Crime, Informality and Microenterprise Growth: Evidence from Mexico

PRELIMINARY DRAFT

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Abstract: Recent studies of microenterprises reveal that despite generating high returns to capital, many microenterprises do not grow. Most microenterprises exhibit only small increases in capital or labor and show limited upward profit trajectories. We investigate one potential explanation for this puzzle: weak protection of property limits the incentives of entrepreneurs to invest in moveable assets. Robbery is one of the main shocks reported by urban microentrepreneurs in a recent survey in Mexico, and more entrepreneurs report suffering a robbery in the past year than having to pay bribes or fines to authorities. At the same time, formal registration may raise the threat that a microenterprise will be targeted or improve its police protection or judicial recourse. We explore the relationship between property crime, informality and growth among microenterprises in Mexico using repeated cross-sectional data on these enterprises and the perception and incidence of crime. We find that higher rates of property crime are associated with significantly lower probability that an enterprise will be formally registered or plan to expand in the next 12 months. These effects are unique to property crimes and are independent of other types of crime, including violent and drug-related offenses. Moreover, we find that vehicle robberies differentially affect transport enterprises' formalization and expansion plans, indicating that these effects are due to risk of asset expropriation rather than demand factors. Finally, our results are not driven by border or drug crime states, and are robust to a number of controls for local institutional quality and registration reform programs.

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Microenterprises—firms that operate with 10 employees or less—are large generators of income and employment in the developing world and their importance within both policy-making circles and research agendas has increased significantly in recent years. Recent literature has shed more light on the sector, but also has generated conflicting observations that highlight the remaining knowledge gaps. First, a number of papers have found that many microenterprises generate very high returns to capital, often significantly above the cost of financed capital (McKenzie and Woodruff, 2006, 2008, Udry and Sanagol 2006). For example, in Mexico, the country of focus of this paper, McKenzie and Woodruff (2008) use a field experiment in which they randomly give some microentrepreneurs an increase in cash or equipment and find estimated monthly returns to capital in the range of 20-33%. These are well above the rates currently charged by most microfinance institutions and suggest that, while credit constrains may still bind, many microentrepreneurs have the capacity to grow their way into higher levels of capital and income. This conclusion is supported by other papers that find a high degree of voluntary entry into micro-entrepreneurship, suggesting it is not simply be a refuge for those unable to find employment elsewhere (Maloney 2004, Bruhn 2010).

Despite the possibility that many microenterprises generate high returns, however, a number of country surveys suggest the sector it is largely stagnant. Many microenterprises do not appear to grow, registering limited increases in capital or labor and only weak upward profit trajectories. For example, comparisons of nationally representative surveys of urban microentrepreneurs in Mexico (ENAMIN) find little change in the sector over the past decade. From 2001 to 2008, the average number of employees per enterprise remains constant at 0.41, while average monthly sales increase only slightly from $411 to $425[1]. In addition, informality remains high, despite efforts to lower registration requirements at both the municipal and federal level (Bruhn 2010). The estimated portion of urban microenterprises that are informal changes insignificantly from 66% in 2001 to 65.6% in 2008. While some microenterprises undoubtedly grow to become small firms, the majority operate at such as small scale that even significant growth rates would leave them within the sample universe. These surveys therefore paint a picture of a sector that experiences little growth and may be characterized by inefficiently small scale.

[1] Authors' calculations from the ENAMIN data. Monthly profit data expressed in December, 2001 pesos and converted to U.S. dollars at the December 30, 2001 exchange rate.

The question of why many microenterprises do not grow is still an open one, and recent papers have explored the role of fixed labor costs (Emran et. al. 2007) and skill constraints (Karlan and Valdivia 2010). The larger focus, however, has been on the role that weak property rights play in limiting firm size (De Soto 1989). In the absence of formal and informal institutions which protect property, entrepreneurs have reduced incentives to invest in productive assets. They also may face limited access to capital due to the absence of pledge-able collateral. Many studies have examined the role of a rapacious state on microenterprises, arguing that in the face of high taxes, fees or bribes, firms may find it optimal to stay small to reduce their exposure to rent extraction (DeSoto 1989).

In this paper, however, we explore another channel through which weak property rights may limit microenterprise growth: the role of private individuals or groups who can seize others' assets with impunity. Robbery can pose a severe threat to firm owners and might provide a strong incentive for enterprises to limit growth. For example, the 2008 survey of microenterprises in Mexico finds that the incidence of robbery is higher than that of fines and bribes and the average losses three times as high (Table 1). The survey also finds that the economic losses from robbery are large- constituting 1.7 times monthly profits-and are two to three times larger than those from fines, bribes, private extortion and natural causes. In the face of such risks, entrepreneurs may reasonably limit their plans for investment in new capital or expanded operations. Furthermore, they may face reduced credit access if microfinance institutions are reluctant to accept moveable assets that have a high probability of being stolen as collateral.

To our knowledge, only one other paper has examined the impact of crime on microenterprise behavior. Krkoska and Robeck (2009) find cross-sectional evidence that enterprises in Eastern Europe and Central Asia suffer substantial losses from street crime, and that those enterprises that suffer the largest losses are the least likely to make new investments. We argue that crime is an important new dimension of the costs of weak property rights, particularly in developing countries facing high degrees of property and personal violence. As such, understanding the impact of crime on microenterprises may help fill in some of the gaps in knowledge about this sector.

In addition to exploring the relationship between crime and enterprise growth, this paper studies the link between crime and microenterprise formality, as it is likely that crime jointly affects the registration and investment decisions of firms. Theoretically, the impact of crime on formality is

unclear. On the one hand, formal registration may make firms more easily targetable by thieves, suggesting that higher crime rates encourage firms to stay informal to avoid detection. Data from Mexico, provided in Table 1, show that the incidence of and losses from robbery are two times higher for formal firms than informal ones. On the other hand, however, formality may confer greater access to police protection and judicial recourse, in which case higher crime rates create a greater incentive for firms to become formal. Suggestive evidence also supports this claim, as formal enterprises are much more likely to report robbery and fraud to the authorities than are informal ones. Thus, the theoretical relationship between crime and informality is ambiguous. We lay out a simple theoretical model that illustrates this ambiguity. Interestingly, the model also highlights the possibility that, in cases where higher crime rates lead enterprises to formalize in order to seek police and legal protection, enterprises may also be more likely to increase their investment levels.

We attempt to address these ambiguities using data from Mexico, a country with a large microenterprise sector, a high degree of informality, and high rates of property-related crimes. We combine repeated cross-sectional surveys of microenterprises with repeated surveys of the general population on crime and insecurity. We construct state-level measures of crime and estimate the effects of different crimes on enterprise-level expansion plans and informality. By using repeated surveys, we can control for state-level unobserved characteristics using state fixed effects. We also can control for a host of state-time varying effects that may jointly determine robbery and microenterprise decisions, including local economic conditions, local institutional quality and demography. We also compare the effects of property crimes—particularly robbery—to those of other types of crime, such as homicides and sexual assaults, that would not be expected to directly influence the investment and formality decisions of microentrepreneurs. Lastly, we distinguish between different types of robberies, including home and vehicle robberies, that might differentially affect microentrepreneurs operating using different types of moveable assets (i.e., transport enterprises).

We find strong suggestive evidence that higher robbery rates significantly reduce the probability that microenterprises will plan to expand their operations. Similarly, lower home robbery rates significantly increase the probability that a firm will be formally registered with the federal and municipal authorities. Home robbery rates have the most significant effects on

expansion and registration, whereas vehicle robbery rates only affect expansion and registration among enterprises in the transport sector. We find no effects of homicides and assaults on expansion plans or registration, suggesting that although Mexican microenterprises operate in an environment with widespread violent crimes, their growth and formality is primarily limited by the threat of asset loss due to robbery.

The paper proceeds as follows. In Section 2, we outline a basic theoretical model illustrating the relationship between crime, informality and investment. Section 3 describes the data. Section 4 outlines our empirical strategy. Section 5 presents baseline results. Section 6 provides robustness checks. In Section 7, we offer conclusions.

Section 2: A theory of crime, formality, and investment

In this section, we lay out a simple, one-period model of crime, formality, and investment. Property crime is typically thought to reduce capital investment levels, but our simple framework illustrates how the option of formalizing one's enterprise can actually lead to higher investment even under greater threat of robbery or general property crime.

Each microentrepreneur chooses her optimal level of capital investment (k) and whether to operate formally and informally. When operating formally, her output function is

$$y_F = \theta_F \gamma f(k) - rk - c$$

where θ_F represents the probability that she will not be robbed when operating formally, γ represents the impact of operating formally on her output, $f(k)$ is her production function using a level of capital k, r is the rental cost of capital, and c is the cost of formalization.

Alternatively, the microentrpreneur can operate informally, facing a probability of not being robbed of θ_I and output function:

$$y_I = \theta_I f(k) - rk$$

Facing these two possibilities, the microentrepreneur can choose distinct optimal levels of investment. For example, if $f(k) = k^{\alpha}$ where $\alpha < 1$,

$$k_F{}^* = \left(\frac{r}{\alpha\theta_F\gamma}\right)^{\frac{1}{\alpha-1}} \quad \text{and} \quad k_I{}^* = \left(\frac{r}{\alpha\theta_I}\right)^{\frac{1}{\alpha-1}}$$

This implies that $k_F^* > k_I^*$ whenever $\frac{\theta_F}{\theta_I}\gamma > 1$. That is, when the net effects of formalization on the value of a given level of production are greater than 1, the entrepreneur will choose to invest more capital if she operates formally than if she chooses to operate informally.

These investment levels lead to different levels of output under these two scenarios.

$$y_F^* = (\theta_F\gamma)^{\frac{\alpha+1}{\alpha-1}} \left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}} - (r)^{\frac{2}{\alpha-1}}\left(\frac{1}{\alpha\theta_F\gamma}\right) - c$$

and

$$y_I^* = (\theta_I)^{\frac{\alpha+1}{\alpha-1}} \left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}} - (r)^{\frac{2}{\alpha-1}}\left(\frac{1}{\alpha\theta_I}\right)$$

The entrepreneur will choose to operate formally when $y_F^* > y_I^*$. To illustrate how this decision can vary with the underlying crime rate, we can model $\theta_I = \omega$ and $\theta_F = \mu\omega$, where ω is the underlying (inverse) risk of robbery among microenterprises, and μ is the differential risk among formal enterprises, which can be greater than 1 or less than 1. Under these assumptions, a microentrepreneur will be indifferent between operating formally and informally when

$$\left[1 - (\mu\gamma)^{\frac{\alpha+1}{\alpha-1}}\right]\left[\omega\left(\frac{\omega r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}}\right] - \left[1 - (\mu\gamma)^{\alpha-1}\right]\left[\left(\frac{r^2}{\alpha}\right)^{\frac{1}{\alpha-1}}\right]\omega^{\alpha-1} = c$$

We briefly return to the question of whether the differential risk of robbery (μ) among formal microenterprises is greater or less than 1. Formal microenterprises may benefit from greater police protection and easier recourse to the legal system and thus face smaller losses from robbery. At the same time, formal microenterprises may also be more easily targeted for robbery, and thus may face a higher probability of robbery. Table 1 offers some suggestive evidence that the risk and average losses from robbery among formal microenterprises in Mexico are significantly higher than among informal enterprises. However, formal enterprises are also much more likely to report

robberies to the authorities, providing greater recourse to the legal system that may offset some of these higher losses. Finally, note that formality may offer benefits to enterprises even independent of crime rates (γ), so the net effect of formality on the value of output ($\gamma\mu$) may be greater than 1 even when the effect due to robbery risk is less than 1.

What effect will a change in crime conditions have on the formality and investment decisions of this indifferent entrepreneur? We can show that the entrepreneur will be more likely to formalize when $\frac{\partial y_F^*}{\partial \omega} > \frac{\partial y_I^*}{\partial \omega}$, that is when

$$\left[1 - (\mu\gamma)^{\frac{\alpha+1}{\alpha-1}}\right]\left[\frac{\alpha+1}{\alpha-1}\right]\left[\left(\frac{r}{\alpha}\right)^{\frac{\alpha}{\alpha-1}}\right]\omega^{\left(\frac{\alpha}{\alpha-1}\right)} - [1-(\mu\gamma)^{\alpha-1}][\alpha-1]\left[\left(\frac{r^2}{\alpha}\right)^{\frac{1}{\alpha-1}}\right]\omega^{\alpha-2} > 0$$

Because < 1 , the first term will be positive whenever $\mu\gamma > 1$, that is when the effect of formality increases the value of output. However, even under these conditions, there will be a set of $[r, \alpha]$ under which the inequality will hold, and others under which it will not. When the costs of formality are not offset by concomitant decreases in the probability of robbery and increases in the value of output when operating formally, an entrepreneur will respond to higher crime rates by being less likely to operate formally. When the costs are low while the net effects of formality on output is high, higher crime may lead to a greater probability of operating formally. In this model, the effect of changes in crime rates on formality thus remains ambiguous.

Interestingly, higher crime rates do not unequivocally lead to lower investment levels. When higher crime rates induce entrepreneurs to switch from informal to formal operation, they can lead to higher levels of investment. We can evaluate the effect of crime on investment levels under formal and informal operations separately,

$$\frac{\partial {k_F}^*}{\partial \omega} = (\alpha-1)\left(\frac{r}{\alpha\gamma\mu}\right)^{\frac{1}{\alpha-1}}\omega^{\alpha-2} \quad \text{and} \quad \frac{\partial {k_I}^*}{\partial \omega} = (\alpha-1)\left(\frac{r}{\alpha}\right)^{\frac{1}{\alpha-1}}\omega^{\alpha-2}$$

Because $\alpha < 1$, both differentials will always be negative. Moreover, because $k_F^* > k_I^*$ whenever $\mu\gamma > 1$, it will never be the case that entrepreneurs will switch to informal operation and increase investment levels. However, when entrepreneurs switch from informal to formal operation, they can make a concomitant switch in their investment to a higher optimal level. For example, when the

level of crime rises from ω_0 to ω_1 (where $\omega_0 > \omega_1$, since ω is the probability of not being robbed), and the entrepreneur chooses to operate informally under ω_0 but formally under ω_1, she may also choose to increase her investment level when

$$k_F^*(\omega_1) > k_I^*(\omega_0) \text{ , or}$$

$$\gamma\mu < \frac{\omega_0}{\omega_1}$$

When the direct effects of formality on output are larger than the rise in crime rates, the entrepreneur may switch to formal operation and to increase her level of investment even as she faces a greater threat of robbery. Thus, microentrepreneurs make formality and investment decisions jointly and can respond ambiguously to changes in the crime rate depending on the underlying parameters of the model. Without first principles to guide us on the value of the model's parameters, we turn to empirics to estimate the net effects of changes in crime rates on informality and investment decisions.

Section 3: The Data

3A. Microenterprise Data

The data on microenterprises come from the ENAMIN, or National Survey of Microentrepreneurs, a cross-sectional, nationally representative survey of microentrepreneurs conducted on a regular basis by INEGI. We restrict attention to the two most recent ENAMIN surveys, conducted in 2001 and 2008, as they match most closely to available crime data[2]. The result is a repeated cross-section that contains 27,704 microenterprises. Summary statistics of the sample are provided in Table 2.

[2] The 2002 ENAMIN survey was conducted from October 2001 to January 2002. The 2008 ENAMIN survey was conducted between October 2008 and February 2009. We take the 4th quarter of 2001 and 2008 as the relevant period. It is important to note that the sample framework for the ENAMIN changed between 2001 and 2008. The earlier sample was drawn from the National Survey of Urban Employment (ENEU), creating an entirely urban sample, while the later sample was drawn from the National Survey of Occupation and Employment (ENOE), creating a combined urban-rural sample. The change was driven by a consolidation of labor force surveys into the ENOE in 2005, thereby changing the base from which the ENAMIN is drawn. To create comparable cross-sections we restrict attention to the urban portion of the 2008 ENAMIN, defined as microenterprises located in areas with 100,000 inhabitants or more or in areas with 15,000 inhabitants or more which form part of 43 principal cities.

The sample is largely male (64%), with an average age of 44 years. The level of education in the sample is relatively high, with 36.8% of microentrepreneurs having a secondary education and 24.4% having a tertiary education. In terms of industry composition, 36% of the sample is in commerce, 40% in services, 11% in manufacturing, 7% in construction, and 5% in transportation and communications, with the composition changing very little across the two periods. In terms of size, as measured by employees, only 21.5% of enterprises in 2001 and 24.1% in 2008 had any employees other than the owner, with the average number falling from 1.9 in 2001 to 1.7 in 2008. Approximately 40% of these employees are unpaid. Average monthly profits were $411 in 2001 and $425 in 2008. These statistics confirm the "micro" size of many microenterprises, both in terms of workers and profits.

To measure informality, we consider registration at the federal and municipal level. We count enterprises as informal if they are not registered with the federal or the relevant municipal governments. According to this measure, 66% of urban microenterprises in 2001 and 65.5% in 2008 were informal. While the national average does not change much between the two periods, as shown in Figure 1, there is significant variation in the averages at the state level. In 18 out of 32 states, average informality rose over this timeframe, while in 14 states it fell. At the maximum, average informality increased by 12.6 percentage points, while in other states it fell by as much as 11.7 percentage points. Thus, the trajectory of informality has been far from uniform across states, a fact we exploit in our estimations.

The most obvious measure of enterprise growth would utilize survey questions about the enterprises' assets. However, the ENAMIN survey module on assets changed dramatically between 2001 and 2008, with the latter module asking only one question on the total value of these assets and generating a high non-response rate (over 20% of the 2008 survey respondents do not answer the asset question)[3]. As a result, we do not have reliable asset measures for 2008. Measuring firm size using labor also is not optimal, given the very low percentage of firms that have any employees. Instead, we rely on entrepreneurs' responses to the question of how they plan to continue the enterprise in the future. Responses include: increasing the number of products, increasing the

[3] In the 1992-2001 ENAMIN surveys the asset module asks separately about the condition upon acquisition, ownership status, and current resale value of tools, machinery, equipment and furniture, computers, and vehicles. In 2008 the asset module is condensed to one question about the estimated resale value of all tools, machinery, utensils, equipment and vehicles used by the enterprise.

number of workers, reducing the number of products, reducing the number of workers, improving the quality of services or products, changing location, seeking a loan, or not enacting important changes. We count entrepreneurs who plan to increase the number of products or workers as having expansion plans, as these responses likely are most highly correlated with enterprise growth. The other responses are most likely correlated with stagnation or shrinkage of the business. We consider alternative measures of enterprise growth in Section V.

Overall, the percentage of enterprises with expansion plans falls across the two periods. In 2001, 15% of enterprises had plans to expand products/services or employees. This figure falls to 9.6% in 2008. Similar to informality, the trajectory varies significantly across states. In 26 states, the average percentage of enterprises with expansion plans falls, while in 6 states it increases. The size of the changes ranges from a 21.6 percentage point decline to an 11.5 percentage point increase. Again, we exploit this variation in our empirical analysis.

3.B. Crime Data

The data on crime come from the National Survey of Insecurity, or the ENSI. This nationally representative household survey was designed to generate reliable estimates of the incidence of common offenses, including vehicle robbery, home robbery, assault and sexual assault, as well as reporting rates, economic losses, perceptions of insecurity, and changes to behavior related to these crimes. As a household level survey, the ENSI produces more reliable estimates of victimization rates than official crime statistics due to the fact that reporting rates for these crimes are low. For example, according to the ENSI, on average 32% of home robberies, 17% of partial vehicle robberies, 87% of full vehicle robbery and 47% of assaults are reported to the authorities.

In our analysis, we use two rounds of the ENSI: the ENSI-3, which corresponds to the year 2004 and the ENSI-6, which corresponds to year 2008[4]. These are the two nationally representative ENSI surveys that most closely match the timing of the microenterprise data. To measure crime incidence, we take the percentage of individuals age 18 or older in urban areas of the state who report being victims of a particular crime in the past year[5]. Our interest is in property crime, and thus we focus on home robbery, full vehicle robbery, and partial vehicle robbery. We are also

[4] There are other ENSI surveys, but only these three are representative at the national and state level.
[5] Averages are weighted to be representative at the state level

concerned about controlling for other types of crime that would not be expected to directly influence the investment and formality decisions of microentrepreneurs but may capture underlying local factors that affect them. We thus also consider physical assault and sexual assault from the ENSI as well as official statistics on homicide rates per 100,000 inhabitants, compile by the Citizens' Institute for the Study of Insecurity (ICESI), which also coordinates the ENSI surveys. It is important to note that two states are not included in the 2008 ENSI - Tamaulipas in the North and Tabasco in the South, Gulf region - restricting the overall sample to 30 out of 32 states.

Summary statistics on incidence and reporting rates across states are provided in Table 3. In 2004 home robbery has a higher average incidence than vehicle robbery, assault, and sexual assault. For interpretation, a value of 2.8% means that, on average across all states, 2.8% of adults age 18 or older in urban areas report being a victim of home robbery at least once in year 2004. This compares to 0.6% for full vehicle robbery, 1.9% for partial vehicle robbery, 0.2% for sexual assault and 1% for assault. The crime rankings change in 2008 due to a large increase in the incidence of partial vehicle robbery. While home robbery falls slightly to 2.3%, partial vehicle robbery shoots up to 5.2%, more than double the incidence of home robbery and close to five times the incidence of assault. While recent attention on crime in Mexico has focused on drug related violence, these statistics establish that petty, non-drug crimes are also a serious concern for many residents.

To show the distribution of crimes across states, Figures 2A and 2B map average incidence across states for home robbery, partial vehicle robbery, full vehicle robbery and assault for the years 2004 and 2008. Figure 2C maps changes in the averages over the four year period. The maps show a high degree of dispersion across states in crime incidence across states, and also show an absence of geographic concentration of property crime and physical assault. This means we are not simply capturing regional phenomena with state level averages. The maps also show that changes in crime rates have been far from uniform across states, with some states registering an improvement in crime rates while other register deteriorations. Again, there do not appear to be strong regional trends in the changes, which helps our empirical estimation.

Finally, the ENSI does not ask about severe crimes, such as homicide, violent assault or kidnapping (although it does ask about short kidnappings, called secuestro express). Given that our data cover the period marked by a sharp increase in drug related violence in Mexico, we also control for estimates of drug-related deaths in Section V.

4. Empirical Strategy

Our starting point is a model in which robbery rates affect expansion and informality:

$$B_{ist} = \alpha + \beta_1 X_{ist} + \beta_2 Z_{st} + \beta_4 robbery_{st} + \delta_t + \gamma_s + \varepsilon_{ist} \quad (1)$$

where B_{ist} is the outcome variable of individual i living in state s interviewed at time t, X_{ist} is a vector of individual-level controls, Z_{st} is a vector of state-level controls, $robbery_{st}$ is the state and time-specific robbery rate, δ_t is a time fixed effect, and γ_s is a state-level fixed effect.

We consider two outcome variables: the first ($informality_{ist}$) is a dummy variable that equals one if the firm is informal and zero otherwise; the second ($expansion_{ist}$) is a dummy variable that equals one if the firm has plans to expand and zero otherwise. Our theory suggests that higher robbery rates are associated with reduced microenterprise expansion ($\beta_4 < 0$), but the effects of robbery rates on informality are theoretically ambiguous ($\beta_4 > 0$ or ≤ 0).

The difficulty in identifying the relationship between robbery and microenterprise outcomes arises from the fact that robbery rates and their changes over time neither are random across states nor entirely orthogonal to other factors that impact the registration and investment decisions of firms. This could lead to reverse causality, wherein microenterprise formalization and expansion attracts higher crime rates, or to omitted variable bias in our estimates of this relationship. Random assignment of a program that reduces crime rates could, in theory, eliminate these biases, though implementation of such a program on a sufficiently broad scale is challenging and costly. In the absence of experimental strategies, instrumental variables could also provide unbiased estimates of the relationship between property crime and expansion and formality decisions. Most of the instruments for crime rates used in the literature, such as weather, are likely to affect demand and thus would be directly correlated with microenterprise formality and expansion decisions, making them invalid instruments for our estimation.

Instead, we rely on differences in crime rates over time and across states using repeated cross-section data, which allow us to control for state fixed effects as well as observable state and time varying factors which may jointly determine robbery and microenterprise expansion and

registration. These controls also allow us to isolate the impact of property crimes—particularly robbery—from those of other types of crime, such as homicides and sexual assaults, that could affect demand for microenterprises' goods and services but would not be expected to directly influence risk of expropriation faced by microentrepreneurs. We compare the effects of robbery to those of non-property crimes, such as homicide and sexual assault, that would not be expected to directly influence the investment and formality decisions of microentrepreneurs, but which may be related to underlying factors that determine both these crimes and robbery. We also consider the incidence of physical assaults, also taken from the ENSI, in some specifications, although these are more likely to reflect some dimension of property crime or destruction. The inclusion of non-property crimes helps control for unobserved factors which vary across states and across time and jointly determine crime rates and enterprises' registration and investment decisions. For example, criminals may be drawn to areas where enterprises are more visible and growing more rapidly, and the inclusion of non-property related crimes, if criminals do not differentially locate, can help account for this reverse causality[6].

Mexican states experienced a variety of institutional changes and economic phenomena between 2001 and 2008, and many of these changes could be correlated with states' differential crime trends. If these changes are also causally related to microenterprise formalization and expansion, they could bias our estimates. We therefore conduct a battery of robustness checks by including time-varying measures of state-level demographics, unemployment and GDP growth rates, crime reporting rates, judicial efficiency, effectiveness of police and other public forces, and business registration offices. To control for broader trends in crime associated with the drug trade, we drop from the estimation states serving as the primary entry and exit points for drugs in the Mexican market, as well as states with the highest levels of drug-related homicides. We also sequentially drop states on the US-Mexico border and the state of Mexico City to check that the effects we identify are not driven by differential conditions in these states, which could be correlated with other economic factors. Overall our identification rests on the assumption that, after controlling for these observable state-level time-varying conditions, robbery rates ($robbery_{st}$) remain uncorrelated with the error term (ε_{ist}), making β_4 unbiased. While we cannot rule out the possibility that other state and

[6] The extent to which this controls for reverse causality depends on whether or not criminals differentially located depending on the type of crime they engage in.

time-varying factors could be jointly responsible for robbery rates and business decisions made by microentpreneurs, this battery of robustness checks provide strongly suggestive evidence on the existence of a causal link between robbery rates and microenterprise expansion and formalization.

Our theory model highlights the role of robberies of assets utilized by microenterprises, but we recognize that robbery rates may also be correlated with demand for goods and services offered by microenterprises. If this is the case, our estimates could reflect entrepreneurs' responses to changes in market demand rather than risk of expropriation of the specific assets they own. For example, higher home robbery rates could lead people to limit the time they spend away from home, thereby reducing their spending on goods and services supplied by microentrepreneurs. To test whether our estimates are driven by demand effects rather than microenterprise expropriation risk, we distinguish between different types of robberies—principally home and vehicle robberies—that might differentially affect microentrepreneurs operating using different types of moveable assets. If expropriation risk is the primary factor driving our estimates, for example, then we should observe that transport enterprises respond differentially to vehicle robberies. Conversely, demand effects of asset-specific crimes would be reflected in broader conditions even for enterprises not actively using these assets or operating in these locations. If demand factors indeed are driving our estimates, transport enterprises should not differentially respond to vehicle robberies. In this case changes in vehicle robberies reflect broader conditions, and should have a similar impact on transport and non-transport industries. Thus, comparing the differential effects of asset-specific robberies offers a useful test of the causal mechanism highlighted in our theory.

5. Baseline Results

We first estimate equation (1) using OLS without state-time varying controls (i.e., excluding Z_{st}). Covariates include the entrepreneur's gender, age, age squared, education, and experience, as measured by the number of years working in the enterprise or similar activity, as well as industry, state and year fixed effects. We use the ENAMIN survey sampling weights in our estimation. The results, presented in column (1) in Tables 4A and 5A, show a significant correlation between robbery and the outcome variables. For informality (Table 4A), the coefficient on home robbery is positive and significant, which means that higher rates of home robbery are associated with higher

average rates of microenterprise informality. For expansion, the coefficient on home robbery is negative and significant, which means that higher rates of home robbery are associated with lower probability of microenterprise expansion plans.

In column (2) of Tables 4A and 5A, we add state-level controls in order to capture economic conditions and employment opportunities that may jointly determine microenterprise and criminal activity. We include state-year measures of unemployment and real GDP per capita growth (from INEGI). In column (3), we add state-year measures of average years of schooling for adults aged 15 or older and the percentage of the state population that is comprised of 16-19 year old males, obtained from the 2000 and 2005 Mexican census. The coefficients on home robbery rates remain significant and relatively unchanged.

In column (4) of Tables 4A and 5A, we add the incidence of physical assault as an additional covariate. This reduces the magnitude of the coefficient on home robbery in the informality regression (Table 4A) and increases its standard error, making the coefficient not statistically different than zero. Meanwhile, physical assault is not statistically significant. One potential explanation may be that some assaults involve property crimes as well. At the same time, in the expansion regression (Table 5A), the coefficient on home robbery remains highly significant, while physical assaults are not significant.

We also compare the effects of home robberies to those of vehicle robberies, including "full" robberies in which the entire vehicle is stolen and "partial" robberies in which parts and accessories, such as tires and engine and dashboard components, are stolen. Column (5) of Table 4A shows that full and partial vehicle robbery rates do not appear to affect the likelihood of enterprise informality. In Column (5) of Table 5A, we find that full vehicle robberies negatively affect enterprise expansion plans, but this coefficient becomes insignificant when it enters into the regression jointly with home robbery rates (Column (6)).

As noted in the empirical strategy section, we expect vehicle robberies to differentially affect enterprises in sectors where vehicles are used to a greater degree. In Table 4B, we compare the effects of vehicle robberies on informality among enterprises in the commerce and services industry category to the effects among those in the transport and communication category. We find that while vehicle robbery rates do not affect informality in the former category (Column (2)), partial

vehicle robbery rates do significantly affect informality rates in the latter category (Column (4)). By contrast, home robbery rates significantly affect informality in commerce and services sector but not in the transport and communications sector. Because the subsample of enterprises in the latter sector is relatively small and the insignificant effect of home robbery could be due to statistical power, we also regress informality on home robberies without including vehicle robberies (although including homicides and sexual assaults). Columns (1) and (3) present the results of these regressions, finding a significant effect of home robberies and homicides in both sectors. These findings support our hypothesis that property crimes affect microenterprise expansion and formalization decisions through the risk of expropriation of the enterprises' assets rather than by limiting demand for the enterprises' goods and services.

6. Robustness Checks

In this section, we address a variety of potential concerns about our primary outcome measures and about omitted variables that could bias our estimates. The results of these checks for informality are shown in Tables 6 and 7. The results for expansion are shown in Tables 8 and 9.

6.A. Skill

We consider additional controls for entrepreneurial skill, which factors into the returns to both entrepreneurship and to criminal activity. If the likelihood that microenterprises formalize or expand and the likelihood that individuals engage in theft are both linked to average skill levels at the state level, inappropriate controls for skill could lead to a spurious correlation between robbery rates and our outcome measures. The baseline estimates included individual entrepreneurs' education and experience, as well as average education levels in the state. We now add two additional measures. The first consist of two dummy variables based on the reasons entrepreneurs give for starting their businesses (McKenzie and Woodruff 2006, McKenzie and Sakho 2010). One of the variables equals one if an entrepreneur cites entering entrepreneurship because of family tradition or the ability to earn more than in wage employment. These responses likely indicate greater entrepreneurial skill. The other variable equals one if an entrepreneur cites entering entrepreneurship due to a lack of better options. This response likely indicates lower levels of entrepreneurial skill.

Secondly, in our regressions of expansion, we consider whether or not a firm keeps accounts. Entrepreneurs that keep accounts likely are more highly skilled than those who do not. Estimation results incorporating these controls are shown in the first columns of Tables 6 and 8. The signs of the additional skill controls are in the right direction, as family tradition/higher income is associated with a higher propensity to be formal and expand, while lack of alternative employment is associated with a lower propensity to be formal and expand. Meanwhile, enterprises that keep accounts have a much higher propensity to expand. In all cases, however, the inclusion of these controls does not change the sign or significance of the coefficient on home robbery. While we cannot completely control for skill, given that a large share of it is difficult to observe, it is promising that our results are robust to additional observable measures.

6.B. Microenterprise age

We separately estimate informality and expansion plans for firms based on their age, given evidence from registration programs in Mexico and Brazil that new firms may have a higher likelihood of registering than established firms (Bruhn 2010, Fajnzylber et.al. 2010). This suggests that firms more heavily consider the formality decision at infancy. Newer firms also might be more likely to expand. We divide firms into two categories: (1) "new" firms that have been in operation for less than two years; (2) "established" firms that have been in operation for two or more years. We separately estimate outcomes for each group. Results are shown in Columns (2) and (3) of Tables 6 and 8. For informality, we find that the effect of robbery is more heavily concentrated in new firms. This is to be expected if registration decisions are more likely to occur during a firms' infancy than its adult life. We lose precision, however, given the small sample of young firms, and the robbery effect becomes insignificant for this group. For expansion, we also see that the robbery effect is more pronounced among new firms, as the coefficient is almost double that for established firms. For both groups, the robbery effect on expansion remains significant. This suggests that robbery may have a differential impact on the formalization decisions and growth trajectories of new firms.

6.C. Sensitivity to Dropping States

Our identification strategy relies on state- and time-level variation in crime rates and other observed factors. There may be concerns, however, that our results are driven by other differential trends in

particular states, like changes in drug market activity and violence or economic changes along the US-Mexico border. As we discuss below, we consider the robustness of our estimates to these phenomena by sequentially dropping groups of states from our analysis.

6.C.1. Mexico City

We first consider the sensitivity of our results to removing Mexico City from the sample. Mexico City, which is a federal district and exists as a separate entity, is an outlier in terms of size and crime incidence, particularly robbery. To ensure that our results are not driven by a "Mexico City" effect, we re-estimate the model on a sample that excludes Mexico City. Results are shown in Column (4) of Tables 6 and 8. In all cases, our results are robust to the exclusion of Mexico City. For informality, the size of the coefficient falls slightly, but it remains positive and significant. For expansion, the size of the coefficient is relatively unchanged, and remains negative and significant. We also note that we repeat this exercise for all states, removing one at a time from the estimation. In all cases the results are robust, confirming that our finding of a robbery effect is not driven by one particular state. Results are available upon request.

6.C.2. Drug Violence

We next consider the sensitivity of our results to removing states that have been most affected by drug violence. Sensitivity to drug violence is a natural concern given that the time frame of our study coincides with the dramatic rise in drug-related crime in Mexico as well as the prevalence, severity, and visibility of these crimes. This rise could affect our estimates if changes in drug-related crime are differentially correlated with robbery rates (more so than with homicide rates, for example), and if drug-related crimes affect the demand for microenterprise goods and services (rather than their risk of property loss or damage). We attempt to control for these concerns by excluding states most affected by drug-related violence. We consider three alternative specifications of this group. First, we exclude all Northern border states (6 states). Second, we exclude states with the highest degree of drug entry, determined by the Washington Post's Mexico at War series (7 states). Third, we remove states with the highest number of drug related deaths over the 2006-2008 period (6 states). The data on drug-related deaths come from the Crime Indicator Database for the Justice in Mexico Project at the Trans-Border Institute. The dataset contains the unofficial tally of drug-related homicides per state per year as reported by the Mexican newspaper Reforma from 2006

through 2008. Results are shown in last columns of Tables 6 and 8. For both informality and expansion the results are largely robust to removing border, drug entry states and high drug death states. In the expansion regression excluding border states, the coefficient on home robbery falls in magnitude somewhat and its standard error is slightly higher, making it statistically insignificant. The effect of home robbery in the informality regression excluding border states remains statistically significant and is larger in magnitude. We take this as evidence that our results are not completely driven by changes in drug related violence.

6. D. Alternative Measure of Firm Expansion

We recognize that our measure of firm expansion is based on the reported plans of entrepreneurs rather than actual firm asset holdings or other measures of capital investment. As a result, this measure could overstate the extent to which home robbery rates affect actual firm growth. We therefore consider alternative measures of firm growth. The first is whether or not a firm has a fixed location, as Fajnzylber et. al.(2010) find that firm registration impacts the likelihood that a firm has a fixed locale. They argue this might be an important dimension along which capital investment occurs. A fixed location (versus an ambulatory one, such as a street cart) is also consistent with our theory that crime may impact the formality decisions of firms because formality increases visibility. A fixed location also increases visibility and our hypothesis suggests that higher robbery rates would reduce the incidence of fixed locations among microenterprises. We re-estimate the baseline version of equation (1) using a fixed location as the outcome variable. Results are shown in the last column of Table 8. The coefficient falls to half the value of the original one, but remains negative and significant at the 10%. This provides further evidence that robbery negatively impacts microenterprise firm size.

6.E. Local Institutional Quality

An important potential source of omitted variable bias is the quality of local institutions, as changes in these institutions may simultaneously explain changes in robbery rates and microenterprise behavior. For example, states with improved judicial institutions may have reduced the explicit and

implicit costs to microenterprises by lowering registration requirements or graft, while simultaneously reducing overall crime rates. We attempt to control for these differences using a variety of strategies. We start with measures of local police and judicial effectiveness; measures that were first used by Laeven and Woodruff (2007) in their study of firm size and local institutional quality in Mexico. The measures come from surveys of lawyers on the effectiveness of local courts in enforcing commercial code governing bank debt (for example, seizing collateral). The surveys began in 1998 and are conducted every two to three years by the Consejo Coordinador Financiero under the direction of the Center for the Study of Law at the Instituto Tecnologico Automono de Mexico (ITAM). The focus on a specific commercial code comes from the fact that while bank debt laws largely are set at the national level, since judicial proceedings must take place in courts where the debtor is located, the implementation and enforcement of the laws varies at the state level. In the surveys, approximately 500 lawyers who either work for banks or act as outside counsel are asked a series of questions regarding the effectiveness of local legal institutions. Responses are ranked from 5 (best) to 1 (worst) and the averages show a high degree of variation across states (total values that range from 3.42 to 1.86-Consejo Coordinador Financiero 2002).

We use the 2002 and 2009 surveys to create measures of local institutional quality. We recognize concerns regarding the ability to capture changes in institutional quality over the seven year time frame of our study. We argue, however, that these years cover a period of dramatic political change in Mexico, following the end of 71 years of single party rule by the PRI (Institutional Revolutionary Party) in the year 2000. Given the tremendous increase in political competition at both the federal and state level and institutional changes stemming from the dismantling of single-party rule, we argue that is reasonable to expect institutional change at the local level over the time period considered. Furthermore, these changes likely have not been uniform across states, making the use of multiple years of ITAM surveys appropriate.

We create three measures of local institutional quality from the ITAM surveys. The first is a measure of judicial effectiveness. Following Laeven and Woodruff (2007), it is an average of the questions relating to: (1) the quality of judges; (2) the impartiality of judges; (3) the adequacy of judicial resources; (4) the efficiency of the execution of sentences; and (5) the adequacy of local

legislation related to contract enforcement[7]. The second is a measure of the support of public forces (such as the police) in executing judicial sentences. The third is a measure of the efficiency of actuaries, notaries and executors. Since the survey does not deal with criminal code, we include the second two measures as we anticipate they may relate more directly to police presence and other commercial codes which impact microenterprises. As shown in the first two columns of Tables 7 and 9, the inclusion of these variables does not alter the sign or significance of the original estimates. For informality, the size of the coefficient on home robbery falls, but remains positive and significant.

We next consider two alternative measures of institutional quality, in case those implemented above do not capture relevant institutions for the criminal code. First, we consider average reporting rates for home robbery. This variable comes from the ENSI surveys, and is the average percentage of the last home robbery that was reported to the authorities[8]. We expect that in states in which police forces, court proceedings, or other institutions have improved substantially, households may be more likely to report crimes to the authorities. Second, we consider perceptions about insecurity. This measure, also taken from the ENSI surveys, takes the average number of adults in urban areas of the state who responded that they consider living in the state to be "insecure". Public perceptions of insecurity are likely to reflect risks associated with a broader set of institutions and thus would capture local institutional variation over time.

The results of estimations incorporating these control variables are shown in Columns (3)-(4) of Tables 7 and 9. For informality, home robbery reporting rates are negative and significant; indicating that in states with higher reporting rates, informality is lower. This is consistent with our expectations, and suggests that reporting rates do reflect variation in institutional quality. The perception of insecurity, meanwhile, has no significant effect on informality. This is perhaps due to the fact that the perception of insecurity has increased uniformly across states, and seems largely de-linked from actual crime rates. In both cases, however, home robbery rates remain positive and significant. Meanwhile, for expansion, neither reporting rates nor the perception of insecurity is

[7] Laeven and Woodruff (2007) also include responses on the efficiency of the public property registries, but this question was discontinued in 2006 (Consejo Coordinador Financiero 2009). To ensure the comparability of the averages across years, we therefore do not include it.

[8] Given the way the ENSI is designed, we cannot construct a measure of total home robberies that were reported. Victims are only asked details about the last crime.

significant. The effect of home robbery, however, remains negative and significant. To the extent that the judicial quality, crime reporting, and security perception variables effectively control for local institutional features, these results indicate that the robbery effect we find is not simply a reflection of broader institutional changes underlying crime and microenterprise decisions.

6. F. Registration reform across states

The time period between the two ENAMIN surveys included notable reforms of business registration by the federal government. In 2002, the government enacted legislation that reduced the federal requirements for registering some businesses and encouraged the reduction of registration requirements at the state and municipal level[9]. To inform the public about the federal reforms and promote similar steps by the municipalities, the agency charged with enacting the federal reforms, COFEMER (Federal Commission for Improving Regulation), began opening business registration centers, known as SAREs (Rapid Business Opening System), in major municipalities around the country (Bruhn 2010). The SARE program was launched in March 2002, after the first ENAMIN survey, and as of 2008, there were 169 SARE centers operating in every state except Nayarit (COFEMER website).

Despite the goal of standardizing the registration process, however, there still exists significant variation in registration requirements across states. As of 2009, the number of days it takes to register a business ranges from 12 to 57, while the cost ranges from 7.4% of income per capita to 25.6% of income per capita (Doing Business in Mexico 2009)[10]. Furthermore, some states have progressed more rapidly than others in reducing registration requirements. This variation in registration requirements, if linked with local institutional quality, could lead to a spurious correlation between microenterprise informality and crime rates. We therefore test whether the introduction and timing of the SARE program affect our results.

We create two measures of the SARE program. The first is the change in the number of SARE offices by state from year end 2001 to November 2008, the time of the ENAMIN survey

[9]Federal regulation was reduced to two procedures that could be implemented in 72 hours or less for "low risk" enterprises, which comprise 685 out of 1254 categories. See Bruhn (2010) for more details on the program.

[10] Estimates taken from the largest cities in each state.

(COFEMER website). The second is the maximum number of months any SARE office in the state had been open as of November 2008 (COFEMER website). Results of the model that include the SARE variables are shown in Tables 7 and 9. As expected, the inclusion of the SARE variables has a larger impact on informality than expansion. For informality, the size of the coefficient on home robbery falls, but remains significant in almost all cases. For expansion, the size and significance of the coefficient on home robbery is unchanged. These results suggest that the effect of home robbery, particularly on informality , is not being driven by regulatory changes at the state level stemming from the introduction of SARE offices.

7. Conclusions

This paper highlights a new dimension of the costs of weak property rights. Most of the focus in assessing these costs to firms and households has been on the threats posed by the state itself and on the insecurity of land and real estate. There has been much less focus on the threat of robbery by private citizens or groups against moveable assets, particularly on the effects of this threat on microenterprises. One reason that this dimension has been largely uninvestigated is the difficulty of identifying credible, disaggregated data on both crime and microenterprises collected over time. We overcome this hurdle by linking datasets on these two distinct issues that jointly provide a rich information set in which to test hypotheses about the nature of the effects of property crime on a variety of microenterprise decisions.

Our strategy relies on variation in property crimes across states and over time in Mexico, controlling for state and year fixed effects and a variety of observable time-varying factors, including non-property crimes, judicial efficiency, and business registration requirements. Admittedly, we cannot eliminate the possibility that other unobserved factors which vary across states and time could be correlated with property crimes and microentrepreneur expansion and formalization decisions. Given that crimes against different property types differentially affect the decisions of enterprises relying on these types of assets, we view our results as a strong indication of a causal relationship between property crimes and microenterprise expansion and formalization.

Our findings have a number of implications for policymakers. First, microenterprise growth is dependent on the social context in which these enterprises operate, and entrepreneurs clearly

respond to risks in this environment. Growth among these enterprises may thus remain limited in settings with high crime, even when public programs offer these enterprises training on business practices, improved access to credit, or other services aimed at enterprise expansion. In such settings, investing in protections of private property rights—particularly protection for individuals in lower socioeconomic categories—may prove more effective in raising microenterprise growth trajectories than would investment in the aforementioned programs.

Second, our theory model highlighted the potential ambiguous response of formalization to robbery risks, based on the dual potential effects of formality on raising targeting of firms by criminals and improving protection by and recourse to official authorities. While our estimation does not allow us to separately identify these effects, we note that the link between higher robbery rates and lower formalization rates suggests that formalization is not *primarily* based on desire for protection against property crimes and recourse to public authorities. This may help policymakers better understand the benefits of formality as perceived by entrepreneurs when the former design programs aimed at raising formalization rates.

Finally, while we identify an important link between property crime rates and microenterprise behavior, linking changing crime rates to explicit features of the local institutional environments across Mexico remains a useful area for further research. For example, it would be useful to determine which dimensions of the local settings have most directly influenced variations in property crime rates over the past decade, and to the degree to which these dimensions are actionable by public entities.

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Table X: Urban Microentrepreneurs, 2008

	All	Formal	Informal	P-value
Victim of given crime in past year:				
Fines/ Bribes	8.14%	11.42%	6.41%	0.000***
Robbery	9.58%	14.05%	7.23%	0.000***
Private Extorsion	1.19%	2.12%	0.70%	0.000***
Fraud	8.79%	13.15%	6.50%	0.000***
Natural Causes/ Accident	2.53%	4.64%	1.42%	0.000***
Of victims of given crime, Estimated loss/monthly profits				
Fines/ Bribes	0.53	0.73	0.34	0.004***
	(2.19)	(3.06)	(0.73)	
Robbery	1.72	2.43	1.03	0.001***
	(7.34)	(10.15)	(2.07)	
Private Extortion	0.56	0.47	0.72	0.229
	(1.32)	(1.24)	(1.44)	
Fraud	0.62	0.68	0.57	0.660
	(4.50)	(6.15)	(1.62)	
Natural Causes/ Accident	0.90	0.88	0.93	0.825
	(2.24)	(1.88)	(2.75)	
Monthly Profits (US$)	387.8	610.3	275.7	0.000***
	(695.6)	(1058.6)	(354.0)	
Of victims of given crime, % who reported to authorities				
Robbery	22.0%	27.5%	16.5%	0.000***
Private Extortion	24.9%	27.8%	20.3%	0.229
Fraud	3.4%	5.3%	1.3%	0.000***
Observations	16,398	5,959	10,439	

Coefficients are weighted averages. Standard deviations are in parentheses
We restricted the 2008 ENAMIN sample to urban microentrepreneurs, defined as those living in areas with 100,000 inhabitants or more or in one of 43 cities. This population is comparable to earlier ENAMIN samples

Table 2: Summary Statistics, ENAMIN

Urban Microentrepreneurs	Total Sample	By Survey Year	
		2001	2008
Entrepreneur a woman	36.6%	31.8%	41.2%
Entrepreneur married	72.8%	73.7%	72.0%
Average Age (in years)	44.0	43.1	44.9
	(12.9)	(12.7)	(13.1)
Primary Education or Less	38.7%	42.1%	35.5%
Secondary Education	36.9%	36.0%	37.6%
College Education	24.6%	21.9%	26.8%
Experience (in years)	9.77	9.60	9.93
	(9.3)	(9.1)	(9.45)
Monthly Profits (USD)[11]	418.1	411.1	425.2
	(717.3)	(670.2)	(762.7)
Employees, total	0.41	0.41	0.41
	(1.01)	(1.11)	(0.91)
Employees, paid	0.26	0.27	0.26
	(0.88)	(0.97)	(0.78)
Employees, unpaid	0.14	0.13	0.15
	(0.48)	(0.48)	(0.49)
Enterprise located in individual's home	18.8%	16.0%	21.4%
Keeps Accounts	43.6%	49.3%	38.2%
Industry:			
Manufacturing/Production	10.9%	11.2%	10.7%
Construction	7.3%	6.4%	7.9%
Commerce	36.4%	34.4%	38.4%
Services	40.0%	42.6%	37.5%
Transportation & Communications	5.3%	5.2%	5.3%
Enterprise Informal	65.8%	66.0%	65.5%
Of enterprises <2 years	68.9%	62.8%	75.4%
Of enterprises >=2 years	62.5%	65.2%	61.0%
Plan to Expand	12.2%	15.0%	9.6%
Of enterprises <2 years	14.9%	17.1%	12.6%
Of enterprises >=2 years	10.0%	12.1%	8.8%
Observations	27,704	16,398	11,306

[11] All values converted to December 2001 Mexican pesos using the CPI and converted to US dollars using the December 30, 2001 exchange rate of 9.16 pesos per US$.

Table 3: Crime Rates

Population weighted state level averages, for urban areas	2004	2008
Home Robbery	2.75%	2.33%
Min	0.54%	1.06%
Max	7.63%	4.37%
Partial Vehicle Robbery	1.89%	5.18%
Min	0.47%	0.91%
Max	4.47%	10.54%
Full Vehicle Robbery	0.57%	0.83%
Min	0.00%	0.00%
Max	3.71%	3.38%
Physical Assault	1.08%	0.41%
Min	0.04%	0.05%
Max	2.50%	1.77%
Sexual Assault	0.25%	0.11%
Min	0.00%	0.00%
Max	0.97%	0.33%
Homicide (per 100,000)	28.5	28.0
Min	9.0	14.0
Max	56.0	70.0
Last home robbery reported	30.4%	33.6%
Min	4.14%	1.02%
Max	53.93%	68.55%

Correlations	Home Rob	PartVehRob	Full VehRob	PhyAssault	SexAssault
Home Robbery	1.0000				
Partial Vehicle Robbery	0.1055	1.000			
Full Vehicle Robbery	0.3328	0.3479	1.000		
Physical Assault	0.2022	-0.3339	-0.0676	1.000	
Sexual Assault	0.0465	-0.0987	-0.1367	0.3236	1.000

Population weighted averages by state. Source for home robbery, partial vehicle robbery, full vehicle robbery, physical assault, and sexual assult, ENSI. Values are percent of adults age 18 or older living in urban areas of the state who report were victims of a specific crime at least once last year. Source of homicide data, ICESI.

Table 4A: Informality

INFORMALITY	(1)	(2)	(3)	(4)	(5)
Home robbery	0.950**	0.970**	0.970**	0.720	
	(0.389)	(0.402)	(0.402)	(0.533)	
Homicides		0.000637***	0.000637***	0.000590	
		(0.000200)	(0.000200)	(0.000431)	
Sexual Assault		-6.439***	-6.439***		
		(2.055)	(2.055)		
Physical Assault				0.879	
				(1.268)	
Full vehide robbery					1.663
					(1.356)
Partial vehide robbery					0.0711
					(0.329)
State-year unemployement & GDP		X	X	X	X
State-year education & males 16-19			X		
Observations	25,996	25,996	25,996	25,996	25,996
R-squared	0.151	0.152	0.152	0.152	0.151

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Estimated using survey weights, standard errors dustered by state
Other controls indude gender, age, age squared, education and experience, industry, year and state fixed effe

Table 4B: Informality, Industry-specific

INFORMALITY	Industry Specific			
	Commerce & Services		Transpor & Comm.	
	(1)	(2)	(3)	(4)
Home robbery	0.923***	0.661**	6.671*	3.288
	(0.240)	(0.322)	(3.872)	(2.677)
Homicides	0.000550***		0.00518***	
	(0.000149)		(0.00147)	
Sexual Assault	-5.144***		-20.96	
	(1.696)		(16.65)	
Full vehide robbery		0.770		-5.101
		(0.952)		(7.974)
Partial vehide robbery		0.00133		5.671***
		(0.251)		(2.030)
Observations	18,325	18,325	1,866	1,866
R-squared	0.134	0.134	0.178	0.174

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Estimated using survey weights, standard errors dustered by state
Controls indude gender, age, age squared, education, experience,
state-year unemployment, real GDP per capita growth, state and year fixed effects

Table 5A: Expansion

EXPANSION	(1)	(2)	(7)	(3)	(4)	(5)
Home robbery	-1.735***	-1.558***	-1.558***	-1.621***		-1.539***
	(0.465)	(0.493)	(0.493)	(0.510)		(0.555)
Homicide		0.000695	0.000695	0.000759		
		(0.000417)	(0.000417)	(0.000467)		
Sexual assualt		-4.188	-4.188			
		(3.446)	(3.446)			
Physical Assault				-0.0404		
				(2.150)		
Full vehide robbery					-3.113*	-1.719
					(1.722)	(1.562)
Partial vehide robbery					0.279	0.371
					(0.447)	(0.369)
State-year unemployement & GDP		X	X	X	X	X
State-year education & males 16-19			X			
Observations	25,996	25,996	25,996	25,996	25,996	25,996
R-squared	0.065	0.065	0.065	0.065	0.065	0.065

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Estimated using survey weights, standard errors dustered by state
Other controls indude gender, age, age squared, education, experience, industry, year and state fixed effects

Table 5B: Expansion, Industry-specific

EXPANSION	Industry Specific			
	Commerce & Services		Transpor & Comm.	
	(1)	(2)	(3)	(4)
Home robbery	-1.675**	-1.572**	-1.038	-0.716
	(0.725)	(0.752)	(0.756)	(0.526)
Homicides	0.000938*		0.000332	
	(0.000512)		(0.000389)	
Sexual Assault	-6.309		-3.595	
	(4.356)		(3.322)	
Full Vehide Robbery		-3.092		0.944
		(2.138)		(1.760)
Partial Vehide Robbery		0.671		-0.766**
		(0.474)		(0.350)
Observations	18,325	18,325	1,866	1,866
R-squared	0.035	0.035	0.033	0.033

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Estimated using survey weights, standard errors dustered by state
Controls indude gender, age, age squared, education, experience,
state-year unemployment, real GDP per capita growth, state and year fixed effects

Table 6: Robustness Checks, Informality

INFORMALITY	Skill	Duration		Removing States			
	Reasons	>=2 yrs	< 2 yrs	Mexico City	Border	Drug entry	Drug deaths[1]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Home robbery	1.158**	0.645***	1.773	0.950**	1.450**	1.076**	0.927*
	(0.454)	(0.204)	(1.229)	(0.385)	(0.580)	(0.444)	(0.450)
Homicide	0.000790***	0.000450***	0.00149**	0.000647***	0.000671***	0.000566**	
	(0.000205)	(0.000137)	(0.000686)	(0.000214)	(0.000238)	(0.000262)	
Sexual assault	-6.259***	-8.178***	-4.039	-6.275***	-8.823***	-5.524**	-5.826**
	(2.055)	(1.510)	(5.903)	(2.122)	(3.126)	(2.372)	(2.662)
Reasons for entering business:							
Family trad./higher income	-0.0794***						
	(0.0138)						
Lack of employment	0.0733***						
	(0.0125)						
Observations	25,996	20,065	5,867	25,091	21,336	19,811	21,425
R-squared	0.161	0.156	0.157	0.158	0.145	0.153	0.147

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Estimated using survey weights, standard errors clustered by state

Controls include gender, age, age squared, education, experience, state-year unemployment, real GDP per capita growth, state and year fixed effects. Industry effects included for regressions not estimated separately for particular industries

[1] Drug death states are those with highest drug-related deaths in 2009: Baja California, Chihuahua, Durango, Guerrero, Michoacan and Sinaloa, Data from the Crime Indicator Database for the Justice in Mexico Project at the Trans-Border Institute.

Table 7: Additional Robustness Checks, Informality

INFORMALITY	Judicial Quality		Reporting & Perceptions		SARE Presence			
	Jud. Effect.	Public Forces	Report	Perception	# offices	# offices	months	months
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Home robbery	0.956**	0.979***	0.760*	0.879***	0.658*	0.723	0.568*	0.825**
	(0.399)	(0.219)	(0.412)	(0.300)	(0.374)	(0.444)	(0.299)	(0.358)
Homicides	0.000663***	0.000719***				0.000632***		0.000527**
	(0.000172)	(0.000113)				(0.000199)		(0.000218)
Sexual assault	-6.340***	-5.184***				-7.135***		-6.361***
	(2.002)	(1.659)				(1.976)		(1.980)
judicial efficiency	-0.00820							
	(0.0173)							
support of public forces		-0.0205***						
		(0.00531)						
adequacy of judicial resources		-0.00674						
		(0.00937)						
Last home robbery reported			-0.104***					
			(0.0347)					
Perception that state insecure				-0.0371				
				(0.0379)				
SARE, # offices					-0.000794	-0.00142**		
					(0.000719)	(0.000602)		
SARE, months open							-0.000406*	-0.000232
							(0.000203)	(0.000163)
Observations	25,996	25,996	25,996	25,996	25,996	25,996	25,996	25,996
R-squared	0.152	0.152	0.152	0.151	0.151	0.152	0.151	0.152

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Estimated using survey weights, standard errors dustered by

Controls indude gender, age, age squared, education, experience, state-year unemployment, real GDP per capita growth,

Table 8: Robustness Checks, Expansion

EXPANSION	Skill		Duration		Removing States				Outcome
	Keeps accts	Reasons	>=2 yrs	<2 yrs	Mexico City	Border	Drug entry	Drug death[1]	Fix. Location
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Home robbery	-1.529***	-1.588***	-1.325**	-2.146***	-1.715***	-1.140	-1.891***	-1.522*	-0.700*
	(0.493)	(0.472)	(0.519)	(0.737)	(0.451)	(0.886)	(0.517)	(0.827)	(0.366)
Homicides	0.000707*	0.000683	0.000722	0.000841	0.000618	0.000846**	0.000810*		-0.00145***
	(0.000412)	(0.000422)	(0.000437)	(0.000522)	(0.000381)	(0.000403)	(0.000398)		(0.000267)
Sexual Assault	-4.809	-4.218	-4.472	-6.762	-3.231	-4.358	-5.291*	-8.538*	8.179***
	(3.470)	(3.435)	(3.385)	(5.343)	(3.161)	(4.702)	(2.999)	(4.928)	(2.532)
Keeps Accounts	0.0455***								
	(0.0161)								
Reasons for entering business:									
Family tradition or higher income		0.00953							
		(0.00591)							
Lack of alternative employment		-0.0379***							
		(0.00762)							
Observations	25,996	25,996	20,065	5,867	25,091	21,336	19,811	21,425	25,996
R-squared	0.069	0.067	0.062	0.078	0.066	0.068	0.066	0.069	0.125

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Estimated using survey weights, standard errors dustered by state

Controls include gender, age, age squared, education, experience, state-year unemployment, real GDP per capita growth, state, year and industry fixed effects.

[1] Drug death states are those with highest drug-related deaths in 2009: Baja California, Chihuahua, Durango, Guerrero, Michoacan and Sinaloa, Data from the Crime Indicator Database for the Justice in Mexico Project at the Trans-Border Institute.

Table 9: Additional Robustness Checks, Expansion

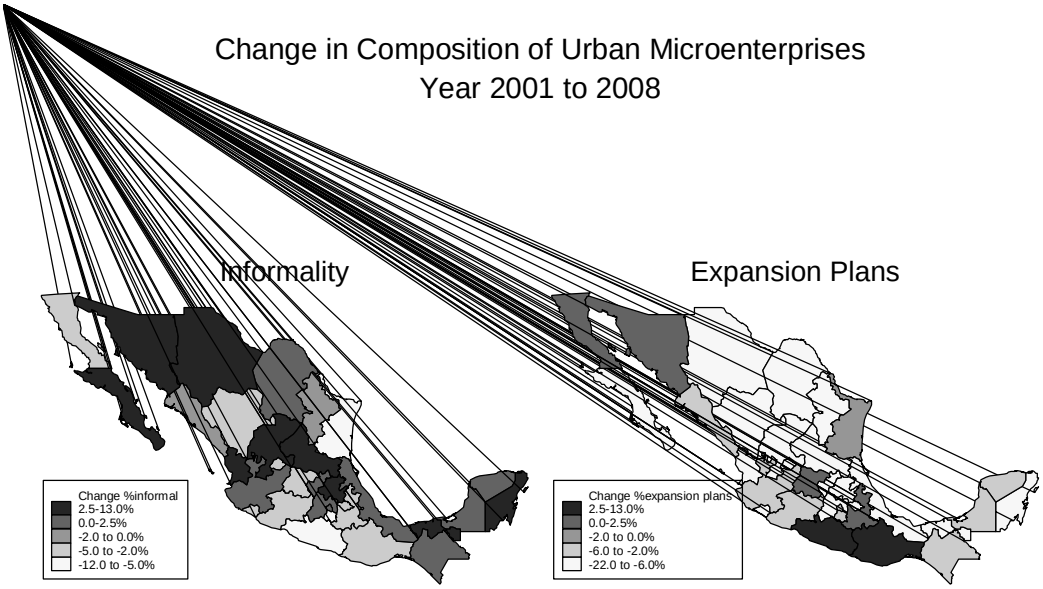
EXPANSION	Local Institutional Quality		Reporting & Perceptions		SARE Controls			
	Jud. Effect.	Pub. Forces	Report	Perception	# offices	# offices	months	months
	(1)	(2)	(3)	(4)	(4)	(5)	(6)	(7)
Home robbery	-1.540***	-1.360**	-1.722***	-1.757***	-1.440***	-1.378**	-2.093***	-1.910***
	(0.489)	(0.575)	(0.330)	(0.460)	(0.433)	(0.520)	(0.465)	(0.476)
Homicides	0.000661	0.000816*				0.000699		0.000426
	(0.000444)	(0.000417)				(0.000414)		(0.000394)
Sexual Assault	-4.320	-3.238				-3.683		-4.000
	(3.296)	(3.371)				(3.516)		(3.149)
Judicial efficiency	0.0110							
	(0.0305)							
Support of public forces		-0.00718						
		(0.0123)						
Adequacy of judicial resources		-0.0151						
		(0.0137)						
Last home robbery reported			-0.0797					
			(0.0745)					
Perception state insecure				0.0336				
				(0.0879)				
SARE, # offices					0.00137	0.00103		
					(0.00192)	(0.00180)		
SARE, months open							-0.000698*	-0.000564
							(0.000375)	(0.000363)
Observations	25,996	25,996	25,996	25,996	25,996	25,996	25,996	25,996
R-squared	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.066

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Estimated using survey weights, standard errors clustered by state

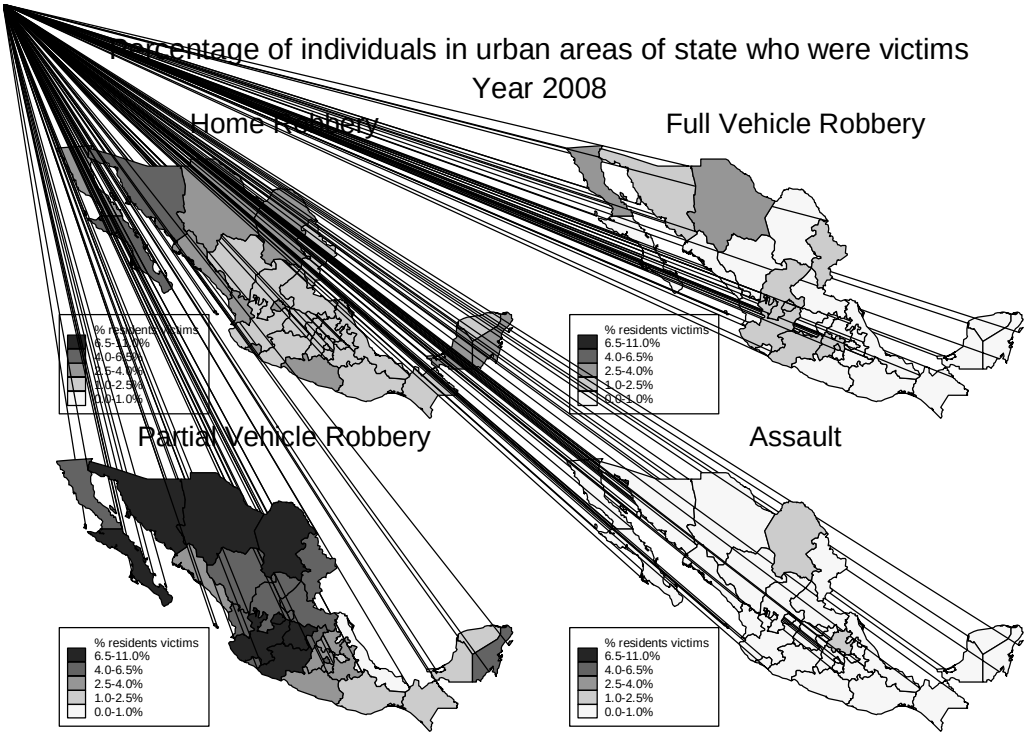
Controls include gender, age, age squared, education, experience, state-year unemployment and real GDP per capita growth,

Figure 1: Change in the Composition of Microenterprises

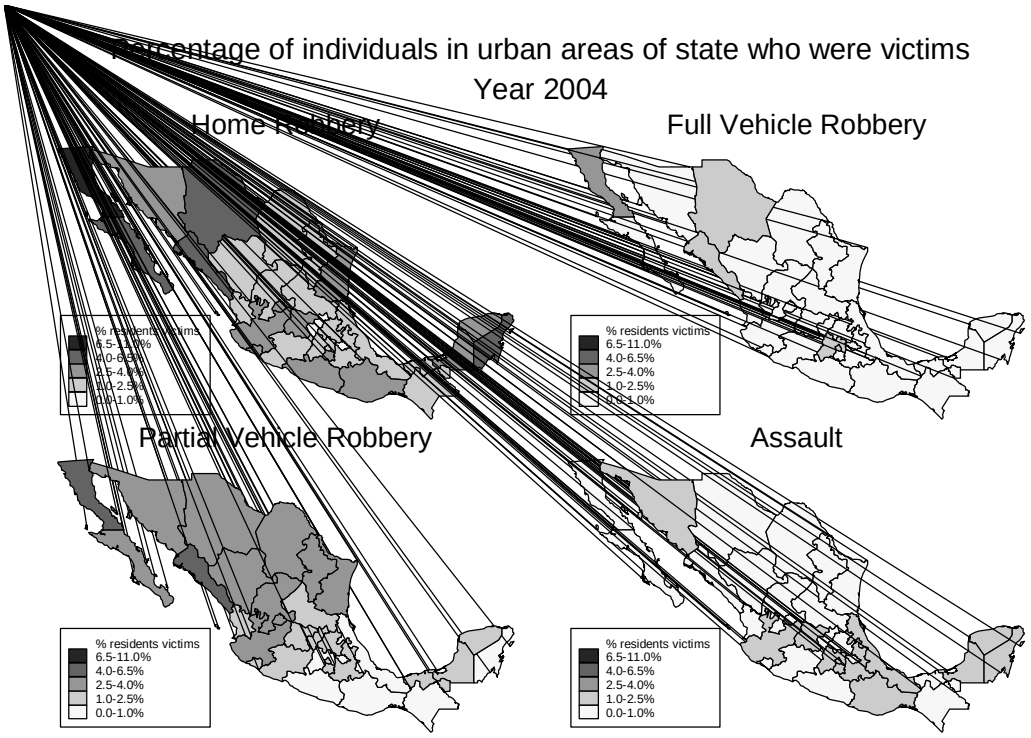


Source: ENAMIN

Figure 2A: Percentage of individuals in urban areas of state who were victimized, by crime type

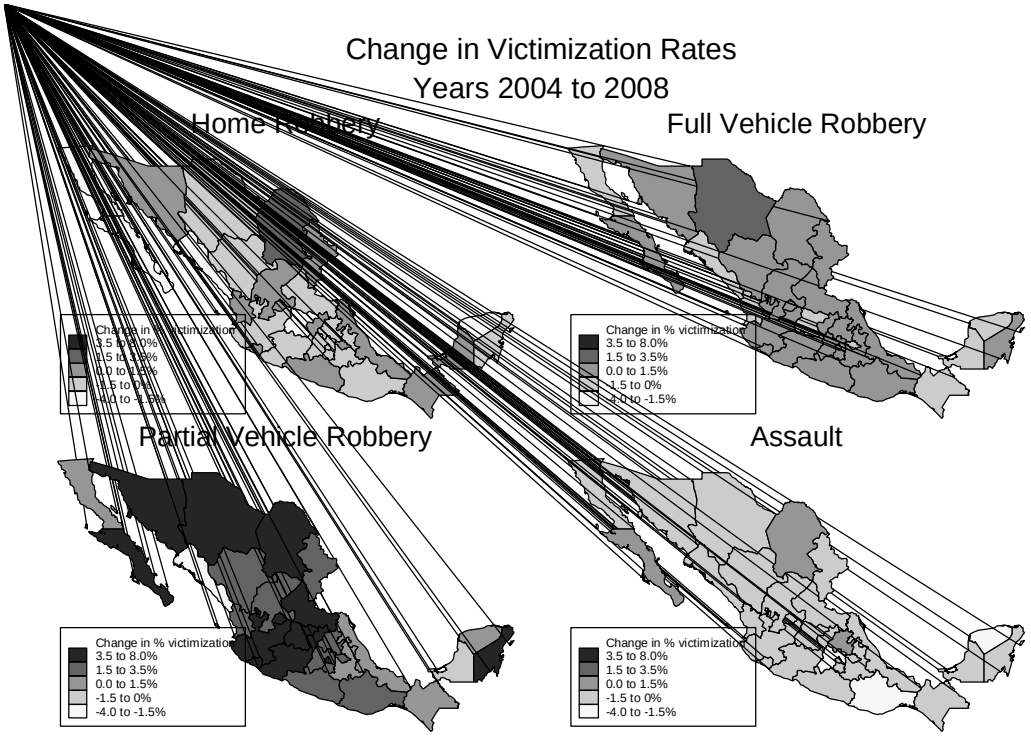


Source: ENSI 2009. National Urban



Source: ENSI. National Urban

Figure 2C



Source: ENSI. National Urban