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Crime and Microenterprise Growth: Evidence from Mexico

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Summary. — We explore the relationship between property crime and growth among microenterprises in Mexico. We use data on microenterprises and crime incidence from victimization surveys. We find that higher rates of property crime are associated with a significantly lower probability an enterprise plans to expand or experiences income growth in the subsequent 12 months. These effects are unique to property crimes and are not due to preventative measures undertaken by more rapidly expanding firms or other sources of reverse causality. These conclusions also are robust to a number of controls for firm heterogeneity and for local institutional quality.

Key words — microenterprises, crime, Latin America, Mexico

1. INTRODUCTION

Microenterprises—firms that operate with 10 employees or less—are recognized as large generators of income and employment in the developing world, and there is increased interest among policy-makers and researchers in improving their productivity. The expanding literature on the subject has posited several possible barriers to this goal, including both microeconomic and macroeconomic factors. On the microeconomic side, potential factors include credit constraints (de Mel, McKenzie, & Woodruff, 2011), savings constraints, and self-control problems (Fafchamps, McKenzie, Quinn, & Woodruff, 2011), labor constraints (de Mel, McKenzie, & Woodruff, 2010; Emran, Morshed, & Stiglitz, 2011), and skill constraints (Bruhn, Karlan, & Schoar, 2010; Drexler, Fischer, & Schoar, in press; Karlan & Valdivia, 2011). On the macroeconomic side, the most important factor arguably is weak institutions, specifically the potential for weak property rights to limit 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. In addition, weak institutions can significantly dampen overall growth in the microenterprise sector if the most productive firms are the most likely to be victims of expropriation.

In studying the institutional drivers of low microenterprise growth, the focus to date largely has been on the role of the state and corruption (de Soto, 1989). Over the past decade, many studies have examined the role of corruption and other forms of state rent-extraction in limiting the incentives for growth among microenterprises (Clarke, 2011; Fjelstad, Kolstad, & Nygaard, 2006; Francisco & Pontara, 2007; Hallward-Dreimeier, 2009; Safavian, Graham, & Gonzalez-Vega, 2001). Almost no attention, however, has been paid to the role of private individuals or groups who can seize others' assets with impunity. Robbery poses a severe threat to firm owners and might provide a strong incentive for enterprises to limit their investment in productive but vulnerable moveable assets. For example, as shown in Table 1, a 2008 survey of microenterprises in Mexico finds that the incidence of robbery is higher than that of fines and bribes and the average loss three times as high. This average estimated loss—equal to 1.7 months of profit—is large and shows that robbery can constitute a severe negative shock for some firms. 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 as collateral assets that have a high probability of being stolen.

Despite the importance of robbery for many microenterprises, the issue has received little attention in the literature. 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 robbery by private agents is an important new dimension of weak property rights, particularly in developing countries facing high degrees of property and personal violence.

We investigate the link between robbery and microenterprise growth using data from Mexico, a country with a large microenterprise sector and high rates of property-related crime. We combine repeated cross-sectional surveys of microenterprises with repeated surveys of the general population on crime. By using repeated surveys we can control for time-invariant, state-level unobserved characteristics as well as control for a host of state-time varying effects that may jointly

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Table 1. *Urban microentrepreneurs 2008*

	All firms	More established firms		
		Has any employees	Has used credit	Enterprise formal
Victim of given crime in past year				
Fines/bribes	8.14%	10.66%	14.45%	11.42%
Robbery	9.58%	14.92%	16.99%	14.05%
Private extorsion	1.19%	1.46%	2.34%	2.12%
Fraud	8.79%	13.27%	16.78%	13.15%
Natural causes/accident	2.53%	3.29%	5.73%	4.64%
Of victims of given crime, estimated loss/monthly profits				
Fines/bribes	0.53	0.48	0.97	0.73
	(2.19)	(2.36)	(3.17)	(3.06)
Robbery	1.72	1.07	4.18	2.43
	(7.34)	(2.68)	(15.60)	(10.15)
Private extortion	0.56	0.89	0.47	0.47
	(1.32)	(1.49)	(0.84)	(1.24)
Fraud	0.62	0.45	0.35	0.68
	(4.50)	(1.42)	(0.87)	(6.15)
Natural causes/accident	0.90	0.89	0.93	0.88
	(2.24)	(2.62)	(1.68)	(1.88)
Of victims of given crime, % who reported to authorities				
Robbery	22.0%	24.9%	27.8%	27.5%
Private extortion	24.9%	28.3%	28.0%	27.8%
Fraud	3.4%	4.1%	2.8%	5.3%
Observations	16,398	4339	1988	5959

Coefficients are weighted averages. Standard deviations are in parentheses.
We restrict 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.

determine robbery and microenterprise decisions, such as local economic conditions, local institutional quality, and demographic changes. Overall, we find strong evidence that higher robbery rates significantly reduce the probability microenterprises will expand their operations. We also find that microenterprises in states with rising robbery rates are much less likely to experience income growth or move to fixed locations in the ensuing 12 months. This relationship holds after controlling for other types of crime, including homicides and assaults, which may be related to underlying factors that determine both crime and microenterprise behavior but have little direct impact on microenterprises. The relationship also holds after we control for other types of property-specific crime, such as mugging, that do not reflect expropriation risks for enterprise assets but may constitute income shocks for customers.

We perform a large number of robustness checks to address concerns that factors other than expropriation risk drive the link between microenterprise expansion and robbery rates. These factors include: heterogeneity among microenterprises and the potential for low productivity firms to be differentially located in states with high robbery rates; the potential for reverse causation, in which crime rates themselves are affected by the growth experiences of microenterprises; the potential for groups of states that have been more affected by violence to drive the results; and the potential for institutional changes to simultaneously determine robbery rates and microenterprise behavior. We include numerous controls and find that our results are robust throughout. Overall, we view our results as providing strong evidence that property crimes likely negatively affect microenterprise expansion.

The paper proceeds as follows. In Section 2, we describe the datasets that we use to conduct the analysis. Section 3 outlines our empirical strategy, while Section 4 presents baseline results. In Section 5, we consider alternative explanations for these results, while Section 6 discusses causal channels. In Section 7 we conduct a series of robustness checks, and offer conclusions in Section 8.

2. DATA

(a) *Microenterprise data*

The data on microenterprises come from the ENAMIN, or National Survey of Microentrepreneurs, a cross-sectional, nationally representative survey conducted by INEGI, the National Statistical and Geographic Institute. [1] We restrict attention to the two most recent ENAMIN surveys, conducted in 2002 and 2008. We limit the sample to urban microenterprises (defined as those operating in areas with a population of 100,000 or more). Our geographic area of focus therefore is urban areas of states. This is the finest level of geographic detail we can achieve, as none of the data are representative at the municipal level.

Summary statistics on the sample are provided in Table 2. The sample is largely male (64%), married (73%), and with a high level of education (24% have some tertiary education). In terms of size, as measured by employees, only 22% of enterprises in 2001 and 24% in 2008 had any employees other than the owner. Approximately 40% of these employees are unpaid. Average monthly profits were $571 in 2001 and $352 in 2008. These statistics confirm the "micro" size of many microenterprises.

To measure enterprise growth, ideally we would use changes in profits and investment in working and fixed capital. [2] This is not possible, however, because we do not have enterprise level

Table 2. *Summary statistics, ENAMIN*

Urban microentrepreneurs	Total sample	By survey year	
		2001	2008
Entrepreneur a woman	36.5%	31.8%	40.9%
Entrepreneur married	72.9%	73.6%	72.3%
Average age (in years)	44.1	43.2	44.9
	(13.0)	(12.8)	(13.1)
Primary education or less	38.8%	42.4%	35.5%
Secondary education	36.9%	36.2%	37.5%
College education	24.3%	21.4%	27.0%
Experience (in years)	9.84	9.70	9.96
	(9.27)	(9.09)	(9.43)
Monthly profits (USD)	461.7	571.3	351.7
	(769.7)	(903.8)	(585.8)
Has any employees	22.8%	21.8%	23.8%
Employees, total	0.41	0.41	0.41
	(1.00)	(1.10)	(0.90)
Enterprise has a fixed location	34.7%	35.9%	33.2%
Enterprise located in individual's home	18.5%	15.9%	21.6%
Keeps accounts	43.8%	49.3%	37.1%
Enterprise informal	66.1%	65.9%	66.2%
Industry			
Manufacturing/production	11.2%	11.4%	10.9%
Construction	7.4%	6.6%	8.2%
Commerce	36.2%	34.8%	38.0%
Services	39.9%	42.0%	37.3%
Transportation & communications	5.4%	5.2%	5.5%
Plan to expand	11.9%	14.4%	9.0%
Income growth Q1	2.05%	1.19%	3.12%
	(1.35)	(1.38)	(1.32)
Income growth Q2	6.36%	5.72%	7.21%
	(1.80)	(1.71%)	(1.92)
Income growth Q3	0.71%	5.99%	−6.54%
	(1.56)	(1.65%)	(1.42)
Moves to a fixed location Q1	21.1%	20.7%	21.6%
Moves to a fixed location Q2	23.1%	23.1%	23.2%
Moves to a fixed location Q3	23.8%	25.0%	22.7%
Observations ENAMIN only	25,558	15,558	10,000

All values are population weighted. Monetary values are 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$. Observations are for the full sample and refer to the enterprise variables only. The observations for income growth and movement to a fixed location are smaller due to rotation out of and attrition from the labor force samples.

panel data and because the repeated cross-sections do not contain comparable data on working and fixed capital over the two rounds. As a result, our primary measure of enterprise growth is entrepreneurs' responses to the question of how they plan to continue the enterprise in the future. We count entrepreneurs who say they plan to increase the number of products as having expansion plans, as this will necessitate an increase in capital, either fixed or working. [3] We therefore view this response as one that is highly correlated with enterprise growth. As shown in Table 3, the overall percentage of enterprises with expansion plans is 14% in 2001, and falls to 9% in 2008.

To complement the subjective measure on expansion plans, we also consider measures of enterprise growth from the labor force surveys from which the ENAMIN samples are drawn. These surveys (ENEU/ENOE) are rotating panels that follow households for five quarters. [4] Approximately 20% of the sample rotates out every period, such that we can follow 80% of the ENAMIN sample for one quarter, 60% for two quarters, *etc*. Since the labor force survey does not ask enterprise-level questions, we are limited to individual-level variables that are most likely to be related to enterprise growth. These include the percentage change in the entrepreneur's income and moving the place of work from a non-fixed to a fixed location. Some authors argue that movement to a fixed location is the first step many firms take to become established and subsequently expand (Fajnzylber, Maloney, & Montes-Rojas, 2009). Despite the dynamic component of both variables, we consider them as secondary measures because they are not firm outcomes and are not available for the full sample. Summary statistics are provided in Table 2.

(b) *Crime data*

The data on crime come from the National Survey of Insecurity, or the ENSI, conducted by INEGI. [5] This nationally representative household survey generates dependable estimates of the incidence of common offenses, including vehicle robbery, home robbery, physical assault, and sexual assault,

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
Mugging	3.77%	3.35%
Min	1.03%	0.59%
Max	12.1%	9.49%
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 assault, 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.

as well as reporting rates, economic losses, and perceptions of insecurity. As a household level survey, the ENSI produces more reliable estimates of victimization rates than official crime statistics due to the low reporting rates for many of these crimes. For example, according to the ENSI, on average 32% of home robberies, and 47% of physical assaults are reported to the authorities. Since reporting rates and the degree of measurement error likely are linked with factors—such as institutional quality—that jointly determine crime rates and microenterprise outcomes, data from victimization surveys will be subject to significantly less bias than official statistics (Soares, 2004).

Our interest is in property crime affecting the capital of microenterprises. The most appropriate measure of such crime in the ENSI data is the rate of burglaries, also called home robberies. Many microenterprises are operated out of the entrepreneur's home, with all assets stored and trade taking place in the home, while other entrepreneurs who work outside of their home may also store their equipment and other capital at home overnight. In such cases, our measure of home robbery captures the direct threat to these enterprises. In other cases, home robbery rates may be quite correlated with commercial robberies at the state-level, making home robbery rates an accurate measure of the property risks faced by microentrepeneurs.

The ENSI also includes two other types of property crimes: vehicle robberies and muggings. Vehicle robberies include "full" robberies, in which the entire vehicle is stolen, and "partial" robberies, in which parts and accessories are stolen. We also control for other types of crime that would not be expected to directly influence the investment decisions of microentrepreneurs but may reflect underlying local factors that affect them. These include physical and sexual assault rates from the ENSI and official statistics on homicide rates, compiled by the Citizens' Institute for the Study of Insecurity (ICESI). [6]

To convert the crime rates from the ENSI into measures of incidence, we take the percentage of individuals aged 18 or older in urban areas of the state who report being victims of a particular crime in the past year. Our geographic unit of observation therefore is urban areas of states. It would be ideal to have victimization data at a more disaggregated level, but the ENSI are not representative at the municipal level and are only representative at the city level for a small and non-representative group of cities. [7] The ENSI are, however, representative for urban areas of states, and by limiting the scope to

these areas we capture the parts of states most prone to property crime. For example, according to the 2008 ENSI, urban residents were 200% more likely than rural ones to be victims of home robbery, close to 300% more likely to be victims of mugging, and 400% more likely to be victims of partial vehicle robbery. In addition, urban areas contain the majority of microentrepreneurs in the country.[8] Limiting the geographic focus therefore allows us to focus on the population likely to be most affected by property crime. Finally, we 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 the incidence of different crimes are provided in Table 3. In 2004 the average home robbery rate of incidence was 2.8%, which means that, on average, 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, 0.3% for sexual assault and 1.1% for physical assault. In 2008 the home robbery rate falls slightly to 2.3%, while 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. These statistics establish that property crimes are a serious concern for many residents.

To show the distribution of crimes across states, Figure 1A and B map average incidence across states for home robbery, partial vehicle robbery, full vehicle robbery, and mugging for the years 2004 and 2008. The maps show a high degree of dispersion in crime incidence across states, and an absence of geographic concentration. This suggests our results are not simply capturing regional phenomena with state level averages.

3. EMPIRICAL STRATEGY

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

$$y_{ijst} = \alpha + \beta_1 X_{ist} + \beta_2 Z_{st} + \beta_3 robbery_{st} + \beta_4 othercrime_{st} + \delta_t + \gamma_s + \eta_j + \varepsilon_{ijst} \quad (1)$$

where y_{ijst} is the outcome variable of individual i living in state s working in industry j interviewed at time t, X_{ist} is a vector of individual-level controls, Z_{st} is a vector of state time-varying controls, $robbery_{st}$ is the state and time-specific robbery rate, $othercrime_{st}$ is a vector of non-robbery crimes that vary by state and time, δ_t is a year fixed effect, γ_s is a state-level fixed effect, and η_j is an industry fixed effect. Our main outcome variable is a dummy variable that equals one if the firm plans to expand and zero otherwise. Our theory suggests that higher robbery rates are associated with reduced microenterprise expansion ($\beta_3 < 0$).

The difficulty in identifying the relationship between robbery and microenterprise outcomes arises from the fact that robbery rates and their changes over time are neither random across states nor orthogonal to other factors that impact firms' investment decisions. For example, some states may have higher quality institutions than others, leading to lower crime rates and greater investment incentives and firm growth. Similarly, some states may have experienced more economic growth over the period examined, decreasing criminals' incentives to rob while also increasing firms' incentives to expand. Random assignment of a program that reduces robbery rates could, in theory, eliminate these biases, though implementation of such a program on a sufficiently broad scale to alter firms' expectations would be challenging and costly. Instrumental variables could also eliminate these biases, but many of the instruments for crime rates used in the literature, such as weather, are also likely to affect demand for microenterprise goods and services. Thus, they would be directly correlated with microenterprise expansion decisions, making them invalid for our estimation.

Instead, we rely on differences in crime rates over time and across urban areas of states using repeated cross-section data. This allows us to control for state fixed effects as well as observable state-time varying factors which may jointly determine robbery and microenterprise expansion. We divide the state-time varying controls into two categories: other crimes and other state-time varying factors. For other crimes, we start with non-property related crimes, including homicide, physical assault, sexual assault, and mugging. These crimes help control for factors which vary across states and time and may jointly determine crime rates and enterprises' investment decisions. For example, the returns to criminal activity may differ in areas where enterprises are more visible and growing more rapidly. If criminals do not differentially locate based on crime type, the inclusion of non-property related crimes can help account for this reverse causality. Non-property related crimes also allow us to isolate the impact of property crimes from those of other types of crime, which is important as robbery rates may be correlated with demand shocks for goods and services offered by microenterprises. Muggings, in particular, are likely to have a greater impact on microenterprise customers than microenterprises themselves (with the exception of street vendors).

For other state-time varying factors we include controls for economic conditions, demographic changes, and local institutional quality, all of which are potential sources of omitted variable bias. To capture economic conditions, we include state-year measures of unemployment and the log of real Gross Domestic Product (GDP) per capita. These data come from INEGI. To capture demographic changes that may be correlated with the size of the low-skill microentrepreneur and criminal population, we include measures of average years of schooling for adults aged 15 or older and the percentage of the state population that is comprised of men between the ages of 16 and 19. These measures come from the 2000 Mexican population census and the 2005 Mexican population count.[9]

Finally, to control for local institutional quality, we include measures of local police and judicial effectiveness (Laeven & Woodruff, 2007). 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 are conducted every several years by the Consejo Coordinador Financiero under the direction of the Center for the Study of Law at the Instituto Tecnológico Autónomo de México (ITAM). The focus on a specific commercial code comes from the fact that while bank debt laws are set at the national level, judicial proceedings must take place in courts where the debtor is located. Thus the implementation and enforcement of the laws vary at the state level. We use the 2002 and 2009 surveys to create two measures of local institutional quality (Consejo Coordinador Financiero 2002, 2009). The first is a measure of judicial effectiveness, taken as an average of the questions relating to the quality of judges, the impartiality of judges, the adequacy of judicial resources, the efficiency of the execution of sentences, and the adequacy of local legislation related to contract enforcement. The second is a measure of the support of public forces (such as the police) in executing judicial sentences.

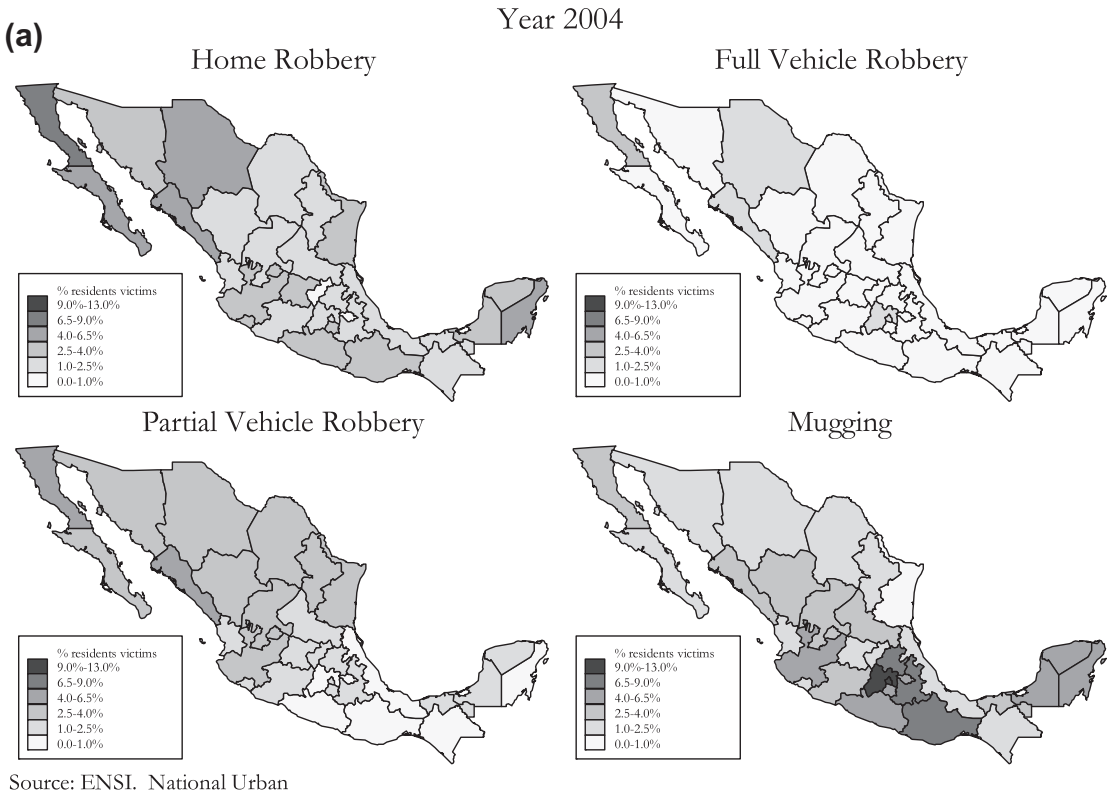

Figure 1. *Maps of crime rates across Mexico. (A) Percentage of individuals in urban areas of state who were victimized, by crime type. (B) Percentage of individuals in urban areas of state who were victimized, by crime type.*

4. RESULTS

We begin by estimating equation one using a probit model, using the ENAMIN survey sampling weights and clustering standard errors at the state level. Table 4 presents these results, with average marginal effects reported. We start with only industry, state, and year fixed effects, along with individual controls, which include gender, education, experience, as measured by the number of years working in the enterprise or similar activity, and experience squared. The results, presented in column one, show a significant, negative correlation between home robbery and microenterprise expansion plans. We next add homicides and physical assault rates as measures of non-property crimes, as well as the full set of state-level time-varying controls outlined above. These results are shown in column two of Table 4. We find that the average marginal effect of home robbery rates remains negative, significant and relatively unchanged in size. In columns three, four, and five, we include sexual assaults, muggings, and vehicle robberies, respectively. In all cases, we find that the estimated effect of robberies remains negative and significant. Home robberies continue to dominate our results.

The estimated effects of home robbery shown in Table 4 are non-trivial. The average marginal effect of home robbery in column two suggests that a one percentage point increase in home robbery incidence (half of the standard deviation) is associated with a 0.9 percentage point decline in the probability the average microentrepreneur plans to expand his/her business. Given that the average percentage of entrepreneurs who plan to expand their operations in the next 12 months is only 11.9%, the associated decline in average expansion plans is large and potentially can help explain why many microenterprises do not grow.

Table 4. *Expansion plans*

Outcome = plans to expand	Full sample					
	(1)	(2)	(3)	(4)	(5)	(6)
Home robbery	−1.070***	−0.876**	−0.877**	−0.813**	−0.967***	
	(0.272)	(0.360)	(0.368)	(0.363)	(0.344)	
Homicide		0.003	0.002	0.006	0.003	
		(0.005)	(0.004)	(0.005)	(0.004)	
Physical assault		−0.381				
		(0.911)				
Sexual assault			−1.589			
			(2.029)			
Mugging				−0.828**		
				(0.323)		
Vehicle robbery					0.131	
					(0.277)	
Transport × home robbery						−2.773
						(2.040)
Non-transport × home robbery						−0.924**
						(0.362)
Transport × vehicle robbery						−0.266
						(0.823)
Non-transport × VehicleRob						0.145
						(0.285)
Transport × homicide						−0.036**
						(0.017)
Non-transport × homicide						0.004
						(0.005)
Log real GDP per capita		−0.098	−0.076	−0.122	−0.109	−0.118
		(0.119)	(0.123)	(0.129)	(0.133)	(0.140)
Unemployment in Q4 of year		−0.000	0.001	−0.005	−0.003	−0.005
		(0.009)	(0.007)	(0.008)	(0.007)	(0.007)
Average years education, adults		−0.017	0.000	0.110	−0.017	−0.028
		(0.101)	(0.103)	(0.092)	(0.101)	(0.112)
% Population, men age 16–19		9.813	9.006	17.465*	9.933	12.730
		(9.315)	(9.442)	(10.243)	(9.403)	(10.046)
Judicial efficiency		−0.002	0.001	0.002	−0.001	−0.002
		(0.032)	(0.031)	(0.032)	(0.032)	(0.033)
Support of public forces		−0.013	−0.008	−0.029*	−0.011	−0.016
		(0.014)	(0.017)	(0.016)	(0.016)	(0.017)
Observations	25,461	25,461	25,461	25,461	25,461	25,461

Coefficients are average marginal effects from a probit model. Estimated using survey weights.
Standard errors clustered by state in parentheses.
Other controls include gender, education, experience, experience squared, industry, year, and state fixed effects.
Linear projection for 2001 crime rates. Homicides rescaled to # per 1 million inhabitants.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

We next test if the effects of robbery of different types of capital vary by industry, by examining if vehicle robbery rates differentially affect expansion among enterprises in the transport sector. We expect that if expropriation risk is the primary channel through which robberies impact microenterprise growth, the effect of vehicle robberies should be larger for transport enterprises than for all enterprises. The results of this estimation, which includes crime-industry interaction terms, are shown in column six of Table 4. Non-transport enterprises continue to strongly respond to home robbery rates. At the same time, while the interaction effect on vehicle robberies for non-transport enterprises is positive, it is negative for transport enterprises (albeit insignificant, likely due to the small sample of transport enterprises in the surveys). These results show differences in firms' response to certain types of property crime depending on whether or not they use the assets in question. The results suggest that although Mexican microenterprises operate in an environment with widespread violent crimes, it is the threat of robbery of the specific assets used in their enterprise that limits their growth.

We next estimate the model using the entrepreneur's income growth and movement to a fixed location as the measures of enterprise growth. The results from the full model, which include individual controls, state-time controls, and state, year, and industry fixed effects, are shown in Table 5. For each variable, we estimate changes one, two, and three quarters after the ENAMIN survey. The results for income growth are shown in columns one through three. In all cases, the coefficients are negative, with a one percentage point increase in home robbery associated with a 0.5% decline in income after one quarter, and a 3% decline after two quarters and 4% decline after three quarters. The coefficients for income growth after two and three quarters are significant. These values represent large differences from the positive average quarterly income growth observed in the full sample and show that microenterprises in states with higher home robbery rates exhibit different growth trends than their counterparts in other states. The same story holds for movement to a fixed location, as for all quarters higher home robbery rates are associated with significant declines in the probability microenterprises in those states move to a fixed location. Overall these results provide further evidence that property crimes reduce the growth potential of microenterprises.

Finally, we test whether home robberies affect fast growing enterprises in the same way as they do slower growing ones. In columns seven through nine of Table 5, we estimate these specifications using as our dependent variable a dummy indicating that an enterprise's income growth was in the top 5% for all enterprises that year. We find that home robberies significantly reduce an enterprise's probability of being in this top 5%, with a marginal effect ranging from negative 0.4% to negative 0.7%. These results further highlight the real costs of burglaries to microenterprise growth.

5. ALTERNATIVE EXPLANATIONS

(a) *Microentrepreneur selection*

The state-level composition of microenterprises may vary in response to crime, as migration or the decision to enter or exit entrepreneurship may be based on the security of operating in a given location. To ensure we are not simply capturing the sorting of enterprises with different growth potentials across states, we limit our sample to "high-tier" enterprises—defined as those that are more likely to survive and grow. Following other authors, we consider several classifications of "high-tier" entrepreneurs (Cunningham & Maloney, 2001; Fajnzylber *et al.*, 2009). The first are entrepreneurs with a secondary education or above. The second are those who entered self-employment from a salaried position and did so voluntarily. The third are entrepreneurs with at least a secondary education whose current monthly income is higher than the average for salaried workers with the same gender, education level, age bracket, industry, and state. [10] The fourth are entrepreneurs who, when asked why they entered entrepreneurship, said they did so to increase their earnings or due to family tradition (in contrast to entrepreneurs who said they entered due to lack of alternative employment). The fifth is enterprises that have any employees, as these are more likely to be established firms with greater survival and growth potential. [11] The results are shown in Table 6. In all cases, the coefficient on home robbery remains negative and significant, showing that the results are not being driven exclusively by the sorting of firms with lower growth potential.

The composition of entrepreneurs also may change across states and time due to migration. In column six of Table 6, we thus limit our sample to entrepreneurs who were born in the same city in which they currently reside. The results are remarkably similar to those in the full sample, indicating that selection through migration is not likely to be driving our results.

(b) *Reverse causality*

There are several possible channels through which microenterprise growth may affect observed property crime rates,

Table 5. *Additional measures of enterprise growth*

Dependent variable	Income growth			Move to a fixed location			Income growth in top 5%		
Model	OLS			Probit			Probit		
Quarter after survey	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Home robbery	−0.483	−3.101*	−3.993**	−1.398***	−0.849**	−1.639***	−0.404*	−0.666***	−0.657**
	(1.934)	(1.618)	(1.810)	(0.337)	(0.336)	(0.497)	(0.229)	(0.114)	(0.297)
Observations	15,068	11,091	7198	19,951	14,713	9569	15,068	11,091	7198

Coefficients are average marginal effects from a probit model. Estimated using survey weights. Standard errors clustered by state in parentheses. Controls include gender, education, experience, experience squared, state-year unemployment, log real GDP per capita, average adult education, percent male age 16–19, local institutions measures, homicides, physical assaults, state, year, and industry fixed effects. Linear project for 2001 crime rates. Homicides rescaled to # per 1 million inhabitants.

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$.

Table 6. *Selection effects*

Outcome variable = plans to expand	Secondary education or above	Entered entrepreneurship from salaried work	Monthly income higher than mean salaried	Entered entrepreneurship to increase income or family tradition	Enterprise has any employees	Born in same city (non-migrants)
	(1)	(2)	(3)	(4)	(5)	(6)
Home robbery	−1.407***	−1.005**	−0.790**	−1.243***	−1.764***	−1.148**
	(0.516)	(0.430)	(0.335)	(0.462)	(0.439)	(0.548)
Observations	14,760	11,966	10,317	6874	6283	14,900

Coefficients are average marginal effects from a probit model. Estimated using survey weights. Standard errors clustered at the state level shown in parentheses. Controls include gender, education, experience, experience squared, state-year unemployment, log real GDP per capita, average adult education, percentage male age 16–19, ITAM local institutions measures, homicides, physical assaults, state, year, and industry fixed effects.
Linear projection for 2001 crime rates. Homicides rescaled to # per 1 million inhabitants.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

including both positive and negative mechanisms. On the former, it is possible that growing microenterprises are better able to dedicate resources to theft prevention and suffer lower losses as a result. Thus, microenterprise expansion and income growth could lead to reductions in state-level robbery rates, and our results may over-state the true effect of robberies on these enterprises. On the latter, higher-growth enterprises may also attract additional robberies, thereby inducing increases in robberies and causing our estimates to under-state the effect of robberies on enterprises. While in the absence of an experiment we cannot conclude that no such bias exists, we can test the extent to which these specific reverse causality channels are present in our setting.

First, to investigate evidence of a positive mechanism, we consider whether high-growth enterprises can better afford to take additional precautionary measures against robberies than can low-growth enterprises. We note that this should be particularly true for credit-constrained enterprises—that is, high-growth enterprises with access to adequate credit should be particularly likely to take precautionary measures. We test this relationship using the ENSI surveys containing information on both crimes and household employment and educational characteristics. While the ENSI does not contain information on microenterprise outcomes, it does ask whether the respondent or any other individual is self-employed. It also contains information indicating whether the household has taken a number of different precautions, including installing a security system, hiring private security for the home or neighborhood, or increasing the insurance policy coverage for a home, car, or business. As a proxy for the growth prospects of the enterprise, we use the education level of the respondent. As the ENSI does not include data on the use of credit by the self-employed, we use the state-level shares of enterprises who report having ever used credit in their operation as a measure of the probability that a given enterprise faces credit constraints. We thus estimate the following specification:

$$\begin{aligned} precautions_{ist} = {} & \alpha selfemp_{ist} + \beta_1 selfemp_{ist} * education_{ist} \\ & + \beta_2 selfemp_{ist} * education_{ist} \\ & * credconstrained_{st} + \beta_3 selfemp_{ist} \\ & * credconstrained_{st} + \beta_4 education_{ist} + X_{ist}\Gamma \\ & + \delta_s + \delta_t + \delta_s * \delta_t + \varepsilon_{ist} \end{aligned}$$

where $precautions_{ist}$ is an indicator of whether the household has undertaken any of the aforementioned major preventative measures. As we are interested in the differential response of better educated self-employed respondents (relative to lesser educated respondents, particularly among the credit-constrained), we now include state-time dummies that control for unobservables common to all respondents in a given state and year

If this reverse causality is present, we should find $\beta_1 > 0$, $\beta_2 < 0$ or $\beta_3 < 0$. That is, better educated self-employed individuals should be more likely to take precautions than lesser educated individuals, and constrained individuals should be less likely to do so (with this effect intensifying for better-educated individuals). We do not focus on β_4 because our baseline results control for state-level educational income as well as entrepreneur-level education.[12] Our results are presented in columns one and two of Table 7. The effects we find do not offer strong evidence of this reverse causality. While the coefficients on self-employment interacted with secondary and tertiary education dummies are indeed positive-, neither is significant—and the two coefficients are themselves quite similar, suggesting that the most educated entrepreneurs are no more likely to take precautions than those with a secondary school education. Moreover, when we introduce interactions with credit constraints in column two, we find that the only interaction that is significant is the one with primary education or less, and that this effect is—surprisingly—positive. In other words, entrepreneurs with a primary education most likely to face credit constraints are actually *more* likely to take expensive precautions against robberies. Meanwhile, the interaction of credit constraints with higher levels of education and self-employment does yield negative coefficients, though these are not significant. While these results cannot conclusively rule out this channel of reverse causality, taken together, they offer little evidence that this channel is prominent enough to generate our large and statistically significant baseline results.

It is possible that entrepreneurs adjust across other margins or make other costly investments to prevent robbery losses, which may be why we see only weak effects on the precautions outcome variable. We therefore check whether these effects are consistent for other types of precautions that entrepreneurs might take. We use outcome variables indicating whether the respondent has changed his or her nighttime behavior in response to crime (i.e., go out at night less frequently), visits family and friends less frequently due to crime, and uses public transportation less frequently due to fears about crime. All of these changes in behavior involve implicit costs borne by an entrepreneur (with the latter possibly including explicit costs

Table 7. *Reverse causality channels*

Dependent variable	Taken precautions		Changed night behavior	Changed visit behavior	Changed public transport use	Home robbery		Vehicle robbery	Assault	Perceptions
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Informant is self employed	0.023***	−0.014	0.019	0.028	0.006	0.010***	0.023**	0.023***	0.001	0.008
	(0.005)	(0.018)	(0.020)	(0.016)	(0.018)	(0.003)	(0.007)	(0.005)	(0.001)	(0.008)
Informant has secondary education	0.127***	0.128***	0.022***	−0.008	0.011**	0.010***	0.010***	0.039***	−0.000	0.016**
	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.006)
Informant has tertiary education	0.295***	0.296***	0.032***	−0.015	0.021*	0.018***	0.018***	0.077***	−0.001	0.000
	(0.006)	(0.006)	(0.010)	(0.008)	(0.010)	(0.002)	(0.002)	(0.004)	(0.001)	(0.010)
Self employed × secondary education	0.017	0.050	−0.033	−0.006	−0.001	0.001	−0.007	0.002	0.002	−0.007
	(0.009)	(0.032)	(0.029)	(0.025)	(0.027)	(0.003)	(0.005)	(0.005)	(0.002)	(0.011)
Self employed × tertiary education	0.020	0.051	−0.050	−0.040	−0.024	0.003	−0.009	−0.010**	0.002	−0.022*
	(0.010)	(0.026)	(0.034)	(0.023)	(0.024)	(0.004)	(0.006)	(0.004)	(0.002)	(0.011)
Self employed × credit constrained		0.284*	−0.269	−0.202	−0.040		−0.088			
		(0.127)	(0.140)	(0.115)	(0.115)		(0.048)			
Self employed × sec. ed. × credit constrained		−0.232	0.341	0.126	0.062		0.072			
		(0.189)	(0.186)	(0.175)	(0.167)		(0.048)			
Self employed × ter. ed. × credit constrained		−0.215	0.397	0.283	0.129		0.112			
		(0.143)	(0.276)	(0.190)	(0.184)		(0.064)			
Observations	87,404	84,331	84,331	84,331	84,331	87,404	84,331	84,331	84,331	84,331

Standard errors in parentheses clustered by state.
*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

in terms of lost enterprise profits if the entrepreneur uses public transportation to go to or conduct her work). So higher profit growth among enterprises may still enable entrepreneurs to take these precautions—meaning better-educated entrepreneurs should still take these precautions to a greater degree than less-educated ones. On the other hand, the credit constraint may not be as relevant for these precautions, since they involve a greater share of implicit costs than does purchasing and installing security equipment, for example.

In columns three through five of Table 7, we find little evidence of these effects. The interaction of education levels and self-employment status are now negative although not significant. The effects of credit constraints are now *positive* and insignificant. Thus, while the most constrained entrepreneurs might make these behavioral rather than capital-intensive changes in response to crime, this effect appears relatively muted in our context.

Finally, we test whether higher-growth enterprises are themselves more likely to be targets of property crime than slower-growth ones (and thus that enterprise growth raises state-level property crime rates). In column six, we take as our outcome variable an indicator of whether the household has experienced a home robbery in the past year (the same variable we use to calculate the state-level incidence variable for our baseline regressions). While both self-employment and educational levels have strong effects on this robbery, their interaction is weakly positive and insignificant. In column seven, we further interact these variables with a state-level credit constraint measure, again finding only insignificant effects. This is not true for vehicle robberies (column eight), which better-educated entrepreneurs are *less* likely to suffer than less educated ones, nor for the respondents' overall perceptions of crime in their area (column 10). Again, taken together, these results offer little evidence that the most plausible channels for reverse causality play major roles in our setting.

6. CAUSAL CHANNELS

Burglaries among microenterprises can limit these firms' expansion through several distinct mechanisms. We argue that main channel of impact is through the entrepreneur's perceived expropriation risk; that is, her expectation of future losses from robberies due to the environment in which she operates. A rise in the robbery rate thus affects all entrepreneurs whose fear of a potential robbery in the future rises. Another possibility, however, is that burglaries involve an income or wealth shock, and that if the robbed enterprises are credit constrained, they may lack the resources to make profitable investments. If this is the case, a rise in robberies should worsen outcomes for those entrepreneurs who have been robbed—but not for others in the same environment. Similarly, if the experience of being robbed alters entrepreneurs' perceived future expropriation risk, one would expect a differential response among these individuals.

To distentangle these two possible mechanisms, we conduct several tests comparing the effects among those entrepreneurs who are directly robbed to others in their environments. Again, if the income or wealth shock channel is driving our main results, we should see entrepreneurs who were robbed experience differential outcomes; if the expropriation risk channel is driving our results, we should see little difference between the two groups. First, we check whether expansion plans are more limited among those entrepreneurs who experienced a robbery in the preceding year. To do so, we remove entrepreneurs in the 2008 sample who report being robbed in the past year (question not in 2001 survey). The results from the estimation that excludes this sample are shown in column one of Table 8. The coefficient on home robbery is similar to that from the full sample, and remains significant. This suggests that entrepreneurs who were robbed do not drive the results.

Next, we assess whether our results are driven by the subsample of entrepreneurs who are most credit-constrained. For the income or wealth shock effect to play a major role, these entrepreneurs must lack the ability to finance profitable investments externally (i.e., through borrowing). We thus return to our baseline specification and add an interaction between burglary rates and a variable indicating whether the entrepreneur has ever used credit in the operation of the firm—an admittedly imperfect measure, but one that nonetheless reflects the most important differences in access to and use of credit. If the income shock channel is important, we expect this interaction term to be positive, i.e., that access to credit for these entrepreneurs should mitigate the negative effects of burglaries. The results, presented in column two of Table 8, show the opposite is true, as the coefficient on the interaction term is negative. This means that entrepreneurs who use credit are even less likely to expand in the face of higher robbery rates than their potentially more credit constrained counterparts. This further suggests that income and wealth shocks are not the main channel through which robbery rates impact microenterprise expansion plans.

Finally, we compare income growth for entrepreneurs in the 2008 ENAMIN who report being robbed and those who do not. If the coefficients capture a pure income shock story, we should see different income trajectories for the two groups; if expectations of future expropriation risk are the main channel, entrepreneurs who were robbed and those who are not should show common income trajectories, as they are subject to the same environmental shocks. To test this, we regress income growth one, two, and three quarters after the ENAMIN sample on a dummy variable that equals one if an entrepreneur was robbed in 2008. In each case, we estimate the model with and without controls. The results, shown in columns three through eight in Table 8, show only small and insignificant correlations between income growth and direct robbery experience. In the full sample, we observe that income growth responds strongly and negatively to robbery rates (Table 5, columns one through three), and thus these results suggest that entrepreneurs who are robbed do not *differentially* respond to their own robbery experience but do reduce their expansion plans in response to broader changes in robbery in their urban environments. The indirect effect of robberies on the population of entrepreneurs—via the expected value of future losses from investments—thus seems particularly powerful.

7. ROBUSTNESS CHECKS

(a) *Sensitivity to specific 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. We consider the robustness of our estimates to these phenomena by sequentially dropping groups of states from our analysis. We first consider the sensitivity of our results to removing Mexico City, a potential outlier due to size and crime incidence. To ensure that our results are not driven by Mexico City, we re-estimate the model on a sample that excludes it. The results, shown in column one of Table 9, show that the findings are robust to the exclusion of Mexico City, as the size of the coefficient is relatively unchanged and remains 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.

We next consider the sensitivity of our results to removing states that have been most affected by drug violence, a natural concern given that the time frame of our study coincides with the dramatic rise in drug-related crime in Mexico. We exclude states most affected by drug-related violence using three specifications. First, we exclude all Northern border states (six states). Second, we exclude states with the highest degree of drug entry, determined by the Washington Post's Mexico at War series (seven states). Third, we remove states with the highest number of drug related deaths over the 2006–2008 period, using data from the Crime Indicator Database for

Table 8. *Channels*

Outcome variable	Plans to expand		Income growth					
	Entrepreneurs robbed in 2008 removed	Credit constraints	One quarter later		Two quarters later		Three quarters later	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Home robbery	−0.853**	−0.861**						
	(0.365)	(0.351)						
Entrepreneur robbed			−0.002	−0.056	−0.096	−0.112	0.082	0.035
			(0.077)	(0.086)	(0.104)	(0.113)	(0.208)	(0.178)
Use credit		0.051**						
		(0.025)						
Home robbery*		−0.440						
Use credit		(0.752)						
Controls	Yes	Yes	No	Yes	No	Yes	No	Yes
Observations	24,068	25,461	8060	8036	5795	5774	3729	3714

Coefficients are average marginal effects from a probit model. Estimated using survey weights. Standard errors clustered by state in parentheses.
Controls include gender, education, experience, experience squared, state-year unemployment, log real GDP per capita, average adult education, percentage male age 16–19, ITAM local institutions measures, homicides, physical assault incidence, state, year, and industry fixed effects.
Linear projection for 2001 crime rates. Homicides rescaled to # per 1 million inhabitants.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Table 9. *Robustness checks*

Outcome variable = plans to expand	Removing states				Alternative measures of institutions				Plan to continue	
	Mexico City	Border	Drug entry	Drug death[a]	Report	Perception	SARE offices	SARE months	Expansion	No plans
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Home robbery	−0.707**	−1.036***	−1.432***	−0.807**	−0.895**	−0.958***	−0.815*	−1.167***	−1.016**	1.001
	(0.314)	(0.391)	(0.497)	(0.405)	(0.348)	(0.349)	(0.452)	(0.412)	(0.416)	(1.030)
Robbery reporting rate					−0.036					
					(0.046)					
Perception state insecure						0.023				
						(0.067)				
SARE, # offices							0.001			
							(0.002)			
SARE, months open								−0.001*		
								(0.000)		
Observations	24,562	20,874	19,408	20,945	25,461	25,461	25,461	25,461	23,469	23,469

Coefficients are average marginal effects from a probit model. Estimated using survey weights. Standard errors clustered at state level in parentheses. Controls include gender, education, experience, experience squared, state-year unemployment, log real GDP per capita, average adult education, percentage male age 16–19, ITAM local institutions measures, homicides, physical assault incidence, state, year, and industry fixed effects.
Linear projection for 2001 crime rates. Homicides rescaled to # per 1 million inhabitants.
[a] 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 from the Justice in Mexico Project at the Trans-Border Institute (www.justiceinmexico.org).
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

the Justice in Mexico Project at the Trans-Border Institute (six states). [13] Results are shown in columns two through four of Table 9. The results are robust to removing border, drug entry, and high drug death states, as the coefficient on home robbery remains negative and significant in all cases. We take this as evidence that our results are not driven by changes in drug related violence.

(b) *Alternative measures of local institutional quality*

We consider three alternative measures of institutional quality, in case our baseline measures are insufficient. The first is average reporting rates for home robbery. This variable comes from the ENSI and is the average percentage of the last home robbery that was reported to the authorities. We expect that in states in which police forces, court proceedings, or other institutions have improved, households may be more likely to report crimes to the authorities (Soares, 2004). The second measure is perceptions about insecurity. This measure, also taken from the ENSI, 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. Finally, since the time period between the two ENAMIN surveys include notable reforms of the business registration process, we consider a measure of institutions that comes from these reforms. In 2002, the federal government enacted legislation that reduced the federal requirements for registering some businesses and encouraged the reduction of registration requirements at the municipal level. To inform the public about the reforms and promote similar steps by municipalities, the agency charged with enacting the reforms, COFEMER (Federal Commission for Improving Regulation), began opening business registration centers, known as SAREs (Rapid Business Opening System), in major municipalities (Bruhn, 2011). Any variation in registration requirements, if linked with local institutional quality and the promotion of microenterprises, could capture underlying institutional factors that jointly impact enterprise expansion and crime rates. We therefore test whether the introduction and timing of the SARE program affect our results using the change in the number of SARE offices by state from year end 2001 to November 2008 and the maximum number of months any SARE office in the state had been open as of November 2008. [14]

The results of estimations incorporating these alternative controls for institutional quality are shown in columns five through eight of Table 9. In all cases, the size and significance of the coefficient on home robbery are unchanged. To the extent that the judicial quality, crime reporting, security perception, and registration reform 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.

(c) *Alternate expansion measures*

Finally we consider the sub-sample of entrepreneurs who say they plan to continue their existing enterprise going forward (as opposed to closing it or opening a new one). [15] Among this sub-sample, we re-estimate our original outcome variable of expansion plans and, as a check, we estimate an alternative outcome variable; having no plans to change the enterprise. Entrepreneurs with no plans to change likely will neither grow nor shrink their enterprise going forward. This is the largest category of entrepreneurs, comprising 64% of those who plan to continue the existing firm. The results from these estimations are shown in columns nine and ten of Table 9. With respect to expansion plans, we find no change in the coefficient on home robbery among the sub-sample that plans to continue the existing enterprises. Alternatively, we find a positive but insignificant coefficient for home robbery when "no plans" is the outcome variable. Thus home robbery is weakly associated with

an increased likelihood that firms plan to do nothing, or stagnate.

8. CONCLUSIONS

This paper highlights a new dimension of the costs of weak property rights. Most of the focus in assessing these costs 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 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 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. 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 decisions. As such, we view our results as a strong indication, rather than proof of, a causal relationship between property crimes and microenterprise expansion.

Our results are particularly notable because they suggest that robberies against moveable assets have important distortionary effects, and likely lead to real inefficiencies. Although robberies of microenterprises represent wealth shocks to these enterprises, the most prevalent impact of these robberies is their reduction of otherwise profitable investment by entrepreneurs concerned about losing these assets. This paper thus extends the evidence on limited investment by other agents in developing country settings facing limited property security, most notably farmers.

Our findings have a number of implications for policymakers. 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. Our work makes a first exploration into the potential value of additional protections of private property for microenterprises, but future work is needed to fully disentangle the role of property crimes from other confounds and lay out clear policy implications.

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 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 the degree to which these dimensions are actionable by public entities.

NOTES

1. ENAMIN stands for Encuesta Nacional de Micronegocios, while INEGI stands for Instituto Nacional de Estadística y Geografía. The data and documentation for the ENAMIN are available on INEGI's website (www.inegi.org.mx). 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. Due to a change in the sample framework for the ENAMIN during 2001–08 (2001 was drawn from a survey of urban unemployment), we use only the urban portion of the 2008 ENAMIN.

2. We cannot use the total change in employees as the ENEU includes bins for different ranges of employees rather than totals.

3. Responses include: increase the number of products, increase the number of workers, reduce the number of products, reduce the number of workers, or not enact changes. Meanwhile, we cannot use enterprise assets to measure growth, because the survey module changed in 2008, generating a high non-response rate (over 20%) and values with more potential for measurement error.

4. The labor force surveys change during 2002–08. In 2002 the survey from which the ENAMIN was draw was the ENEU, or the National Survey of Urban Employment (Encuesta Nacional de Empleo Urbano). In 2005 this changed to the ENOE, or the National Survey of Occupation and Employment (Encuesta Nacional de Ocupación y Empleo). The surveys from all years are available on INEGI's website.

5. ENSI stands for Encuesta Nacional Sobre Inseguridad. The data and documentation are available on INEGI's website. We use the ENSI-3 (year 2004) and the ENSI-6 (year 2008). We address the time gap by projecting 2001 crime rates using a linear time trend. For robustness, we consider two alternatives. The first is using 2004 crime rates as a proxy for 2001 crime rates—a strategy that assumes no change in crime incidence across the three year period. The second is projecting 2001 crime rates using an exponential time trend—a strategy that assumes a constant percentage change in crime rates. We do not show the results from the two alternative specifications, but they are similar to those produced by the linear time trend and are available upon request.

6. ICESI stands for the Instituto Ciudadano de Estudios Sobre la Inseguridad. The website is www.icesi.org.mx.

7. The ENSI for 2004 and 2008 is representative of 13 cities in total, and cities with higher crime rates are disproportionately included relative to their population size. For example, several of the largest cities with lower crime rates, such as Puebla and León, are not included, while smaller cities, such as Acapulco, that have experienced increases in violence recently are included. Thus this subsample provides a less representative picture of crime rates than the urban areas of states.

8. According to the 2008 ENAMIN 58% of the microenterprise population lives in urban areas.

9. The population census and mid-census population count are conducted by INEGI and are available on INEGI's website.

10. This information comes from the ENEU and ENOE.

11. We recognize that the growth potential of established firms depends upon where they are in their life cycle. To explore if robbery effects are concentrated in firms at different stages of their growth cycles, we separately estimate expansion plans on "new" (less than 2 years in operation) and "established" firms (more than 2 years). The results, available upon request, find that the robbery effect is negative and significant for both groups.

12. As a result, changes in the crime rate due to changes in education levels of entrepreneurs or to changes in overall income levels in the state should be suitably controlled for and thus not responsible for major reverse causality bias.

13. We use data from the Ejecutometro database, which tallies organized crime style homicides using reports from the Reforma newspaper. These data are available on the Justice in Mexico project's website (www.justiceinmexico.org).

14. These data are from COFEMER, la Comisión Federal de Mejora Regulatoria (www.cofemer.gob.mx).

15. We do not remove entrepreneurs who say they do not plan to continue from the baseline estimates, as it is not clear that all of them leave entrepreneurship. Some say they plan to open a new enterprise after closing the existing one.

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