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Financial Frictions and the Rule of Law

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Abstract

Using cross-country micro establishment-level data we document that crime and lack of access to finance are two major obstacles to business operation in poor and developing countries. Using an otherwise standard model of production heterogeneity that integrates institutional differences in the degree of financial development and the rule of law, we quantify the effects of these institutions on aggregate outcomes and economic development. The model accounts for the patterns across establishments in access to finance and crime as obstacles to their operation. Weaker financial development and rule of law have substantial negative effects on aggregate output, reducing output per capita by more than 50 percent. Weak rule of law institutions substantially amplify the negative impact of financial frictions. While financial markets are crucial for development, an essential precondition to reap the gains from financial liberalization is that property rights are secure.

JEL: 01, 04.
Key Words: misallocation, establishments, financial frictions, rule of law, crime, micro data.

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1 Introduction

Understanding the causes of cross-country income differences is a fundamental question in the macro-development literature. Recent work has emphasized that the allocation of resources across heterogeneous establishments is important for understanding cross-country productivity differences (Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009; Bartelsman et al., 2013). What are the frictions, policies, and institutions that create factor misallocation and hence reduce aggregate productivity in poor countries? In this paper, we focus on two institutions that are empirically relevant for business operation in poor countries: financial market development affecting access to credit and the rule of law affecting the potential for crime. These institutions create idiosyncratic effects across establishments since heterogeneous producers are affected differently by them. We evaluate the quantitative relevance of institutional differences in financial development and the rule of law in accounting for resource misallocation and aggregate income differences across countries.

Our focus on the rule of law and financial development as key institutional features is motivated by their importance for development as highlighted across separate strands in the literature, (e.g. King and Levine, 1993; Rajan and Zingales, 1998; Shleifer and Vishny, 1998; Svensson, 1998). The rule of law and financial development are closely linked to crime and access to credit, two highly relevant distortions in developing countries. While the importance of access to finance is well documented in the literature, less known is the prevalence of establishment-level crime across countries. We document that crime is a prevalent and severe obstacle to business operation in developing countries, at least as prevalent as the lack of access to finance across a host of countries in several sub-continents. For instance, using the World Bank Enterprise Surveys (WBES), we find that in South America 40 percent of establishments report crime as a major obstacle to business operation, whereas 24 percent of establishments report access to finance as a major obstacle. The corresponding percent of establishments in Africa reporting crime and finance as major obstacles to business operation are 27 and 42 percent. To provide context, in a developed country such as Germany, less

than 5 percent of establishments report crime as a major obstacle to business operation and 15 percent report access to finance as a major obstacle.

To study the quantitative importance of institutional differences in the rule of law and financial development, we consider a unified framework whereby differences in the rule of law affect the potential for crime at the establishment level and differences in financial market development restricts establishment access to credit. The model is a variant of Lucas (1978) span-of-control framework. Individuals differ along entrepreneurial ability and asset holdings, and choose either to operate an establishment as an entrepreneur or supply labor as a worker. Two market imperfections are central to our analysis. First, economies differ along financial market development, which is modelled as an endogenous collateral constraint that restricts access to finance and is proportional to entrepreneur asset holdings. Entrepreneurs in less developed financial markets face a more stringent collateral constraint (financial frictions). Second, economies differ in the strength of the rule of law which affects the potential for crime. We model crime as the proportion of capital that is expropriated from an entrepreneur post-production, an outcome determined within the model. The potential for crime is inversely related to the rule of law and how much protection an entrepreneur is able to purchase. Differences in the rule of law and financial market development affect occupational choices and the scale operation of entrepreneurs, generating effects on aggregate productivity and output. Moreover, as we elaborate below, these institutions have the potential to amplify the effects arising from crime or access to finance individually. Our goal is to quantify these effects and assess their implications for cross country income differences.

We discipline the quantitative analysis using data from the WBES 2010 which contains establishment-level data related to crime and external finance. The dataset contains detailed information related to robbery, theft, arson and vandalism on the establishment's premises, which we interpret as crime. For financial market development we use data on whether an establishment is able to obtain a loan and whether it is financed through internal or external sources. Key parameters in the model are calibrated to match relevant micro and macro mo-

ments on crime and access to finance in Colombia. In particular, we pin down the parameter that governs the rule of law in Colombia by targeting the proportion of establishments that report incidences related to crime in a given year, and pin down the level of financial market development by targeting the share of capital financed through external sources. Each of these targets are based on an aggregation of establishment-level observations. We choose Colombia for the calibration because crime and access finance are equally important obstacles to business operation in this country.

Our main findings are as follows. The long-run effects of crime and access to finance are quantitatively important. Differences in institutional development between Colombia and the undistorted benchmark economy lowers output by close to 30 percent in Colombia, TFP by close to 20 percent and consumption falls by over 30 percent. In the economy that has the weakest level of institutional development, as implied by the data, output falls by over 50 percent relative to the benchmark economy and consumption is close to 60 percent lower. Since institutional development is uniquely identified through separate parameters in the model we can assess the relative importance of crime and financial frictions in generating these effects. Crime lowers output by 3 percent in Colombia relative to the benchmark economy—a 15-fold effect on output since crime accounts for 0.2 percent of output in the model—and financial frictions lower output by 20 percent. Their joint effects exceed the sum of their individual effects implying substantial amplification on output. Crime and finance account for about 10 and 70 percent of total output losses while the remaining 20 percent is from their joint interaction. Moreover, we find that including crime into a standard model of financial frictions is quantitatively important; for instance, including crime generates a more than 2-fold increase in output losses in the economy with the weakest level of institutional development.

The intuition for the amplification effect is straightforward. In models that feature financial frictions, constrained entrepreneurs can overcome their financing constraint by reinvesting profits in their business and gradually expanding, the motive to self-finance (Buera and Shin,

2011; Midrigan and Xu, 2014; Moll, 2014). Crime hinders this process. As entrepreneurs invest and expand, they become a bigger target for crime. Constrained entrepreneurs face a trade-off: gradual expansion is a necessary condition to alleviate financing constraints but doing so exposes them to crime. Resources are lost due to crime and/or spent on protection which slows re-investment and the process of overcoming the financing constraint. Financial frictions, in turn, increase the potential for crime. This is because financing constraints lower entrepreneur profit which reduces how much is spent on protection, thus raising the potential for crime. Taken together, financial frictions increase the likelihood of crime, and crime impedes the motive to self-finance, both of which amplify output losses.

Our results broadly contribute to the long-standing questions in the macro-development literature related to institutions and their relevance for development. One strand in the literature stresses the importance of a strong rule of law for development through its effects on entrepreneurial investment and expansion (Besley, 1995; Shleifer, 1997; Shleifer and Vishny, 1998; Svensson, 1998; Acemoglu et al., 2001) while a separate strand emphasizes that financial market development is critical for the efficient allocation of capital (King and Levine, 1993; Levine, 1997; Rajan and Zingales, 1998; Levine et al., 2000). Our framework, which incorporates these measures of institutional development is able to assess the importance of each of these factors. Specifically, we use our framework to ask whether improving financial market development (i.e. access to finance) or the rule of law (i.e. lowering crime) has a bigger effect on economic development (as measured by aggregate output), and if the optimal policy depends on the level of institutional development. We find that when the rule of law is weak improving it is more important for development, irrespective of the level of financial market development. However, when the rule of law is above a certain threshold, improving financial markets become more important for development.[1] Hence, while financial markets are crucial for development, a necessary condition is that property rights secure (McMillan, 1997; Johnson et al., 2002). Moreover, we use our framework to inform which countries are

[1]Clearly, these considerations must also take into account the cost and implementation of such policies which we abstract from in this paper.

associated with a weak rule of law and financial markets by mapping relevant moments in the model to the data on crime and access to finance. Based on our simulations, improving the rule of law is more important for development in more than a quarter of our sample of countries, notably Botswana, Cameroon, Chile and Ecuador, while for the majority of countries improving financial markets are more important.

Our paper relates to the broad misallocation literature but more closely to the misallocation literature emphasizing either financial frictions or crime. The macro literature emphasizing financial frictions include Jeong and Townsend (2007), Amaral and Quintin (2010), Buera et al. (2011), Buera and Shin (2013), Caselli and Gennaioli (2013), Greenwood et al. (2013), Midrigan and Xu (2014), Moll (2014), among many others. Fewer studies examine the macro effects of crime. Ranasinghe (2015) studies the effects of extortion in Eastern Europe and Oguzoglu and Ranasinghe (2015) estimate the effects of crime on establishment size in South America. Our framework integrates these two relevant institutions studying their interaction and potential to account for the substantial differences in output per capita across countries.

The remainder of the paper is organized as follows. Section 2 provides micro-level evidence relating to the prevalence of crime and access to finance across countries. In Section 3 we present the model which combines the effects of crime and financial frictions. Section 4 describes the calibration of the model and the cross-country calibration of the rule of law and financial friction institutions. In Section 5, we report our quantitive results. Section 6 concludes.

2 Facts

We use micro data from the World Bank Enterprise Surveys (WBES) to document the prevalence of crime and lack of access to finance among establishments across countries at different levels of development.[2] While the importance of access to finance is well documented

[2]Data is from the most recent survey in a country.

in the literature, less known are the key patterns related to crime across countries.

The micro data contains information related to obstacles to doing business at the establishment level. There are several questions in the survey devoted to understanding crime. In particular, establishments report whether they experienced arson, robbery, theft or vandalism on their premises in the past year—which we interpret as crime against the establishment—and the value of losses from crime as a share of sales. Hence, we know from the survey the frequency of crime and its severity as measured by monetary losses. Establishments also report whether crime is a severe, major, moderate, minor or non-obstacle to business operation. The WBES also contains information on whether an establishment paid for private security and the amount paid for these services as a share of sales. Also included in the survey are questions related to financing, specifically the proportion of working capital that is financed through external sources. Relevant to our analysis is an establishment's potential access to finance from financial intermediaries. We use the proportion of working capital financed through external sources—banks or non-bank financial institutions—as a proxy for financial market development and access to finance. Establishments also report whether access to finance is a severe, major, moderate, minor or non-obstacle to business operation.[3]

Table 1 reports the percentage of establishments that state a given distortion is a severe or major obstacle to business operation across sub-continents in the world. While our focus is on crime and access to finance, for comparison we also report two distortions that are generally viewed as important obstacles for business operation in poor countries: practises of the informal sector and tax administration.[4] There are two main points that Table 1 highlights. First, access to finance is a major constraint to business operation in many parts of the world, notably in Africa where over 40 percent of establishments report finance as a major obstacle. Second, crime is also a major obstacle to business operation, and a more

[3]See Hallward-Driemeier and Pritchett (2015) for a broader discussion of the relevance of establishment-level data to measure costs associated with doing business in a country. Compared to legal institutional measures in the World Bank's Doing Business, measures from establishment-level data paint a more accurate picture of actual costs of operating in a country.

[4]Corruption is often listed as the biggest obstacle to business operation in poor countries. Crime and the lack of access to finance are symptomatic and reflective of issues underlying corruption.

pressing issue in several continents than the other distortions listed in the table. For instance, in South America and the Caribbean over 40 and 30 percent of establishments report that crime is a major obstacle to business operation.

Table 1: Obstacles to doing business across sub-continents

	Access to Finance	Crime	Informal Sector	Tax Administration
Africa	42.3	26.9	37.7	26.2
Asia	16.5	16.8	16.3	12.2
Caribbean	33.8	31.6	27.3	22.0
Eastern Europe	16.8	9.1	19.5	15.2
Europe	13.2	7.5	-	18.4
Middle East	34.7	17.6	32.2	22.3
South America	24.3	40.2	36.1	23.7
South Asia	11.6	19.4	22.9	10.2

Notes: Percentage of establishments that report that a given obstacle (access to finance, crime, informal sector, tax administration) is a severe or major obstacle to business operation. Possible responses include severe, major, moderate, minor or non-obstacle to operation.

Next, we examine how measures related to access to finance and crime vary across countries. These measures are shown in Figure 1. Panel A documents average losses from crime, as a percentage of sales, plotted against log GDP per capita (PPP prices, 2011). There is a negative correlation between these variables (-0.42) implying that countries with higher GDP per capita have fewer losses from crime. Average losses from crime as a share of sales exceed 3 percent in several countries, notably those in Africa. While we have focused on average losses from crime, other measures related to crime share a similar pattern with GDP per capita. In particular, countries that have high average losses from crime also have a high frequency of crime. For instance, in Brazil, Chad, Malawi, Mexico and Venezuela over 35 percent of establishments report at least one incident related to crime in a given year. Figure 1, Panel B, documents the proportion of investment financed through external sources (banks and non-bank financial institutions), which is a proxy for access to finance, plotted against log GDP per capita (PPP prices, 2011) across countries. There is a positive corre-

lation between these variables (0.36) implying that countries with higher GDP per capita feature a larger share of investment financed through financial institutions. This pattern holds for other measures related to access to finance as well; percentage of establishments that use banks to finance investment, proportion of investment and working capital financed by banks, among others.

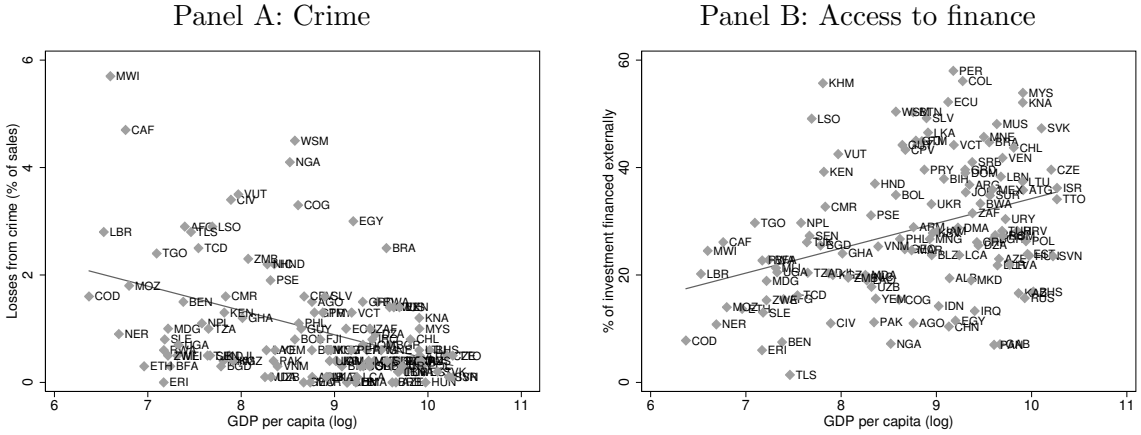

Figure 1: Crime and access to finance across development

To further assess the effects of crime and access to finance across countries, Figure 2 plots the relationship between the percentage of establishments that report crime as a major or severe obstacle to business operation and the percentage of establishments that report access to finance as a major or severe obstacle. The correlation between these measures of crime and access to finance is 0.46 implying that in countries where access to finance is particularly acute, so is crime. Notably, for several countries in Africa a substantial proportion of establishments report that both access to finance and crime are major obstacles to business operation. Given the importance and correlation of these variables, evaluating the joint interaction of these institutions may provide key insights in accounting for differences in income per capita across countries.

So far, we have documented that lack of access to finance and crime are particularly severe in poor countries. A key feature in models of production heterogeneity is whether institutions such as financial development and the rule of law at the country level translate into effects

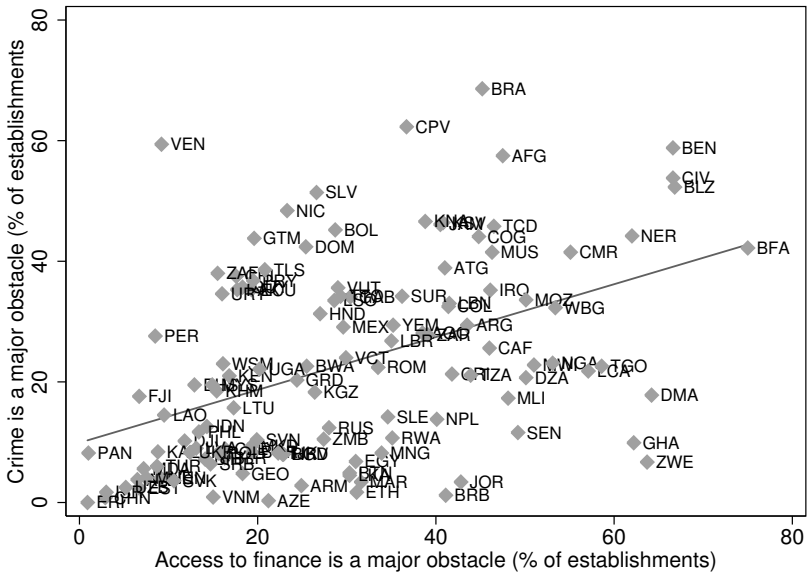

Figure 2: Crime and access to finance

that are idiosyncratic across establishments (i.e. affect establishments differently). We now evaluate how access to finance and crime vary across the size distribution of establishments. To this end, we regress measures related to access to finance and crime on establishment size, controlling for industry, country and continent-level fixed effects. These regressions are meant to provide a general pattern if any and do not have a causal interpretation. To get at the cross-establishment patterns, we restrict our sample to countries in Africa and South America where access to finance and crime are most severe. Table 2 presents results for four dependent variables: (1) is access to finance a major/severe obstacle to doing business (yes/no), (2) proportion of working capital financed by banks ($0-4$ scale), (3) is crime a major/severe obstacle to doing business (yes/no), and (4) whether an establishment has faced crime in the past year (yes/no). The independent variable is establishment size, a categorical variable based on the number of employees.

We report the results in Table 2. There are two main facts that emerge. First, access to finance is most difficult among small establishments and this effect dissipates with establishment size. This conclusion arises from the negative coefficient in column (1), implying that as establishment size rises access to finance is less of an obstacle to business operation—a

Table 2: Access to finance and crime across establishment size

	(1) Finance obstacle major/severe (yes/no)	(2) Borrow from banks (% working capital) (0 − 4)	(3) Crime obstacle major/severe (yes/no)	(4) Faced crime last year (yes/no)
Establishment size	−0.241***	0.274***	−0.127***	−0.248***
	(0.0224)	(0.0131)	(0.0215)	(0.0148)
Observations	17788	18042	17943	17949
Industry-level controls	Y	Y	Y	Y
Country-level controls	Y	Y	Y	Y
Continent-level controls	Y	Y	Y	Y

Notes: Each column reports point estimates from a separate ordered Logit regression. In columns (1) and (3) the dependent variables are whether access to finance and crime are a severe or major obstacle to business operation (yes/no). In column (2) the dependent variable is the percentage of working capital borrowed from banks (0 − 4 scale), and in column (4) the dependent variable is whether the establishment has faced crime in the last year (yes/no). Size is an independent categorical variable based on number of employees: less than 10, 10 − 49, 50 − 99, 100 − 249 and greater than 249. The categories for percentage of working capital borrowed from banks are 0%, 1 − 25%, 26 − 50%, 51 − 75% and > 75%. *** denotes significance at the 1 percent level.

one unit increase in size lowers the likelihood of reporting finance is a major/severe obstacle by over 20 percent.[5] Also, the positive coefficient in column (2) means that the proportion of working capital financed by banks rises with size, implying that larger establishments are better able to access credit, at least relative to smaller ones. This does not imply, however, that capital is efficiently allocated across establishments since the link between establishment size and productivity is tenuous in poor countries (Restuccia and Rogerson, 2008; Bartelsman et al., 2013). Second, the severity of crime is also negatively related with establishment size. The regression estimate in column (3) is negative implying that as size rises crime is less of an obstacle to business operation—a one unit increase in size lowers the likelihood of reporting crime is a major/severe obstacle by 12 percent. Similarly, the coefficient in column (4) is negative and implies that a one unit increase in size lowers the likelihood of facing crime by over 20 percent.[6]

[5]The standard coefficients from the ordered Logit are reported in Table 2 because its sign points to the direction of the relationship between the dependent and independent variables. Raising the coefficient to the exponential function (i.e. e^{β_i}) provides the odds-ratio.

[6]The results emphasized in Table 2 are robust to alternative establishment-size specifications and to different measures related to crime and access to finance.

3 Model

Our aim is to evaluate the joint effects of crime and financial frictions on establishment behaviour and to understand their implications for economic development. To this end, we consider an otherwise standard span-of-control framework of establishment size as in Lucas (1978) extended to allow for institutional differences in financial market development and the rule of law. In the model, individuals differ in entrepreneurial ability and asset holdings and choose between operating an establishment as an entrepreneur or being a worker. We follow a large literature by considering financial market development as a collateral constraint, which restricts that entrepreneur borrowing is proportional to wealth. The rule of law influences the potential for crime which affects the returns to entrepreneurship. Hence, in our framework production and occupation choices are affected by access to finance and the potential for crime.

3.1 Environment

The economy is populated by a measure one of infinitely-lived individuals who differ in entrepreneurial ability $s \in S$ and asset holdings $a \in A \equiv [0, \infty)$. Ability evolves over time according to an exogenous Markov process $M(s, s')$. The cumulative distribution over assets and ability is denoted by $G(a, s)$. There is no market for consumption insurance which implies that individual asset holdings are the only mechanism for self-insurance against ability shocks. Preferences are over streams of consumption, $\sum_{t=0}^{\infty} \beta^t u(c_t)$, is time separable and $\beta \in (0, 1)$ represents the time discount factor.

Individuals are endowed with one unit of productive time each period, which is supplied inelastically, and choose between operating an individual specific production technology (entrepreneurship) or working for a wage (worker). Each occupation requires one unit of labor so that individuals select into one occupation every period. The production technology is standard, $f(s, k, n)$, which combines the inputs of capital k, labor from workers n, and en-

trepreneur ability s to produce output. We assume $f(s,k,n)$ is increasing in all inputs and features decreasing returns to scale in k and n.

The economy features two distinct distortions. The first is related to financial frictions arising from underdeveloped financial markets which restricts how much capital entrepreneurs can be borrow. The second is related to crime on entrepreneur capital arising from imperfections in the rule of law. We describe these in turn.

3.2 Financial Frictions

We follow Buera et al. (2011), Midrigan and Xu (2014), and Moll (2014) among others in modelling financial market development. In particular, financial market imperfections—due to limited enforcement or monitoring technology—imply that entrepreneurs face a collateral constraint for borrowing capital given by $(1-\phi)k \leq a$, where $\phi \in [0,1]$ represents the fraction of capital that can be recouped by financial intermediaries if an entrepreneur defaults. In this setup, ϕ serves as a measure of financial market development with higher values representing more developed financial markets (a higher fraction of capital can be recouped). This formulation has the intuitive appeal that the amount of capital borrowed depends on entrepreneur assets a, and is proportional to financial market development ϕ.[7] When $\phi = 1$ financial markets are fully developed and the collateral constraint is non-binding. Conversely, when $\phi = 0$ financial markets are non-existent, there is no potential to borrow and capital is restricted to equal entrepreneur asset holdings. Thus, values of $\phi \in [0,1]$ capture differences in the potential to borrow across economies and holding ϕ constant, a captures differences in the potential to borrow *within* economies.

We note that the collateral constraint is the only friction in the financial market. In particular, we abstract from issues related to irreversibility and adjustment costs on entrepreneur capital. Also, the collateral constraint we examine is static and on a per-period basis. While

[7] The collateral constraint can be re-written as $k \leq \tilde{\lambda} a$, where $\tilde{\lambda} \equiv \frac{1}{1-\phi}$, as is more standard. We use ϕ for consistency with our modelling of the rule of law and for easier comparison across measures of institutional development.

in reality financial contracts are dynamic, a static one-period contract is sufficient to capture the key features in our analysis—entrepreneur borrowing depends on individual asset holdings and the level of financial market development in a country.

3.3 Rule of law

The second source of friction arises from the potential for crime against entrepreneurs, which we model following Ranasinghe (2015). The probability of facing crime depends on two factors: the rule of law and spending on protection. We think of the rule of law as the probability with which the state can prevent criminal activity $\lambda \in [0,1]$, with higher values representing a stronger rule of law and a lower potential that entrepreneurs face crime. Entrepreneurs can also reduce the potential of facing crime by spending on private protection $p \geq 0$, which supplements the existing rule of law.[8] Taken together, the probability an entrepreneur faces crime is $1-F(\lambda,p)$, where $F(\lambda,p)=\lambda(1+p^{\theta}) \in [0,1]$, $\theta > 0$, is increasing in both arguments.[9]

In this setup, λ has a similar interpretation for institutional development as ϕ. When $\lambda = 1$ there is no opportunity for crime and when $\lambda = 0$ the rule of law is non-existent and criminal activity occurs un-impeded (given the functional form for $F(\cdot)$ we assume). Values of $\lambda \in [0,1]$ therefore capture institutional differences in the potential for crime across economies, and holding λ constant, p captures differences in the potential for crime *within* economies due to differences in protection spending.

We model crime as the fraction of entrepreneur capital expropriated by an exogenous stand-in mafia.[10] In particular, if an entrepreneur does not face crime, which occurs with

[8] Protection is bought post-production and does not require financing. This allows us to isolate the effects of financial frictions on capital demand and avoid unnecessary complexity.

[9] It follows that $p \in [0,\bar{p}]$ where $\bar{p} = \left(\frac{1-\lambda}{\lambda}\right)^{\frac{1}{\theta}}$, which ensures that $F(\lambda,p) \leq 1$. The functional-form for $F(\lambda,p)$ we assume implies that private protection and the rule of law are complimentary, lowers the probability of crime and entrepreneurs face crime at most with probability of $1-\lambda$.

[10] We could instead impose that crime is related to output with little consequence to our central results. Since access to finance is related to capital, for consistency crime is also modelled as dependant on entrepreneur capital.

probability $F(\lambda, p)$, profit from production is

$$\pi(a, s, k, n) = f(s, k, n) - wn - (1 + r)k + (1 - \delta)k,$$

and if they face crime, which occurs with probability $1 - F(\lambda, p)$, profit from production is

$$\pi_c(a, s, k, n) = f(s, k, n) - wn - (1 + r)k + (1 - \delta - e)k,$$

where w is the wage paid to workers, r is the real interest rate, $\delta \in (0, 1)$ is the depreciation rate (hence, $r + \delta$ is the rental rate of capital), and $e \in (0, 1)$ is the fraction of capital lost due to crime. In each of these scenarios, entrepreneur choice of capital is constrained by the collateral constraint, $(1 - \phi)k \leq a$.

The timing is as follows. Entrepreneurs first make decisions related to production. Then the mafia group chooses the fraction of capital to expropriate taking into consideration entrepreneur capital and protection. In what follows, entrepreneur decisions on capital, labor and protection are made in anticipation of the mafia's best-response to these choices.

Note that we focus on crime faced by entrepreneurs, abstracting from crime on individual asset holdings. This is because we focus on the distortionary effects of the rule of law institution on establishment decisions and hence the data we use on crime is at the establishment-level. Furthermore, individuals in the model that have the most assets tend to be entrepreneurs, and hence, asset accumulation and capital are closely linked.

3.4 Decisions

Entrepreneur decisions are the purchase of protection—which reduces the potential of crime—and capital and labor inputs in production. Since entrepreneurs face crime with probability $F(\lambda, p)$, capital, labor, and protection are chosen to maximize expected profit. Specifically,

the problem of an entrepreneur is

$$\widetilde{\pi}(a,s) = \max_{k\geq 0,\ n\geq 0,\ p\in[0,\overline{p}]} \left\{ F(\lambda,p)\pi(a,s,k,n) + [1-F(\lambda,p)]\,\pi_c(a,s,k,n) - \frac{bp^{\psi}}{\psi} \right\},$$

which using the definitions of profit above simplifies to,

$$\widetilde{\pi}(a,s) = \max_{k\geq 0,\ n\geq 0,\ p\in[0,\overline{p}]} \left\{ \pi(a,s,k,n) - [1-F(\lambda,p)]ek - \frac{bp^{\psi}}{\psi} \right\}, \tag{1}$$

subject to the collateral constraint $(1-\phi)k \leq a$. Equation (1) states that with probability $F(\cdot)$, an entrepreneur does not experience crime and earns profit $\pi(a,s,k,n)$, and with probability $1-F(\cdot)$ faces crime and earns profit $\pi_c(a,s,k,n)$. This expression simplifies to imply an entrepreneur earns his full profit from production less the fraction of capital lost due to crime, ek, which occurs with probability $1-F(\cdot)$. The cost of buying protection is $\frac{bp^{\psi}}{\psi}$. Expected profit from entrepreneurship for an individual of type (a,s) is $\widetilde{\pi}(a,s)$.

The mafia group optimizes by choosing how much capital to expropriate from each entrepreneur of type (a,s), which determines the fraction of capital lost due to crime, $e \in (0,1)$,

$$\Pi_M(a,s) = \max_{e\in[0,1]} \left\{ [1-F(\lambda,p)]ek - \frac{he^{\rho}}{\rho} \right\}. \tag{2}$$

The mafia is successful in expropriating entrepreneur capital with probability $1-F(\lambda,p)$ earning ek and with probability $F(\lambda,p)$ is unsuccessful earning zero. We assume the mafia incurs a cost for engaging in crime due to monitoring, collection and 'flying under the radar' given by $\frac{he^{\rho}}{\rho}$, where $h>0$ is a scale parameter and ρ is the elasticity term.[11]

[11]The cost functions for protection and crime do not depend on entrepreneur capital. Nevertheless in equilibrium, spending on protection is increasing with establishment capital, consistent with micro-level evidence. For crime, it is likely that expropriating from high capital establishments is more costly for the mafia. This feature is captured in our framework since protection expenditure rises with establishment capital, making it more costly to expropriate from high capital establishments due to a lower probability of success $F(\cdot)$.

The individual problem of asset accumulation and occupational choice can be written recursively using the Bellman equation as

$$v(a,s) = \max_{c,a' \geq 0} \left\{ u(c) + \beta \mathbb{E} v(a',s') \right\}, \tag{3}$$

$$s.t.\ c + a' \leq \max\{w, \widetilde{\pi}(a,s)\} + (1+r)a,$$

where the expectation operator is over next period ability s' governed by the Markov process $M(s,s')$. Individuals make a consumption-savings inter-temporal choice and an occupational choice based on $\max\{w, \widetilde{\pi}(a,s)\}$. Since there is no capital irreversibility or adjustment costs, the occupational choice is static which we denote by $o(a,s) \in \{E, W\}$ for an entrepreneur or worker.

3.5 Stationary Competitive Equilibrium

A stationary competitive equilibrium consists of an invariant distribution over assets and ability $G(a,s)$, policy functions for individuals $\{c(a,s), a'(a,s), o(a,s)\}$, policy functions for entrepreneurs $\{k(a,s), n(a,s), p(a,s)\}$, profits $\widetilde{\pi}(a,s)$, policy function for the mafia $e(a,s)$, and prices $\{w, r\}$, such that:

(*i*) Given prices, $k(a,s)$, $n(a,s)$ and $p(a,s)$ solve the entrepreneurs problem in (1), determining $\widetilde{\pi}(a,s)$.

(*ii*) $e(a,s)$ solves the mafia problem in (2).

(*iii*) Given prices and profits, $c(a,s)$, $a'(a,s)$ and $o(a,s)$ solves the individual's problem described in (3).

(*iv*) Markets clear:

$$\int_{o(a,s)=E} n(a,s) G(da,ds) = \int_{o(a,s)=W} G(da,ds),$$

$$K \equiv \int_{o(a,s)=E} k(a,s) G(da,ds) = \int aG(da,ds),$$

$$\int c(a,s)G(da,ds) + \delta K + P + E = \int_{o(a,s)=E} f(s,k,n)G(da,ds),$$

where $P = \int_{o(a,s)=E} \frac{bp(a,s)^{\psi}}{\psi} G(da,ds)$ is aggregate spending on protection and $E = \int_{o(a,s)=E} [1 - F(\lambda, p(a,s))]\, e(a,s)k(a,s)G(da,ds)$ is aggregate losses from crime.

(v) G is an invariant distribution

$$G(a,s) = \int_{\tilde{s}\leq s} \int_{a'(\hat{a},\hat{s})\leq a} M(\hat{s}, d\tilde{s})G(d\hat{a}, d\hat{s}).$$

3.6 Discussion

Prior to evaluating the quantitative implications of crime and financial frictions we discuss some key insights from the model. When $\phi = \lambda = 1$, the economy is undistorted, achieving the first-best allocations. In this economy, ability is the sole criterion for selection into entrepreneurship and production. With lower values for ϕ and λ, the collateral constraint tightens and the potential for crime increases, distorting selection and production decisions. When $\phi < 1$ establishment size depends on both ability and asset holdings implying that low asset entrepreneurs operate below the optimal capacity, $k(a,s) \leq k(s)$. Likewise, when $\lambda < 1$ capital is chosen to maximize expected profit, instead of first-best profit, which distorts the optimal choice of capital—entrepreneurs who are most vulnerable to crime choose capital below the optimal scale. Taken together, access to finance restricts how much capital can be borrowed and crime affects how much capital an entrepreneur wants to borrow. These distortions affect expected profit from production and have the potential to alter occupation choice.

In our framework each distortion can be analyzed jointly or in isolation, which enables us to understand how these distortions interact and amplify aggregate output losses. While we evaluate the effects of these institutions numerically, it is convenient to consider special cases of the model to highlight the underlying mechanisms at work. Consider the case when crime is the only distortion in the economy ($\phi = 1$ and $\lambda < 1$). When $\rho = \psi = 2$ and $\theta = 1$,

a closed-form solution for crime and protection exists and depends solely on entrepreneur ability. This is depicted in Figure 3 for select values of λ. Protection expenditure is increasing in ability and crime—the expropriation of capital—is hump-shaped in entrepreneur ability. This is because high ability entrepreneurs purchase sufficient protection which lowers the probability they face crime and low ability entrepreneurs are not a lucrative target for the mafia group because they use little capital in production, and crime is costly. Moderate ability entrepreneurs face the most crime because they are not sufficiently profitable to incur adequate protection expenditure. As the rule of law weakens the potential for crime rises and the fraction of capital expropriated expands outward.

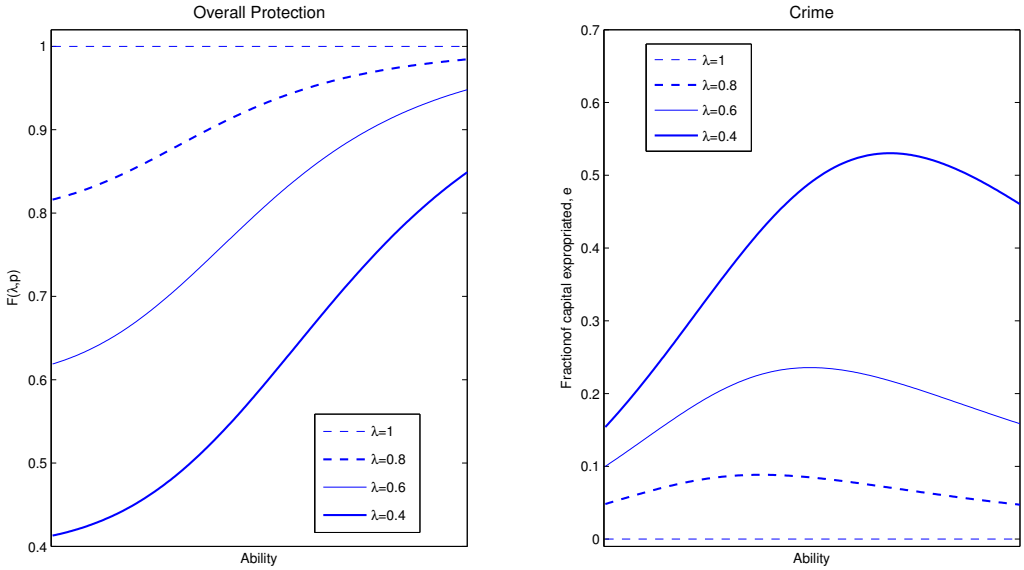

Figure 3: Crime across entrepreneur ability ($\phi = 1$)

When financial frictions are introduced into the economy ($\phi < 1$ and $\lambda < 1$) the potential for crime rises, especially among high ability entrepreneurs. To appreciate this point, note that high ability entrepreneurs mitigate the effects of crime by spending on protection. However, when they face financial frictions they choose capital based on their collateral constraint, which lowers profit and thus spending on protection, raising the potential for crime. As such, a higher proportion of entrepreneurs become more vulnerable to crime when

financial frictions are present.

Crime amplifies the effects from financial frictions as well. To illustrate this, consider the case when only financial frictions are present ($\phi < 1$, $\lambda = 1$). As highlighted in Buera and Shin (2011), Midrigan and Xu (2014) and Moll (2014), constrained entrepreneurs can gradually overcome their collateral constraint through self-financing. By re-investing profit entrepreneurs loosen their collateral constraint which enables them to operate on a larger scale in subsequent periods. When $\lambda < 1$, however, the presence of crime can severely hinder this process. Since crime initially rises with capital, as capital rises with ability, an entrepreneur that has low assets faces increasing crime since they initially start with little capital in production. While re-investment and gradual expansion is necessary to overcome the collateral constraint, doing so also increases the potential for crime. As these entrepreneurs expand more resources are either spent on protection or lost to crime, which hinders the process of relaxing the collateral constraint. These effects are especially severe when the rule of law is weak (higher potential for crime) magnifying the implied output losses.

Crucial to the amplification effect just described is that the severity of crime initially rises with establishment size and then falls. In Section 2, we documented a general pattern whereby the severity of crime is negatively related to establishment size. We evaluate whether this pattern holds when the sample is restricted to small establishments. Table 3 reports estimates when the sample size is restricted to establishments that have fewer than 25 employees. The dependent variable in column (1) is whether crime is a major/severe obstacle to business operation and the coefficient on establishment size is not significant—when all establishments are included this coefficient is negative and significant. In column (2) we expand the definition of crime to a five-point scale (not an obstacle, minor, moderate, major or severe). The coefficient on establishment size in column (2) is positive, suggestive that the severity of crime rises with size among smaller establishments (see also the Appendix for further evidence and discussion). This finding is consistent with Oguzoglu and Ranasinghe (2015) who find that crime is most severe among medium size establishments and less so among small and

large establishments in South America. Hence, that the severity of crime initially rises with establishment size is reasonably supported by the evidence.[12] The dependent variable in column (3) is whether the establishment faced crime in the last year (yes/no). The coefficient in column (3) is negative which implies that as size rises the probability of facing crime falls, even among small establishments. This is consistent with our theory since protection expenditure rises with size, which lowers the likelihood of crime.

Table 3: Severity of crime among small establishments ($\leq$ 25 employees)

	(1) Crime obstacle yes/no	(2) Crime obstacle $0-4$	(3) Faced crime yes/no
Establishment size	-0.007	0.029^{**}	-0.066^{***}
	(0.0249)	(0.0146)	(0.0195)
Industry-level controls	Y	Y	Y
Country-level controls	Y	Y	Y
Continent-level controls	Y	Y	Y
Observations	10424	10424	10433

Notes: Each cell reports point estimates from a separate ordered Logit regression. Establishment size is a categorical variable based on number of employees: $0-5$, $6-10$, $11-15$, $16-20$ and $21-25$. ***, ** denote significance at the 1 and 5 percent level.

4 Calibration

To study the effects arising from financial frictions and crime, we take the stance that countries are identical in every respect except for the level of institutional development reflected in ϕ as a measure of financial market development and λ as a measure of rule of law. While countries clearly differ along many additional dimensions, our abstraction enables us to use

[12] We considered a variety of size thresholds for defining a small establishment. We generally found the coefficient in column (2) is positive but not always statistically significant. In South America the coefficient for crime as an obstacle to doing business is positive (close to 0.06) and significant for establishments that have fewer than 20 employees, and in Africa, the coefficients are positive (0.04) and significant for establishments that have fewer than 30 employees. The measures related to finance reported in Table 2 are consistent when the sample is restricted to smaller establishments.

our framework to evaluate the quantitative effects arising from these specific institutional differences.

Our calibration strategy is as follows. We calibrate the model in two steps. First, we consider an undistorted economy with prefect credit markets and no crime and calibrate this economy to data for the United States. This allows us to assign values to technology and preference parameters that are well established in the literature. Second, holding the calibrated parameters for preferences and technology constant, we consider an economy with financial frictions and crime and calibrate this economy to data for Colombia (WBES 2010).[13] This allows us to calibrate the remaining parameters on crime and access to finance to match related moments in the data for Colombia.[14]

4.1 Preferences and technologies

We assume per-period utility features constant relative risk aversion $u(c) = \frac{c^{1-\nu}}{1-\nu}$ and the future is discounted at a rate $\beta \in (0,1)$. The entrepreneurial production technology is $f(s,k,n) = s(k^{\alpha}n^{1-\alpha})^{1-v}$, where $1-v$ determines returns to scale at the establishment level and in a competitive economy also determines the share of income accruing to production inputs (k,n). Then α represents the share of production inputs' income accruing to capital and $1-\alpha$ to labor. Capital depreciates at the rate δ every period. We assume shocks to entrepreneurial ability follow a Markov process with persistence and variance parameters ρ_s and σ_s. As a result, there are 7 parameters to calibrate at this stage $\{\nu, \delta, \alpha, v, \rho_s, \sigma_s, \beta\}$. We consider an economy with $\phi = \lambda = 1$ and calibrate this economy to U.S. data, which allows us to pin down these seven parameters without having to take a stance on parameters related to crime. When $\phi = \lambda = 1$ the model reduces to a standard span-of-control framework where there are no financial frictions and no crime. We take this stance not because we think the U.S. is a crime-free economy but because data on establishment-level crime is mostly for

[13] The Appendix considers robustness checks whereby the model is calibrated to data for Brazil—where crime is more severe than in Colombia—and to Peru—where access to finance is more severe than in Colombia. Our main results are qualitatively similar across these alternative calibrations.

[14] Throughout, an entrepreneur represents an establishment unit in the data.

Table 4: Calibration of $\lambda = \phi = 1$ economy to U.S. data

Target Moments:	U.S. Data	Model	Parameter
Fraction of entrepreneurs (FOE)	0.075	0.075	$v = 0.25$
Interest rate	0.05	0.05	$\beta = 0.90$
Earnings share (top 5%)	0.30	0.28	$\sigma_s = 0.04$

developing economies which excludes the U.S.[15]

We set $\nu = 1.5$, $\alpha = 1/3$, $\delta = 0.08$ and $\rho_s = 0.95$ which are fairly standard in the literature. The remaining parameters, v, β and σ_s are calibrated to match three relevant moments in the U.S. data: (a) the fraction of entrepreneurs, which we target to 7.5 percent (Cagetti and DeNardi, 2006); (b) the real interest rate which we target to 5 percent; and (c) the income share going to the top five percent of earners, which is about 30 percent (The World Top Income Database). Table 4 reports the model fit for the economy with $\lambda = \phi = 1$ relative to the U.S. data and the last column documents the resulting parameter values.

4.2 Institutional development and protection technology

We now turn to the parameters related to institutional development and to establishment crime and protection. There are two parameters related to institutional development $\{\phi, \lambda\}$ and five parameters related to crime and protection $\{\rho, \psi, h, b, \theta\}$. We calibrate (ϕ, λ) to the level of institutional development in Colombia and select crime and protection parameters to match establishment-level observations related to the severity of crime and protection in Colombia. We choose Colombia for our calibration because crime and access to finance are equally severe obstacles to business operation. Our data from the WBES discussed in Section 2 indicates that in Colombia, 33 percent of establishments report crime as a major obstacle to business operation, whereas 41 percent of establishments report access to finance as a

[15]The data we use is from the WBES which focuses primarily on developing countries and a few developed countries in Europe. For the most developed countries in Europe, establishment level crime is very small as is the extent to which establishments face difficulties in obtaining external finance. These facts motivate our abstraction.

major obstacle.[16]

We calibrate the remaining 7 parameters jointly by solving the model. Each parameter has a first-order effect on some target so we discuss them in turn to motivate the relevance of each data target. We determine ϕ, the level of financial market development, by targeting the proportion of capital financed through external sources in Colombia, which is about 32 percent.[17] This target closely mimics the collateral constraint in the model where higher values of ϕ imply that a higher proportion of capital is financed through external sources. We determine λ, the rule of law, by targeting the percentage of establishments that report facing crime in Colombia, which is 24 percent. Recall that the probability an establishment faces crime is $1 - F(\lambda, p)$ where λ has a first-order effect on the probability of crime. Hence, the fraction of establishments that face crime is informative of λ.

Data on crime is used to determine the parameters for the cost function of crime, ρ and h. The parameter ρ is the elasticity term for engaging in crime with higher values implying that stealing a larger share of entrepreneur capital is increasingly costly. Hence, ρ is informative of the share of crime occurring across the establishment size distribution; we target the share of crime among the top decile of entrepreneurs (as measured by employees), which is about 29 percent. The parameter h is a scale which is useful to target aggregate losses from crime relative to output, which is 0.2 percent. We pin down parameters for the protection cost function, ψ and b, similar to the approach used for the crime cost function. The parameter ψ is the elasticity term where higher values imply that buying additional protection is increasingly costly and b is the scale parameter. Therefore, ψ is chosen to

[16]For other countries in South America the gap between the proportion of establishments that report crime and access to finance as major obstacles to operation is more spread. See the Appendix for alternative calibrations of the model to data for Brazil and Peru. Even though crime and the lack of access to finance is equally or more prevalent in Africa than in South America, we do not calibrate the model to countries in Africa because there are many missing observations related to capital at the establishment-level in these countries.

[17]The proportion of capital that is financed through external sources is calculated as the sum of establishment value of capital times the proportion of investment financed through external sources, divided by the sum of capital. This target is very close to the external finance to GDP ratio reported for Colombia by the World Bank (Beck et al., 2000)—the value is 0.57 in 2005 in the dataset and 0.62 in the calibrated model economy. Since targets for crime are from the WBES, we use this same source to target external finance so that our targets are from a common source.

target the share of protection spending among the top decile of establishments which is 22 percent in the data; and b is chosen to target aggregate spending on protection relative to output, which is 1 percent. Finally, the parameter θ affects the returns to protection spending and is chosen to target the cost of protection and crime (total cost associated with crime) relative to sales among the top 50 percent of establishments.[18]

Table 5 reports the target moments from data, the corresponding statistics in the model, and the resulting parameter values from the calibration. To target the share of capital financed through external sources the model implies $\phi = 0.37$, which means an entrepreneur can borrow close to 1.6 times their asset holdings.[19] The parameter for the rule of law is $\lambda = 0.5$. In the absence of protection the probability of facing crime is 50 percent $(1-\lambda)$, however, after accounting for protection expenditure, close to 23 percent of entrepreneurs actually face crime. It is important to note that this average masks considerable heterogeneity across establishment's ability and wealth: crime rates are hump-shaped in ability and decreasing in asset holdings. The elasticities for the cost function for crime and protection are greater than one, $\rho, \psi > 1$, implying that stealing a larger share of capital and buying additional protection is increasingly costly. The scale parameters on the cost functions are high, especially for crime, to ensure the share of output going to crime and protection is in line with the evidence.

4.3 Financial development and the rule of law across countries

In our quantitative analysis in the next section, we consider cross-country variations in the two parameters describing institutional development: financial development ϕ and the rule of law λ. What are the plausible ranges for these parameters across countries? In the model, financial market development maps into the proportion of capital financed through external

[18] While choosing specific deciles in the distribution of establishments to target ρ, ψ and θ is arbitrary, our results are not too sensitive to these choices as we show in the Appendix under alternative calibration targets. Focusing on the top decile of the establishment distribution makes sense because establishments in this group account for the bulk of production. Similarly, establishments in the middle of the distribution account for the bulk of protection and crime.

[19] Recall that the collateral constraint is $k \leq [1/(1-\phi)]a$, where $1/(1-\phi)$ is the proportion factor of assets that can be used for borrowing.

Table 5: Calibration of crime and external finance in Colombia

Target Moments	Colombian Data	Model	Parameter
External finance to capital	0.343	0.342	$\phi = 0.369$
Prob. of crime	0.239	0.232	$\lambda = 0.496$
Crime share (top decile)	0.286	0.279	$\rho = 1.174$
Crime to Output	0.002	0.002	$h = 19.35$
Protection share (top decile)	0.555	0.582	$\psi = 1.985$
Protection to Output	0.010	0.010	$b = 7.422$
(protection+crime)/sales (top 50%)	0.012	0.015	$\theta = 0.228$

sources and the rule of law maps into the probability of facing crime. Using data on these statistics from the WBES we report the data for over 50 countries in Figure 4.[20]

In the data, the share of capital financed through external sources range from close to 10 percent to 50 percent and the proportion of establishments facing crime ranges below 10 percent to slightly over 50 percent. The implied values for ϕ and λ given the above ranges are $\phi \in (0.15, 0.6)$ and $\lambda \in (0.3, 0.8)$. Seven countries in the sample are characterized as having weak financial markets and rule of law ($\phi = \lambda \leq 0.40$), all of them African or Caribbean countries. Moreover, close to 20 countries have implied values of $\lambda < 0.45$ (about 40 percent of establishments are victims of crime in these countries and losses due to crime as a percentage of sales ranges from 1 to 4 percent).

5 Results

We evaluate the implications of crime and financial frictions by studying economies that are otherwise identical to our calibrated economy except on the parameters ϕ and λ representing differences in the level of institutional development. We study the effects on aggregate outcomes of these institutions jointly and in isolation to assess the importance of each institution and their amplification effects. We also evaluate the importance for economic development of

[20]Data from WBES are for low and middle income countries which is why there are no observations in the 'north-east' quadrant in Figure 4. We also exclude countries that have implied values of $\phi, \lambda < 0.15$ and $\phi, \lambda > 0.85$. See the Appendix for more details.

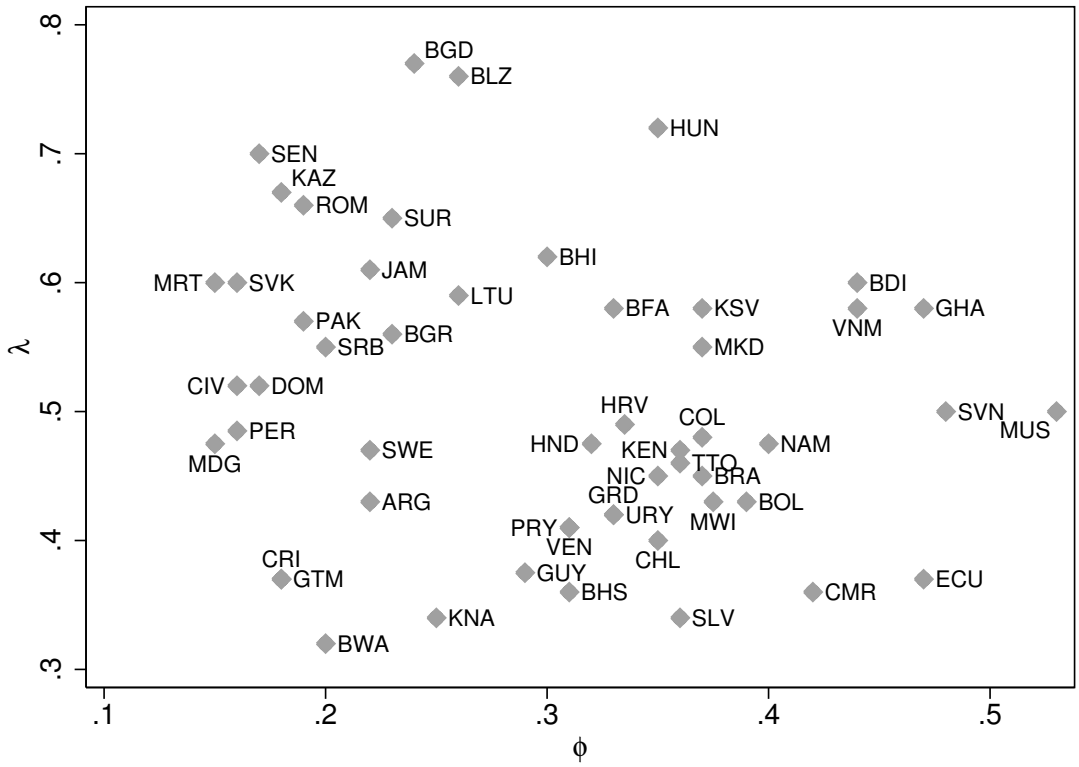

Figure 4: Financial frictions ϕ and rule of law λ across countries

policy reforms that improve the rule of law or financial market development across economies that differ along the level of institutional development.

5.1 Quantitative effects

Table 6 reports relevant statistics such as aggregate output, capital, consumption, and total factor productivity (TFP) for three economies: a benchmark economy with ($\phi = \lambda = 1$) which was calibrated to U.S. data, an economy with ($\lambda = .5, \phi = .37$) which was calibrated to institutional levels and establishment crime and protection data for Colombia, and an economy with ($\lambda = 0.32, \phi = .20$), the weakest level of institutional development observed in the cross-country data documented earlier (Botswana in Figure 4).

The main result from Table 6 is that institutional differences in the rule of law and financial market development have substantial negative effects on aggregate variables. In the

Colombia economy, output is 28 percent below the benchmark economy, TFP is 17 percent lower, and aggregate capital and consumption are 35 and 32 percent lower. These aggregate effects are magnified in the economy with the weakest level of institutional development where aggregate output is half that of the benchmark economy. Hence, for this economy, an improvement in institutional development alone to levels in the benchmark economy would increase output by more than a 2-fold factor. Consumption is almost 60 percent below the benchmark economy.[21] The reduction in these aggregate variables are attributed to effects along the intensive and extensive margins of production. Along the intensive margin, entrepreneur capital demand falls both due to the collateral constraint and anticipated losses from crime. This translates to effects along the extensive margin lowering the fraction of entrepreneurs (FOE) and raising average establishment size. Nonetheless, the average capital to labor ratio used in production—or capital intensity—is lower; relative to the benchmark economy, capital intensity in production is more than 6 times lower in the Weakest economy. Importantly, these effects are despite lower equilibrium prices for capital and labor in the distorted economies.

Table 6: Quantitative effects of crime and access to finance

	Benchmark Economy ($\lambda = \phi = 1$)	Colombia Economy ($\lambda = .50, \phi = .37$)	Weakest Economy ($\lambda = .32, \phi = .20$)
Relative output Y	1.00	0.72	0.49
Relative TFP	1.00	0.83	0.93
Relative capital K	1.00	0.65	0.15
Relative consumption, C	1.00	0.68	0.42
Relative FOE	1.00	0.94	0.87
Relative wage	1.00	0.72	0.49
Relative avg. capital-labor ratio k/n	1.00	0.65	0.15

Notes: Statistics relative to the benchmark economy. FOE is the fraction of entrepreneurs.

Next, we isolate the effects attributable to crime and financial frictions. We decompose the effects of crime and finance in the Colombia economy and the Weakest economy. Table 7

[21] TFP in the Weakest economy is higher than the Colombia economy due to a higher threshold for selection into entrepreneurship.

reports the results relative to the Benchmark economy. The columns labelled "Crime" present the scenario where each economy maintains its rule of law and adopts the level of financial market development in the Benchmark economy. In this scenario, differences between the distorted economies and the Benchmark economy are solely attributable to differences in the rule of law, thereby isolating the quantitative importance of crime. In the Weakest economy, crime alone accounts for a 27 percent reduction in output, capital is more than 65 percent lower and consumption is about 35 percent lower. In the Colombia economy, crime reduces output by 3 percent, capital by 10 percent and consumption by 5 percent. These effects are substantial considering that crime accounts for only 0.2 percent of aggregate output in the Colombia economy—a 15-fold effect on output. Protection plays a key role in accurately accounting for the importance of crime by ensuring the share of crime among the top decile is in line with the evidence.[22]

Table 7: Isolating the effects of crime and access to finance

	Colombia Economy ($\lambda = .50, \phi = .37$)			Weakest Economy ($\lambda = .32, \phi = .20$)		
	Total	Crime ($\phi = 1$)	Finance ($\lambda = 1$)	Total	Crime ($\phi = 1$)	Finance ($\lambda = 1$)
Relative output Y	0.72	0.97	0.80	0.49	0.73	0.75
Relative TFP	0.83	1.01	0.87	0.93	1.06	0.84
Relative capital K	0.65	0.90	0.76	0.15	0.33	0.70
Relative consumption C	0.68	0.95	0.80	0.42	0.66	0.75
Relative FOE	0.94	0.96	1.32	0.87	1.27	1.40
Relative wage	0.72	0.97	0.82	0.49	0.75	0.77
Relative avg. k/n ratio	0.65	0.89	0.78	0.15	0.34	0.72

Notes: Statistics are reported relative to the benchmark economy. Total reports the effects of access to finance and crime in each economy. Crime reports the effects if only crime is present (i.e. $\phi = 1$) and Finance reports the effects if only weak access to finance is present (i.e. $\lambda = 1$).

The columns "Finance" isolate the effects arising from financial frictions. Here, we consider the case where each economy maintains its level of financial market development and

[22]Excluding protection from the model implies that crime rises with establishment size, producing substantially larger effects on aggregate variables.

adopts the rule of law of the Benchmark economy. We find that in the Colombia economy, access to finance has substantially larger effects on aggregate output, capital and consumption than crime. Aggregate output falls by 20 percent, capital and consumption by 24 and 20 percent. In the Weakest economy, however, access to finance has smaller effects on these variables than crime. For instance, access to finance lowers output and consumption by 25 percent which is lower than what is generated by crime for this economy. Our results also imply that TFP losses are primarily from access to finance.

It is worth noting that the difference between "Total" and "Finance" represents the additional quantitative effects of including crime in a standard model of financial frictions with collateral constraints.[23] The quantitative effects of adding crime to the Colombia economy with financial frictions generates an additional 40 percent reduction in output, 45 percent lower aggregate capital, and 40 percent lower consumption. These effects are much larger in the Weakest economy where adding crime generates a more than 2-fold increase in output, capital and consumption losses.

5.2 Amplification

We now turn to the amplification effects that arise from evaluating crime and financial frictions together. As presented in Table 7, the joint effects from these distortions are greater than the sum of their individual effects. For instance, when examined in isolation crime lowers output by 3 percent and financial frictions lower output by 20 percent in the Colombia economy; when examined jointly they account for a 28 percent reduction in output—a more than 20 percent bigger effect on output than the sum of their individual components. Similarly for consumption—examined in isolation crime and financial frictions lower output by 5 and 20 percent respectively, but when evaluated together consumption falls by 32 percent.[24] Put differently, about 63 percent of the drop in consumption is accounted for by financial

[23] Setting $\lambda = 1$ and re-calibrating ϕ to match the proportion of capital financed through external sources generates a value almost identical to the one in Table 5. Hence, the results reported in column "Finance" in Table 7 accurately represents the quantitative effects from a model that only features financial frictions.

[24] We find similar patterns for the Brazil and Peru calibrated economies (see Table 13 in Appendix).

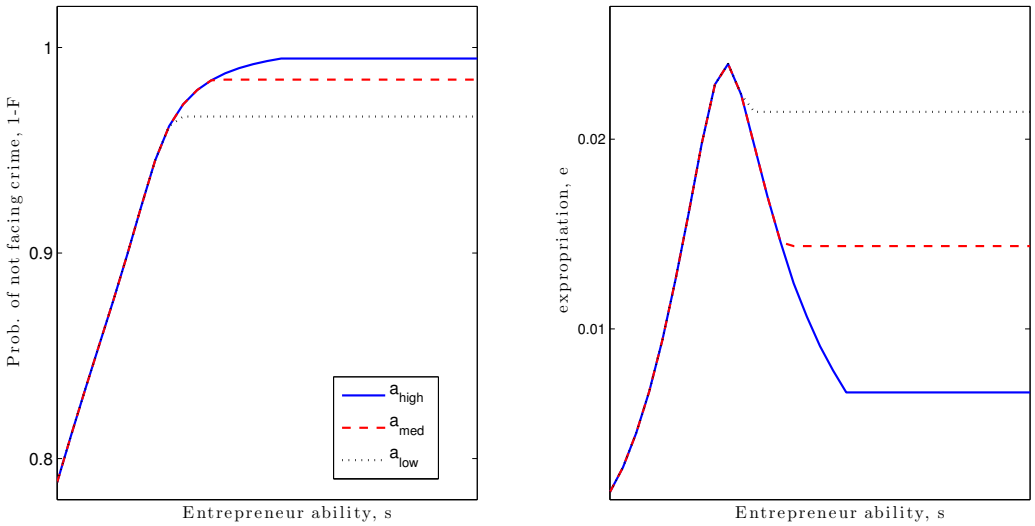

Figure 5: Crime across entrepreneur ability and wealth in the Colombian economy

frictions, about 15 percent by crime and the remaining 22 percent is due to the interaction of these distortions.

The model provides simple intuition for the amplification mechanism. As already discussed, in models that feature financial frictions, entrepreneurs can self-finance and overcome their collateral constraint. Crime hinders this process because as constrained entrepreneurs expand they become a bigger target for crime. In equilibrium, the proportion of individuals with low wealth rises and the wealth distribution becomes positive skewed amplifying aggregate losses.

Financial frictions magnify the severity of crime as well. In the model, high ability entrepreneurs buy protection to limit their exposure to crime. Financial frictions restrict establishment size and spending on protection which raises the potential for crime. Figure 5 shows overall protection, $1 - F(\lambda, p)$, and the fraction of capital lost due to crime across entrepreneur ability in the Colombian economy. The solid line in the left panel shows overall protection for high asset (or relatively unconstrained) entrepreneurs, and the corresponding line on the right panel shows the fraction of capital expropriated, contingent on facing crime. High ability entrepreneurs, who account for the bulk of aggregate output, face minimal

losses from crime (the curve is hump-shaped in ability). In contrast, low/moderate asset–high ability entrepreneurs face a higher probability of crime and lose a larger share of capital (dashed and dotted lines in the figure). For these entrepreneurs, financial frictions limit their scale of operation, spending on protection and increase the severity of crime.

Taken together, crime limits entrepreneur self-financing and financial frictions raise the probability of crime. These channels are reinforcing, and account for the amplification effects on output, capital and consumption.

5.3 Policy reform

A long standing question in economic development surrounds which institutional factors are most crucial for development. A strand of the literature stresses that a strong rule of law is critical to incentivize investment and business expansion, thereby spurring development (e.g., Besley, 1995; Shleifer and Vishny, 1998; Svensson, 1998). Another strand of the literature emphasizes that financial markets are essential for the efficient allocation of resources across establishments and is a key component for economic development (e.g., King and Levine, 1993; Levine, 1997; Rajan and Zingales, 1998). While the underlying mechanisms in both literatures are important, it remains elusive which institutional factor is most relevant for development. Our framework allows us to provide some insight into this question by assessing the relative importance of each institutional factor for development, side-stepping issues related to identification often encountered in empirical work in this area.[25]

We ask, do comparable improvements in financial market development (ϕ) or the rule of law (λ) have differential effects on aggregate output? If so, how do the differences depend on the level of institutional development of the country (e.g., the level of ϕ and λ)? Our approach is to evaluate the long-run effects on aggregate outcomes of a hypothetical policy reform that

[25]Determining the relative importance of rule of law and financial frictions for development empirically is challenging since improvements in one source of institutional measure often triggers an improvement in another institutional measure, preventing identification. An exception is Johnson et al. (2002) who use an exogenous policy change in post-Communist Europe to evaluate the effects of improved access to finance across six countries.

improves either financial markets (ϕ) or the rule of law (λ) abstracting from other relevant issues such as the source of the reform, costs, and implementation. We assume only one of these reforms is implemented. Reforms that improve the rule of law can be interpreted as policies that lower crime and reforms that improve financial markets are policies that increase access to finance.[26]

Table 8 reports values for steady-state aggregate output across economies that differ in the rule of law and financial market development, based on the calibrated parameters from the previous section. The numbers reported in the table are relative to aggregate output in the economy with $\lambda = \phi = 0.3$. We begin with financial market reform, studying the effects of improving access to finance from $\phi = 0.3$ across economies that differ in the rule of law λ. Improving access to finance raises output in each case, with the largest effects in economies that have a weak rule of law. For example, improving access to finance from $\phi = 0.3$ to 0.9 increases aggregate output by 36 percent in the economy with a weak rule of law $\lambda = 0.3$, whereas 28 percent in the economy with $\lambda = 0.9$. Improving access to finance in low λ economies not only improves the allocation of resources across entrepreneurs, but also enables them to negate the potential of crime by spending on protection, amplifying output gains. We now focus on the reform of the rule of law, evaluating the effects of improving the rule of law from $\lambda = 0.3$ across economies that differ in financial market development ϕ. Output increases substantially in each case with the largest gains in economies that have weak financial markets. For example, a reform that increases λ from 0.3 to 0.9 generates an increase in output of 52 percent for the $\phi = 0.3$ economy and 42 percent in the $\phi = 0.9$ economy.[27]

Our results indicate that when the rule of law is relatively weak, i.e. $\lambda < 0.4$, improving the

[26]There are many examples of large-scale economy-wide reforms. Related to access to finance, recent examples include a major reform in India in 1998 (Banerjee and Duflo, 2014) and in Mexico in 2014. Mexico's stance on the drug war in 2010 is an example of a policy reform that aims to improve the rule of law.

[27]Improving the rule of law λ from 0.3 to 0.9 is equivalent to a reduction in the crime rate on establishments from 55 to 3 percent. Improving financial market development ϕ from 0.3 to 0.9 is equivalent to increasing external financing from 21 to 62 percent. In the first-best economy with $\lambda = \phi = 1$ the crime rate is zero percent and external financing 77 percent.

Table 8: Effects of policy reform on aggregate output

	Access to finance ϕ			
Rule of law λ	0.3	0.5	0.7	0.9
0.3	1.00	1.11	1.24	1.36
0.5	1.38	1.54	1.71	1.89
0.7	1.48	1.62	1.77	1.93
0.9	1.52	1.65	1.79	1.94

Notes: Aggregate output across economies that differ in institutional development (ϕ, λ) relative to aggregate output in the economy with $\phi = \lambda = 0.3$.

rule of law is more important for development than improving financial markets, irrespective of the value of ϕ, and when the rule of law is above this threshold, improving financial markets becomes more important for development.[28] To appreciate this point note in Table 8 that the output gains from improvements in the rule of law mostly occur from 0.3 to 0.5, whereas for financial market development the gains are spread more evenly over the increase in access to finance. From a policy perspective, our model implies that when the rule of law is weak, improving it should take priority over financial market development; beyond this, improving financial market development becomes more important. These results relate to the empirical literature on why access to finance programs can have muted effects, see for instance Berge et al. (2015) and Karlan et al. (2014). Our framework emphasizes that in environments where other factors are more pressing concerns, such as crime, policies that improve access to finance are likely to have smaller effects. In other words, the rule of law is a precondition to reap the benefits from financial market development. We note that our results imply that in several countries in the world (for instance, Botswana, Cameroon, Chile and Ecuador, where crime rates exceed 35 percent) improving the rule of law (lowering crime) is essential for development, whereas for most countries, improving financial markets is the

[28] An alternative interpretation is that in countries where the probability an establishment faces crime exceeds 33 percent and/or crime as percentage of output is close to 2 percent, improving the rule of law has larger effects on output than improving access to finance. We have considered similar experiments for the calibration of Brazil and Peru and find that this result holds for values of $\lambda \in (0.4, 0.45)$.

most relevant institution for development.

6 Conclusion

We developed an integrated framework to evaluate the effects of two highly relevant institutions that are prevalent in developing countries: weak access to finance and crime. The framework is an otherwise standard model of occupation choice and entrepreneurship extended to incorporate financial frictions and the rule of law. A calibrated version of this framework revealed several key insights. First, weak access to finance and rule of law have strong negative effects on aggregate outcomes, reducing output by a factor of more than 2-fold. Second, we find strong complementarities among the two institutions we consider, that is we find the amplification effects of crime and access to finance on macro variables to be substantial. In our model output losses are amplified because weak access to finance lowers the ability of an entrepreneur to buy protection against crime, thereby raising the possibility for crime. Likewise, crime deters the self-finance motive which exacerbates the effects on output from financial frictions. Third, we studied the effects of policy reforms in our framework. When both financial market development and the rule of law are weak, policies that improve the rule of law have a bigger positive impact on aggregate output than those that improve financial market development. However, at reasonable levels of rule of law, polices that liberalize financial markets increase output more than further improvements in rule of law. An interpretation of our result is that financial markets are crucial for development, but a necessary condition is that property rights are secure.

Recent empirical studies on micro-finance programs show mixed results and a lack of consensus whether these programs are an effective tool for promoting development (e.g Karlan et al., 2014; Berge et al., 2015). Our results highlight that expropriation can influence whether micro-finance programs have viable long-run effects. In particular, our results indicate that polices that liberalize financial markets have large aggregate output effects in economies

where the rule of law is at least moderate, but much smaller effects when the rule of law is weak. A relevant extension of our analysis would be to incorporate the rule of law in macroeconomic studies of micro-finance programs such as the quantitative study in Buera et al. (2014).

We have focused on the misallocation effects created by weak access to finance and rule of law. A weak rule of law and the prevalence of crime can help account for why managers in less developed countries do not utilize the best management practices as emphasized in Bloom and VanReenen (2010), Bloom et al. (2010), and Bloom et al. (2013). We leave this potentially useful exploration for future research.

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A Appendix

A.1 Data sources and countries

For the descriptive statistics presented in Table 1 the most recent country-level data is used from the World Bank Enterprise Surveys (WBES), which range between 2005 to 2015. Countries are grouped by continent as follows. Countries in Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. Countries in Middle East and North Africa: Algeria, Djibouti, Egypt, Iraq, Israel, Jordan, Lebanon, Morocco, Syria, Tunisia, West Bank and Gaza and Yemen. Countries in South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela. Countries in the Caribbean: Antigua and Barbuda, Bahamas, Barbados, Belize, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, and Trinidad and Tobago. Countries in Asia: Afghanistan, Azerbaijan, Bangladesh, Bhutan, Cambodia, China, Georgia, India, Indonesia, Kazakhstan, Korea, Kosovo, Kyrgyz Republic, Lao, Malaysia, Montenegro, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Uzbekistan and Vietnam. Countries in Europe: Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Macedonia, Moldova, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Turkey and Ukraine. The data reports for each country the number of establishments surveyed and the proportion of establishments that identify a given distortion as a major or severe obstacle to business operation. These two statistics allow us to calculate averages across continents as reported in Table 1.

Figure 1 and 2 are based on data from the WBES which report, at the country-level, average losses from crime as a percentage of sales, the proportion of investment financed by external sources, and the fraction of establishments that report crime and access to finance are major obstacles to business operation. Other relevant variables include the proportion of establishments that face crime, proportion of working capital financed by external sources, proportion of establishments that have access to a line of credit or use banks. Data on real GDP per capita across countries is from the World Bank (PPP prices, 2011).

A.2 Access to finance, crime and establishment size

Table 9 and Table 10 provide additional evidence on the link between establishment size and measures of finance and crime. Specifically, Table 9 is similar to Table 2 except that finance and crime as obstacles to doing business are reported on a five-point scale (not an obstacle, minor, moderate, major or severe obstacle). Also reported are results when the sample size is restricted to establishments that have fewer than 25 employees. Worth noting is the coefficient in column (3) which is positive and marginally insignificant at the 5 percent level, when the sample is restricted to small establishments—that is, crime as an obstacle to doing business initially rises with establishment size. Table 10 reports results for a more general case where the estimates can vary across size categories (i.e. access to finance and crime can have differential effects across size). The coefficients for finance as an obstacle to doing business, percentage of working capital borrowed from banks and whether an establishment has faced crime increase with size (in absolute value) which implies that lack of finance and the probability of facing crime falls with establishment size. For crime as an obstacle to doing business in column (3), the coefficients are initially positive and then negative. This evidence is consistent with our theory that while the probability of facing crime falls with size, its severity tends to initially rise with size.

Table 9: Access to finance and crime across establishment size (five-point scale)

	(1) Finance obstacle $0-4$ scale	(2) (% working capital) Borrow from Banks $0-4$	(3) Crime obstacle $0-4$ scale	(4) Faced crime last year yes/no
All establishments:				
Establishment size	-0.207^{***}	0.274^{***}	-0.027^{**}	-0.248^{***}
	(0.0122)	(0.0131)	(0.0116)	(0.0148)
Observations	17788	18042	17942	17949
Establishments with ≤ 25 employees:				
Establishment size	-0.078^{***}	0.139^{***}	0.029^{*}	-0.066^{***}
	(0.0149)	(0.0182)	(0.0146)	(0.0197)
Observations	10327	10489	10424	10433
Industry-level controls	Y	Y	Y	Y
Country-level controls	Y	Y	Y	Y
Continent-level controls	Y	Y	Y	Y

Notes: Each cell reports point estimates from a separate Ordered Logit regression. In Column (1) and (3) the dependent variables are whether access to finance and crime are a severe, major, moderate, minor or non-obstacle to business operation. In column (2) the dependent variable is the percentage of working capital borrowed from banks, and in column (4) is whether the establishment has faced crime (yes or no). Establishment size is a categorical variable based on number of employees: For 'All establishments', size categories are less than 10, $10-49$, $50-99$, $100-249$ and greater than 249, and for '≤ 25 employees' the categories are $0-5$, $6-10$, $11-15$, $16-20$ and $21-25$. The categories for the percentage of working capital borrowed from banks are 0%, $1-25\%$, $26-50\%$, $51-75\%$ and $>75\%$. ***, **, * denote significance at the 1, 5 and 10 percent level.

A.3 Data moments

In Section 4.2 we use the WBES 2010 to obtain relevant moments in the data for the Colombian economy to discipline our quantitative analysis. Here we provide more detail on how these moments are calculated. First, we exclude establishments that report negative values for number of full-time employees, capital, losses from crime, protection expenditure and sales (value added). We also exclude establishments that are deemed untruthful—about opinions or perceptions and numbers—by the surveyor. To ensure that our moments are not sensitive to outliers, particularly for the crime and protection shares we target, we exclude the top one percent of establishments in sales, employees, protection and crime. We are left with 832 establishments for Colombia.

Table 10: Access to finance and crime by establishment size

	(1) Finance obstacle $0-4$ scale	(2) (% working capital) Borrow from Banks $0-4$	(3) Crime obstacle $0-4$ scale	(4) Faced crime last year yes/no
Establishment size:				
$n < 10$	–	–	–	–
$10 \leq n < 50$	-0.227^{***}	0.427^{***}	0.051	-0.208^{***}
	(0.0341)	(0.0425)	(0.0351)	(0.0458)
$50 \leq n < 100$	-0.380^{***}	0.769^{***}	0.105^{**}	-0.626^{***}
	(0.0502)	(0.0565)	(0.0491)	(0.0622)
$100 \leq n < 250$	-0.618^{***}	0.871^{***}	-0.023	-0.621^{***}
	(0.0510)	(0.0570)	(0.0493)	(0.0635)
$n \geq 250$	-0.8567^{***}	1.130^{***}	-0.153^{***}	-1.026^{***}
	(0.0582)	(0.0622)	(0.0537)	(0.0693)
Observations	17788	18042	17942	17949
Industry-level controls	Y	Y	Y	Y
Country-level controls	Y	Y	Y	Y
Continent-level controls	Y	Y	Y	Y

Notes: Each column reports estimates from a separate Ordered Logit regression where each size category is a dummy variable. Results are relative to the smallest size category, $n < 10$. Variables are the same as those in Table 9. ***, **, * denote significance at the 1, 5 and 10 percent level.

Establishments report whether they experienced losses as a result of crime (yes or no, question $i3$ in the Surveys). Summing over establishments that report yes relative to all establishments gives us the percentage of establishments that face crime.[29] Also reported are estimated losses due to crime as a percentage of sales ($i4a$) and annual sales ($d2$); the product of these two variables is used to determine monetary losses from crime. Similarly the product of sales and the percent of annual sales spent on security ($i2$) is used for annual protection expenditure. The aggregate crime to output ratio is the sum of monetary losses from crime across establishments divided by the sum of value-added sales across establishments.

[29]Since we clean the data and drop outliers each observation is weighted equally for consistency. Using the weights provided generate similar, but slightly higher, target values for crime and protection.

Value-added sales is calculated as annual sales less intermediate inputs in production ($n2b$, $n2e$, $n2f$, $n2j$ and $n2i$). Following a similar approach, we use establishment spending on security to obtain aggregate spending on protection relative to output. To target the share of monetary losses from crime among the top decile of the distribution, establishments are sorted by employees and the sum of losses from crime in the top decile is divided by aggregate losses from crime; similarly for the share of protection expenditure across the top decile. In regards to capital, we use the replacement cost of machinery/equipment and land/buildings to determine the value of establishment capital ($n7a$ and $n7b$). The WBES also reports the percentage of working capital financed by external sources (commercial banks, state-owned banks and non-bank financial institutions; $k3bc + k3e$). We assume that all establishment capital is financed based on this percentage. Hence, the product of capital and the percentage of capital financed by external sources, summed across all establishments and divided by aggregate capital is the external finance to capital ratio. This ratio generates an external finance to *output* ratio in the model that is very close to what is reported by the World Bank (Beck et al., 2000).

In Section 4.3 we follow the same procedure as described above to determine the probability of facing crime and the external finance to capital ratio across countries, except that we use sales instead of value added sales for dropping outliers. This allows for more observations at the country level and these moments are not dependant on sales. The model is simulated for values of ϕ and λ in intervals of 0.05 in the calibrated economy. We then assign the pair (ϕ,λ) that generates an external finance to capital ratio and probability of facing crime in the model that is closest to a country's moments. Countries that have implied values of $\phi < 0.15$ or $\phi > 0.85$ are excluded primarily because they have too few observations or too many missing observations to produce reliable moments. For consistency, we apply the same rule for λ. Of the close to 100 countries that we have data for, after applying the above rule we are left with 53 countries.

A.4 Calibration and robustness

In our calibration of the Colombian economy, we target crime and protection shares among the top decile of size distribution. Table 11 reports parameter values when the model is calibrated to an alternate decile for crime and protection shares—top 20 percent—in the Colombian economy. The quantitative effects generated from these parameter values are similar to those reported in Table 6.

Table 11: Calibration Colombian Economy to alternative crime and protection shares

Target Moments	Colombian Data	Model	Parameter
External finance to capital	0.343	0.343	$\phi = 0.368$
Prob. of crime	0.239	0.233	$\lambda = 0.522$
Crime share (top 20%)	0.501	0.493	$\rho = 1.20$
Crime to Output	0.002	0.002	$h = 20.14$
Protection share (top 20%)	0.733	0.793	$\psi = 1.88$
Protection to Output	0.010	0.010	$b = 11.43$
(protection+crime)/sales (top 50%)	0.012	0.015	$\theta = 0.271$

We also calibrate our model to the Brazil and Peru economies to evaluate the sensitivity of our quantitative results. We choose Brazil because it has a similar external finance to capital ratio as Colombia but higher probability of crime; Peru has a similar probability of crime as Colombia but a lower external finance to capital ratio. Target moments for Brazil and Peru are calculated similarly to those for Colombia. Table 12 reports target moments from the data, corresponding moments in the model and parameter values for the Brazil and Peru economies. The Colombia economy in Section 4.2 is included for comparison. The calibrated parameters imply a lower value for ϕ in Peru, relative to Colombia, and a lower value of λ in Brazil (though the model under-predicts the probability of facing crime and aggregate crime relative to output in Brazil). Table 13 reports the quantitative effects from the lack of finance and crime for the calibrated economies of Brazil and Peru. For Brazil, adding crime to a model with financial frictions generates an additional 50, 42 and 84 percent reduction in output, TFP and consumption; in Peru these values are 30, 29 and 50 percent.

Table 12: Calibration parameters for Brazil and Peru Economies

	Brazil			Peru		
Target Moments	Data	Model	Parameter	Data	Model	Parameter
External finance to capital	0.35	0.34	$\phi = 0.376$	0.149	0.149	$\phi = 0.151$
Prob. of crime	0.32	0.29	$\lambda = 0.479$	0.248	0.248	$\lambda = 0.496$
Crime share (top decile)	0.42	0.41	$\rho = 1.092$	0.433	0.309	$\rho = 1.19$
Crime to Output	0.004	0.001	$h = 18.97$	0.002	0.002	$h = 19.42$
Protection share (top decile)	0.54	0.66	$\psi = 1.932$	0.445	0.612	$\psi = 2.03$
Protection to Output	0.014	0.014	$b = 7.361$	0.015	0.011	$b = 7.72$
(protection+crime)/sales (top 50%)	0.017	0.019	$\theta = 0.244$	0.017	0.016	$\theta = 0.238$
	Colombia					
Target Moments	Data	Model	Parameter			
External finance to capital	0.34	0.34	$\phi = 0.369$			
Prob. of crime	0.24	0.23	$\lambda = 0.496$			
Crime share (top decile)	0.29	0.28	$\rho = 1.174$			
Crime to Output	0.002	0.002	$h = 19.35$			
Protection share (top decile)	0.58	0.56	$\psi = 1.985$			
Protection to Output	0.01	0.01	$b = 7.422$			
(protection+crime)/sales (top 50%)	0.012	0.015	$\theta = 0.228$			

Table 13: Isolating the effects of crime and access to finance

	Brazil Economy ($\lambda = .48, \phi = .38$)			Peru Economy ($\lambda = .5, \phi = .15$)		
	Total	Crime ($\phi = 1$)	Finance ($\lambda = 1$)	Total	Crime ($\phi = 1$)	Finance ($\lambda = 1$)
Relative output Y	0.70	0.96	0.80	0.65	0.96	0.73
Relative TFP	0.83	1.01	0.88	0.78	1.00	0.83
Relative capital K	0.61	0.87	0.76	0.56	0.89	0.68
Relative consumption C	0.65	0.94	0.81	0.61	0.95	0.74
Relative FOE	0.88	0.88	1.30	0.94	0.97	1.43
Relative wage	0.69	0.95	0.82	0.64	0.97	0.76
Relative avg. k/n ratio	0.60	0.86	0.78	0.56	0.90	0.70

Notes: Statistics are reported relative to the benchmark economy. Total reports the effects of access to finance and crime in each economy. Crime reports the effects if only crime is present (i.e. $\phi = 1$) and Finance reports effects if only weak access to finance is present (i.e. $\lambda = 1$).