + \rho) (1 - \alpha (1 - \theta))^2 - \Pi^2 t (t + \rho) (1 - \alpha (1 - \theta))^2}{\mu \left[ \mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2 \right]}
\]

(A6.3.3) \[ \beta_B = \frac{\Pi t \varphi}{\mu \varphi + \Pi^2 (t + \rho)^2 (1 - \alpha (1 - \theta))^2} \]

The total cheating and corruption rents \( TCCR \) are:
$TCCR_B = \frac{\mu (\Pi \varphi)^2}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2} + \frac{\alpha \Theta^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2} - \frac{\Pi^2 \varphi \left(\mu \varphi + 2 \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\alpha \theta\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

The government revenues available for the provision of public goods are:

$PG_B = \Pi \mu - \frac{(\Pi \mu)^2 \varphi}{\mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)} - \frac{(1 - \alpha) \Pi^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2} - \frac{\alpha \Theta^4 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$= \Pi \mu - \frac{2 \Pi^2 \varphi \left(\mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$= \Pi \mu - \frac{2 \Pi^2 \varphi \mu + 2 \alpha \Theta^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right) - 2 \Pi^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right) + \alpha \Theta^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$= \Pi \mu - \frac{2 \Pi^2 \varphi \mu + 2 \alpha \Theta^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right) - 2 \Pi^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$= \Pi \mu - \frac{2 \Pi^2 \varphi \mu + 2 \alpha \Theta^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right) - 2 \Pi^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$= \Pi \mu - \frac{2 \Pi^2 \varphi \mu + 2 \alpha \Theta^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right) - 2 \Pi^4 (t + \rho)^2 \varphi \left(1 - \alpha (1 - \theta)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$= \Pi \mu - \frac{\Pi^2 \varphi \left(2 \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

$PG_B = \Pi \mu - \frac{\Pi^2 \varphi \left(2 \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right)}{2 \left[ \mu \varphi + \Pi^2 (t + \rho)^2 \left(1 - \alpha (1 - \theta)\right)\right]^2}$

The total cheating and corruption rents $TCCR_B$ and the revenues available for the provision of the public goods $PG_B$ determine the point B in the TC.
A6.4 Slope of Transformation Curve

To examine the slope of the transformation curve we look at \( \frac{dTCCR}{dPG} \). Since we are considering the change of the auditing rate only, the total differential is equal to the partial derivative with respect to the auditing rate \( \delta \) i.e., \( dTCCR = \frac{\partial TCCR}{\partial \delta} d\delta \) and
\[
dPG = \frac{\partial PG}{\partial \delta} d\delta.
\]
By taking the ratio of the total differentials we have:
\[
(A6.4.1) \quad \frac{dTCCR}{dPG} = \frac{\frac{\partial TCCR}{\partial \delta}}{\frac{\partial PG}{\partial \delta}}
\]
Notice that the numerator is given in equation (A6.1.2), while the denominator in equation (A6.2.3).
\[
\frac{\partial TCCR}{\partial \delta} = -\frac{\Pi^2 \left[ t - \delta (t + \rho) \right] (1 - \alpha (1 - \theta))}{\mu} \left( t + \rho \right) (1 - \alpha) \frac{\Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta))}{\mu} \frac{\partial \alpha \theta}{\partial \delta}
\]
\[
= -\frac{\Pi^2 \left( t + \rho \right) (1 - \alpha)}{\mu} + \frac{\partial \Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta))}{\mu} \left[ (1 - \alpha) - \alpha \theta \right]
\]
\[
= -\frac{\Pi^2 \left( t + \rho \right) (1 - \alpha) + \partial \Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta)) (1 - \alpha (1 + \theta))}{\mu}
\]
\[
\frac{\partial PG}{\partial \delta} = \frac{\Pi^2 \left( t + \rho \right) t \left[ (1 - \alpha) + \alpha \theta + (1 - \alpha) \right] - \delta \left[ 2 \Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta))(1 - \alpha) + \mu \phi \right]}{\mu}
\]
Substituting \( \frac{\partial TCCR}{\partial \delta} \) and \( \frac{\partial PG}{\partial \delta} \) into (A5.4.1) we obtain:
\[
(A6.4.2) \quad \frac{dTCCR}{dPG} = \frac{-\Pi^2 \left( t + \rho \right) (1 - \alpha) + \partial \Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta))(1 - \alpha (1 + \theta))}{\Pi^2 \left( t + \rho \right) t \left[ 2 (1 - \alpha) + \alpha \theta \right] - \delta \left[ 2 \Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta))(1 - \alpha) + \mu \phi \right]}
\]
As outlined in Appendix 6.1, for \( \delta \in [0, \delta_c] \) the slope of \( TCCR \) function is negative i.e. \( \frac{\partial TCCR}{\partial \delta} < 0 \). The calculation in Appendix 6.2 showed that
\[
\arg \max_{\delta} PG = \delta_c = \frac{\Pi^2 \left( t + \rho \right) t \left[ 2 (1 - \alpha) + \alpha \theta \right]}{\mu \phi + 2 \Pi^2 \left( t + \rho \right)^2 (1 - \alpha (1 - \theta))(1 - \alpha)}.
\]
For \( \delta < \delta_c \) the denominator
\[ \frac{\partial PG}{\partial \delta} > 0 \] which implies a negative slope for the TC i.e., \[ \frac{dTCCR}{dPG} < 0. \] For \( \delta > \delta_c \) the denominator \( \frac{\partial PG}{\partial \delta} < 0 \) is negative i.e., implying a positive slope for the TC \[ \frac{dTCCR}{dPG} > 0. \] To summarize, the TC has a negative slope for values of \( \delta \in ]0, \delta_c[ \) and a positive slope for the high values of the auditing rate on the range \( \delta \in ]\delta_c, \delta_d[ \).

Let us now calculate the slope of the TC at points A; B; C and D.

\[
\left[ \frac{dTCCR}{dPG} \right]_A = \frac{-\Pi^2 t(t + \rho)(1 - \alpha) + \delta_c \Pi^2 (t + \rho)^2 \left[ (1 - \alpha)^2 - (\alpha \theta)^2 \right]}{\Pi^2 (t + \rho) \left[ 2(1 - \alpha) + \alpha \theta \right] - \delta_c \left[ 2 \Pi^2 (t + \rho)^2 (1 - \alpha(1 - \theta))(1 - \alpha) + \mu \theta \right]}
\]

\[
= \frac{-\Pi^2 t(t + \rho)(1 - \alpha)}{\Pi^2 (t + \rho) \left[ 2(1 - \alpha) + \alpha \theta \right]} = \frac{(1 - \alpha)}{\frac{2(1 - \alpha) + \alpha \theta}{2}} < -\frac{1}{2}
\]

As outlined in Appendix 6.3, \((TCCR + PG)\) are maximized at point B. Recall the FOC \[ \frac{\partial (TCCR + PG)}{\partial \delta} = 0. \] This implies that \[ \frac{\partial TCCR}{\partial \delta} + \frac{\partial PG}{\partial \delta} = 0. \] or \[ \left[ \frac{dTCCR}{dPG} \right]_B = -1. \]

The slope of the TC at point B equal to minus one indicates a one-to-one transfer of rents.

\(PG\) is maximized at point C, which implies that \[ \frac{\partial PG}{\partial \delta} = 0. \] Substitute the denominator by zero to give:

\[
\left[ \frac{dTCCR}{dPG} \right]_C = \frac{-\Pi^2 t(t + \rho)(1 - \alpha) + \delta_c \Pi^2 (t + \rho)^2 \left[ (1 - \alpha)^2 - (\alpha \theta)^2 \right]}{0}
\]

\[
= \frac{-\Pi^2 t(t + \rho)(1 - \alpha) + \Pi^4 (t + \rho)^3 t(1 - \alpha)(1 - \alpha(1 - \theta))}{0}
\]

\[
\lim_{\delta \to \delta_c} \left[ \frac{dTCCR}{dPG} \right]_C = \frac{-\Pi^2 t(t + \rho)(1 - \alpha) + \Pi^4 (t + \rho)^3 t(1 - \alpha)(1 - \alpha(1 - \theta))}{0} = -\infty
\]

An infinite slope of the TC means that the tangent line at point C is a vertical line.
\[
\frac{dTC_{CR}}{dPG} = \frac{-\Pi^2 (t + \rho)(1 - \alpha) + \delta_P \Pi^2 (t + \rho)^2 (1 - \alpha)^2 - (\alpha \theta)^2}{\Pi^2 (t + \rho)t \left[ 2(1 - \alpha) + \alpha \theta \right] - \delta_P \left[ 2 \Pi^2 (t + \rho)^2 (1 - \alpha)(1 - \theta)(1 - \alpha) + \mu \phi \right]} - \frac{-\Pi^2 (t + \rho)(1 - \alpha) + \Pi^2 (t + \rho)^2 t(1 - \alpha)(1 - \theta)(1 - \alpha)(1 + \theta)}{t(1 - \alpha)(1 - \theta)}
\]

\[
= \frac{-\Pi^2 (t + \rho)[(1 - \alpha) - (1 - \alpha) + \alpha \theta]}{\Pi^2 (t + \rho)^2 t \left[ 2(1 - \alpha) + \alpha \theta \right] - \delta_P \left[ 2 \Pi^2 (t + \rho)^2 t(1 - \alpha)(1 - \theta)(1 - \alpha) + \mu \phi \right]} - \frac{-\Pi^2 (t + \rho)(1 - \alpha) - \Pi^2 (t + \rho)^2 t(1 - \alpha)(1 - \theta)(1 - \alpha)}{t(1 - \alpha)(1 - \theta)}
\]

\[
= \frac{-\Pi^2 (t + \rho) \alpha \theta + \Pi^2 (t + \rho) \alpha \theta}{-\Pi^2 (t + \rho)t \alpha \theta - \mu \phi} = \frac{\Pi^2 (t + \rho) \alpha \theta}{\Pi^2 (t + \rho) \alpha \theta + \mu \phi} > 0
\]
A6.5 Curvature of the Transformation Curve

For the curvature of the TC we examine the second order derivative with respect to the auditing rate $\delta$ that is given as:

$$
\frac{\partial \frac{dTCR}{dPG}}{\partial \delta} = \frac{-\Pi^2(t+\rho)(1-\alpha)+\delta \Pi^2(t+\rho)^2(1-\alpha)^2-(\alpha \theta)^2}{\Pi^2(t+\rho)(2(1-\alpha)+\alpha \theta)-\delta \Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}
$$

$$
= \frac{-2 \Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha)^2-\Pi^2(t+\rho)(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}{\Pi^2(t+\rho)(2(1-\alpha)+\alpha \theta)-\delta \Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}
$$

$$
= \frac{-\Pi^2(t+\rho)^2 t(1-\alpha(1-\theta))(1-\alpha)(1-\alpha(1+\theta)) \delta - \Pi^2(t+\rho)t(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}{\Pi^2(t+\rho)(2(1-\alpha)+\alpha \theta)-\delta \Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}
$$

$$
+ \frac{\Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha(1+\theta)) \mu \rho \delta + 2 \Pi^2(t+\rho)^4(1-\alpha(1-\theta))(1-\alpha(1+\theta))}{\Pi^2(t+\rho)(2(1-\alpha)+\alpha \theta)-\delta \Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}
$$

$$
= \frac{\Pi^4(t+\rho)^3 t(1-\alpha(1-\theta))[(1-\alpha)-\alpha \theta]^2(2(1-\alpha)+\alpha \theta)+2(1-\alpha)^2]}{\Pi^2(t+\rho)(2(1-\alpha)+\alpha \theta)-\delta \Pi^2(t+\rho)^2(1-\alpha(1-\theta))(1-\alpha)+\mu \rho}
$$

The negative sign of the second derivative of the TC implies that the TC is concave.
A6.6 The Adjusted TCCR and PG Curves

The TCCR\(^A\) Curves

We can obtain a family of TCCR\(^A\) curves at various given values of \(\psi\). We examine their location as \(\psi\) increases from zero to one, i.e., as revenues allocated to education increase. Equation (6.4) presents the TCCR\(^A\):

\[
TCCR^A = TCCR + \theta(1 - \psi)PG = [TCCR + \theta PG] - \psi \theta PG
\]

Firstly, we examine what happen to the intercept of TCCR\(^A\), i.e., TCCR\(^A\)\(_{\delta=0}\) at different values of \(\psi\). TCCR\(^A\)\(_{\delta=0}\) = TCCR\(_{\delta=0}\) + PG\(_{\delta=0}\)\(\theta - \psi \theta PG\)\(_{\delta=0}\) and \(\frac{\partial TCCR^A}{\partial \psi}_{\delta=0} = - \theta PG^A_{\delta=0} < 0\). This indicates that as the allocation factor \(\psi\) increases from zero to one the intercept of the TCCR\(^A\) functions decrease proportionally with \(\psi\).

Secondly, we examine the slope of the TCCR\(^A\) i.e., \(\frac{\partial TCCR^A}{\partial \delta} = \frac{\partial TCCR}{\partial \delta} + \frac{\partial PG}{\partial \delta} \theta(1 - \psi)\) as \(\psi\) increases. We know that \(\frac{\partial TCCR}{\partial \delta} < 0\) and \(\frac{\partial PG}{\partial \delta} > 1 < 0\). Provided that

\[
\frac{\partial TCCR}{\partial \delta} > \frac{\partial PG}{\partial \delta} \theta(1 - \psi)
\]

we have \(\frac{\partial TCCR^A}{\partial \delta} < 0\) or downward sloping TCCR\(^A\) curves. An increase in \(\psi\) will affect the slope of TCCR\(^A\) as follows:

\[
\frac{\partial}{\partial \psi} \left( \frac{\partial TCCR^A}{\partial \delta} \right) = - \frac{\partial PG}{\partial \delta} \theta \left( > 1 > 0 \right)
\]

For low values of auditing rate \(\delta < \arg \max_\delta PG\), the term

\[
- \frac{\partial PG}{\partial \delta} \theta < 0
\]

which indicates that TCCR\(^A\) curves obtained on higher values of \(\psi\) have a larger slope. For high values of auditing rate \(\delta > \arg \max_\delta PG\), the term

\[
- \frac{\partial PG}{\partial \delta} \theta > 0
\]

indicating that TCCR\(^A\) curves obtained at higher values of \(\psi\) have a lower slope.

To summarize we obtain a family of TCCR\(^A\) curves as \(\psi\) increases. Each of them differs in both the intercept and the slope. These TCCR\(^A\) curves shift down, on the South direction, as their respective \(\psi\) increases i.e., more revenues are allocated to education.
For $\delta \left( \delta < \arg \max PG \right)$ the $TCCR^A$ curves are falling steeper, while for $\delta \left( \delta > \arg \max PG \right)$ the $TCCR^A$ curves are falling flatter as their respective $\psi$ increases i.e., as more revenues are allocated to education. Note that $TCCR^A_{\psi=1} = TCCR$. Figure 6.5 depicts the family of the $TCCR^A$ curves.

The $PG^A$ Curves

We can also obtain a family of $PG^A$ curves at various given values of $\psi$. Similarly with the case of $TCCR^A$, we examine their location as $\psi$ increases from zero to one, i.e., as more revenues are allocated to education. Equation (6.3) represents the $PG^A$ function:

$$PG^A = PG \left\{ \psi \left[ \sigma_E - \sigma_I (1-\theta) \right] + \sigma_I (1-\theta) \right\}$$

$$PG^A = PG \sigma_I (1-\theta) + PG \psi \left[ \sigma_E - \sigma_I (1-\theta) \right]$$

All $PG^A$ curves reach the maximum at the same level of the auditing rate.

From the maximization problem $\max_\delta PG^A = PG \sigma_I (1-\theta) + PG \psi \left[ \sigma_E - \sigma_I (1-\theta) \right]$ the FOC indicates that $\frac{\partial PG^A}{\partial \delta} = PG \left\{ \sigma_I (1-\theta) + \psi \left[ \sigma_E - \sigma_I (1-\theta) \right] \right\} = 0$ when $\frac{\partial PG}{\partial \delta} = PG'_\delta = 0$, which implies that the same auditing rate $\delta_C$ maximizes all $PG^A$ curves.

Firstly, we examine the intercept of the $PG^A$ curves, i.e., $PG^A_{\delta=0}$. The intercept is given by:

$$PG^A_{\delta=0} = PG_{\delta=0} \sigma_I (1-\theta) + PG_{\delta=0} \psi \left[ \sigma_E - \sigma_I (1-\theta) \right]$$

The increase in $\psi$ may either decrease or increase the intercept of the $PG^A$ curves, depending on the sign of the term $\left[ \sigma_E - \sigma_I (1-\theta) \right]$. If $\left[ \sigma_E - \sigma_I (1-\theta) \right] > 0$, which implies that $\frac{\sigma_E}{\sigma_I} > (1-\theta)$, then the intercept increases with an increases in $\psi$. If $\frac{\sigma_E}{\sigma_I} < (1-\theta)$, then the intercept decreases with more revenues allocated to education.
Secondly, we examine whether the slope of \( PG^A \) curves changes with an increase in \( \psi \).

The slope of \( PG^A \) curve is \( \frac{\partial PG^A}{\partial \delta} = \frac{\partial PG}{\partial \delta} \sigma_i (1-\theta) + \frac{\partial PG}{\partial \psi} \sigma_E [\sigma_E - \sigma_i (1-\theta)] \), while the change in the slope as a result of an increase in \( \psi \) is \( \frac{\partial \left( \frac{\partial PG^A}{\partial \delta} \right)}{\partial \psi} = \left[ \sigma_E - \sigma_i (1-\theta) \right] \frac{\partial PG}{\partial \delta} \). If \( \frac{\sigma_E}{\sigma_i} > (1-\theta) \), the \( PG^A \) curves shift upward and become steeper with an increase in \( \psi \). If \( \frac{\sigma_E}{\sigma_i} < (1-\theta) \), the \( PG^A \) curves shift inward and become flatter with an increase in \( \psi \).

Figure 6.6, Panel A presents the case when returns from education are relatively higher than returns from infrastructure. Figure 6.6, Panel B presents the case when returns from education are relatively much lower than returns from infrastructure.

**The Slope of the Envelope TC for \( \psi \in (0,1) \)**

The slope of the Envelope TC for \( \psi \neq 0 \) and \( \psi \neq 1 \) is given by:

\[
\frac{dTCCR^A}{dPG^A} = \frac{\frac{\partial TCCR^A}{\partial \psi}}{\frac{\partial PG^A}{\partial \psi}} d\psi = \frac{-\theta PG}{\left[ \sigma_E - \sigma_i (1-\theta) \right] PG}
\]

\[
\frac{dTCCR^A}{dPG^A} = \frac{\theta}{\left[ \sigma_E - \sigma_i (1-\theta) \right]}
\]

For \( \frac{\sigma_E}{\sigma_i} > (1-\theta) \) the slope is \( \frac{dTCCR^A}{dPG^A} < 0 \), while for \( \frac{\sigma_E}{\sigma_i} < (1-\theta) \) the slope is \( \frac{dTCCR^A}{dPG^A} > 0 \).