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# The impact of crime on the enterprise sector: Transition versus non-transition countries

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## **Abstract**

The need to protect property rights and fight against crime and corruption continues to be an urgent task for authorities in many developing and transition countries. This paper identifies the factors explaining why some enterprises are more likely to be targeted by crime than others, and analyses the impact of crime on enterprise performance and behaviour in a simple modelling framework. The results of enterprise surveys conducted in 34 countries in Europe and Asia during 2002 and 2005 show that higher rates of crime are particularly associated with the weak development of micro enterprises in the services sector, operating in large countries with high unemployment. The paper also highlights the deterrent effect of crime on FDI inflows and job creation, especially in less advanced transition countries, providing empirical evidence to substantiate the importance of the fight against crime for economic development.

*Keywords:* crime, enterprise performance and behaviour, enterprise survey, transition, development

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## INTRODUCTION

The need to protect property rights and fight against crime and corruption continues to be one of the most urgent tasks for authorities in developing and transition countries. However, there is a surprising lack of detailed multi-country analysis of how crime affects the enterprise sector. The analysis presented in this paper complements the extensive research on corruption by focusing on criminal activities that are not related to the abuse of assets and the power of public authorities.<sup>1</sup>

Using data from the Business Environment and Enterprise Performance Survey (BEEPS) – undertaken jointly by the EBRD and the World Bank in 25 transition countries in 1999, 2002, and 2005, and 8 non-transition countries in 2004 – this paper identifies factors explaining why some enterprises are more likely to be targeted by crime than others.<sup>2</sup> There are two main types of factors affecting crime against enterprises: within-country and between-country factors. This paper first focuses on the *within*-country variation, identifying the features of these enterprises such as size, ownership, location and sector which are most likely to be targeted by crime (controlling for country differences). Secondly, the differences *between* countries are reviewed to learn the extent to which particular country features, such as the level of unemployment, private sector share and structural composition of GDP, explain differences in the severity of crime across countries.

The paper also analyses the impact of crime on enterprise performance and behaviour. Increases in crime-related enterprise costs divert resources from business expansion and improvements. Crime also leads to greater uncertainty. In extreme cases, a high incidence of crime may induce enterprises to exit from the marketplace or relocate to safer locations.<sup>3</sup> A high level of crime, and in particular organised crime, can also have a detrimental effect on potential new entry of enterprises, both local and foreign companies, and their expansion. This paper finds empirical evidence of a higher incidence of crime in countries with lower FDI inflows at the country level, as well as a negative relationship between crime and job creation and sales growth at the firm level.

Section one of this paper provides a literature review, relating the paper to existing research on institutions and property rights, corruption, tax evasion, organised crime and other illegal activities. The second section presents definitions and methodology. The third section describes the basic statistical properties of the data. Sections four and five present the results of empirical analysis of the variation in crime against enterprises within and between countries. Section six concludes.

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<sup>1</sup> In addition, this paper does not include analysis of organised crime that either does not impose additional direct financial costs on official enterprises, such as trafficking in drugs and humans, or which provides direct financial benefits to enterprises, such as money laundering.

<sup>2</sup> See the description of the data in Section 4. Although there are three waves in which the survey was conducted, the data gathered in 1999 are not used as that survey did not include some of the questions on crime.

<sup>3</sup> See, for example, World Bank (2003) on the impact of crime on the economy in Jamaica.

# 1 LITERATURE REVIEW

In the related literature, crime is analysed in three main strands: i) in institutions, ii) the economics of crime, and iii) the unofficial economy. Research on institutions includes enterprise experience with crime as one of several indicators to measure the quality of an institutional set-up. The main focus of the economics of crime literature is on law enforcement aspects of the fight against criminal activities, as well as on factors which explain the decision to commit crime. As regards the third strand of related literature, the unofficial economy is often defined to include irregular, illegal and criminal activity. However, most of the unofficial economy estimates exclude many illegal activities and focus mainly on tax evasion.

In the framework of the New Institutional Economics, institutions are defined as humanly devised constraints that structure human interaction (see North, 1990). These constraints are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behaviour, conventions, and self-imposed codes of conduct), and their enforcement characteristics. Papers such as Frye and Shleifer (1997), Hay and Shleifer (1998), and Frye and Zhuravskaya (2000) focus mostly on the impact of weak institutions on the enterprise sector in general and present the impact of crime as one symptom of general institutional weakness. Crime thrives where the state is unable to exert power over public administration, protect property rights, or provide institutions that support the rule of law.

Frye and Shleifer (1997) argue that, on the basis of a comparative survey of shop owners in Warsaw and Moscow, the relatively weak legal framework in Russia compared with Poland accounts for the slower pace of enterprise development in the country. Frye and Shleifer (1997) also found that enterprises in Russia rely on private protection, either through employment of legal protection agencies or through payments to organised crime, to substitute weak law enforcement. This finding has been confirmed by Hay and Shleifer (1998) and Frye and Zhuravskaya (2000).

The economics of crime literature can be divided into two groups – theoretical and empirical papers. A prime example of theoretical papers analysing the economic impact of crime is the seminal work by Becker (1968). In his paper, Becker models general crime as a type of economic activity that is certainly immoral but, nevertheless, can be analysed by standard economic tools.<sup>4</sup> Becker uses a model of the relationship between crime and punishment to develop optimal public and private policies, including the optimal amount of resources and level of punishment to minimise social loss from crime. Assuming that crime is an economic activity carried out by individuals who balance costs and benefits, offenders will refrain from entering the criminal business when these activities “do not pay off”, that is when the risk of high punishment or the cost respectively is too high.

Another more recent theoretical model of crime and law enforcement, building on Becker (1968), is provided by Goglio (2004). Goglio defines crime as economic activity with negative repercussions on various factors influencing the functioning of an economic system, such as human and social capital, resource allocation and entrepreneurship.

In the framework of the economics of crime literature predictions are often empirically tested by analysing the decision-making of a potential criminal. The decision to commit crime is a result of expected utility maximisation, comparing the rewards of committing crime with the costs associated with being the criminal (these include primarily costs of punishment). The maximisation model has a single decision variable with values equal 0 (the decision not to

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<sup>4</sup> More recent theoretical models of crime and corruption and their relation to punishment and law enforcement are provided by Goglio (2004) and Mauro (2004).

commit crime) and 1 (the decision to commit crime). This optimisation problem was specified and empirically tested in numerous studies, focusing on the relationship between per capita reported crime rates and severity of punishments for different types of crime (see for example, Ehrlich, 1973; Cornwell and Trumbull, 1994; Andrienko, 2002; and Soares, 2004).

The simple modelling framework presented in this paper is based on the view that crime against property is a type of economic activity that can be modelled using standard economic tools. The model, however, does not focus primarily on the relationship between crime and punishment, but instead on the links between crime and the victim (in this case, the enterprise sector).

Papers that examine the economic impact of crime from an empirical perspective include Lotspeich (1995). Lotspeich focuses on the empirical identification of general trends in all types of crime in transition economies and finds substantial growth in criminal activities after the collapse of the centrally planned economic system. Lotspeich examines how the reform process in transition countries has fostered crime, looking at various aspects of changes that destabilised existing behavioural patterns such as changes in law enforcement institutions, rapidly shifting economic regulations and shifts in social psychology. Lotspeich's research mainly aims to identify the roots of crime in general. This paper, however, focuses on how crime affects enterprise development in particular.

Andrienko (2002) assessed the links between crime, wealth and inequality, using data from the International Crime Victim Survey of the UN Interregional Criminal Justice Research Institute. Andrienko also builds on Becker's model of the relationship between crime and punishment. One of the major findings of his paper is that the wealth of an individual is closely connected to the risk of becoming a victim of crime. In countries with higher income inequality the risk of individual victimisation of crime is higher than in countries with less inequality.

Latin America has been subject to a number of empirical studies of crime. Gaviria (2002) has analysed the impact of crime on firms in Latin America. Drawing on survey data of private firms, Gaviria finds that crime substantially reduces overall economic performance of enterprises, and sales growth in particular. A recent World Bank study on economic development in Jamaica paid particular attention to the issue of crime (World Bank, 2003). Crime has been detected as one of the main reasons for weak economic development in Jamaica due to its substantial costs on businesses in the country.

Literature on the unofficial economy should incorporate illegal activities and therefore be relevant to an analysis of the impact of crime on the enterprise sector. However, the definitions of the informal economy vary considerably. Feige (1990) offers a summary of the different definitions of underground and informal economies. Feige himself includes illegal economic activities which are defined as the production and distribution of prohibited goods and services. In general, however, the empirical literature on the unofficial economy deals mostly with tax evasion of official business or unregistered activities which are otherwise legal. Johnson, Kaufman and Shleifer (1997), for instance, look at the links between the unofficial economy and criminal activities, arguing that firms whose potential profits are taken away by predatory governments might choose instead to operate unofficially. They find that overregulation fosters criminal activity because firms that operate unofficially resort to protection and other services supplied by private, including criminal, organisations.

## 2. DEFINITIONS AND ANALYTICAL FRAMEWORK

The analytical framework in this paper aims to present links between indicators of crime targeting the enterprise sector, enterprise characteristics, and external factors. This allows us to formulate formal hypotheses to be tested. The model is based on the interaction between a representative criminal and a representative firm, both of which are risk-neutral. The criminal is maximising his/ her expected revenues, the income from crime (the loot)<sup>5</sup> less the cost of crime. The firm is minimising the losses to crime and expenditures on security measures.

Let a representative criminal be denoted with index  $i$  and a representative firm with index  $j$ . Let us further assume that there are  $N$  potential criminals and  $M$  enterprises in a country  $k$ . For each firm  $j$  a potential criminal  $i$  optimises his effort  $e_{i,j,k}$  to maximise the loot  $L$  less costs of crime  $C$ :

$$\max_{e_{i,j,k}} [L(e_{i,j,k}, s_{j,k}, F_{j,k}, Z_{j,k}) - C(e_{i,j,k}, s_{j,k}, F_{j,k}, Z_{j,k})].$$

Both the loot of the criminal,  $L$  (which is also the loss of the firm) and the cost of crime,  $C$ , are functions of unobservable effort  $e_{i,j,k}$ , spending on security by the firm  $s_{j,k}$ , firm characteristics  $F_{j,k}$  (for example, the sector, ownership, and location) and external characteristics  $Z_{j,k}$  (such as size of the country, unemployment and other country characteristics, as well as the quality of the law enforcement or punishment indicators introduced by Becker, 1968).

Each firm, at the same time, decides how much to spend on security  $s_{j,k}$  to minimise combined expected losses from crime  $L$  and security spending:

$$\min_{s_{j,k}} \left[ \sum_{i=1}^N L(e_{i,j,k}, s_{j,k}, F_{j,k}, Z_{j,k}) + s_{j,k} \right].$$

The optimum effort of criminal  $i$  and the optimum spending on security by firm  $j$  in country  $k$  are given by the first order conditions for the criminal's maximisation problem and the firm's minimisation problem.<sup>6</sup>

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<sup>5</sup> This paper distinguishes between organised crime and street crime. Organised crime is defined as an event where a company reports protection payments to organised crime in order to prevent violence or property damage, which are equivalent to losses to crime in this paper's analytical framework. Street crime is defined as an incidence of theft, robbery, vandalism or arson.

<sup>6</sup> It is possible to extend this paper's model of crime into a model of corruption. However, some modifications are necessary since corruption does not only impose costs but may also provide some benefits to enterprises. These benefits can take many different forms, including faster processing of enterprise requests for permissions and licences as well as less regulatory pressure. In addition, the crime model is based on the assumption that enterprises do not pay voluntarily to criminals. In the case of corruption all enterprises which operate well within the bounds of law have an option not to pay. The Prisoner's Dilemma provides a useful framework to understand the costs and benefits of the decision to bribe or not to bribe, depending on operating in a high or low corruption country. Therefore, the model of corruption would have to incorporate a decision making process of an enterprise which has to decide whether to pay bribes and if to do so then how much to pay.

$$\frac{\partial L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})}{\partial e_{i,j,k}} - \frac{\partial C(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})}{\partial e_{i,j,k}} = 0,$$

$$\frac{\partial \sum_{i=1}^N L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})}{\partial s_{j,k}} + 1 = 0$$

with

$$\frac{\partial^2 L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})}{\partial e_{i,j,k}^2} - \frac{\partial^2 C(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})}{\partial e_{i,j,k}^2} < 0,$$

$$\frac{\partial^2 \sum_{i=1}^N L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})}{\partial s_{j,k}^2} > 0.$$

Empirically, the measure of crime against the enterprise sector which can be observed most precisely is a dummy indicator describing whether an enterprise suffered losses due to crime or not. This paper's respective indicator is called *incidence of crime*. Let the incidence of crime against the enterprise  $j$  in country  $k$  as  $inc_{j,k}$  be defined as:

$$inc_{j,k} = 1 \quad \text{if} \quad \sum_{i=1}^N L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k}) > 0 \quad \text{and}$$

$$inc_{j,k} = 0 \quad \text{if} \quad \sum_{i=1}^N L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k}) = 0.$$

The solutions of the two optimisation problems above, assuming that the functions  $C$  and  $L$  are concave with respect to variable  $e_{i,j,k}$  and convex with respect to variable  $s_{j,k}$ , give the equilibrium effort of criminal  $i$ ,  $e_{i,j,k}^* = e(F_{j,k}, Z_{j,k})$ , and optimal spending on security by a firm  $j$   $s_{j,k}^* = s(F_{j,k}, Z_{j,k})$ . The equilibrium effort of criminal  $i$  and spending on security by firm  $j$  in country  $k$  then give the observable loss from crime  $L_{j,k}^* = \sum_{i=1}^N L(e_{i,j,k}^*, s_{j,k}^*, F_{j,k}, Z_{j,k})$ , and incidence of crime for enterprise  $j$ ,  $inc_{j,k}^* = inc(s_{j,k}^*, F_{j,k}, Z_{j,k})$ .

In the empirical part of this paper linear approximations are estimated for the incidence of crime against a particular enterprise and losses due to crime as a function of firm and external variables using firm level data:

$$(inc_{j,k}, L_{j,k}) = const_k + \alpha \cdot s_{j,k} + \beta \cdot F_{j,k} + \gamma \cdot Z_{j,k} + \varepsilon_{j,k},$$

where  $const$ ,  $\alpha$ ,  $\beta$ , and  $\gamma$  are two-dimensional vectors of parameters to be estimated,  $s_{j,k}$  describes spending on security by firm  $j$ ,  $F_{j,k}$  are firm level characteristics,  $Z_{j,k}$  are external variables<sup>7</sup> applicable to firm  $j$  in country  $k$ , and  $\varepsilon_{j,k}$  is a vector error term, assumed to be independent and identically distributed (i.i.d.) with asymptotically multivariate normal distribution.

The analysis is then extended to country level data using country average incidence of crime and average losses due to crime and their relationship to country characteristics. The country level estimate of the probability of being targeted by a criminal ( $P_k$ ), country level expected losses of crime against the enterprise sector ( $L_k$ ), and country level optimal spending on security ( $s_k$ ) are based on simple averages of firm level indicators:

$$\bar{P}_k^* = \sum_{j=1}^M \frac{1}{M} inc_{j,k}^*,$$

$$\bar{L}_k^* = \sum_{j=1}^M \frac{1}{M} L_{j,k}^*,$$

$$\bar{s}_k^* = \sum_{j=1}^M \frac{1}{M} s_{j,k}^*.$$

The country level regressions are then based on averaging the firm level regression presented above:

$$(\bar{P}_k, \bar{L}_k) = const + \alpha \cdot \bar{s}_k + \beta \cdot \bar{F}_k + \gamma \cdot \bar{Z}_k + \varepsilon_k,$$

where  $const$ ,  $\alpha$ ,  $\beta$ , and  $\gamma$  are again two-dimensional vectors of parameters to be estimated,  $\bar{s}_k$  describes country level average spending on security,  $\bar{F}_k$  are average firm level characteristics,  $\bar{Z}_k$  are external variables for country  $k$ , and  $\varepsilon_k$  is a vector error term, assumed to be *i.i.d.* with asymptotically multivariate normal distribution.

Although this paper's analytical framework is the same for street crime and organised crime, and it is assumed that the determinants of the two types of crime are the same, the possibility is acknowledged that the impact of firm or external characteristics can be different. Therefore, the regressions for street crime and organised crime are run separately.

The results are expected to show that private firms, and in particular locally-owned private firms, those operating in services, and smaller firms in urban locations are more often a target of crime and their losses to crime are larger as a percentage of sales. On the country level it is assumed, in line with the literature (for example, Soares, 2004), that countries with higher unemployment will have higher levels of crime against the enterprise sector. The firm-level regression results in this paper are expected to imply that countries with a higher private sector share in GDP as well as countries with a higher contribution of services to GDP (which

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<sup>7</sup> For the firm level regressions country dummies are used to control for the impact of external factors which are the same for all enterprises in a given country. The impact of different external factors is investigated in the country level regressions.

is equivalent to lower contribution of agriculture to GDP) would have higher levels of crime against enterprises.

So far this paper has focused on directly observable indicators of crime. However, one may also substantiate the need to protect property rights and fight against crime and corruption by subjective indicators describing *perception* of crime. Although this variable is not part of the analytical framework described above, one might assume that each enterprise forms its perception of crime on the basis of a subjective assessment of the probability to be targeted by a criminal. Perception of crime,  $perc_{j,k}$ , by firm  $j$  can then be described as the function of the probability to be targeted by a criminal,  $P^*(F_{j,k}, Z_{j,k})$ , and expected losses,  $L^*(F_{j,k}, Z_{j,k})$ , which are functions of firm characteristics  $F_{j,k}$  and external characteristics  $Z_{j,k}$ :

$$perc_{j,k}^* = perc[P^*(F_{j,k}, Z_{j,k}), L^*(F_{j,k}, Z_{j,k})] = perc(F_{j,k}, Z_{j,k}).$$

The relationship between perception of crime and more direct measures of crime, such as incidence of crime and losses due to crime, as well as firm characteristics and external factors can then be empirically tested in two different forms, either using direct indicators for crime against enterprises or indirectly using enterprise and external characteristics:

$$perc_{j,k} = const_k + \mu \cdot inc_{j,k} + \eta \cdot L_{j,k} + \varepsilon_{j,k},$$

or

$$perc_{j,k} = const + \alpha \cdot s_{j,k} + \beta \cdot F_{j,k} + \gamma \cdot Z_{j,k} + \varepsilon_{j,k}$$

It is expected that coefficients  $\mu$  and  $\eta$  would be positive and statistically significant, and the coefficients  $\alpha$ ,  $\beta$ , and  $\gamma$  in the perception equation would have the same sign as the coefficients in the regression equations for the incidence of crime and losses due to crime, as discussed above.

The country level estimate of perception is, again, based on simple averages of firm level indicators:

$$perc_k = const + \mu \cdot \bar{P}_k + \eta \cdot \bar{L}_k + \varepsilon_k,$$

or

$$perc_k = const + \alpha \cdot \bar{s} + \beta \cdot \bar{F}_k + \gamma \cdot \bar{Z}_k + \varepsilon,$$

again with the expectations that coefficients  $\mu$  and  $\eta$  would be positive and statistically significant, and the coefficients  $\alpha$ ,  $\beta$ , and  $\gamma$  in the perception equation would have the same sign as the coefficients in the regression equations for the incidence of crime and losses due to crime at the country level.

### 3. DATA DESCRIPTION

This paper is based on survey data from the EBRD/World Bank Business Environment and Enterprise Performance Survey (BEEPS). Approximately 9,500 firms in 26 transition countries were surveyed.<sup>8</sup> In addition, results from a comparator survey conducted in eight non-transition countries in 2004, including over 4,000 firms in both mature economies in the EU and emerging economies in south-east Asia, are used.<sup>9</sup> The distribution of the sample between manufacturing and service sectors was determined according to the sector's relative contribution to the GDP in each country. Firms that operate in sectors subject to government price regulation and prudential supervision, such as banking, utilities, and railways, were excluded from the sample as were farms and other types of agriculture enterprises. Companies that had 10,000 employees or more were also excluded from the sample, as were firms that started their operations in 2002-05.

The survey provides three main ways of measuring the impact of crime on enterprises, as already indicated in the analytical framework. The first, and most precise, measure is *incidence of crime*, that is, whether or not the enterprise experienced losses due to crime. The second measure is an estimate of *actual costs of crime* as a share of company revenues. The third measure is a firm's *perception of crime*. Firms were asked to rate the severity of business obstacles including "street crime, theft and disorder" and "organised crime / mafia" on a scale from 1 to 4 where 1 indicates little or no obstacle and 4 is a serious obstacle. The first two measures, incidence and cost of crime, are in principle objective measures and allow direct comparison of enterprises or, on aggregated level, countries. However, it should be noted that even these objective measures of crime suffer from estimation bias, since the data are based on enterprise survey and thus reliant on willingness of enterprises to admit to being a victim of crime and on their ability to correctly estimate the cost of crime. The third measure, perception of crime, is clearly subjective and should be interpreted with caution.

As mentioned beforehand, this paper distinguishes between organised crime and street crime. Organised crime is when a company reports protection payments to organised crime in order to prevent violence or property damage. Street crime is defined as theft, robbery, vandalism or arson.<sup>10</sup> To increase the willingness of companies to answer questions on organised crime, the survey asks indirectly; first, whether firms in similar lines of business pay for protection and, second, what per cent of total annual sales are customarily paid. The question on street crime — theft, robbery, vandalism and arson — is direct, asking the firms whether they experienced any such incidents and how large, in terms of sales, estimated losses are. The survey also provides information on security payments, for example, on equipment, personnel, or professional security services.

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<sup>8</sup> The countries covered include Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Montenegro, Poland, Romania, Russia, Serbia and, Slovak Republic, Slovenia, Tajikistan, Ukraine and Uzbekistan. The survey was not conducted in Turkmenistan.

<sup>9</sup> The countries covered include Germany (distinguishing between former East and West Germany), Greece, Ireland, Portugal, South Korea, Spain, Turkey and Vietnam.

<sup>10</sup> In this paper, payments for protection to organised crime are not considered as a voluntary action of an enterprise and are treated in a similar way as street crime, albeit acknowledging the different nature of street and organised crime.

**Table 1 – Correlations between incidence, cost and perception of crime and corruption**

		Incidence			Cost			Perception		
		Street crime	Organised crime	Corruption	Street crime	Organised crime	Corruption	Street crime	Organised crime	Corruption
<b>Incidence</b>	Street crime	1	-	-	-	-	-	-	-	-
	Organised crime	0.08** (0.00)	1	-	-	-	-	-	-	-
	Corruption	0.08** (0.00)	0.10** (0.00)	1	-	-	-	-	-	-
<b>Cost</b>	Street crime	-	-	-	1	-	-	-	-	-
	Organised crime	-	-	-	0.18* (0.02)	1	-	-	-	-
	Corruption	-	-	-	0.14* (0.08)	0.41** (0.00)	1	-	-	-
<b>Perception</b>	Street crime	0.16** (0.00)	0.11** (0.00)	0.11** (0.00)	0.01 (0.92)	0.02 (0.77)	0.13 (0.10)	1	-	-
	Organised crime	0.07** (0.00)	0.13** (0.00)	0.12** (0.00)	0.01 (0.87)	0.09 (0.26)	0.19* (0.01)	0.73** (0.00)	1	-
	Corruption	0.07** (0.00)	0.11** (0.00)	0.25** (0.00)	-0.08 (0.26)	0.18* (0.02)	0.29** (0.00)	0.58** (0.00)	0.59** (0.00)	1

Source: BEEPS.

Before turning to the empirical analysis of the data, simple correlations between the three measures of street and organised crime described above are presented, as well as similar measures of corruption which are also included in BEEPS (see Table 1). There are positive pair-wise correlations between the incidence of street crime, organised crime and corruption, which are statistically significant in each case. However, the correlation coefficients are relatively low, between 0.08 and 0.10. The correlations between the cost of street crime, organised crime and corruption are also positive and statistically significant, with a particularly strong correlation between costs of organised crime and corruption at 0.41. The correlations between the perception measures for the three types of illegal activities are also positive and statistically significant, but the correlation coefficients are much higher, between 0.58 and 0.73.

The overview of simple correlations between the different measures of illegal activities indicate that they are indeed positively correlated and thus useful as joint measures of the quality of institutions, but the relation between the perception measures is much stronger than relation between the other crime measures. In other words, companies perceiving organised crime as a serious business obstacle are very likely to perceive street crime as a serious business obstacle as well, even though their experience of organised crime might be only weakly related to their experience of street crime. This also implies that the potential explanatory variables for different indicators of crime may vary.

#### 4. EMPIRICAL RESULTS – WITHIN COUNTRIES VARIATION

This section looks at the sources of variation within countries, controlling for differences between countries by using country dummies.<sup>11</sup> Firm-level characteristics refer to:

- ownership of the company - dummy variables denoting majority locally owned private and majority foreign-owned private enterprises with majority state-owned enterprises as a benchmark
- location of the company - a dummy variable with value 1 if the company is based in a location with less than 50,000 inhabitants and 0 otherwise
- sector in which the company operates - distinguishing between manufacturing, construction, and four types of services (transport and telecoms, trade, real estate, and hotels and restaurants)
- sales growth - percentage of sales growth rate in the three years prior to the survey
- size of the company - dummy variables for micro enterprises with less than 10 employees, and small enterprises with between 10 and 49 employees, with medium and large enterprises as a benchmark.

**Table 2 – Enterprise type averages 2004 and 2005**

	Street Crime			Organised Crime		
	Incidence	Cost	Perception	Incidence	Cost	Perception
State-owned	26.90	1.86	1.68	7.70	2.47	1.50
Locally owned private	20.16	2.77	1.74	7.88	2.60	1.57
Foreign-owned	25.43	1.31	1.60	5.68	2.79	1.47
Capital	19.21	2.40	1.73	8.83	3.00	1.59
Non-capital urban	20.83	2.72	1.74	7.30	2.41	1.57
Rural location	22.54	2.59	1.70	7.41	2.43	1.52
Large firm	29.75	1.50	1.65	7.59	1.85	1.52
Medium firm	26.57	1.74	1.75	9.03	2.28	1.60
Small firm	20.58	2.67	1.72	7.58	2.61	1.56
Micro firm	16.36	3.62	1.74	7.44	2.96	1.56

Source: BEEPS.

The differences between average indicators of crime for various types of firms are presented in Table 2. These results indicate that there is substantial variation between different types of firms. The results of an empirical analysis of factors affecting the impact of crime on different types of firms are presented in Tables 3 and 4 for street crime and organised crime respectively. Given that the dependent variables for incidence and perception of crime are categorical, probit and ordered probit models are used respectively for these regressions.

<sup>11</sup> Separate regressions have been run on an enterprise level and on a country level mainly because the enterprise level characteristics used in within-country regressions have their country level equivalents in between-country regressions (that is, the ownership variables at the enterprise level are related to share of private sector in GDP at the country level; sectoral variables at the enterprise level are related to sectoral composition of GDP at the country level).

**Table 3 – Firm level regression analysis – street crime**

	<b>Incidence</b>	<b>Cost</b>	<b>Perception (1)</b>	<b>Perception (2)</b>	<b>Employment growth</b>
Locally owned private	-0.09 <sup>+</sup> (0.06)	0.70* (0.31)	-	0.11* (0.05)	0.18** (0.06)
Foreign-owned	-10 (0.08)	0.35 (0.37)	-	-0.02 (0.07)	0.36** (0.14)
Rural location dummy	0.02 (0.03)	-0.06 (0.25)	-	-0.05* (0.03)	-0.02 (0.04)
Construction	0.004** (0.000)	-0.001 (0.003)	-	0.001** (0.000)	0.00 (0.00)
Transport and telecoms	0.003** (0.001)	0.009 (0.006)	-	0.002** (0.000)	0.00 (0.00)
Trade	0.003** (0.000)	0.002 (0.003)	-	0.001** (0.000)	0.00 (0.00)
Real estate	-0.001** (0.001)	0.004 (0.004)	-	-0.001 <sup>+</sup> (0.000)	-0.00 (0.00)
Hotels and restaurants	0.003** (0.001)	0.005 (0.004)	-	0.002** (0.000)	-0.00 (0.00)
Sales growth	0.002** (0.000)	-0.001 (0.003)	-	-0.00 (0.00)	0.002** (0.001)
Small firm dummy	-0.18** (0.04)	0.90** (0.22)		0.04 (0.03)	-0.07 (0.05)
Micro firm dummy	-0.34** (0.04)	1.73** (0.29)		0.05 (0.03)	-0.24** (0.05)
Use of security services	0.41** (0.03)	-0.88** (0.25)	-	0.07** (0.03)	0.01 (0.05)
Cost of security services	0.01 (0.01)	0.42** (0.10)	-	0.02** (0.01)	0.00 (0.01)
Street crime incidence	-	-	0.44** (0.03)	-	0.04 (0.05)
Street crime cost	-	-	0.01** (0.01)	-	0.01 (0.01)
Street crime perception	-	-	-	-	-0.04* (0.02)
Organised crime incidence	-	-	0.26** (0.06)	-	-
Organised crime cost	-	-	0.01 (0.01)	-	-
Corruption incidence	-	-	0.27** (0.03)	-	-

Corruption cost	-	-	0.00 (0.01)	-	-
Number of observations	12294	2365	11765	12085	4024
R squared / pseudo R squared	0.12	0.10	0.08	0.06	0.04
R squared for country dummies only as a % of R squared for full model	55.9	56.4	65.8	88.2	31.6

Source: BEEPS.

Notes: Statistically significant differences from 0 are denoted by <sup>+</sup> for the 10 per cent significance level, \* for the 5 per cent significance level and \*\* for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected using the variance inflating factor (VIF) test. The benchmark categories are state-owned for ownership, urban for location, and industry for sector. Country dummies were used in all regressions. Probit was used for the incidence of crime, ordinary least squares regression for the cost of crime and ordered probit for the perception of crime. The regression for cost of crime was run only for firms reporting losses due to crime. Note that the number of observations for employment growth regression is smaller because many firms did not provide the necessary data in the survey.

**Table 4 – Firm level regression analysis – organised crime**

	Incidence	Cost	Perception (1)	Perception (2)	Employment growth
Locally owned private	0.04 (0.08)	0.08 (0.30)	-	0.24** (0.05)	0.17** (0.06)
Foreign-owned	-0.20 <sup>+</sup> (0.12)	0.50 (0.60)	-	0.11 (0.08)	0.30* (0.14)
Rural location dummy	0.02 (0.04)	0.20 (0.22)	-	-0.07* (0.03)	-0.02 (0.04)
Construction	0.002** (0.001)	0.001 (0.003)	-	0.001 <sup>+</sup> (0.000)	0.00 (0.00)
Transport and telecoms	0.001 (0.001)	-0.003 (0.004)	-	0.002** (0.001)	-0.00 (0.00)
Trade	0.001 (0.001)	0.001 (0.002)	-	0.00 (0.00)	0.00 (0.00)
Real estate	-0.001 <sup>+</sup> (0.001)	-0.000 (0.004)	-	-0.00 (0.00)	0.00 (0.00)
Hotels and restaurants	0.01** (0.001)	0.007* (0.003)	-	0.002** (0.001)	0.00 (0.00)
Sales growth	0.001* (0.001)	0.002* (0.003)	-	-0.001 <sup>+</sup> (0.000)	0.002** (0.001)
Small firm dummy	0.03 (0.05)	0.40 (0.21)		0.02 (0.03)	-0.08 (0.05)
Micro firm dummy	0.11* (0.05)	0.59** (0.21)		-0.00 (0.03)	-0.24** (0.05)
Use of security services	0.58**	-1.36**	-	0.07*	0.01

	(0.04)	(0.23)		(0.03)	(0.05)
Cost of security services	0.03** (0.01)	0.42** (0.05)	-	0.02** (0.01)	0.01 (0.01)
Street crime incidence	-	-	0.18** (0.04)	-	-
Street crime cost	-	-	0.01* (0.00)	-	-
Organised crime incidence	-	-	0.42** (0.06)	-	0.06 (0.10)
Organised crime cost	-	-	-0.01 (0.01)	-	-0.01 (0.03)
Organised crime perception	-	-	-	-	-0.03 (0.02)
Corruption incidence	-	-	0.29** (0.03)	-	-
Corruption cost	-	-	0.02** (0.01)	-	-
Number of observations	12140	846	11511	11817	3930
R squared / pseudo R squared	0.14	0.30	0.07	0.05	0.04
R squared for country dummies only as a % of R squared for full model	59.7	53.5	71.3	95.2	34.1

Source: BEEPS.

Notes: Statistically significant differences from 0 are denoted by + for the 10 per cent significance level, \* for the 5 per cent significance level and \*\* for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected using the variance inflating factor (VIF) test. The benchmark categories are state-owned for ownership, urban for location, and industry for sector. Country dummies were used in all regressions. Probit was used for the incidence of crime, ordinary least squares regression for the cost of crime and ordered probit for the perception of crime. The regression for cost of crime was run only for firms reporting losses due to crime. Note that the number of observations for employment growth regression is smaller because many firms did not provide the necessary data in the survey.

In the regressions most of the ownership variables are significant only at the ten per cent level of significance.<sup>12</sup> Locally owned private companies are less likely to be a target of street crime than state firms, suggesting that private owners are better able to control their property and protect their assets against crime. However, if locally owned private companies experience street crime their losses to street crime are higher compared with the overall average.

Firm location does not seem to have any impact on the experience with crime. In contrast, firm size matters. Small and micro firms are less likely to be targeted by street crime, probably due to better oversight by owners, but if they become a victim of street crime the costs are higher. According to these results micro firms suffer more from organised crime and their respective costs are higher in terms of revenues than the costs of larger firms.

<sup>12</sup> On the basis of simple averages for different types of enterprises as presented in Table 2 higher statistical significance could be expected. The relatively low significance is a result of controlling for other enterprise characteristics.

The sector in which a firm operates also matters. Except for real estate the sector dummies are all highly significant and positive when looking at street crime incidence. As regards organised crime only hotels and restaurants and construction are more likely to be targeted.<sup>13</sup> For instance, the cost of organised crime for hotels and restaurants is 3.3 per cent of sales, compared with the overall average of 2.6 per cent.

Sales growth is positive and significant for the incidence of crime regressions but not for the cost of crime regressions, indicating that more dynamic enterprises are more likely to be targeted by crime but do not experience greater costs of crime.

The security dummy is positively correlated with the incidence of crime variables but negatively correlated with the cost of crime variables. There are three potential explanations for this result. First, both the crime level and the employment of security services may be a sign of weak protection of property rights. Secondly, the use of security services could signal potentially greater rewards for targeting an enterprise to a criminal and, thus, leading to a higher likelihood of being targeted. Thirdly, the use of security services may signal past experience with crime by an enterprise.

Turning to the relationship between perception of crime and experience with crime, a strong link between the two is found, that is, firms reporting losses due to either type of crime are more likely to perceive either type of crime as a bigger problem. The perception of crime on the enterprise level is also found to be driven by different characteristics than experience with crime. For instance micro enterprises are less likely to be victims of street crimes but they are as concerned about being targeted as large firms.

To get information on the possible deterrent effects on overall economic development, the relationship between crime and employment growth has been studied (the empirical results are presented in the last columns of Tables 4 and 5).<sup>14</sup> A significant and negative impact of street crime perception on job creation is found, with an increase in the perception indicator by a factor of 1 (on a scale from 1 to 4) associated with the decline in employment growth by 4.5 percentage points. This suggests that negative perception of street crime as a business obstacle has a deterrent impact on job creation and re-emphasizes the need to fight crime and enforce rule of law in order to support economic development.<sup>15</sup>

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<sup>13</sup> This is in line with the results for between countries variation, presented in the next section, where share of industry and services in GDP is significant for street crime and not for organised crime. One may therefore make a conclusion that the country level results regarding the share of agriculture in GDP are being driven, to a large extent, by the services sector.

<sup>14</sup> In addition to employment growth, the relationship between sales growth and crime has also been reviewed. In line with papers on Latin America (Gaviria, 2002) we have found that higher perception of crime has a negative impact on sales growth. The empirical results are available on request.

<sup>15</sup> We have also tested for the impact of perception of corruption on job creation, given high correlation between all perception measures related to illegal activities, and did not find a statistically significant relationship.

## 5. EMPIRICAL RESULTS – BETWEEN COUNTRIES VARIATION

In this section, simple country level averages are described (see Table 5), statistical differences between main regions covered by the survey are tested and the country level determinants and consequences of crime against enterprises are analysed.

**Table 5 – Country averages 2004 and 2005**

	Street crime			Organised crime		
	Incidence	Cost	Perception	Incidence	Cost	Perception
New EU members (CEB)	31.32	2.16	1.73	7.45	2.50	1.53
South-eastern Europe	20.04	2.27	1.88	9.55	2.59	1.79
CIS (including Russia)	15.95	4.88	1.77	7.35	2.87	1.61
Russia	25.46	3.45	1.93	11.48	2.91	1.69
Mature market EU	23.12	1.94	1.58	7.18	1.79	1.42
South Korea	4.01	1.73	1.32	2.84	0.47	1.19
Turkey	10.05	4.27	1.95	18.13	2.46	1.87
Vietnam	10.40	1.28	1.76	0.60	0.80	1.54

Source: BEEPS.

The comparison of different regions shows significant regional differences in crime affecting the enterprise sector. The perception of crime, both street crime and organised crime, is lower in mature market economies in the EU in comparison with three main transition sub-regions - Central Europe and the Baltic states (CEB), south-eastern Europe (SEE) and the Commonwealth of Independent States (CIS), as well as Turkey and Vietnam. The comparison between the mature market EU economies and transition countries regarding incidence and cost of crime is less clear-cut than the comparison of perception indicators. According to the survey data, incidence of street crime is, perhaps surprisingly, smaller in SEE and CIS, as well as in South Korea, Turkey and Vietnam, than in the EU. Enterprises in CEB report a higher incidence of street crime. Organised crime incidence and cost in CEB countries is on average similar to the EU. In SEE and CIS countries in particular, the cost of organised crime is significantly higher than in the EU. Later in the section, regional differences are tested while controlling for country characteristics such as unemployment, composition of GDP, and size of the country. Once these factors are taken into account, the differences between transition and non-transition countries are no longer significant, that is, country characteristics unrelated to crime explain much of the differences observed for simple country averages.

In Tables 6 and 7 the results of an empirical analysis of the between-countries variation in crime indicators are shown. The contribution of the variation between countries to overall variation in the data is estimated to be between 44 per cent and 60 per cent for the incidence and cost of crime and between 65 and 95 per cent for the perception of crime. The latter result indicates that perception of crime, in particular, is to a large extent driven by the differences between countries rather than within countries. There were several issues to be considered when choosing the final empirical specification presented in the paper:

First, endogeneity of security services needed to be taken into account. Estimates for equations including the payments on security services are presented in Tables 6 and 7. To assess potential impact of endogeneity of security services payments the reduced-form model excluding the security variables also needed to be re-estimated. The empirical results are similar to the results presented in Tables 6 and 7 and are available on request.

A second major issue in connection with model specification was the selection of country characteristics that could influence crime targeting the enterprise sector. The selected

country characteristics were based on the analytical framework and correspond to the enterprise characteristics discussed in the previous section (for example, share of private sector in GDP, composition of GDP). These characteristics also correspond to the empirical literature assessing general level of crime (for example, unemployment – see Soares, 2004). In the selection of the final set of structural indicators one of the main criteria was the relative stability of the indicator in time. For example, results may be similar when using GDP growth instead of unemployment but, unlike unemployment, GDP growth may be more volatile between years and can be influenced by one-off factors, such as one-off boosts to trade after the EU accession or the opening of a new oil or gas pipeline. The analytical framework also implies that the set of explanatory variables should be the same for all the regressions, a similar constraint as in the case of enterprise level regressions.

A third issue to be addressed is the use of proxies for law enforcement quality, the punishment element in the model. Certainly, crime indicators are themselves indirect indicators of the quality of protection of property rights and are used as such in the new institutional economics literature (for example, Frye and Shleifer, 1997). Alternatively, the extent of the unofficial economy or incidence of corruption could be used. However, for reasons of endogeneity, these indicators were not included into the final specification.<sup>16</sup>

The explanatory variables used in the country level regressions are the share of private sector in GDP, the population density, the share of agriculture in GDP, the country size (a dummy variable with the value of 1 for a country with less than 4 million inhabitants and 0 otherwise), and unemployment. Variables have been chosen on the basis of the empirical literature on the economics of crime, including Ehrlich (1973), Cornwell and Trumbull (1994), Andrienko (2002) and Soares (2004). The importance of a natural resource dummy<sup>17</sup> and different versions of a war dummy for large-scale armed conflict during the transition period has also been tested.<sup>18</sup>

According to the results, the incidence of street crime at the country level is related to a number of structural factors. Countries that have a lower share of agriculture in GDP (or larger share of industry and services) report higher levels of street crime. According to the empirical results, a 10 per cent lower share of agriculture in GDP is associated with 4.2 per cent higher incidence of street crime and 1.7 per cent lower losses due to street crime, while a 10 per cent higher share of private sector in GDP is associated with 1.9 per cent higher incidence of street crime. Countries where enterprises spend on average more of their revenues on security were found to report lower levels of street crime.

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<sup>16</sup> The results are similar when either of the two indicators (unofficial economy and corruption) is included in the set of explanatory variables. Corruption is significant, with a positive sign, only for the street crime incidence equation while share of unofficial economy is not significant in any specification.

<sup>17</sup> Regardless of specification the natural resource dummy was not significant in any of the regressions.

<sup>18</sup> The war dummy is statistically significant with a positive sign in the regression of the incidence of organised crime for reduced specifications without unemployment and without the share of private sector in GDP.

**Table 6 – Country level regression analysis – street crime**

	<b>Incidence</b>	<b>Cost</b>	<b>Perception (1)</b>	<b>Perception (2)</b>
Unemployment	0.11 (0.11)	-0.05 (0.04)	-	1.70** (0.37)
Population density	-0.04* (0.02)	-0.00 (0.00)	-	-0.05 (0.05)
Country size dummy	-0.03 (0.03)	-0.00 (0.01)	-	-0.24** (0.09)
Agriculture / GDP	-0.42* (0.16)	0.17** (0.06)	-	0.89* (0.41)
Private sector / GDP	0.19* (0.09)	0.01 (0.02)	-	0.49 (0.30)
Security costs	-3.33** (1.14)	-0.02 (0.68)	-	0.12 (5.05)
Street crime incidence	-	-	0.63 (0.33)	-
Street crime cost	-	-	-0.82 (1.43)	-
Organised crime incidence	-	-	0.60* (0.29)	-
Organised crime cost	-	-	7.52* (3.00)	-
Corruption incidence	-	-	0.56* (0.24)	-
Corruption cost	-	-	-1.10 (7.00)	-
Constant	0.21* (0.09)	0.02 (0.02)	1.26** (0.18)	1.33** (0.27)
Year dummy	-0.69** (0.02)	-0.01 (0.01)	-0.06 (0.09)	-0.14 (0.08)
Transition country dummy	0.07 (0.05)	0.00 (0.01)	0.17 (0.13)	0.06 (0.16)
Number of observations	60	60	60	60
R squared	0.52	0.41	0.37	0.35
R squared for dummies only	0.09	0.09	0.09	0.09

Source: BEEPS.

Notes: Statistically significant differences from 0 are denoted by \* for the 5 per cent significance level and \*\* for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected using the variance inflating factor (VIF) test.

**Table 7 – Country level regression analysis – organised crime**

	<b>Incidence</b>	<b>Cost</b>	<b>Perception (1)</b>	<b>Perception (2)</b>
Unemployment	0.43* (0.19)	0.02 (0.01)	-	2.09** (0.33)
Population density	-0.00 (0.14)	-0.00 (0.00)	-	-0.02 (0.05)
Country size dummy	-0.09* (0.04)	-0.01** (0.00)	-	-0.22** (0.07)
Agriculture / GDP	0.17 (0.15)	0.01 (0.02)	-	1.07** (0.39)
Private sector / GDP	0.12 (0.10)	0.01 (0.01)	-	0.29 (0.21)
Security costs	3.11 (1.79)	0.73** (0.17)	-	5.72 (5.09)
Street crime incidence	-	-	-0.19 (0.30)	-
Street crime cost	-	-	-1.72 (1.37)	-
Organised crime incidence	-	-	0.96** (0.28)	-
Organised crime cost	-	-	7.51** (2.72)	-
Corruption incidence	-	-	-2.53 (6.87)	-
Corruption cost	-	-	0.41 (0.23)	-
Constant	0.28 (0.07)	0.00 (0.01)	1.37** (0.19)	1.21** (0.20)
Year dummy	-0.09* (0.04)	0.01* (0.00)	-0.14 (0.09)	-0.15* (0.07)
Transition country dummy	0.02 (0.04)	0.01 (0.01)	0.09 (0.11)	0.01 (0.14)
Number of observations	60	60	60	60
R squared	0.29	0.31	0.42	0.49
R squared for dummies only	0.13	0.08	0.12	0.12

Source: BEEPS.

Notes: Statistically significant differences from 0 are denoted by \* for the 5 per cent significance level and \*\* for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected using the variance inflating factor (VIF) test. Results are based on 60 observations.

Higher unemployment and smaller country size are significantly related to incidence of organised crime. A 10 per cent higher unemployment rate is associated with 4.3 per cent higher incidence of organised crime. A small country is associated with a 9 per cent lower incidence of organised crime and 1 per cent lower protection payments.

The two perception regressions for street crime, relating perception of crime with either direct indicators of crime against enterprises or with country characteristics, provide insights into the formation of perception on business obstacles. Incidence and cost of street crime do not have a significant impact on the perception of street crime. Street crime is actually correlated with incidence and cost of organised crime as well as the incidence of corruption. The observation that street crime perception is not related to the experience with street crime is then confirmed by the second perception equation relating perception of street crime to structural factors. Here, unemployment, the structure of the economy and country size are the main explanatory factors for perception of crime. This is a different set of significant country characteristics than is the case for incidence and cost of street crime. Thus, enterprises in larger countries with higher unemployment and higher contribution of agriculture to GDP are on average more concerned about street crime as a business obstacle, with the impact of unemployment by far the largest in relative terms.

Unlike the case of street crime, perception of organised crime seems to be driven by experience with organised crime. In countries with higher unemployment both incidence and perception of organised crime are higher. Similarly, smaller countries report smaller incidence, cost and perception of organised crime. It is interesting to note that in the case of organised crime also higher security payments are associated with higher protection payments. This is an empirical result which seems to be in line with Frye and Shleifer (1997) findings on the consequences of weak protection of property rights and the notion of legal or illegal private protection bodies as a substitute for state property protection.

To get information on possible deterring effects of crime on overall economic development the relationship between crime and inflows of foreign direct investments were assessed.<sup>19</sup> Table 8 presents the relationship between inflows of FDI in the three years after the 2002 BEEPS as a dependent variable (that is, in 2003-05), and proxy variables for standard determinants of FDI<sup>20</sup> and different crime indicators.<sup>21</sup>

First, a clear negative relationship between perception of crime — both, organised and street crime — and inflows of FDI was found. Secondly, higher costs of organised crime are associated with significantly lower FDI inflows.<sup>22</sup> When assessing the size of the impact of crime on FDI inflows as indicated by the regression coefficients, it appears that if perception of organised crime<sup>23</sup> in new EU member states were at the levels of Germany, annual FDI inflows per capita would be roughly 13 per cent higher, *ceteris paribus*. In the case of SEE

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<sup>19</sup> Since there is only a small number of observations it should be noted that these results are only indicative.

<sup>20</sup> Determinants of FDI in the regressions are population density and country size dummy as a proxy for the size of the market, the share of agriculture in GDP as a proxy for natural resources and skills endowment, and progress in transition as a proxy for the existing stock of FDI. For a detailed discussion of various determinants of FDI see Bevan and Estrin (2000) and EBRD (2003).

<sup>21</sup> Crime could be seen as a proxy of the general business environment. However, as shown in EBRD (2005) the development of crime differs from the development of other institutional characteristics, such as corruption.

<sup>22</sup> Similar regressions have been run for the equivalent corruption indicators with only perception of corruption significant, due to high correlation between all perception indicators.

<sup>23</sup> Note that incidence and cost of organised crime in CEB is not significantly different from the mature market economies in the EU although the perception is that organised crime is a significantly bigger business obstacle. Perception of crime could be thus seen as a proxy for the rule of law. Alternatively, perception variables, as indirect estimates of enterprise costs of crime, could be lagging the actual costs or be upwardly biased.

and CIS countries similar estimates give figures of 46 and 133 per cent which are much more significant result, related to generally low per capita FDI inflows in these regions.

**Table 8 – Country level regression analysis – Impact of crime on FDI flows**

	FDI flows per capita (in US\$)					
	(2002-04)					
Population density	203 (102)	200 (124)	204 (112)	257* (97)	208 (102)	264* (111)
Country size dummy	-162* (74)	-114 (94)	-111 (91)	-157* (71)	-150 (89)	-98 (87)
Agriculture / GDP	-1043** (358)	-1252** (358)	-1214* (471)	-916** (318)	-1078** (333)	-1366** (326)
Progress in transition	310** (86)	251 (121)	248* (98)	264** (74)	268** (92)	157* (72)
Street crime perception	-345** (88)	-	-	-	-	-
Street crime incidence	-	-40 (487)	-	-	-	-
Street crime cost	-	-	-94 (1012)	-	-	-
Organised crime perception	-	-	-	-349** (84)	-	-
Organised crime incidence	-	-	-	-	-380 (242)	-
Organised crime cost	-	-	-	-	-	-9387* (3456)
Constant	109 (252)	-354 (277)	-359 (285)	142 (225)	-370 (257)	63 (242)
Number of observations	26	26	26	26	26	26
R squared	0.79	0.65	0.65	0.79	0.69	0.73

Source: BEEPS.

Notes: Statistically significant differences from 0 are denoted by \* for the 5 per cent significance level and \*\* for the 1 per cent significance level. Robust standard errors are in brackets. The hypothesis of multicollinearity in the data has also been tested and rejected using the variance inflating factor (VIF) test.

## 6. SUMMARY AND CONCLUDING REMARKS

This paper presents an analysis of the relationship between crime and the enterprise sector in a range of developed, developing and transition countries in Europe and Asia, based on a simple optimisation model of criminal behaviour affecting enterprises. Crime remains a more significant problem in transition countries compared with more mature EU member states. A large part of these differences is due to structural variations, including the share of industry and services in the economy, the share of private sector in GDP, and unemployment.

This paper shows that higher rates of crime, and particularly organised crime, are associated with the weaker development of micro enterprises, in particular in the service sector in large countries with high unemployment.

Whether crime has a deterrent effect on enterprise behaviour, particularly enterprise entry and expansion, was also examined. According to the survey data perception of crime as a serious business obstacle has a highly detrimental impact on the willingness of foreign investors to enter a country, particularly in early and intermediate transition countries where perception of crime is much worse than in advanced transition countries.

Moreover, higher perception of street crime leads to lower rates of job creation, with an increase in the perception indicator by a factor of 1 (on the scale from 1 to 4) associated with the decline in employment growth by 4.5 percentage points. These findings re-emphasise the importance of policy advice for less advanced transition countries to fight crime and corruption in order to support enterprise development.

As part of the empirical analysis, significant differences in the way enterprises estimate direct costs of crime and form perceptions of crime were highlighted. These differences should raise caution in drawing conclusions on business environment issues which are based exclusively on country level perception indicators.

There are several possible extensions of this paper. One is greater emphasis on punishment as in the standard Becker-type general crime model. Furthermore, the assumption of an involuntary nature of organised crime could be relaxed, allowing an enterprise to become actively involved in the decision to make protection payments to organised crime. The model constructed in this paper can be also relatively easily extended to cover corruption as well, although one would have to account for the decision process of enterprises to be involved in corrupt activities in relation to potential (illegal) benefits.

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