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Capital Crimes
Kidnappings and Corporate Investment in Colombia

Rony Pshisva and Gustavo A. Suarez

2.1 Introduction

Recent cross-country studies suggest that crime hinders economic activity. For example, using survey data for Latin America, Gaviria (2002) finds that firms located in countries where managers report that crime is an obstacle to doing business exhibit lower sales growth. Similarly, Barro (1991) and Alesina and Perotti (1996) find that politically unstable countries grow more slowly and invest less. Developing countries are simultaneously burdened by high crime rates and deficits in economic and social infrastructure, including health and education. Hence, understanding the effect of crime on economic activity is central for debating priorities and strategies for development policy. In addition, high rates of violent crime in developing countries may help researchers explain the puzzling result that capital does not appear to flow from rich countries to poor countries (Lucas 1990).

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Negative correlations between crime and investment in cross-country studies may be explained by omitted variables. Importantly, poor economic conditions may simultaneously deter investment and increase incentives to commit crimes. Instead of exploiting variation across countries, this chapter uses variation of crime rates over time within regions in Colombia to understand the relationship between kidnappings and corporate investment rates.

Colombia provides a useful setting for studying the economic consequences of violent crime, because it has experienced high levels of crime in recent decades. The combination of guerrillas, paramilitaries, and drug trafficking has given Colombia the highest per capita rates of homicides and kidnappings in the world since the early 1990s. Furthermore, there has been substantial variation in criminal activity both over time and across regions. The total number of kidnappings in Colombia almost tripled from 1996 to 2000.[1] In 2002, Medellin, the second largest city, reported almost four times the number of homicides per capita of Bogota, the largest city.[2]

Our data set combines detailed information about crime rates across thirty-two regions in Colombia with financial-statement data for an unbalanced panel of roughly 11,000 firms from 1997 to 2003. Using detailed data on the victims of kidnappings allows us to isolate crimes that affect firm managers and owners from widespread forms of crime that victimize the entire population. By comparing the effect of firm-related kidnappings with the effect of broader forms of violent crime, we are able to isolate the relationship between firm-related kidnappings and investment that is not explained by omitted variables that affect all forms of violent crime.

Our main result is that firms invest less when kidnappings directly target firm owners or managers in the region where the firms are headquartered. By contrast, forms of crime that victimize the entire population but that do not explicitly target firm owners or managers are statistically unrelated with corporate investment. These results are not driven by the subset of firms whose managers and owners are actually kidnapped. On the contrary, the negative relationship between firm-related kidnappings and firm investment is explained by the firms that are headquartered in the same region as the firms whose managers and owners are actually victimized. In addition, we find that firms with substantial shares of foreign ownership appear to be more sensitive to the kidnappings of foreign managers and foreign owners. Similarly, firm investment in a given industry is strongly negatively correlated with kidnappings of firm owners and managers within the industry but is unrelated with kidnappings in other industries.

Focusing on firm-level data within a country allow us to exploit firm characteristics to address concerns that unobserved poor demand conditions

1. In section 2.3 we discuss a data set on kidnappings in Colombia (FONDELIBERTAD).
2. Colombia's National Police.

explain a negative correlation between investment and crime. In particular, we compare the effect of kidnappings on firms that sell on local markets and the effects on firms that rely on exports. If omitted poor demand conditions explained the negative correlation between kidnappings and corporate investment, we should expect stronger effects for firms selling in local markets. By contrast, we find similar effects in firms that sell in local markets and those that sell mostly in foreign markets, providing evidence against an explanation of the negative correlation between corporate investment and crime based on omitted demand variables.

The results in this chapter complement recent studies that exploit variation of crime rates within countries. In particular, Abadie and Gardeazabal (2003) show that terrorism reduces firms' returns in the Basque Country using event-study methodologies. Our findings complement their study, because we focus on firm-related crime and not on general forms of crime.

The rest of the chapter is organized as follows. Section 2.2 illustrates the link between kidnappings and investment using a stylized cross-country regression. Section 2.3 provides a brief historical background of Colombia and explains the data set. Section 2.4 outlines the empirical strategy, and section 2.5 reports our main results. Section 2.6 compares alternative explanations for the negative effect of firm-related kidnappings on investment, and section 2.7 concludes.

2.2 Preliminary Evidence From Cross-Country Data

As motivation for our subsequent analysis using data from Colombian firms, this section reports the results of simple cross-country regressions linking the rate of kidnappings by international terrorists with aggregate investment. The rate of kidnappings by international terrorists is both closely related to the measures of violent crime we analyze for the Colombian case and available for a large panel of countries. Other cross-country studies have studied the relationship between more general forms of crime and economic activity (Fajnzylber, Lederman, and Loayza 2002; Gaviria 2002), but none have explicitly focused on kidnappings.

We measure investment as either Gross Capital Formation or net Foreign Direct Investment, both scaled by gross domestic product (GDP). We use an unbalanced panel of 196 countries with annual observations from 1968 to 2002 to estimate pooled ordinary least squares (OLS) regressions with country- and year-fixed effects:

$$(1)\quad \text{Investment}_{i,t} = \alpha + \beta \times \text{Kidnappings}_{i,t} + \gamma \times \text{GDP per capita}_{i,t-5} + \delta_i + \eta_t + \varepsilon_{i,t},$$

where i indexes countries and t indexes years. Investment, GDP, and population data are taken from the World Bank's World Development Indicators. Finally, $Kidnappings_{i,t}$ is the number of kidnappings per 100,000 popu-

lation perpetrated by international terrorists, reported in the ITERATE data set.[3]

As a check on the influence of outliers, the regressions reported in this section exclude two country-year observations with net foreign direct investment larger than GDP and one observation with gross capital formation larger than GDP. Similarly, the regressions reported in this section drop two country-year observations with kidnappings rates larger than one per 100,000 people. Results are similar when we keep these observations. Our results are also robust to controlling for indexes of creditor rights protection as in La Porta et al. (1998)[4] and replacing kidnapping rates with their one-year lag.

Table 2.1 reports the results of estimating equation (1) using our two alternative measures of investment. The dependent variable in columns (1) and (2) is gross capital formation, while the dependent variable in columns (3) and (4) is net foreign direct investment. Columns (1) and (3) report the results of an OLS regression of investment on kidnappings and a constant with no other controls, while columns (2) and (4) add country- and year-fixed effects and lagged GDP.

The results in table 2.1 suggest that those countries where kidnappings are more frequent also tend to accumulate domestic capital more slowly and attract less foreign direct investment. The evidence summarized in table 2.1 is suggestive, but raises questions. For example, the relationship between kidnappings and investment may be explained by omitted variables, as poor economic conditions may simultaneously depress investment and motivate criminal activity. Credit conditions are tighter during recessions, as creditors anticipate more frequent defaults, and firms themselves, expecting lower sales, are reluctant to conduct capital expansions. Meanwhile, recessions reduce employment opportunities in legal activities and accentuate income disparities, perhaps stimulating criminal activity. In addition, cross-country regressions, like equation (1), cannot distinguish whether the negative relation between investment and violent crime is mainly concentrated on those households or firms that are direct victims of violent events, or whether the effects are more widely spread.

The limitations of cross-country studies provide a major motivation for studying the link between violent crime and investment using more disaggregated data. The rest of this chapter discusses the relationship between violent crime and investment in the context of a large panel of firms located in Colombia.

3. The acronym ITERATE stands for "International Terrorism: Attributes of Terrorist Events." Mickolus et al. (2003) describe the data set in detail.

4. The cost of including creditor right indexes is a sample reduction.

Table 2.1 **Cross-country evidence**

Dependent variable	Net $FDI_{i,t}$ (% of GDP) (1)	Net $FDI_{i,t}$ (% of GDP) (2)	Gross Capital $Formation_{i,t}$ (% of GDP) (3)	Gross Capital $Formation_{i,t}$ (% of GDP) (4)
Kidnappings per 100,000 $people_{i,t-1}$	–14.104**	–17.709*	–38.989**	–17.198**
	(6.621)	(10.208)	(17.480)	(8.263)
$\log(\text{GDP per capita})_{i,t-5}$		0.213		–0.309
		(0.648)		(1.262)
Constant	2.223***	–0.039	23.056***	25.330***
	(0.192)	(4.699)	(0.479)	(9.325)
Country fixed effects?	No	Yes	No	Yes
Year fixed effects?	No	Yes	No	Yes
Observations	3,688	3,688	4,019	4,019
Number of countries	160	160	172	172
R^2	0.001	0.350	0.003	0.551

Notes: Standard errors (in parentheses) are adjusted for country clustering. This table reports the ordinary least squares (OLS) estimate of the effect of kidnappings on investment in an unbalanced panel of 196 countries from 1968 to 2002, corresponding to equation (1) in the text. The dependent variable in columns (1) and (2) is net Foreign Direct Investment (FDI) scaled by GDP, and the dependent variable in columns (3) and (4) is Gross Capital Formation scaled by GDP. The variable Kidnappings is obtained from the ITERATE data set; it is defined as the number of kidnappings by international terrorists divided by 100,000 population. The series of Net FDI, Gross Capital Formation, and GDP per capita are from the World Bank's World Development Indicators data set. We exclude country-year observations for which Net FDI (2 observations) or Gross Capital Formation (1 observation) is larger than the GDP. Similarly, we exclude 2 country-year observations for which the rate of kidnappings is larger than one.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

2.3 Data on Firms and Crime in Colombia

2.3.1 Violent Crime in Colombia in Historical Perspective

Colombia is highly violent for its level of development. For example, the United Nations reports that the annual rate of homicides in Colombia averaged sixty-three homicides per 100,000 people between 1998 and 2000, the highest rate in the world.[5] By contrast, the average homicide rates in South America and the Organization for Economic Cooperation and Development (OECD) countries were forty-one per 100,000 people and three per 100,000 people, respectively.

As measured by homicide rates, violent crime in Colombia has trended

5. United Nations, Seventh Survey of Crime Trends and Operations of Criminal Justice.

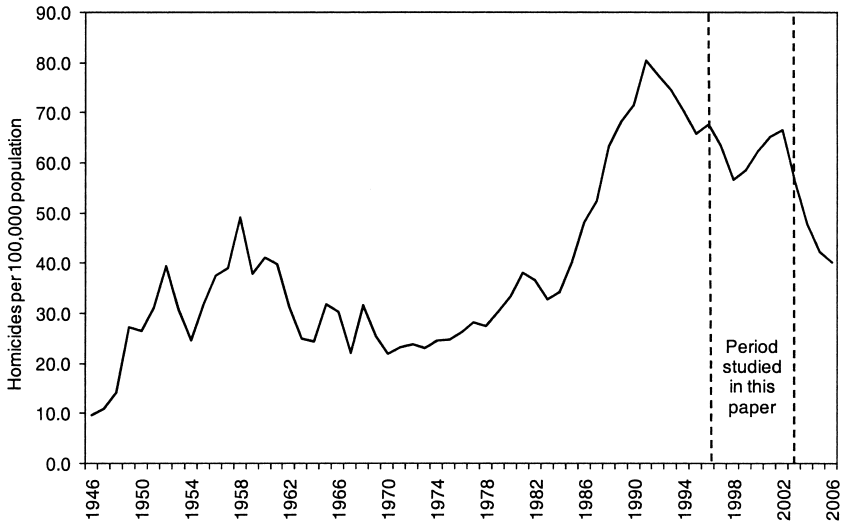


Fig. 2.1 Homicide rate in Colombia, 1946–2005

Sources: National Police, Departmento Administrativo Nacional de Estadística de Colombia (DANE); and Sanchez, Diaz, and Formisano (2003).

up for several decades before the years studied in this chapter. As figure 2.1 illustrates, homicide rates rose sharply in the 1940s, as the two main political parties waged a civil war. Although these political parties agreed on an explicit power-sharing mechanism, higher homicide rates persisted into the 1960s, as some of the peasant resistance groups formed during the civil war evolved into leftist guerrillas like the Revolutionary Armed Forces of Colombia (FARC), one the largest rebel groups currently active (Safford and Palacios 2001). Homicide rates skyrocketed in the 1980s and 1990s, as cocaine production surged (Angrist and Kugler 2008; Bergquist, Peñaranda, and Sanchez 2001). Drug trafficking increased violence, as the government prosecuted drug lords, and different cartels fought for market control. During the last decades of the twentieth century, powerful economic interests—including drug dealers—organized right-wing groups of paramilitaries to protect their businesses from guerrilla extortion.[6]

The dramatic rise in homicides during the 1980s and 1990s parallels increases in other measures of violent crime. As figure 2.2 illustrates, both kidnappings and guerrilla attacks rose steadily throughout the 1990s and peaked in 2000.[7] Kidnappings and guerrilla activity moved together, likely because rebels use hostages to strengthen their political bargaining position

6. Both guerrilla and paramilitaries have been linked with drug trafficking in recent years. See, for example, Streatfeild (2002).

7. Guerrilla attacks (FARC) include bombings, arm-trafficking, massacres, ambushes, piracy, and confrontation with the army or the National Police.

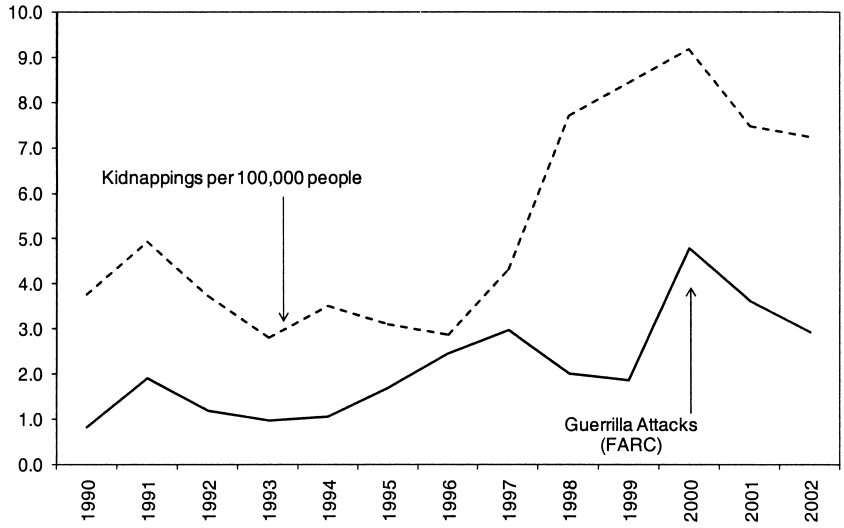


Fig. 2.2 Kidnappings and guerilla attacks, 1990–2002

Sources: National Police, Ministry of Defense, Departamento Administrativo Nacional de Estadística de Colombia (DANE); and Sanchez, Diaz, and Formisano (2003).

and partly finance their operations with monetary ransoms. Paramilitaries, drug cartels, and gangs are also frequently associated with kidnappings. In *News of a Kidnapping,* for instance, Garcia Marquez (1997) reconstructs the story of seven hostages kidnapped in 1989 by the Medellin drug cartel to force the Colombian government into repealing its extradition treaty with the United States. The cartel leaders were keenly interested in securing their trial and imprisonment in Colombia under more favorable terms. After the increase in kidnappings during the 1990s, Colombia became the country with the highest absolute number of kidnappings per year and the highest annual kidnapping rate in the world.[8]

The persistence of high rates of violent crime has motivated several studies measuring the cost of crime and conflict using Colombian data.[9] Using aggregate data, Rubio (1995) shows that increases in crime rates are correlated with lower GDP growth, and Cardenas (2007) argues that the acceleration in criminal activity in the 1990s is partly to blame for Colombia's productivity slowdown. More recently, using household-level data, Barrera and Ibañez (2004) and Rodriguez and Sanchez (2009) study the effects of crime on education. Similarly, exploiting variation in crime rates across

8. In 2003, Kroll, a private security advisor headquartered in New York, estimated that more kidnappings were perpetrated in Colombia (about 4,000 per year) than in other countries. Mexico followed with roughly 3,000 kidnappings per year.

9. Montenegro and Posada (2001) and Riascos and Vargas (2003) survey the literature on the costs of crime and violence in Colombia. For a more recent treatment, see Sanchez (2007).

municipalities, Urdinola (2004) analyzes the effect of violent crime on infant mortality.

2.3.2 Statistics on Kidnappings and Other Types of Crime

The statistics on violent crime in Colombia used in this chapter are aggregated at the level of "department." Colombia is divided into thirty-two departments or semiautonomous administrative units. Colombian departments are similar to states in the United States, but have substantially less legislative autonomy. The FONDELIBERTAD, a governmental organization in Colombia established in 1996, collects detailed information on individual kidnappings reported to the Colombian Ministry of Defense.[10] For each kidnapping event between 1996 and 2002, FONDELIBERTAD reports the date and department in which the kidnapping occurred, the identity of the kidnapper (guerrillas, paramilitaries, common criminals, or not determined), and the number of days in captivity. Importantly for the regression analysis, the data set reports the occupation and nationality of the victim. For most victims with ownership or employment relationships with a firm, the data set reports the name of the firm. In the case of owners, however, the data set does not report the fraction of ownership or whether the victim held stakes in several firms. The data set does not disclose information on monetary ransoms.

The first six columns of table 2.2 summarize the main characteristics of the FONDELIBERTAD data set. As shown in column (1), the data set reports roughly 2,700 kidnappings per year between 1996 and 2002.

The data set attributes 56 percent of overall kidnappings to guerrillas, 14 percent to common criminals, and 5 percent to paramilitaries. (The identity of the kidnappers, is unknown or not disclosed for the rest of the observations.) According to the demands of the kidnappers, FONDELIBERTAD classifies abductions as having either economic or political objectives. Kidnappings for economic reasons typically involve a monetary ransom. Just over half of the kidnappings in the sample are classified as having economic ends, while 10 percent of the kidnappings are classified as having political objectives.[11] As shown in column (2) of table 2.2, only 2 percent of the victims are not Colombian citizens.

Kidnappings and Firms

To focus on the subset of kidnappings that target firms, we define *Kidnappings of Firm Owners* as those where victims own at least part of the firm; and

10. The term FONDELIBERTAD is short for Fondo Nacional para la Defensa de la Libertad Personal (National Fund for the Protection of Individual Liberty). In addition to collecting statistics on kidnappings, FONDELIBERTAD provides legal and psychological assistance to affected families, and advises government policies on kidnappings. Publicly available FONDELIBERTAD data on kidnappings after 2003 has been less detailed.

11. The demands of the kidnappers are unknown for roughly a third of the observations.

Table 2.2 Kidnappings, homicides, and guerrilla attacks by year

Year	Total kidnappings (1)	Kidnappings of foreigners (2)	Kidnappings of firm management (3)	Kidnapping of firm owners (4)
1996	1,091	41	193	1
1997	1,671	31	205	0
1998	3,023	43	371	32
1999	3,349	57	470	77
2000	3,697	42	n.a.	n.a.
2001	3,050	49	168	60
2002	2,986	31	163	43
Total	18,867	294	1,570	213

Year	Kidnappings of government employees (5)	Kidnappings of Army and National Police (6)	Total homicides (7)	Total guerrilla attacks (8)
1996	23	24	26,130	934
1997	442	38	24,828	1,146
1998	280	266	22,673	790
1999	98	168	23,820	736
2000	n.a.	n.a.	25,859	1,931
2001	84	68	27,356	1,471
2002	112	57	28,363	1,210
Total	1,039	621	179,029	8,218

Notes: This table reports, by year, the total number of kidnappings, homicides, and guerrilla attacks in Colombia from 1996 to 2002. Data on homicides and guerrilla attacks are from the National Police/Ministry of Defense. Guerrilla attacks considers only attacks perpetrated by FARC. Data on kidnappings are obtained from FONDELIBERTAD. Total kidnappings are all kidnappings reported in the FONDELIBERTAD data set. Government employees include local and national government, except the Army and National Police. Kidnappings of firm management victimize CEOs, presidents, vice presidents, board members, and division managers. Kidnappings of firm owners include those victims who own at least part of the firm.

Kidnappings of Firm Management as those where victims are board members, chief executive officers (CEOs), presidents, vice presidents, or division managers. Table 2.2 reports that just under 10 percent of the kidnappings in the FONDELIBERTAD data set targeted firm management (column [3]), and about 1 percent targeted owners (column [4]).

To compare the effects of kidnappings that target firms to other types of kidnappings, we consider two additional categories. We define government employees as individuals who worked for the local or national government or candidates running for public office at the time of the kidnapping. We group members of the Army and National Police in a separate category, even though they are also government employees. Columns (5) and (6) of table 2.2 report, respectively, that 5 percent of the victims in the FONDELIBERTAD

data set were government employees and that 3 percent of the victims served in the Army or the National Police.

Finally, a large fraction of the victims in the data set are under eighteen (about 10 percent), self-employed workers (about 45 percent), and members of not-for-profit organizations such as religious communities and Nongovernmental Organizations (NGOs) (about 5 percent). Occupation is unknown for 12 percent of the observations in the data set.

Other Types of Crime

To isolate the effect of kidnappings on investment from the effect of overall violence, we consider variables other than kidnappings that reflect common crime activity or the armed conflict between government and rebels. Based on reports from Colombia's National Police and Army, the National Planning Department (DNP in Spanish) compiles a data set on different types of crime by department since 1995. We focus on two of the most common types of violent crime in Colombia: guerrilla attacks and homicides.

As a limitation to our analysis, the data on kidnappings are more detailed than the data on guerrilla attacks and homicides. The FONDELIBERTAD data set on kidnappings allows us to identify the victim and his or her occupation (and hence, whether he or she works for a firm). By contrast, the DNP data set on guerrilla attacks and homicides contains no information about individual victims within departments.

Guerrilla attacks in the DNP data set include arm trafficking, massacres, bombings, ambushes, piracy, and confrontations with the army or the National Police. We restrict attention to attacks by FARC for two reasons. First, by the number of combatants and terrorist attacks, FARC is the largest rebel group in Colombia. Second, while other rebel groups operate only in a handful of departments, FARC is widely spread throughout the country. Homicides reported by DNP include all kinds of violent deaths and not only killings related with the armed conflict. Columns (7) and (8) of table 2.2 report the number of terrorist attacks and homicides from 1996 through 2002.

The maps in figure 2.3 illustrate the distribution of kidnappings, homicides, and guerrilla attacks per capita across departments in Colombia.[12] The FARC are somewhat more likely to attack departments with a large fraction of rural population in the southeast of the country or departments with abundant natural resources (like oil-rich Arauca along the Venezuelan border). By contrast, homicides and kidnappings are more evenly distrib-

12. We exclude one department from the statistical analysis—the islands of San Andres and Providencia—because there is no information on crime and other regional characteristics. Additionally, we treat the metropolitan area of Bogota—known as the Capital District—as a separate department, because it concentrates roughly one-fifth of Colombia's population. Data on population are described in the appendix, table 2A.1.

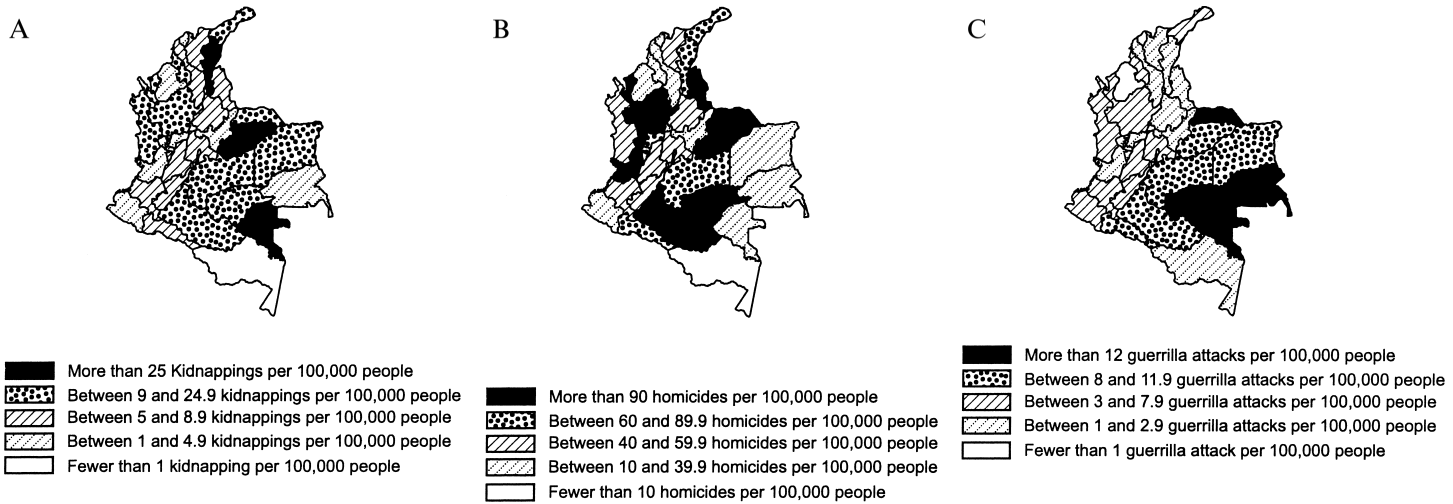


Fig. 2.3 Distribution of violence across departments: *A*, kidnappings; *B*, homicides; *C*, guerilla attacks (FARC).

Notes: Panel A shows the distribution of average kidnapping rates (1996–2002) across Colombia's departments. Darker areas represent departments with higher kidnapping rates. Panel B shows the distribution of average homicide rates (1996–2002) across Colombia's departments. Darker areas represent departments with higher homicide rates. Panel C shows the distribution of average guerrilla attacks per capita (1996–2002) across Colombia's departments. Darker areas represent departments with higher guerrilla attacks per capita.

uted across departments than guerrilla attacks.[13] However, kidnappings, homicides, and guerrilla attacks are highly correlated across regions.

2.3.3 Firms

We combined balance sheet and income statement data for publicly-traded firms that report to the Superintendencia Financiera and for privately-owned firms in Colombia that report to the Superintendencia de Sociedades. The Superintendencia Financiera is a government agency that oversees and regulates both banking and securities markets,[14] while the Superintendencia de Sociedades oversees incorporated firms and regulates liquidation and bankruptcy. Combining these two data sets yields an unbalanced panel of almost 11,000 firms with annual observations between 1996 and 2003 (roughly 44,000 firm-year observations).

Prior to 2000, reporting of financial statements to the Superintendencia de Valores was mandatory for all firms incorporated in Colombia. After 2000 only firms with assets above an inflation-indexed threshold are required to report, but a substantial number of firms below the threshold continued to voluntarily report after 2000.[15]

Table 2.3 summarizes the distribution of firms over time and across industries coded in the International Standard Industrial Classification (ISIC). As it is the case in most developing countries, only a small fraction of firms in Colombia are publicly traded (panel A). Roughly half of the observations in the sample are from the manufacturing sector or from the wholesale and retail trade sector (panel B).[16]

Table 2.4 summarizes the characteristics of the firms in the sample.[17] The average firm-year observation has real assets of $7.7 million, while the median firm has real assets of $2.3 million. As it is the case for firm data in other developing and industrialized countries, the sample is skewed toward smaller firms. Investment, defined as the change in net Property, Plant, and Equipment (PPE), scaled by assets is –0.3 percent for the average observation and –0.5 percent for the median. Since our definition of investment

13. Collier and Hoeffler (2004) argue that the quest for social justice is not the only cause behind rebellions: in fact, many rebellions pursue the capture of rents. Diaz and Sanchez (2004) study the importance of these two types of causes for the location of FARC in Colombia.

14. The financial reports from publicly-traded firms that we use in this chapter were originally collected by the Superintendencia de Valores, which merged with the Superintendencia Bancaria in 2005 to form the Superintendencia Financiera.

15. The dollar equivalent of the 2003 threshold was about $2 million. The results in this chapter are robust to excluding firms with asset values below the threshold during the entire sample.

16. The results in the following sections are robust to excluding firms in heavily regulated industries (financial intermediation and utilities).

17. Nominal variables are deflated using the Producer Price Index (PPI). Appendix table 2A.1 describes all variables used in this section. Total Assets are translated to U.S. dollars using the exchange rate in 1999, which is the base year of the PPI.

Table 2.3 Distribution of firms

Panel A: Distribution by year of firms in sample

	Privately-held firms	Publicly-traded firms	Total
1997	6,700	115	6,815
1998	7,153	67	7,220
1999	6,870	73	6,943
2000	7,139	75	7,214
2001	4,767	77	4,844
2002	4,448	94	4,542
2003	6,648	79	6,727
Total	43,725	580	44,305

Panel B: Distribution by industry (firm-year observations)

Agriculture, hunting, and forestry	3,892
Fishing	126
Mining and quarrying	859
Manufacturing	12,233
Electricity, gas, and water supply	67
Construction	4,391
Wholesale and retail trade	11,540
Hotels and restaurants	766
Transport, storage, and communications	2,122
Financial intermediation	2,237
Real estate, renting, and business activities	4,936
Public administration and defense	0
Education	73
Health and social work	161
Other community, social, and personal service activities	883
Private households with employed persons	19
Extra-territorial organizations and bodies	0
Total	44,305

Notes: Panel A reports the distribution by year of firms in the sample. Data on private firms are collected by the Superintendencia de Sociedades in Colombia; data on public firms are obtained from the Superintendencia Financiera. Panel B reports the distribution of firm-year observations by industry sector, according to the International Standard Industry Classification (ISIC).

captures capital expenditures net of depreciation, investment is not censored at zero.[18] Negative investment for the median and the average observation partly reflects the downturn experienced by the Colombian economy during most of the sample, which overlaps with the emerging market crisis of 1998. The ratio of net income to total assets (return on assets, or ROA), a measure of profitability, is 0.1 percent for the average observation and 1.5 percent for the median. Finally, table 2.4 also reports that foreign firms account for

18. We have no data on gross PPE or capital expenditures in the database.

Table 2.4 **Descriptive statistics: Firms' characteristics**

	Mean	Median	Standard deviation	Firm-year observations
Total assets (millions of dollars)	7.700	2.308	19.693	44,305
Investment/TA (%)	–0.337	–0.516	16.928	44,305
Return on assets (%)	0.114	1.555	12.175	44,305
Real cash/TA (%)	6.639	2.696	10.262	44,305
Foreign ownership (Yes = 1, No = 0)	0.173	0.000	0.340	33,600

Notes: This table reports descriptive statistics for the firm variables used in the empirical analysis, corresponding to the sample summarized in table 2.3. "Investment" is the change in Property, Plant, and Equipment, and "TA" denotes Total Assets. "Return on Assets" is the ratio of net income to total assets. The dummy variable Foreign Ownership equals 1 if foreigners own at least 50 percent of the firm.

roughly 17 percent of the sample. Firms are classified as foreign if more than 50 percent of its shares are held by foreigners.

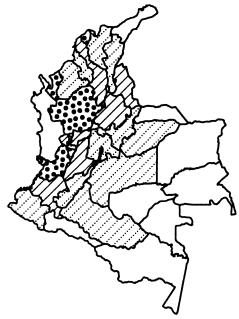
The map in figure 2.4 depicts the geographic distribution of the firms in the sample in 2003 and illustrates the high concentration of economic activity. Most firms were headquartered in the northern (or Caribbean) departments or in the central (or Andean) departments. Just a bit over half of the sample was headquartered in Bogota, D.C., and about one-quarter of the sample was headquartered in the departments of Antioquia and Valle del Cauca, mainly in their capital cities (Medellin and Cali, respectively).[19] However, roughly one-fifth of the sample was distributed in twenty-one departments other than Bogota, Antioquia, and Valle del Cauca. Only a small fraction of firms was headquartered in the northwestern department of Choco (close to the border with Panama) or in the southeastern departments (close the borders with Brazil and Peru), as their territory is largely tropical rain forest.

2.4 Empirical Strategy

To measure the relationship between kidnappings and firm investment, our empirical strategy exploits two sources of variation. First, we consider changes over time in kidnapping rates measured at the department level. Second, we compare the effect of kidnappings that target firm-related individuals with the effect of other types of kidnappings (and also to other types of crime).

To estimate the effect of the kidnappings rate of department *j* on the investment of all firms located in that department, we control for char-

19. Our results are similar when we exclude firms located in Bogota, D.C.



Total: 6,727 firms

More than 1,000 firms (1 department: Bogota, D.C. 3,809)
Between 200 and 999 firms (3 departments: Atlantico, 292, Valle del Cauca, 782, Antioquia, 975)
Between 50 and 199 firms (7 departments)
Between 1 and 99 firms (12 departments)
Departments with no firms (9 departments)

Fig. 2.4 Geographic distribution of firms in Colombia, 2003

Note: Figure 2.4 shows the distribution of firms across Colombia's departments in 2003. Darker areas represent departments with more firms.

acteristics of department *j* that may affect both investment decisions and incentives to kidnap. Additionally, we control for firm characteristics that predict investment behavior.

In the traditional "crime and punishment" approach, individuals decide to commit crimes after weighting the costs and benefits of criminal behavior (Becker 1968; Glaeser 1999). For example, adverse economic conditions reduce the opportunity cost of criminal activities. Supportive of this prediction, Fajnzylber, Lederman, and Loayza (2002) find that crime rates are countercyclical and Miguel, Satyanath, and Sergenti (2004) show that negative exogenous shocks to economic growth increase the likelihood of civil conflict in a sample of African countries.[20] Hence, economic conditions in department *j* may determine not only the investment decisions of firms in department *j*, but also the incentives of kidnappers in department *j*. In our statistical analysis, we control for GDP per capita, poverty levels, public infrastructure, and primary school enrollment.[21]

We include homicides and guerrilla attacks in our regressions because we do not want to confound the effect of kidnappings with the effect of the overall civil conflict. To the extent that omitted variables affect all types of

20. Recent studies challenge the conventional view that poverty generates terrorism. For example, Abadie (2006) finds that terrorist risk is not significantly higher in poor countries, after controlling for country characteristics (including political freedom).

21. Appendix table 2A.1 describes department-specific variables.

crime in a similar way, we identify the effect of crime on firm investment from the differential effect of crime specifically targeted against firms.[22]

Empirical studies of corporate investment typically find that firms with higher holdings of liquid assets (or cash) and more favorable investment opportunities (or Tobin's Q) invest more (Fazzari, Hubbard, and Petersen 1988; Stein 2003). In line with these standard results, we control for cash balances scaled by assets and approximate investment opportunities by using net income scaled by assets. Unfortunately, forward-looking proxies for investment opportunities, such as price-to-book ratios, are available only for the small subset of publicly-traded firms in the sample.

We measure the impact of kidnappings on firm investment using the following pooled OLS regression:

$$\begin{aligned}(2)\qquad \frac{\text{Investment}_{i,t}}{\text{TA}_{i,t-1}} = {} & \alpha + \beta_1 \times \text{Kidnappings}_{j,t-1} + \beta_2 \\ & \times \text{Guerrilla Attacks}_{j,t-1} + \beta_3 \times \text{Homicides}_{j,t-1} \\ & + \delta X_{i,t-1} + \gamma Z_{j,t-1} + \phi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t},\end{aligned}$$

where i indexes firms, j indexes departments, t indexes years, and k indexes industries. Investment is defined as the change in property, plant, and equipment; and *TA* denotes total assets. *Kidnappings, Guerrilla Attacks,* and *Homicides* are measured at the department level and scaled by 100,000 people, and $X_{i,t}$ denotes the vector of firm-specific controls: log of total assets, cash holdings scaled by total assets, and net income scaled by total assets. Similarly, $Z_{j,t}$, represents the vector of department controls: income per capita, primary school enrollment, a poverty index,[23] and the extension of roads in 1995. Variables ϕ_i, η_t, λ_k, and μ_j represent firm, year, industry, and department fixed effects, respectively. Finally, standard errors are clustered by department.[24]

We assume that lagged crime rates are good predictors of future crime rates (and hence, future conditions that are potentially relevant for investment). In fact, univariate time series analysis that we do not report here suggests that the rates of kidnappings, homicides, and guerrilla attacks are autoregressive and stationary processes. Furthermore, crime rates in subsequent years are positively correlated.[25]

22. Recent developments in the economics of crime suggest that social interactions explain an important component of the variance of crime both across cities and over time (Glaeser, Sacerdote, and Scheinkman 1996; Glaeser and Sacerdote 1999). In a framework where social interactions are important, the incentives to kidnap may depend on the intensity of other types of crime in the same time and place.

23. The index is Necesidades Basicas Insatifechas (NBI) and reflects crowded or substandard housing conditions, school-age children not attending school, and/or lower education of the head of the household.

24. Results are robust to clustering by year-department.

25. Results are robust to using contemporary kidnappings as opposed to lagged kidnappings and to instrument contemporary kidnappings with lagged kidnappings.

2.5 Results

2.5.1 Kidnappings That Target Firms

Table 2.5 reports OLS estimates of equation (2) using alternative types of kidnapping rates as explanatory variables. The first three regressions in the table consider kidnappings whose victims are not directly linked to firms, and the last two regressions consider kidnappings whose victims are firm managers or owners.

Table 2.5 Kidnappings and firm investment

	Dependent variable: Investment$_t$ / Total assets$_{t-1}$				
	(1)	(2)	(3)	(4)	(5)
Total kidnappings per 100,000 pop.$_{t-1}$	0.027				
	(0.078)				
Kidnappings of government employees per 100,000 pop.$_{t-1}$		0.575			
		(0.691)			
Kidnappings of Army and National Police per 100,000 pop.$_{t-1}$			–0.570		
			(0.592)		
Kidnappings of firm management per 100,000 pop.$_{t-1}$				–1.332**	
				(0.496)	
Kidnappings of firm owners per 100,000 pop.$_{t-1}$					–4.105*
					(2.068)
Homicides per 100,000 pop.$_{t-1}$	–0.004	0.000	0.000	0.004	0.004
	(0.008)	(0.008)	(0.010)	(0.010)	(0.009)
Guerrilla attacks per 100,000 pop.$_{t-1}$	–0.065	–0.210	–0.216	–0.199	–0.219
	(0.115)	(0.259)	(0.247)	(0.251)	(0.241)
Observations	44,305	39,461	39,461	39,461	39,461
Number of firms	10,957	10,877	10,877	10,877	10,877
R^2	0.994	0.995	0.995	0.995	0.995

Notes: This table reports OLS estimates of the effect on investment of kidnappings, homicides, and guerrilla attacks. The results correspond to equation (2) in the text. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include lagged firm controls (log assets, cash holdings scaled by assets, and ROA); lagged department controls (GDP per capita, primary school enrollment, a poverty index, and the extension of roads in 1995); and fixed effects (by year, industry, department, and firm). The rates of kidnappings, homicides, and guerrilla attacks are measured at the department level and are scaled by 100,000 population. The sample is an unbalanced panel of firms located in Colombia with annual observations from 1996 to 2003. Total kidnappings are all kidnappings reported in the FONDELIBERTAD data set. Government employees include local and national government, except the Army and the National Police. Firm management includes board members, CEOs, presidents, vice presidents, and division managers. Firm owners are victims who own at least part of the firm. Guerrilla attacks includes FARC attacks reported by the National Police/Ministry of Defense. Standard errors (in parentheses) are adjusted for department clustering.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Kidnappings that target firm owners or managers have a statistically significant negative relationship with corporate investment. To illustrate the economic magnitude of the relationship of firm-related kidnappings, note that a one-standard deviation decrease within a department in the rate of kidnappings victimizing firm management is associated with an average increase of about 1.7 percentage points in investment rates ($= -1.332 \times 1.30$).[26] This is a sizeable effect, as the average investment rate in the sample is about –0.3 percent of total assets. Similarly noticeable magnitudes arise when we rank regions into quartiles based on the rate of kidnappings of firm management and then compare firm investment in the most dangerous quartile with firm investment in the least dangerous quartile.[27]

By contrast, kidnappings whose victims are not directly related to firms have a statistically insignificant relationship with corporate investment. In particular, kidnappings that target government employees, or the Army and National Police are unrelated to investment. Although a few of these coefficients are large, they are imprecisely estimated. In addition, the coefficient on total kidnappings is also not statistically significant.

In sum, while kidnappings that target firm owners or managers have a statistically significant relationship with firm investment, other—more general—types of violent crime that do not target firms directly have no significant relationship with investment. This finding alleviates concerns that our results with firm-related kidnappings may be explained by unobserved variables that drive both overall criminal activity and investment.[28] The identifying assumption in equation (2) is that unobserved variables have no differential effect across different types of crime. For example, if economic conditions that are not captured by GDP affect both criminal activity and corporate investment, we assume that all types of crime are equally affected by such economic conditions.[29]

2.5.2 Firms Directly Affected

A finding that firms directly attacked by kidnappings are forced to cut back on investment would be, to some extent, unsurprising. After all, kidnappings of employees disrupt production and firms may be forced to pay ransoms. However, we find a more surprising—and perhaps more interesting—result: the negative effects of firm-related kidnappings on investment

26. Appendix table 2A.2 reports summary statistics of the series of kidnappings, homicides, and guerrilla attacks.

27. Comparing firms in the most violent quartile with firms the least dangerous quartile is equivalent to comparing firms in Antioquia (where the infamous Medellin drug cartel operated in the 1980s and 1990s) with firms in Bogota, D.C.

28. For example, we are unable to observe attitudes toward crime, the effectiveness of local courts and local police, which are likely to affect incentives of both firms and kidnappers.

29. As an illustration, we assume kidnappings of government employees and kidnappings of managers are equally countercyclical.

decisions go beyond the subset of firms directly affected; firms that face a high risk of kidnappings reduce investment even when their own employees are not victims of kidnappings. Potentially, the indirect effect is more harmful for aggregate industrial activity than the direct effect, because it spills over to a larger group of firms.

Of all the kidnappings in the FONDELIBERTAD data set, we classify 1,570 as targeting a firm manager or owner (table 2.2). Of this sample of firm-related kidnappings, we are able to identify the specific firm involved and match it to our sample for roughly 600 firm-year observations, less than 1 percent of the sample. Table 2.6 reports the results of separately estimating equation (2) for two groups of firms: (a) firms whose managers or owners were themselves victims of kidnappings, and (b) the rest of the sample.

Importantly, kidnappings of firm owners and managers have a significant impact on firms that have not been directly affected. The impact on the subset of victimized firms is larger in magnitude but not statistically significant, perhaps because the estimation is based on a considerably smaller sample. The evidence in table 2.6 suggests that the negative relationship between corporate investment and kidnappings of firm owners and managers and investment is not explained by the inclusion of firms whose employees are victims of kidnappings.

2.5.3 Kidnappings in the Same Industry and Kidnappings in Other Industries

If firm managers and owners make investment decisions based on their perceived conditional probability of being kidnapped, the most relevant kidnappings for a firm manager working on a given industry will likely be those occurring in the same line of business. Firms within a given industry are generally better informed about competitive conditions within their own industry, and well-organized industry groups typically promote the sharing of information about common problems or challenges. To test this conjecture, we estimate the following regression:

$$(3)\quad \frac{\text{Investment}_{i,t}}{\text{TA}_{i,t-1}} = \alpha + \beta_1 \times \text{Kidnappings Same Industry}_{j,k,t-1} + \beta_2 \times \text{Kidnappings Other Industries}_{j,k,t-1} + \delta X_{i,t-1} + \pi \widetilde{Z}_{j,t-1} + \phi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t},$$

where X, ϕ, η, λ, and μ are defined as in equation (2). For notational convenience, the vector of department controls is expanded to include homicides and guerrilla attacks and relabeled $\widetilde{Z}$. *Kidnappings Same Industry*$_{j,k,t}$ represents the number of kidnappings of firm managers or owners in industry k in departments other than j. *Kidnappings Other Industries*$_{j,k,t}$ represents the number of kidnappings of firm managers or owners in all industries other

Table 2.6 Direct and indirect effects

Panel A: Firms directly affected by kidnappings		
Dependent variable: Investment$_t$ / Total assets$_{t-1}$		
	(1)	(2)
Kidnappings of firms' top management per 100,000 pop.$_{t-1}$	–10.645	
	(7.476)	
Kidnappings of firms' owners per 100,000 pop.$_{t-1}$		–15.944
		(23.580)
Homicides per 100,000 pop.$_{t-1}$	0.072	0.046
	(0.056)	(0.054)
Guerrilla attacks per 100,000 pop.$_{t-1}$	–0.973	–1.229
	(0.592)	(0.718)
Observations	628	628
Number of firms	150	150
R^2	0.275	0.273
Panel B: Firms not directly affected by kidnappings		
Dependent variable: Investment$_t$ / Total assets$_{t-1}$		
	(1)	(2)
Kidnappings of firms' top management per 100,000 pop.$_{t-1}$	–1.186**	
	(0.461)	
Kidnappings of firms' owners per 100,000 pop.$_{t-1}$		–3.942*
		(1.960)
Homicides per 100,000 pop.$_{t-1}$	0.002	0.002
	(0.010)	(0.009)
Guerrilla attacks per 100,000 pop.$_{t-1}$	–0.170	–0.188
	(0.246)	(0.236)
Observations	38,833	38,833
Number of firms	10,727	10,727
R^2	0.995	0.995

Notes: This table reports OLS estimates of the effect of kidnappings on investment, corresponding to equation (2) in the text. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include lagged firm-specific controls (log assets, cash holdings scaled by assets, and ROA); lagged department controls (GDP per capita, primary school enrollment, a poverty index, the extension of roads in 1995, lagged FARC attacks per 100,000, and lagged homicides per 100,000); and fixed effects (by year, industry, department, and firm). Kidnapping rates are measured at the department level and are scaled by 100,000 population. For each type of kidnappings, we present results for two subsamples: (1) firms whose management or owners were subject to kidnappings reported in the FONDELIBERTAD data set (panel A); and (2) firms whose employees and owners were not subject to kidnappings reported in the FONDELIBERTAD data set (panel B). The total sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2003. Standard errors (in parentheses) are adjusted for department clustering.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

than k and in all departments other than j, scaled by the number of industries.[30] More formally:

$$\text{Kidnappings Same Industry}_{j,k,t} = \sum_{\text{department} \neq j} \text{Firm-Related Kidnappings}_{\text{department},k,t}$$

$$\text{Kidnappings Other Industries}_{j,k,t} = \frac{1}{(\text{Number of industries}_t)} \times \sum_{\substack{\text{department} \neq j \\ \text{industry} \neq k}} \text{Firm-Related Kidnappings}_{\text{department,industry},t}$$

Panel A in table 2.7 reports the results of estimating equation (3) by OLS. Only firm-related kidnappings within an industry have a statistically significant negative relationship with the investment of firms in that industry. The magnitude of the coefficients is not comparable to those in previous tables, because kidnappings are not scaled by 100,000 population, as we aggregate kidnappings over industries and not over geographical units.

The result that own-industry kidnappings have larger effects than kidnappings in other industries is consistent with various explanations. First, rational and fully informed CEOs make corporate decisions based on the conditional probability of being kidnapped; hence, when other managers in the same industry are kidnapped, CEOs perceive a larger probability of victimization. Alternatively, less than fully informed CEOs are more likely to share information (or have a common source of information) with CEOs in the same industry; hence, they only revise the probability of kidnappings upwards when the victim is someone they know or someone they can identify themselves with.

2.5.4 Foreign Firms and Kidnappings of Foreign Citizens

Kidnappings of foreign owners or foreign managers are likely to be more relevant for foreign firms. To test this hypothesis, we estimate the following regression:

$$\begin{aligned}(4) \qquad \frac{\text{Investment}_{i,t}}{\text{TA}_{i,t-1}} = {} & \alpha + \beta_1 \times \text{Kidnappings Foreigners}_{j,t-1} + \beta_2 \\ & \times \text{Kidnappings Foreigners}_{j,t-1} \\ & \times \text{Foreign Ownership}_{i,t} + \beta_3 \\ & \times \text{Foreign Ownership}_{i,t} + \delta X_{i,t-1} + \pi \widetilde{Z}_{j,t-1} \\ & + \phi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t},\end{aligned}$$

where *Kidnappings Foreigners* is the rate of firm-related kidnappings with non-Colombian victims scaled by 100,000 population, and firm-related kid-

30. Industrial activity tends to cluster by regions. Hence, to avoid confusing the effect of kidnappings in the same department with the effect of kidnappings in the same industry, we exclude observations in the same department in the definitions of own-industry kidnappings and other-industry kidnappings.

Table 2.7 Industry and nationality effects

Panel A: Kidnappings in the same industry vs. kidnappings in other industries	
Dependent variable: Investment$_t$/Total assets$_{t-1}$	
Firm-related kidnappings in the same industry$_{t-1}$	–0.036**
	(0.017)
Firm-related kidnappings in other industries$_{t-1}$	–0.001
	(0.001)
Homicides per 100,000 pop.$_{t-1}$	0.001
	(0.011)
Guerrilla attacks per 100,000 pop.$_{t-1}$	–0.208
	(0.265)
Observations	39,379
Number of firms	10,874
R^2	0.995
Panel B: Firm-related kidnappings of Colombians and foreign citizens	
Dependent variable: Investment$_t$/Total assets$_{t-1}$	
Firm-related kidnappings of non-Colombians per 100,000 pop.$_{t-1}$	–1.854
	(4.295)
Foreign ownership	0.645
	(0.578)
Firm-related kidnappings of non-Colombians per 100,000 pop.$_{t-1}$	
× (foreign ownership)	–6.795**
Non-Colombians per 100,000$_{t-1}$	(3.149)
Homicides per 100,000 pop.$_{t-1}$	0.003
	(0.011)
Guerrilla attacks per 100,000 pop.$_{t-1}$	–0.238
	(0.250)
Observations	33,600
Number of firms	8,455
R^2	0.316

Notes: Panel A of this table reports OLS estimates of the effect on investment of own-industry and other industries kidnappings, corresponding to equation (3) in the text. The sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2003. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include lagged firm-specific controls (log assets, cash holdings scaled by assets, and ROA); lagged department controls (GDP per capita, primary school enrollment, a poverty index, the extension of roads in 1995, FARC attacks per 100,000, and homicides per 100,000); and fixed effects (by year, industry, department, and firm). For each two-digit ISIC industry code department and year, the variable Firm-related kidnappings in the same industry is the sum of kidnappings of firm management or firm owners in that industry code but in other departments. Firm-related kidnappings in other industries is defined as the sum of kidnappings of firm management and firm owners over all other departments and all other industries divided by the total number of industries. Kidnapping rates are not scaled by 100,000 population. Panel B reports OLS estimates of the effect on investment of firm-related kidnappings of non-Colombians. Victims of firm-related kidnappings are firm owners or firm management. The estimates correspond to equation (4) in the text. The dummy variable Foreign ownership equals 1 if foreigners own at least 50 percent of the firm. Kidnapping rates are measured at the department level and are scaled by 100,000 population. Standard errors (in parentheses) are adjusted for department clustering.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

nappings are defined as those victimizing firm management or firm owners. *Foreign Ownership* is a dummy variable that equals 1 for firms with more than 50 percent of foreign ownership. The definition of all other variables follows equation (3).

Panel B of table 2.7 reports OLS estimates of the coefficient on kidnappings of foreign owners or managers and its interaction with the foreign ownership indicator in equation (4). The estimate reported in panel B suggests that foreign firms are significantly more sensitive to kidnappings of foreign citizens than Colombian firms are. The large standard error for the estimate of the marginal effect of foreign kidnappings for firms with foreign ownership reflects the relatively small number of firms with substantial foreign ownership (table 2.4).

2.5.5 Limitations of the Analysis

The estimates of the relationship between firm-related kidnappings and firm investment reported in this section may be biased due to sample selection. An important investment decision of firms is whether to continue operating at all. In fact, shutting down the firm is the extreme form of disinvestment. Unfortunately, we are not able to properly identify firm exit, and our sample consists of active firms. If surviving firms invest more than exiting firms and firms exit more frequently from violent regions, our estimates of the effect of firm-related kidnappings on investment are biased toward zero. The importance of entry and exit decisions is hard to assess with our data, because Superintendencia de Sociedades exempted some smaller firms from mandatory reporting in 2000. Thus, not all firms that stopped reporting in 2000 shut down.

As a second important limitation of our analysis, we are only able to observe a link between individuals and firms for owners and managers. We are not able to identify kidnappings that victimize relatives of firm owners and managers. The effect of this limitation may be nonnegligible, as 10 percent of victims in the FONDELIBERTAD data set are children or teenagers (who might be related to firm managers) or owners.

In addition, our estimates of the relationship between investment and firm-related kidnappings may be biased because of nonrandom allocation of kidnappings across regions and firms. For example, if kidnappers target owners or managers of firms with larger cash holdings, and firms are likely to use them to pay ransoms, we should expect the estimates of the coefficient on firm-related kidnappings to be biased toward zero, since cash-abundant firms tend to invest more than financially constrained firms. However, it seems plausible that kidnappers target individuals based on their own wealth, rather than based on financial information of the firm they work for or they own. Unfortunately, we cannot determine with the available information whether firms really use their own cash to pay ransoms for their managers or owners.

Although most kidnappings in Colombia pursue economic objectives,

guerillas, paramilitaries, and drug lords have exploited kidnappings for political reasons too. In the early 1990s, for example, drug dealers kidnapped the relatives of the Colombian political and business elite with the purpose of pressing the government to revoke an extradition treaty with the United States (Garcia Marquez 1997; Bowden 2002). More recently, businessmen, majors, soldiers, and even presidential candidates have been abducted to negotiate the release of imprisoned FARC rebels.

Since crime rates are far higher in Colombia than in most other countries, it may be argued that the evidence presented here is not representative of the effect of crime on investment. Colombia is, however, similar in various dimensions to other countries that experience high crime rates. For example, according to the United Nations, four out of the ten most violent countries in terms of per capita homicides are Latin American.[31] In addition, the average GDP per capita of the ten most violent places is, in year 2000 U.S. dollars, 7,340, while the average GDP per capita of Colombia is 6,340.[32] As many developing countries experience high rates of violent crime, the findings in this section suggest that crime may explain why capital does not flow to poor countries.

2.6 Potential Channels

This section uses firm and industry characteristics to evaluate the evidence for three mechanisms through which crime may deter investment. First, kidnappings may reduce demand for goods and services: during violent periods, households may decide to consume fewer goods or services if consuming them is dangerous (for example, dining out or going to a shopping center), or even to migrate to safer regions. Firms that expect demand to decrease may, as a consequence, invest less. We call this mechanism the *demand channel.*

Second, firms that face a high probability of being victimized by kidnappings may face tighter financial constraints, if financial institutions are reluctant to finance firms when money can be diverted to unproductive activities, like paying ransoms. In addition, banks will deliberately stay out of a region during violent times to protect their owners and employees. In developing countries, where capital markets are not fully developed, banks provide most of the external finance raised by firms. We call this hypothesis the *credit constraints channel.*

Finally, kidnappings may increase the cost of doing business: firms in regions with high kidnapping rates face higher security costs, such as bodyguards, armored cars, and intelligence services. Private security firms in

31. United Nations, *Seventh Survey of Crime Trends and Operations of Criminal Justice.* It covers the period 1998 to 2000. The countries with the ten highest rates of homicides are, in order: Colombia, South Africa, Jamaica, Venezuela, Russia, Mexico, Lithuania, Estonia, Latvia, and Belarus.

32. World Bank, *World Development Indicators, 2002.*

Mexico, for instance, estimate that large firms spend between 20,000 and 30,000 dollars per month to protect their executives from kidnappings. We call this hypothesis the *cost channel.*

2.6.1 Demand Channel

The results in section 2.5 hint that the mechanism through which kidnappings reduce investment is likely not a fall in demand, because the baseline regressions control for GDP at the department level. The additional evidence in this section is also inconsistent with the demand channel. In particular, we compare the response of firms that depend on Colombian markets with the response of firms that sell to foreign markets.

If kidnappings reduce investment through a decrease in local consumption, investment by firms that have access to alternative markets should be less sensitive to firm-related kidnappings than investment by firms that sell in local markets only. Firms that sell in foreign markets may be able to shift production to foreign markets when local demand falls.

Table 2.8 compares the effect of firm-related kidnappings on firms that operate in industries that differ in their ability to sell in foreign markets. More formally, we estimate by OLS the following equation:

$$
\begin{aligned}
(5) \qquad \frac{\text{Investment}_{i,t}}{\text{TA}_{i,t-1}} = {} & \alpha + \beta_1 \times \text{Kidnappings}_{j,t-1} + \beta_2 \\
& \times \text{Industry Tradability}_k + \beta_3 \\
& \times \text{Kidnappings}_{j,t-1} \times \text{Industry Tradability}_k \\
& + \delta X_{i,t-1} + \pi \tilde{Z}_{j,t-1} + \phi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t},
\end{aligned}
$$

where *Industry Tradability* is the fraction of exports in total sales for each four-digit ISIC industry code.[33] All other definitions follow equation (3). The interaction terms between industry tradability and kidnappings of firm owners and managers are statistically insignificant, which is hard to reconcile with the demand channel. More important, the absence of a differential effect for firms that depend exclusively on local markets alleviates the concern that our results may be driven by omitted demand variables.

2.6.2 Credit Constraints Channel

Since the markets for corporate bonds and equity in Colombia are thin, the most common form of external financing in Colombia is bank debt. Banks may be reluctant to lend to firms headquartered in regions with high rates of violent crime. If kidnappings that target firms reduce investment through a tightening in credit constraints, firms should contract less bank debt when kidnapping rates go up. To test this hypothesis, we estimate the following equation:

33. For each four-digit ISIC industry code, we average the tradability measure from 1991 to 1995 (before the first year in our sample). Appendix table 2A.1 provides additional details.

Table 2.8 **Firm-related kidnappings and industry tradability**

Dependent variable: Investment$_t$/Total assets$_{t-1}$		
	(2)	(4)
Kidnappings of firms' top and middle management per 100,000 pop.$_{t-1}$	–1.776*	
	(0.880)	
Kidnappings of firms' top and middle management per 100,000 pop.$_{t-1}$ × (industry tradability)	0.043	
	(0.060)	
Kidnappings of firms' owners per 100,000 pop.$_{t-1}$		–3.976*
		(1.957)
Kidnappings of firms' owners per 100,000 pop.$_{t-1}$ × (industry tradability)		–0.023
		(0.093)
Industry tradability	–0.146**	–0.134**
	(0.068)	(0.058)
Homicides per 100,000 pop.$_{t-1}$	0.003	0.002
	(0.011)	(0.010)
Guerrilla attacks per 100,000 pop.$_{t-1}$	–0.218	–0.236
	(0.266)	(0.254)
Observations	39,190	39,190
Number of firms	10,874	10,874
R^2	0.995	0.995

Notes: This table reports the effect on investment of the interaction between firm-related kidnappings and industry tradability. The results correspond to equation (5) in the text. The sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2003. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include lagged firm controls (log assets, cash holdings scaled by assets, and ROA); lagged department controls (GDP per capita, primary school enrollment, a poverty index, the extension of roads in 1995, guerrilla attacks per 100,000, and homicides per 100,000); and fixed effects (by year, industry, department, and firm). We define Industry tradability as the fraction of exports in total sales at the industry level; this measure of tradability is an average from 1991 to 1995. Kidnappings are measured at the department level and scaled by 100,000 population. Firm management includes board members, CEOs, presidents, vice presidents, and division managers. Firm owners are victims who own at least part of the firm. Standard errors (in parentheses) are adjusted for department clustering.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

$$(6)\qquad \frac{\Delta \text{ Bank Debt}_{i,t}}{\text{TA}_{i,t-1}} = \alpha + \beta_1 \times \text{Kidnappings}_{j,t-1} + \theta \widetilde{X}_{i,t-1} + \pi \widetilde{Z}_{j,t-1} + \phi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t},$$

where the vector of firm controls has been expanded to include property, plant, and equipment scaled by total assets, and all other definitions follow equation (3).[34] The credit constraints channel predicts that the coefficient associated with kidnappings is negative. Table 2.9 reports the results of esti-

34. The regression follows the specification of Rajan and Zingales (1995) in their study of capital structure of firms located in industrialized countries.

Table 2.9 The effect of violence on firm borrowing

Dependent variable: (Bank debt$_t$ – bank debt$_{t-1}$)/Total assets$_{t-1}$		
	(1)	(2)
Kidnappings of firms' top and middle management per 100,000 pop.$_{t-1}$	–1.669	
	(1.561)	
Kidnappings of firms' owners per 100,000 pop.$_{t-1}$		–3.974
		(5.107)
Homicides per 100,000 pop.$_{t-1}$	0.017	0.025
	(0.012)	(0.018)
Guerrilla attacks per 100,000 pop.$_{t-1}$	0.083	0.058
	(0.091)	(0.101)
Observations	32,894	32,894
Number of firms	10,854	10,854
R^2	0.467	0.467

Notes: This table reports OLS estimates of the effect on firm borrowing of kidnappings, homicides, and guerrilla (FARC) attacks. The dependent variable is the change in bank debt scaled by lagged assets. Regressions include lagged firm-specific controls (log sales, cash holdings scaled by total assets, ROA, and PPE scaled by total assets), lagged department controls (GDP per capita, primary school enrollment, a poverty index, and the extension of roads in 1995), and fixed effects (by year, industry, department, and firm). Kidnappings, homicides, and guerrilla attacks are measured at the department level and scaled by 100,000 population. The sample is an unbalanced panel of firms located in Colombia with annual observations from 1996 to 2003. Firm management includes board members, CEOs, presidents, vice presidents, and division managers. Firm owners are victims who own at least part of the firm. *Guerilla attacks* includes FARC attacks reported by the National Police/Ministry of Defense. Standard errors (in parentheses) are adjusted for department clustering.

mating equation (6) by OLS. The dependent variable in the regression is the change in bank debt scaled by assets. The coefficients associated with kidnappings of firm owners and firm managers are negative but statistically insignificant, providing rather weak evidence that firms contract less debt when kidnappings target firms.

2.6.3 Cost Channel

If kidnappings increase security costs, firms that face high kidnapping rates should report larger administrative expenses. Table 2.10 summarizes the results of running a regression similar to equation (2), with administrative expenses scaled by assets as dependent variable. We use the same regional controls as in equation (2). We use similar firm-specific controls as in equation (2), but return on assets is replaced by sales over assets.[35] Finally, as a proxy for industry concentration, we add the Herfindahl index on sales for each two-digit ISIC code.

The coefficients associated with the kidnapping rates of firm owners and firm managers are statistically indistinguishable from zero, suggesting that

35. Administrative costs likely depend on gross revenue and not on net income.

Table 2.10 The effect of violence on firms' costs

Dependent variable: Administrative expenses$_t$ / Total assets$_{t-1}$		
	(1)	(2)
Kidnappings of firms' top and middle management per 100,000 pop.$_{t-1}$	–0.021	
	(0.021)	
Kidnappings of firms' owners per 100,000 pop.$_{t-1}$		–0.002
		(0.064)
Homicides per 100,000 pop.$_{t-1}$	0.0002	0.0002
	(0.0001)	(0.0002)
Guerrilla attacks per 100,000 pop.$_{t-1}$	0.002	0.002
	(0.001)	(0.001)
Observations	39,818	39,818
Number of firms	10,854	10,854
R^2	0.714	0.714

Notes: This table reports OLS estimates of the effect on firms' administrative costs of kidnappings, homicides, and guerrilla (FARC) attacks. The dependent variable is administrative expenses scaled by assets. Regressions include firm-specific controls (log assets, cash holdings scaled by assets, and sales scaled by assets); department controls (GDP per capita, primary school enrollment, a poverty index, and the extension of roads in 1995); industry controls (Herfindahl index on sales); and fixed effects (by year, industry, department, and firm). Kidnappings, homicides, and guerrilla attacks are measured by department and are scaled by 100,000 population. The sample is an unbalanced panel of firms located in Colombia (annual observations from 1996 to 2003). Firm management includes board members, CEOs, presidents, vice presidents, and division managers. Firm owners are victims who own at least part of the firm. Guerilla attacks includes FARC attacks reported by the National Police/Ministry of Defense. Standard errors (in parentheses) are adjusted for department clustering.

the effect of kidnappings on investment is not likely explained by increased administrative costs. Our evidence on the cost channel is not conclusive, because we cannot observe what fraction of administrative costs corresponds to payments on private security.

2.6.4 Discussion

The evidence in this chapter is consistent with the hypothesis that firms are reluctant to invest when their owners and managers are afraid of becoming victims of kidnappings. A number of different mechanisms may explain the negative effect of firm-related kidnappings on corporate investment. The fact that administrative costs and bank debt are not negatively affected by kidnappings of firm owners and firm managers provides no evidence for mechanisms operating through credit or through costs of protection. Very importantly, the evidence in this section suggests that firm-related kidnappings have no differential effect on the investment of firms that depend on sales to local markets, thus buttressing our identification strategy. If omitted demand variables explained the negative correlation between firm-related kidnappings and corporate investment, one should expect a more negative correlation for firms that sell their products in local markets.

2.7 Conclusions

In this chapter, we exploit variation in different forms of crime within regions in Colombia to measure the negative effect of violent crime on investment under identifying assumptions that are less restrictive than those typically used in cross-country studies. First, unobserved institutional characteristics and crime reporting standards vary more widely across countries than within countries. Second, we are able to observe different types of crime and identify whether firms are directly attacked by crimes. To the extent that omitted variables affect all types of crime in a similar way, we are able to compare the effect of firm-related crimes on investment with the effect of more general forms of crime that do not necessarily target firms. Finally, we exploit cross-sectional differences in firm characteristics to address plausible omitted variables stories. In particular, we use the industry's export share to identify firms that depend exclusively on Colombian demand and firms that sell in foreign markets. Under the assumption that foreign markets are less affected by kidnappings in Colombia, the differential effect of firm-related kidnappings on firms that depend on Colombian demand signals the importance of omitted demand variables.

We find that kidnappings that directly target firm managers or firm owners have a statistically and economically significant negative effect on firm-level investment. By contrast, general forms of crime—such as overall homicides and kidnappings—do not have a significant effect on investment. This second finding suggests that the negative effect of firm-related kidnappings on investment is not driven by omitted variables common to all forms of crime. We also find that firm-related kidnappings affect industries that sell in Colombian markets as well as industries that sell in foreign markets, alleviating the concern that unobservable demand variables explain our basic result. The distribution of violence and kidnappings in Colombia is not truly random. Therefore, the causal effect of violent crime on investment is not fully identified in our empirical strategy.

This chapter presents evidence suggesting that firm-related kidnappings reduce investment, because managers operate under the distraction of fear. Individuals are not only scared because of the probability of expropriation, but also because of threats to their personal security. We provide evidence suggesting that the mechanism is unlikely to operate through demand conditions, credit constraints, or administrative costs.

Recent empirical studies show that institutions that protect property rights foster investment and long-run economic growth (Besley 1995; Acemoglu, Johnson, and Robinson 2001; Easterly and Levine 1997, 2003). One of the most important issues for institutional design and policy reform is to understand what specific aspects of property rights are relevant for economic development (Acemoglu and Johnson 2005). The empirical challenge, therefore, is to dismantle the black box of property rights. Similarly, the results in

this chapter suggest that crime may have significant effects on investment. However, crime threatens both property rights and personal security. Our findings suggest that both the security of property rights and personal security are important concerns for investors. The challenge for future research, therefore, is to understand what forms and aspects of crime are particularly relevant for economic activity and investment.

Appendix

Table 2A.1 **Department and industry variables: Data description**

Variable name	Description	Years covered	Level of aggregation	Source
Poverty index	Necesidades Básicas Insatisfechas (Unfulfilled Basic Needs). Reflects crowded or substandard housing conditions, school-age children not attending school, and/or less than primary education of the head of the household.	1990–2002	Municipality	DANE, CEDE
GDP per capita	Real GDP divided by population. The GDP is measured in constant Colombian pesos of 1994.	1990–2001	Department	DANE
Paved roads in 1995	Paved roads (hundreds of squared kilometers) in 1995.	1995	Municipality	DANE, CEDE
Primary school enrollment	Students enrolled in primary school divided by population between 6 and 12 years.	1993–2002	Municipality	DANE, CEDE
Population	Estimated total population, based on the 1993 census and annual population projections.	1990–2003	Municipality	DANE
Producer price index	Countrywide producer price index.	1990–2003	Countrywide	DANE
Industry tradability	Industry's exports divided by industry's sales. Exports and sales are measured in current Colombian pesos.	1991–1998	4-digit ISIC code	DANE

Notes: This table summarizes department, municipality, and industry variables that are used in the empirical analysis, but are not explained in the main body of the text. All series are annual, except for paved roads, which is observed only for 1995. The DANE is the National Administrative Department of Statistics (Departamento Administrativo Nacional de Estadistica) and CEDE is the Center for Research on Economic Development (Centro para Estudios Sobre el Desarrollo Economico) at Universidad de Los Andes.

Table 2A.2 **Kidnappings by year and department**

		Panel A: Average rates by department, 1996–2002 (per 100,000 pop.)						
Department	Total kidnappings	Kidnappings of top and middle management	Kidnapping of firm owners	Kidnappings of government employees	Kidnappings of army and national police	Kidnappings of foreigners	Total homicides	Total guerrilla attacks
Antioquia	9.30	1.05	0.09	0.52	0.27	0.10	126.87	3.33
Atlántico	1.02	0.14	0.00	0.01	0.01	0.01	30.22	0.03
Bogotá, D.C.	1.68	0.21	0.05	0.01	0.00	0.06	39.64	0.06
Bolívar	6.44	0.37	0.09	1.03	0.09	0.06	24.04	1.78
Boyacá	4.04	0.21	0.05	0.12	0.11	0.04	20.30	2.21
Caldas	4.20	0.36	0.04	0.05	0.06	0.06	88.10	1.16
Caquetá	14.24	0.67	0.03	1.27	3.22	0.15	107.33	11.52
Cauca	5.40	0.29	0.07	0.82	0.18	0.16	43.02	6.43
Cesar	25.92	1.48	0.06	1.22	0.47	0.16	71.03	2.98
Córdoba	1.64	0.10	0.01	0.04	0.02	0.00	27.79	0.55
Cundinamarca	8.17	0.73	0.15	0.36	0.07	0.20	40.22	6.02
Chocó	12.30	1.15	0.29	0.70	0.71	0.45	50.42	5.40
Huila	5.96	0.57	0.12	0.36	0.20	0.01	51.87	4.51
Guajira	13.78	1.48	0.24	1.00	0.21	0.52	61.11	4.77
Magdalena	8.87	0.64	0.08	0.15	0.06	0.13	49.73	2.54
Meta	16.29	1.51	0.35	0.83	1.00	0.17	65.60	11.01
Nariño	3.06	0.11	0.02	0.85	0.31	0.03	29.64	4.19
N. de Santander	8.25	0.89	0.11	0.81	0.41	0.26	90.54	1.59
Quindío	1.61	0.16	0.02	0.03	0.03	0.00	65.43	1.88
Risaralda	4.16	0.46	0.07	0.25	0.03	0.04	99.06	2.52
Santander	8.31	0.76	0.10	0.57	0.16	0.11	46.46	2.92
Sucre	9.37	0.77	0.05	0.37	0.16	0.05	31.42	2.75
Tolima	7.38	0.74	0.16	0.34	0.31	0.04	52.48	3.54

Valle del C.	4.06	0.48	0.11	0.13	0.02	0.12	92.77	1.19
Arauca	12.88	1.09	0.07	1.44	0.25	0.70	104.81	21.78
Casanare	29.20	3.14	0.30	0.69	0.20	0.18	99.36	9.81
Putumayo	5.72	0.17	0.04	0.59	0.66	0.03	65.12	10.45
Amazonas	0.58	0.00	0.00	0.22	0.00	0.00	9.32	1.99
Guainía	3.08	0.80	0.00	0.00	0.00	0.00	16.44	35.86
Guaviare	17.31	0.00	0.00	0.00	10.04	0.00	115.76	31.02
Vaupés	35.82	0.00	0.00	0.53	12.90	0.00	23.32	31.86
Vichada	10.99	3.34	0.00	1.59	1.59	0.14	23.50	9.95
Colombia	6.39	0.58	0.08	0.39	0.22	0.10	62.89	2.88

Panel B: Means and standard deviation, 1996–2002

	Total kidnappings	Kidnappings of top and middle management	Kidnapping of firms' owners	Kidnappings of government employees	Kidnappings of army and national police	Kidnappings of foreigners	Total homicides	Total guerrilla attacks
Observations	224	192	192	192	192	224	224	224
Mean	8.95	0.39	0.04	0.29	0.71	0.13	58.21	7.43
Std. deviation	20.24	1.44	0.10	0.68	6.49	0.27	35.78	15.09
Std. deviation within department	18.21	1.30	0.09	0.59	4.65	0.22	15.55	11.85

Notes: Panel A reports average rates (per 100,000 pop.) of homicides, guerrilla attacks, and kidnappings by department in Colombia from 1996 to 2002. Panel B reports the mean and standard deviation of these variables in a panel of all thirty-two departments from 1996 to 2002. Data on homicides and guerrilla attacks were obtained from the National Police/Ministry of Defense. Guerrilla attacks include only attacks perpetrated by the Revolutionary Armed Forces of Colombia (FARC). Data on kidnappings were obtained from the FONDELIBERTAD data set. Total Kidnappings are all kidnappings reported in the FONDELIBERTAD data set; Government employees include local and national government employees (judiciary, legislative, and executive branches), except the Army and National Police. Firm-related kidnappings correspond to kidnappings of firms' employees, owners, or contractors; Top management includes CEOs, presidents, vice presidents, and board members; Top and middle management includes division managers and supervisors plus Top management. Annual population is projected by DANE.

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Comment

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Summary

In this original and captivating piece, Pshisva and Suarez identify the causal impact of regional kidnapping rates on corporate investment. They find that a one standard deviation decrease in the rate of management-targeted kidnapping within a Colombian department is, on average, associated with an increase of 1.7 percentage points in department-level corporate investment rates. However, the investigation of potential causal mechanisms

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