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# **IS ECONOMIC GROWTH CRIMINOGENIC FOR FIRMS IN DEVELOPING ECONOMIES?**

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# IS ECONOMIC GROWTH CRIMINOGENIC FOR FIRMS IN DEVELOPING ECONOMIES?

## Abstract

Several studies have explored the relationship between economy level crime rates or individual level crime and economic growth. However, few studies have examined the relationship between economic growth and crime against firms which is an important issue especially for developing economies. Using data for about 12,000 firms in 27 developing countries we find that economic growth has a negative effect on crime. We also find that several macro-economic factors can weaken or strengthen the relationship between crime and economic growth. The results are robust to various sensitivity checks.

## 1 Introduction

Several studies have explored the relationship between crime and economic growth. In general economic growth increases job market opportunities, consequently raising the opportunity cost of engaging in illegitimate activities (Becker, 1968). Furthermore economic growth may increase tax revenues resulting in higher government budgets for crime prevention (Cook, 2010; Levitt, 2004). Both mechanisms propose an inverse relationship between economic growth and crime. However, economic growth also serves as an indicator of increasing prosperity and thus the effect on crime may depend on the level of risk aversion (Ehrlich, 1973). Increasing prosperity may encourage crime-prone behavior such as individuals leaving their houses more often, increasing alcohol consumption, or owning more cars. Finally legal institutions, being typically slow to adapt, may find it difficult to deal with rapid economic growth and thus providing more leeway for criminals to escape punishment, and thus reducing the costs of engaging in illegitimate activities. In general, empirical findings have indicated a negative relationship between economic growth and crime (Fajnzylber et al, 2002; Bourguignon, 1999; Dutta, 2009).

Most of the literature mentioned above concerns overall crime rates in an economy, or crime against households. A natural extension of this literature would be to examine the link between economic growth and crime against firms since overall crime rate results do not give any indication of how the results apply only to firms. Given the importance of private firms in aiding development in less developed economies, it is important to examine how the relationship between economic growth and crime fairs at the firm level. A few mechanisms translate well with regards to crime against firms. Economic growth resulting in increasing economic opportunities of individuals makes firms less susceptible to theft, and rising government spending on crime may complement a firm's security measures. However, in terms of risk prone behavior induced by economic growth, it is unlikely that alcohol consumption or increasing outings by individuals is highly correlated with crime against firms, although there may be increases in firm spending on items such as cars across all sizes of firms that may attract criminal activity. On the other hand, the rate at which legal institutions adapt to increasing economic growth will determine the level of crime against firms.

There is very limited research done on crime against firms. Previous studies have found that firms have higher rates of victimization than households. About 24% of retailers and manufacturers were burgled in 1993 in contrast to 5.6% of households in Britain (Hopkins, 2002). For Latin American countries, large firms experience more crime than small firms, although small firms face a larger burden of crime (Amin, 2009). In Africa, ownership of informal firms matter, with firms owned by immigrants being more susceptible to a crime than native owned firms.

The relationship between economic growth and crime against firms is an important macro-micro link for developing economies. As far as we know, this is the first study to explore the relationship between the burden of crime against firms, as measured by losses due to crime as a % of sales, and economic growth. Given the data limitation, it is impossible to comprehensively identify a causal link. Thus the goal of this study is to quantify the correlation between economic growth and crime against firms, and then explore this relationship further in terms of several socio-economic and firm characteristics.

In order to examine the relationship between growth and crime, we use a unique firm level dataset with about 12,000 firms in 27 developing countries maintained by the World Bank's Enterprise Analysis unit (Enterprise Surveys). We find that an increase in real GDP per capita growth by 1 standard deviation results in a 0.09 standard deviation reduction in the losses due to crime. We find that female ownership and management strengthens the relationship between economic growth and losses due to crime. While a large police force, good governance, and greater voter turnout in elections are good substitutes for economic growth in the context of reducing losses due to crime. We use % of land in the tropics, and malaria risk index as instruments and find that the results are retained, if not magnified. The results are also robust to various sensitivity checks.

Section 2 describes the data, section 3 provides the estimation and results, and sections 4, 5, and 6 provide instrumental variable estimations, robustness checks, and conclusions respectively.

## **2 Data and Main Variables**

The data for firm level variables are collected by the World Bank's Enterprise Surveys. The Enterprise Surveys use standard survey instruments to collect firm-level data on a country's business environment from business owners and top managers. The surveys cover a broad range of topics including access to finance, corruption, infrastructure, crime, competition, labor, obstacles to growth and performance measures. The survey is designed to be representative of a country's private non-agricultural economy and only registered firms with at least five employees are included in the sample. The data consists of a random sample of 12,000 firms across 27 developing countries in different regions stratified by firm size, location, and sector. The survey year ranges between 2007 and 2009. Details of countries in the sample and their respective survey years can be found in the first column of table A2 in the appendix. Data source and description of the variable can be found in table A1, with summary statistics in table A2.

### *2.1 Dependent variable*

The main dependent variable utilized is losses due to crime as a percentage of annual sales. This variable is derived from the survey question: "In fiscal year [insert fiscal year], what are the estimated losses as a result of theft, robbery, vandalism or arson that occurred on establishment's premises calculated as a percent of annual sales or the total annual value of the losses?"

For total values of crime, the percentage over sales is calculated. Crime losses as a % of sale capture the intensity of crime. We make no distinction between a firm that has experienced no crime and a firm that has experienced crime but incurred no losses. Both firms get a zero value

for the dependent variable. The variable averages 0.72% in the sample with a standard deviation of 3.9%. Using country averages across all firms, Azerbaijan has the lowest amount of crime losses at 0.20% of sales, while El Salvador has the highest with 1.73%.

We also include an estimation where the dependent variable is a dummy variable indicating whether or not a firm has experienced crime in the last fiscal year. The survey question is phrased as follows: “In fiscal year [insert last complete fiscal year], has this establishment experienced losses as a result of theft, robbery, vandalism or arson?” This estimation elucidates the relationship between economic growth and the incidence of crime as opposed to the burden of crime.

## *2.2 Explanatory variable*

The main variable of interest is real GDP per capita growth rate which is available for the years the firm surveys were undertaken. The sample mean for the rate of economic growth is 2.66% while a standard deviation of 4.2%. Belarus and Romania are the fastest growing economies in the sample with growth rates of 10.2% and 9.6% respectively. The country average crime losses and economic growth rates are presented in table A4 for each country in the appendix.

## *2.3 Other explanatory variables*

We control for several firm level and country level variables. The degree of crime a firm faces may depend on its size, the sector it belongs to, and its locale. We control for firm size using dummies for small and medium firms. A small firm is defined as a firm with less than 20 employees, while a medium firm has workers between 20 and 99. We also have a dummy for

manufacturing firms. A priori it is not clear whether a manufacturing firm should have higher crime losses with respect to other sectors. We also include a city size dummy which takes the value of 1 if the city has a population of 250,000 or greater, or is a capital city, and 0 otherwise. We also include a dummy for whether a firm has at least one female owner. All these variables are from the Enterprise Survey's data set.

At the country level we control for the number of police per 100,000 of population. The variable is obtained from United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems. The variable is typically lagged by 1 year, however due to data constraints, for some countries the lag is not exactly one year previous, but a few years before in certain cases. The specific details of the number of lags are available in table A3 in the appendix. We also control Real GNI per capita and the country wide Gini index given their prominence in the literature. For cases where data for the exact date is unavailable, we use data for the closest date available. The exact year of data used for GNI per capita and the Gini index are presented in table A3 in the appendix. We finally control for country size using the total population of the country. These data are available from the World Bank's World Development Indicators. Data source and description of the variable can be found in table A1, with summary statistics in table A2.

### **3. Estimation**

We estimate following equation using OLS for crime losses, and Tobit estimation for crime experience.



$$(1) \quad \text{crime}_{ij} = \beta_1 \text{GDPgr}_j + \beta_2 \text{Policelag}_j + \beta_3 \text{Fem}_{ij} + \beta_4 \text{GNicap}_j + \beta_5 \text{GINI}_j + \beta_6 \text{Population}_j + \beta_7 \text{Small}_{ij} + \beta_8 \text{Medium}_{ij} \\ + \beta_9 \text{LargeCity}_{ij} + \beta_{10} \text{Manf}_{ij} + \varepsilon_{ij}$$

Where *crime* is the losses due to crime as a % of sales of a dummy representing whether a firm experienced crime in the last fiscal year, *GDPgr* is the real GDP per capita growth rate, *Policelag* is the lagged number of police per 100,000 population, *Fem* is a dummy representing female ownership, *GNicap* is the real GNI per capita, *GINI* is the Gini coefficient, *Population* is the total population of the economy, *Small* and *Medium* are firm size dummies, *LargeCity* is a dummy for cities with population of 250,000 and greater, or capital cities, and finally *Manf* is a dummy for manufacturing firms.

All estimates are based on standard errors clustered at the country level. In the later sections we add additional variables and interact them with the variable of interest to elucidate several relationships. The usual econometric issues of endogeneity and omitted variable bias are of a concern in the estimation. Reverse causality is an issue given that higher crime can lead to slower economic growth. We also have the issue of omitted variable bias as economic growth may be correlated with several factors. Both issues are challenging given data limitations. We address this by using various checks as presented in the robustness section including instruments.

### 3.1 Base Regression Results

All magnitudes discussed in the text are presented in standard deviation units, unless indicated. The figures shown in the tables are in nominal units, not standard deviation units. The base results are presented in table 1. Column1 indicates that firms in faster growing economies are

less likely to experience crime. Consistently, column 2 shows that an increase in GDP per capita growth by 1 standard deviation results in a 0.09 reduction in the standard deviation units of losses due to crime. Both results are significant at 1%. The sign and significance of these results are unchanged when the estimation is done without any controls. The reduction in crime losses when the controls are excluded from the estimation is 0.055, significant at 1%. These results indicate that economic growth may be a deterrent for crime against firms. One reason could be that economic growth increases the opportunity cost of criminal activities leading to less crime. This is consistent with studies for individual level crime (Bourguignon, 1999; Fajnzylber et al., 2002).

A few other results stand out. Firms with female owners are both more likely to experience crime, and also face a higher percentage of losses due to crime over sales. A couple of results retain significance but switch signs when comparing the impact on likelihood of experiencing crime (incidence of crime) and the losses due to crime (burden of crime). GNI per capita seems to increase the likelihood of experiencing crime while reducing the losses due to crime. That is, with higher income, crime against firms becomes more widespread but also more petty. Income per capita has generally shown non robust results with regards to individual level crime in the literature (Fajnzylber et al., 2002; Soares, 2004)<sup>1</sup>. Additionally, small and medium firms are less likely to experience crime than large firms, but face higher losses due to crime, which has been also found in previous studies (Amin, 2009). The size of the country in terms of population has a

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<sup>1</sup> Due to the lack of continuous data for GNI per capita for some countries, we use the GDP growth rate instead of the GNI growth rate as our indicator for economic growth. This is typical in the literature (Fajnzylber et al, 2002). The results for female ownership are retained if we use the level of GDP per capita instead of GNI per capita.

positive effect on losses due to crime, but no effect on the incidence of crime. Thus, in larger economies, firms have higher losses due to crime.

We now consider how several country and firm-level factors may influence the relationship between economic growth and the burden of crime on firms. Economic growth may not only represent labor market opportunities, but may also capture the quality of legal and public institutions (Lederman et al., 2002). Thus we examine the strength of the relationship between economic growth and crime and how this relationship depends on factors such as police, female ownership and management, governance and voter turnouts in elections. The relationship between police, governance and crime have been explored in the literature, and thus we expect the effect of economic growth may be conditional these factors. We also use voter turnout as a proxy for social organization, and thus it would be interesting to see if the effect of economic growth is strengthened by social organization, or weakened by its presence. Finally, given the robust positive relationship between female ownership and management and crime, which is consistent with female headed households and crime, we examine whether economic growth weakens or strengthens this relationship. We use the estimation results in table 1, column 2 as the base as there is a more straightforward interpretation with regards to the magnitude of the effects of interaction variables. Both the Logit and OLS estimations provide qualitatively similar results for economic growth

### *3.2 Number of Police*

The interaction term between number of police and economic growth is positive and significant at 5%. The overall effect of economic growth on crime losses is still negative at the sample mean

number of police after interacting economic growth with police. However, looking at the extremes of the sample, economic growth has no significant effect on crime losses at the sample maximum number of police, but has a large and significant negative effect at the sample minimum number of police. The magnitudes are presented in column 1 of table 2. The effect of increasing economic growth by 1 standard deviation results in a 0.008 standard deviation reduction in crime losses at the sample mean number of police, and 0.149 standard deviation units at the lowest number of police in the sample, both results significant at 1%. The number of police turning point, after which the effect of economic growth on crime losses is insignificant, in the sample is 425 per 100,000 of population, which is at the 83 percentile of the sample. The implication of these results may indicate that a larger police force may be a substitute for the economic growth when it comes to reducing crime against firms.

### *3.3 Female Ownership and Management*

The interaction term between female ownership and management and economic growth is positive and significant at 5%. Economic growth reduces crime losses whether or not a firm has a female or male owner, but the magnitude of the effect is larger if the firm has a female owner, or both a female manager and female owners as shown in columns 2 and 3 of table 2. The results indicate that a one standard deviation increase in economic growth results in a 0.102 standard deviation reduction in the dependent variable for female owned firms, in contrast to 0.074 standard deviation reduction for firms that do not have a female owner. The magnitude is even greater for firms with both a female owner and female manager at 0.139 in contrast to 0.081 for firms that have all male owners and managers. An interpretation of this result is that economic growth benefits the more vulnerable or less well off in a society.

### *3.4 Governance*

We use ICRG's Quality of government indicator as a measure of governance. The interaction term between Quality of Government and Economic growth is positive and significant at 10%. Economic growth has a negative and significant relationship with crime losses at the sample mean of the governance indicator. However, this relationship turns insignificant at the sample maximum of the governance indicator. At the sample minimum level of governance, the effect of economic growth increases in magnitude while retaining significance, when compared to the mean level of governance. In column 1 of table 3, we present the magnitudes at the bottom. A one standard deviation increase in economic growth results in an approximately 0.095 and 0.144 standard deviation reduction in crime losses for the sample mean and minimum respectively. One interpretation is that better governance is a substitute for the crime-reducing effect of economic growth.

### *3.5 Voter Turnout*

Social disorganization theory indicates that factors that diminish the effectiveness of informal social controls increase criminal activity (Kelly, 2000). Here we consider one indicator of social disorganization – voter turnout in elections. The interaction term between voter turnout and economic growth is positive and significant at 1%. At the mean level of voter turnout, an increase in economic growth is significant after interacting voter turnout with economic growth. However, this relationship loses significant at the sample minimum of voter turnout, but actually gains magnitude and retains significance at the sample maximum of voter turnout. The bottom of column 2 of table 3 presents the magnitudes of the effects. A one standard deviation increase in economic growth results in a 0.073 standard deviation reduction in crime losses at the sample

mean level of voter turnout and a 0.165 standard deviation reduction in crime at the maximum level of voter turnout, both results significant at 1%. The turning point where the effect of an increase in the economic growth ceases to be significant is a voter turnout above 0.8, which is at the 85<sup>th</sup> percentile of the firm sample. This result indicates that a higher voter turnout, possibly indicating greater social organization, is a substitute for economic growth with regards to crime reduction.

Two major concerns about the estimation results are that the relationship between economic growth and losses due to crime are reverse causality and omitted variable bias. Essentially, an increase in losses due to crime can deter economic growth. Similarly, economic growth may be capturing something else such as institutions that are not included in the estimations. We mitigate this possibility by using instruments and subjecting the base estimates to several robustness checks.

#### **4. Instrumental Variables**

We use two instruments for economic growth: the % of land in tropics for each country, and malaria risk index, which is the proportion of each country's population that live with risk of malaria transmission in 1994 developed by Sachs and Gallup (2004). Both these variables have been found to be an important determinant of economic growth (Sachs et al, 1998). We report the results in table 4. The first stage estimation results presented in column 2 show that while % of land in tropics is significant, malaria ecology is not. We include the latter variable in order to pass the test of overidentifying restrictions. The overall results are retained without the malaria risk instrument. The second stage estimation results are presented in column 1 of table 4. The

coefficient of real GDP per capita growth using instrumental variables estimation method retains the sign and significance of the base estimations. The magnitude increases slightly from -0.08 in the base estimations to -0.12 in the estimations using the instrumental variables. As indicated in the bottom of table 4, the Sargen-Hansen test of overidentifying restrictions is not rejected for all conventional levels of significance. Thus we cannot reject the null that all the instruments are valid. We also reject that the estimation is underidentified at 5% level of significance.

## **5. Robustness**

We check for the robustness in terms of model specification. Several studies have shown that demographics and human capital (Kovandzic and Sloan, 2002; Kelly, 2000; Di Tella and Schargrotsky, 2004), corruption (Gaviria, 2002), fractionalization (Fajnzylber et al, 2000), trade (Ghosh et al., 2011), prison population (Kovandzic and Sloan, 2002; levitt, 2004), and government spending (Naidoo, 2006) are factors that influence crime. We add sets of variables that proxy for the aforementioned factors and present the results in table A5. We also include firm level variables such as total employees and security costs as a % of total sales and check if they affect our estimation of interest. We also control for inflation, using it as an indicator of macroeconomic stability. As shown in table A5, including these sets of variables do not improve the goodness of fit, the explanatory power of the model, or reduce the significance of the variable of interest.

We also worry that extreme observations in the sample may be driving the results. Thus we omit the top 1%, bottom 1 %, and top and bottom 1% observations of losses due to crime as well

economic growth, to see if our results are retained. As indicated in table A6, the significance of our results is unaffected.

Finally, we worry that our results may be dominated by certain countries. Thus we drop one country at a go from the sample and see if the coefficient of economic growth retains the signs and significance. As indicated by figure A1, the results are not dominated by any particular country in the sample as we retain the sign and significance at 5%.

## **6. Conclusion**

This paper contributes to the literature by examining the relationship between economic growth and crime against firms, a fairly under-researched area. The paper finds a negative relationship between firm losses due to crime and economic growth. Expressed in terms of standard deviations, we find that an increase in real GDP per capita growth by 1 standard deviation results in a 0.09 standard deviation reduction in the losses due to crime over total sales. The suggested mechanism for this effect is that economic growth increases opportunities elsewhere and thus increasing the opportunity cost of crime. We find that economic growth is more effective in reducing crime losses for firms with female owners and managers.

Possible ways to extend this paper would be to check if the results hold for developed economies as well. It would also be interesting to formally explore various channels through which economic growth affects crime. Finally, estimations with some time variation in the data would be able to test some of the relationships presented in this paper more rigorously.



TABLE 1: GDP GROWTH AND CRIME AGAINST FIRMS

	Logit: Experienced Crime (marginal effects)	OLS: % of Losses Due to Crime Over Sales
	1	2
Real GDP per Capita Growth	-0.0941*** [0.0226]	-0.0808*** [0.0208]
Police per 100,000 persons lagged	-0.0008 [0.0009]	-0.0011* [0.0005]
Firm with Female Owner	0.1357** [0.0621]	0.1181* [0.0632]
Real GNI per capita in 100s	0.0040** [0.0018]	-0.0058*** [0.0012]
GINI	-0.0023 [0.0121]	-0.0065 [0.0113]
Population in Millions, Total	-0.004 [0.0035]	0.0034* [0.0017]
Small firms	-0.8113*** [0.1138]	0.4023*** [0.0940]
Medium firms	-0.3551*** [0.0820]	0.1664** [0.0658]
Large City or Capital	0.0157 [0.0657]	0.0331 [0.0953]
Manufacturing	-0.6394*** [0.0741]	-0.2238** [0.0813]
Number of Countries	27	27
Number of Observations	12801	12274

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 2: GDP GROWTH AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	Police lagged x GDP growth	GDP Growth x Female Owner	GDP Growth x Female Owner & Manager
	1	2	3
Real GDP per Capita Growth	-0.1679*** [0.0471]	-0.0695*** [0.0219]	-0.0763*** [0.0261]
Real GDP per Capita Growth x lagged Police	0.0003** [0.0001]		
Real GDP per Capita Growth x Female Owner		-0.0260* [0.0149]	
Real GDP per Capita Growth x firm with female owner and manager			-0.0554** [0.0259]
Firm with female owner and manager			0.4054** [0.1587]
Police per 100,000 persons	-0.0020** [0.0009]	-0.0010* [0.0005]	-0.0011* [0.0005]
Firm with Female Owner	0.1078* [0.0630]	0.1886** [0.0851]	
Real GNI per capita (in 100s)	-0.0061*** [0.0012]	-0.0058*** [0.0012]	-0.0056*** [0.0012]
GINI	-0.0066 [0.0114]	-0.0062 [0.0113]	-0.008 [0.0129]
Population in Millions, Total	0.0025 [0.0019]	0.0034* [0.0018]	0.0034** [0.0016]
Small firms	0.3979*** [0.0937]	0.3945*** [0.0950]	0.3511*** [0.0977]
Medium firms	0.1654** [0.0654]	0.1609** [0.0650]	0.1336* [0.0758]
Large City or Capital	0.0454 [0.0944]	0.0321 [0.0951]	0.0546 [0.0903]
Manufacturing	-0.2312*** [0.0815]	-0.2240** [0.0810]	-0.2297** [0.0885]
Number of Countries	27	27	27
Number of Observations	12274	12274	12449
<b>Effect of 1 std dev increase in Economic Growth:</b>			
Change in the standard deviation of the Dependent Variable.			
Using Mean	-0.008***		

Using Min	-0.149***		
Using Max	0.002		
Interacted Dummy =0		-0.074***	-0.081***
Interacted Dummy =1		-0.102***	-0.139***

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 3: GDP GROWTH AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	GDP Growth x Quality of Government	GDP Growth x Voter Turnout
	1	2
Real GDP per Capita Growth	-0.2226*** [0.0621]	-0.3078*** [0.0793]
Real GDP per Capita Growth x Quality of Government	0.2570* [0.1262]	
Quality of Government	-1.9895*** [0.6779]	
GDP per Capita Growth x Voter Turnout		0.3340*** [0.1174]
Voter Turnout		-1.5371** [0.6045]
Police per 100,000 persons	-0.0018*** [0.0005]	-0.0011* [0.0005]
Firm with Female Owner	0.1139* [0.0643]	0.1130* [0.0646]
Real GNI per capita (in 100s)	-0.0030* [0.0015]	-0.0043*** [0.0014]
GINI	-0.0220* [0.0118]	-0.001 [0.0099]
Population in Millions, Total	0.0032** [0.0014]	0.0037** [0.0017]
Small firms	0.4144*** [0.1036]	0.4094*** [0.0962]
Medium firms	0.1806** [0.0673]	0.1728** [0.0674]
Large City or Capital	0.0455 [0.1057]	0.0392 [0.0973]
Manufacturing	-0.2211** [0.0952]	-0.2141** [0.0836]
Number of Countries	24	27
Number of Observations	11242	12274
<b>Effect of 1 std dev increase in Economic Growth:</b>		
Change in the standard deviation of the Dependent Variable.		
Using Mean	-0.095***	-0.073***
Using Min	-0.144***	-0.165***
Using Max	-0.021	-0.010

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 4: GDP GROWTH AND CRIME AGAINST FIRMS – INSTRUMENTAL VARIABLES

	% of Losses Due to Crime Over Sales IV Estimates Second Stage Results	Real GDP per capita Growth First Stage Results
	1	
Real GDP per Capita Growth	-0.1212*** [0.0351]	
Police per 100,000 persons lagged	-0.0012** [0.0006]	-0.0072 [0.0052]
Firm with Female Owner	0.1097* [0.0602]	-0.1129 [0.1782]
Malaria Ecology Index		-1.3047 [1.8650]
% of land in the Tropics		-3.6070*** [1.0278]
Real GNI per capita in 100s	-0.0076*** [0.0017]	-0.0590*** [0.0191]
GINI	-0.0231 [0.0152]	-0.2658*** [0.0761]
Population in Millions, Total	0.0043*** [0.0015]	0.0364** [0.0169]
Small firms	0.4118*** [0.0942]	0.1307 [0.1110]
Medium firms	0.1721*** [0.0656]	0.0650 [0.0836]
Large City or Capital	0.03 [0.0976]	-0.0108 [0.2656]
Manufacturing	-0.2224*** [0.0793]	0.0783 [0.1045]
Number of Countries	27	27
Number of Observations	12274	12274
Instruments	Malaria Ecology Index, % of land in the Tropics	
Under-identification test (Kleibergen-Paap LM statistic) P-value:	0.0233	
Hansen J statistic (over-identification test of all instruments) p-value:	0.1113	

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

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## APPENDIX

TABLE A1: VARIABLE DEFINITIONS

Variable	Definition	Data Source
Losses Due to Crime (% of sales)	Response to the Question: “In fiscal year [insert fiscal year], what are the estimated losses as a result of theft, robbery, vandalism or arson that occurred on establishment’s premises calculated as a percent of annual sales or the total annual value of the losses?” For actual values, % of sales was calculated.	Enterprise Surveys, World Bank
Experienced Crime	Response to the Question: “In fiscal year [insert last complete fiscal year], has this establishment experienced losses as a result of theft, robbery, vandalism or arson?”	Enterprise Surveys, World Bank
Real GDP per Capita Growth	Real GDP per Capita Growth Rate, constant 2000 USD	World Development Indicators (WDI), World Bank
Police per 100,000 persons lagged	Police per 100,000 persons lagged. Due to data constraints, for some countries the lag is not exactly lagged by year. Specifics of all lag years can be found in the appendix.	United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems
Firm with Female Owner	Yes Response to Question: "Are any of the owners female?"	Enterprise Surveys, World Bank
Female Owner and Manager	Yes Response to Questions: “Is the Top Manager female?” and "Are any of the owners female?"	Enterprise Surveys, World Bank
Real GNI per capita (in 100s)	GNI per Capita, Constant 2000 USD	World Development Indicators (WDI), World Bank
GINI	Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WDI, World Bank, Development Research Group
Population, Total in millions	Total Population	World Development Indicators (WDI), World Bank
Small firms	Dummy is 1 if firm is small (<20)	Enterprise Surveys, World Bank
Medium firms	Dummy is 1 if firm is medium (20-99)	Enterprise Surveys, World Bank
Large City or Capital	Dummy is 1 if city is either the capital or has more than 250,000 population	Enterprise Surveys, World Bank
Manufacturing	Dummy is 1 for manufacturing firms	Enterprise Surveys, World Bank
Quality of Government	Mean value of the ICRG governance variables “Corruption”, “Law and Order”, and “Bureaucracy Quality”, scaled 0-1. Higher values indicate better quality of government. 1990-2007 average used.	International Country Risk Guide – The PRS Group
Voter Turnout	Turnout in parliamentary elections measured as the total number of votes cast divided by the number of registered voters.	IDEA: International Institute for Democracy and Electoral Assistance <a href="http://www.idea.int/vt/index.cfm">http://www.idea.int/vt/index.cfm</a>
Polity 2	Index of Democracy (Polity 2). Score between -10 and 10 that indicate how democratic a country. Values increase with greater democracy. 1990-2007 average used.	Polity IV, <a href="http://www.systemicpeace.org/polity/polity4.htm">http://www.systemicpeace.org/polity/polity4.htm</a>

Years of Schooling	Average Years of Schooling of Population over 15. 1990-2007 average used. 1990-2007 average used.	Barro and Lee (2010)
Corruption	Corruption Perception Index: 10 point scale where higher values indicate less corruption. 1995-2009 average used.	Transparency International ww.transparency.org
Ethnic Fractionalization	Probability that two randomly selected people from a given country will not belong to the same ethnic group	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Language Fractionalization	Probability that two randomly selected people from a given country do not speak the same language	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Religious Fractionalization	Probability that two randomly selected people from a given country do not belong to the same religion	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Total Employees	Response to Question: “At the end of fiscal year [insert last complete fiscal year], how many permanent, full-time employees did this establishment employ?”	Enterprise Surveys, World Bank
Security Costs as a % of sales		Enterprise Surveys, World Bank
Proportion of Female Population	Population, female (% of total)	WDI, World Bank
Percentage of Population in Urban Agglomerates	Population in urban agglomerations of more than one million is the percentage of a country's population living in metropolitan areas that in 2000 had a population of more than one million people.	WDI, World Bank
Population Density	People per sq. km of land area	WDI, World Bank
Proportion of Population between 15 and 64	Population ages 15-64 (% of total)	WDI, World Bank
Life Expectancy		WDI, World Bank
Government spending on Public Order and Safety over total Government spending	Includes spending on police, fire protection services, law courts, and prisons	Government Financial Statistics (GFS), International Monetary Fund
Inflation		WDI, World Bank
Adult Prison Capacity	Prisons refer to “Prisons, Penal Institutions or Correctional Institutions” which means all public and privately financed institutions where persons are deprived of their liberty.	United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems
Judges	Number of judges per 1000 of population	United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems
Trade	Exports plus imports as a % of GDP	WDI, World Bank
Malaria Risk	Proportion of each country's population that live with risk of malaria transmission in 1994	Sachs and Gallup (2004)
% of land in Tropics		Sachs et. al. (1998)

TABLE A2: SUMMARY STATISTICS

Variable	Mean	Std. Dev.	Min	Max	Data Unit
Losses Due to Crime (% of sales)	0.716	3.942	0.000	100.000	Firm
Experienced Crime	0.232		0.000	1.000	Firm
GDP per Capita Growth	2.656	4.213	-5.529	10.192	Country
Police per 100,000 persons lagged	287.894	108.187	90.110	480.013	Country
Firm with Female Owner	0.419		0.000	1.000	Firm
Female Owner and Manager	0.152		0.000	1.000	Firm
Real GNI per capita (in 100s)	37.345	31.014	2.257	141.816	Country
GINI	39.826	7.768	25.810	52.330	Country
Population, Total in millions	28.615	27.065	1.353	141.816	Country
Small firms	0.369		0.000	1.000	Firm
Medium firms	0.378		0.000	1.000	Firm
Large City or Capital	0.627		0.000	1.000	Firm
Manufacturing	0.537		0.000	1.000	Firm
Quality of Government	0.525	0.101	0.351	0.791	Country
Voter Turnout	0.718	0.089	0.460	0.893	Country
Polity 2	6.153	3.926	-5.647	10.000	Country
Years of Schooling	8.066	1.816	2.850	11.689	Country
Corruption	3.369	0.960	1.982	6.091	Country
Ethnic Fractionalization	0.383	0.173	0.118	0.663	Country
Language Fractionalization	0.372	0.254	0.030	0.836	Country
Total Employees	121.246	478.223	1.000	20843	Firm
Life Expectancy	69.407	7.440	44.966	78.314	Country
Proportion of Female Population	50.957	1.339	48.750	54.020	Country
Percentage of Population in Urban Agglomerates	21.339	10.624	4.406	39.027	Country
Population Density	88.485	71.842	1.610	290.871	Country
Proportion of Population between 15 and 64	63.549	5.393	47.959	70.721	Country
Government Spending on Public Order & Safety over Total Spending	0.057	0.026	0.015	0.119	Country
Inflation	9.488	7.816	2.358	50.705	Country
Security Costs as a % of sales	1.514	5.373	0.000	384.615	Firm
Judges per 1000 of Population	13.166	11.808	0.760	47.020	Country
Adult Prison Capacity	41384	50603	1017	160327	Country
Trade as a % of GDP	84.496	36.049	37.354	182.512	Country
Malaria Risk Index	0.259	0.377	0.000	1.000	Country
% of land in tropics	0.370	0.454	0.000	1.000	Country

TABLE A3: POLICE, GINI, AND GNI PER CAPITA DATA AND SURVEY YEAR

<b>Country Survey Year</b>	<b>Police per 100,000 persons lagged Year</b>	<b>GINI</b>	<b>GNI per Capita</b>
Argentina 2009	2008	2009	2009
Azerbaijan 2008	2006	2008	2008
Belarus 2007	2004	2007	2004
Bosnia and Herzegovina 2008	2007	2007	2007
Costa Rica 2009	2006	2009	2009
Czech Republic 2008	2007	1996	2008
Ecuador 2009	2006	2009	2009
El Salvador 2009	2006	2007	2009
Estonia 2008	2007	2004	2008
Fyr Macedonia 2008	2006	2008	2005
Hungary 2008	2007	2007	2008
Kazakhstan 2008	2007	2007	2008
Latvia 2008	2007	2008	2008
Lithuania 2008	2007	2008	2008
Moldova 2008	2007	2008	2008
Mongolia 2008	2004	2008	2000
Nepal 2008	2006	2004	2000
Nicaragua 2009	2006	2005	2009
Paraguay 2009	2006	2008	2009
Peru 2009	2004	2009	2009
Philippines 2008	2007	2006	2008
Poland 2008	2007	2008	2008
Romania 2008	2007	2008	2008
Slovak Republic 2008	2007	1996	2008
Slovenia 2008	2007	2004	2008
Turkey 2007	2006	2008	2007
Ukraine 2007	2006	2008	2007

TABLE A4: CRIME AND GROWTH - COUNTRY AVERAGES

Country	% of Losses Due to Crime Over Sales	Real GDP per Capita Growth
Argentina	0.63	-0.13
Azerbaijan	0.20	9.54
Belarus	0.72	10.19
Bosnia and Herzegovina	0.44	5.57
Costa Rica	0.54	-2.79
Czech Republic	0.48	1.58
Ecuador	1.11	-0.70
El Salvador	1.73	-4.00
Estonia	1.69	-4.99
Fyr Macedonia	0.50	4.76
Hungary	0.25	1.00
Kazakhstan	0.60	2.05
Latvia	0.42	-3.82
Lithuania	0.43	3.46
Moldova	0.54	7.97
Mongolia	0.52	7.67
Nepal	0.87	4.18
Nicaragua	1.68	-2.76
Paraguay	1.54	-5.53
Peru	0.64	-0.27
Philippines	1.32	2.27
Poland	0.45	5.11
Romania	0.36	9.59
Slovak Republic	0.64	5.99
Slovenia	0.26	3.33
Turkey	0.38	3.36
Ukraine	0.45	8.55

TABLE A5: ROBUSTNESS – ADDED CONTROLS

	Coefficient of Real GDP per Capita Growth	Adjusted R Squared
BASE	-0.0808*** [0.0208]	0.01
<u>Fractionalization</u> Ethnic, Language, Religion	-0.0616** [0.0222]	0.01
<u>Employees and Security</u> Total Employees, Security Costs as a % of sales	-0.0803*** [0.0211]	0.01
<u>Corruption and Democracy</u> Corruption (Transparency International), Polity 2 Score	-0.0844*** [0.0205]	0.01
<u>Population and Demographics</u> Proportion of Female Population, Population Density, Proportion of Population between 15 and 64	-0.0578** [0.0238]	0.01
<u>Human Capital</u> Life Expectancy, Years of Schooling	-0.0881*** [0.0285]	0.01
<u>Government Spending and Inflation</u> Government Spending on Public Order & Safety, Inflation	-0.0586* [0.0321]	0.01
<u>Judges and Prison Capacity</u> Judges per 1000 of Population, Adult Prison Capacity	-0.0743*** [0.0243]	0.01
<u>Trade</u> Trade as a % of GDP	-0.0741*** [0.0204]	0.01

TABLE A6: ROBUSTNESS – EXTREME OBSERVATION DOMINANCE

	Coefficient of Real GDP per Capita Growth
<u>Dropping Extreme Crime Loss Observations</u>	
Bottom 1%	-0.081*** [0.021]
Top 1%	-0.111*** [0.026]
Top and Bottom 1%	-0.112*** [0.027]
<u>Dropping Extreme Real GDP per Capita Growth Observations</u>	
Bottom 1%	-0.078*** [0.021]
Top 1%	-0.084*** [0.025]
Top and Bottom 1%	-0.082*** [0.025]

FIGURE A1: COUNTRY DOMINANCE

