

# Captive Markets: the Impact of Kidnappings on Corporate Investment in Colombia

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## Abstract

*This paper measures the impact of crime on firm investment by exploiting variation in kidnappings in Colombia from 1996 to 2002. Our central result is that firms invest less when kidnappings directly target firms. We also find that broader forms of crime -homicides, guerrilla attacks, and general kidnappings- have no significant effect on investment. This finding alleviates concerns that our main result may be driven by unobserved variables that explain both overall criminal activity and investment. Furthermore, kidnappings that target firms reduce not only the investment of firms that sell in local markets, but also the investment of firms that sell in foreign markets. Thus, an unobservable correlation between poor demand conditions and criminal activity is unlikely to explain the negative impact of firm-related kidnappings on investment. Our results are consistent with the hypothesis that managers are reluctant to invest when their freedom and life are at risk, although we cannot completely discard alternative explanations.*

## Resumen

*Este estudio explora la variación de los secuestros ocurridos en Colombia durante el periodo 1996-2002 para medir el impacto del crimen sobre la inversión privada. El resultado principal es que las empresas invierten menos cuando los secuestros están dirigidos directamente contra su capital humano. Además, se encuentra que formas de crimen más amplias -homicidios, ataques guerrilleros y secuestros en general- no tienen un impacto significativo sobre la inversión. Este hallazgo permite descartar la posibilidad de que el resultado principal del estudio sea producto de variables no observadas que expliquen, al mismo tiempo, la actividad criminal general y la inversión. Adicionalmente, los secuestros dirigidos contra las empresas no sólo reducen la inversión de las empresas con ventas en el mercado local, sino también la inversión de las empresas con ventas en los mercados externos. Por esta razón, es improbable que el impacto negativo de los secuestros sobre la inversión sea resultado de una correlación no observada entre condiciones de demanda adversas y actividad criminal. Por último, los resultados son consistentes con la hipótesis de que los gerentes de las empresas se resisten a invertir cuando su libertad y su vida están en riesgo; aunque no es del todo posible descartar explicaciones alternativas.*

*Keywords: Crime, Kidnappings, Investment, Colombia.  
Palabras clave: Crimen, secuestro, inversión, Colombia.  
Clasificación JEL: K42, O16, D74, P14, G30.*

*Primera versión recibida en febrero 16 de 2006; versión final aceptada en febrero 21 de 2006.  
Coyuntura Económica volumen xxxvi, No. 1, primer semestre de 2006, pp. 27-62. Fedesarrollo, Bogotá - Colombia.*

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<sup>1</sup> Protego México.

<sup>2</sup> Board of Governors of the Federal Reserve.

*"Who wants to invest money and effort in building a business if their reward is to risk losing their life and/or their money?"*

*The Economist, June 19th, 2004*

## I. INTRODUCTION<sup>3</sup>

Although it is commonly assumed that crime deters investment, the magnitude of the effect is unknown. Measuring this magnitude, however, has important policy implications, because the negative effects of crime may explain why capital does not flow from rich countries to poor countries (Lucas, 1990). In fact, Katz *et al.* (2001) suggest that fear of crime is one of the main reasons why households move out of high poverty neighborhoods, and Porter (1995) argues that firms stay away from inner cities to avoid crime. Fighting crime may be as important for deve-

loping countries as other economic reforms aimed at fostering investment and growth.

Recent studies argue that institutions protecting property rights promote investment and economic prosperity (North, 1981; Besley, 1995; Acemoglu *et al.*, 2001). When the government is weak, crime and disorder threaten property rights; however, excessively strong rulers and dictators frequently endanger property rights as well (De Long and Shleifer, 1993). Therefore, balancing off the costs of dictatorship and disorder is a fundamental problem of institutional design (Djankov *et al.*, 2003). Importantly, crime may deter investment, because it endangers property and threatens the lives and freedom of individuals themselves.

Following Becker (1968), most empirical studies of crime seek to explain the economic rationale behind criminal behavior and also to measure the efficiency of deterrence mechanisms.<sup>4</sup> In a different line of research, recent cross-country studies suggest that political instability, crime, and terrorism are costly for economic activity. For example, Barro (1991) and Alesina and Perotti (1996) find that politically unstable countries exhibit lower growth and investment rates. Similarly, using survey data on Latin America, Gaviria (2002) finds that the growth of firms' sales is lower in countries where managers believe that crime is an obstacle to doing business. More direct evidence can be seen in Figure 1, which shows that kidnappings per capita and investment rates are negatively correlated in a panel of 196 countries from 1968 to 2002. In particular, Gross Capital Formation and net Foreign Direct Investment (FDI) as percentage of GDP are lower when kidnapping rates are higher.<sup>5</sup> Each point in the figure is a country-year observation,

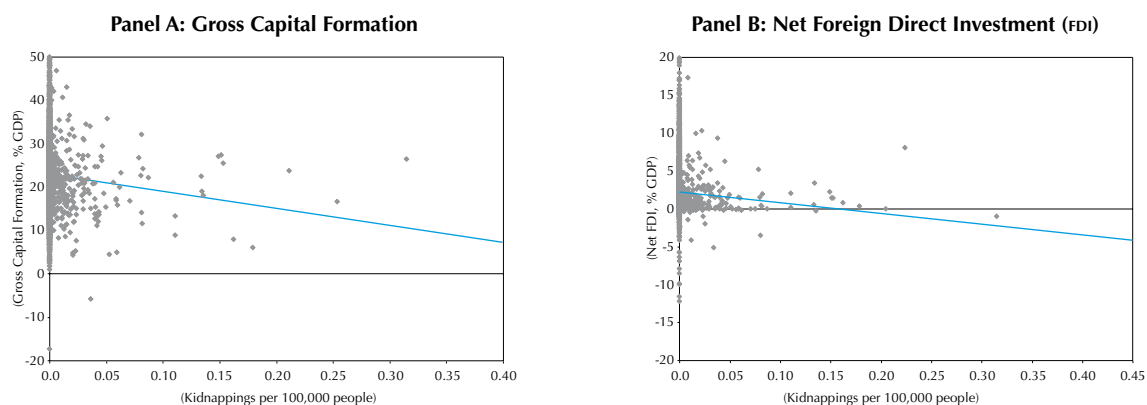
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<sup>3</sup> A previous version of this article circulated with the title "Crime and Finance: Evidence from Colombia". For their valuable advice and continuous encouragement, we are grateful to Andrei Shleifer, Jeremy Stein, Larry Katz, and Martin Feldstein. For his detailed discussion and suggestions, we are indebted to Juan Carlos Echeverry. For their useful comments, we would like to thank Alberto Abadie, Philippe Aghion, Pedro Aspe, Antonio Cabrales, Rafael Di Tella, Carola Frydman, Arturo Galindo, Alejandro Gaviria, Ed Glaeser, Borja Larraín, Nellie Liang, Rodolfo Martell, Adriana Lleras-Muney, Marcelo Moreira, Emily Oster, Jorge A. Restrepo, Jim Robinson, Raven Saks, Jeremy Tobacman, Piedad Urdinola, Eric Werker, John Womack, and seminar participants at Harvard, IIES, the Second Latin American Finance Network, UPF, Purdue, Notre Dame, and the Federal Reserve Board. This paper would not have been possible without the generosity of Ana María Díaz and Fabio Sánchez who shared their dataset on crime and social indicators in Colombia and provided useful suggestions. Marcela Eslava, Leopoldo Fergusson, Enrique López, Mercedes Parra, and Esperanza Sanabria were instrumental in understanding the firm-level data we use. Paola Cuevas provided excellent research assistance. The authors gratefully acknowledge financial support from Harvard's Seminar on National Security, the Fundación México en Harvard, CONACYT, Banco de la República, and Universidad de Los Andes. All remaining errors are our own. The views in this article are those of the authors and not necessarily reflect those of the Federal Reserve System. Corresponding author: Gustavo.A.Suarez@frb.gov

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<sup>4</sup> Glaeser (1999) surveys the "crime and punishment" literature.

**Figure 1**  
**INVESTMENT AND TERRORISM**



Note: Panel A of Figure 1 plots Gross Capital Formation as a percentage of GDP (in the y axis) against the rate of kidnappings per 100,000 people (in the x axis) for a panel of 196 countries from 1968 to 2002. The figure also plots the predicted value of a regression of Gross Capital Formation on kidnappings per 100,000 people and a constant. Panel B of Figure 1 plots Net Foreign Direct Investment as a percentage of GDP (in the y axis) against the rate of kidnappings per 100,000 people (in the x axis) for a panel of 196 countries from 1968 to 2002. The figure also plots the predicted value of a regression of Net Foreign Direct Investment on kidnappings per 100,000 people and a constant. Source: World Development Indicator - World Bank and ITERATE dataset.

and the solid line corresponds to the OLS estimate of a regression of investment on kidnappings per capita and a constant.

Although suggestive, the evidence from cross-country studies is not entirely satisfactory, because reverse causation and omitted variables may explain the negative relation between crime and investment. A particularly important concern is that poor economic conditions may reduce investment and also increase the incentives to commit crimes.

In contrast to the previous literature, this paper exploits firm-level data in Colombia to measure the

effect of crime on investment. Focusing on firm-level data within a single country has several advantages over cross-country studies. First, we are able to compare the effect of crimes that are specifically targeted against firms to the effect of broader definitions of criminal activity. To the extent that omitted variables affect all types of crime in a similar way, we identify the effect of crime from the differential impact of crime targeted at firms. Second, we can exploit differences in firm characteristics to address the concern that an unobservable correlation between criminal activity and demand conditions might explain the negative relationship between crime and investment. In particular, we compare the effect of crime on firms that sell in Colombian markets and firms that sell in foreign markets. Whereas a story of omitted demand variables would suggest that a negative correlation between crime and investment should only be apparent for firms selling to local markets, firms selling to all markets should be

<sup>5</sup> Appendix 1 contains a detailed description of the data used in Figure 1, and Appendix Table 1 reports the regression results. The negative relation between kidnappings and investment rates is robust to controlling for lagged GDP per capita, and year and country effects.

affected equally if crime has a direct effect on investment. Third, unobserved cultural and institutional characteristics, such as attitudes toward crime and law enforcement, and crime reporting standards are arguably more homogeneous within a country than across countries.<sup>6</sup>

Colombia provides a particularly useful environment to study the economic consequences of violent crime, because it has experienced high levels of crime during the past decade. 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 almost tripled from 1996 to 2000.<sup>7</sup> In 2002, Medellín, the second largest city, reported almost four times the number of homicides per capita of Bogotá, the largest city.<sup>8</sup>

In this paper we examine the impact of firm-related kidnappings on the investment of firms in Colombia. Using a detailed dataset on kidnappings from FONDELIBERTAD, a governmental organization in Colombia, we are able to distinguish whether kidnappings target individuals that own or work for a firm. This information is useful, because it allows us to isolate the effect of the criminal activity that target firms from general types of crime.

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<sup>6</sup> A study that is similar in spirit to our paper is Abadie and Gardezabal (2003), who use an event-study methodology to show that terrorism reduces firms' returns in the Basque Country. Our findings complement their study, because we focus on firm-related crime and not on general forms of crime.

<sup>7</sup> FONDELIBERTAD. In section II we discuss the dataset on kidnappings in Colombia.

<sup>8</sup> Colombia's National Police.

The main result of this paper is that kidnappings that target firms have a significantly negative impact on investment. Our estimates suggest that a one-standard deviation increase in firm-related kidnappings would reduce the investment rate of the average firm from 0.29% to -0.28% of total assets. Other forms of violence -such as homicides, and the total number of kidnappings- do not have a statistically or economically significant effect on investment. The finding that not all forms of violence matter for investment suggests that unobserved variables that explain overall criminal activity and investment are not driving our main result.

We compare the effect of kidnappings on firms that differ in their ability to sell in foreign markets, and find that firms are affected by kidnappings regardless of the tradability of their industry. This finding alleviates the concern that unobservable demand conditions may explain the negative correlation between firm-related kidnappings and investment. We also find that kidnappings in the same industry have a stronger impact than kidnappings in other industries, and that investment of foreign firms is more responsive to kidnappings of foreigners than to kidnappings of Colombians. This evidence suggests that crime makes managers reluctant to invest when their lives and freedom are at risk.

The rest of the paper is organized as follows. Section II presents a brief historical background of Colombia and explains the dataset. The results in Section III show that some types of crime, especially when targeted against firms, matter more for investment than other types (such as total homicides and total kidnappings). Section IV compares alternative explanations for the negative effect of firm-related kidnappings on investment. Section V concludes and suggests further research topics.

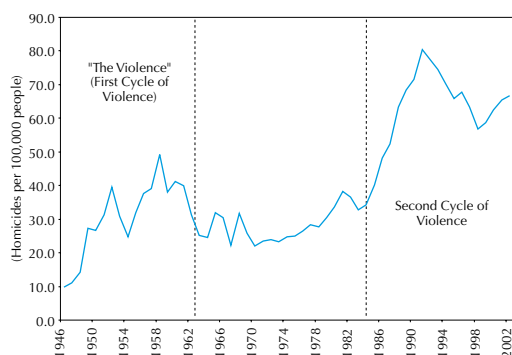
## II. FIRMS AND CRIME IN COLOMBIA: A UNIQUE DATASET

### A. Historical Background

For a country of its level of development, Colombia is highly violent. The United Nations, for example, reports that Colombia has the highest annual rate of homicides per capita in the world: 63 per 100,000 people. By contrast, the average homicide rate in South America is 41 per 100,000 people and the average homicide rate in OECD countries is 3 per 100,000 people.<sup>9</sup>

Figure 2, which plots homicides per capita since 1946, illustrates that violence is not a recent phenomenon in Colombia. Homicide rates increased sharply in the 1940s as a consequence of a civil war between the two main political parties. During the war, known by historians as "The Violence", groups

**Figure 2. HOMICIDE RATE, 1946-2002**



Note: Figure 2 plots yearly homicides per 100,000 people in Colombia (in the y axis) over time (in the x axis) from 1946 to 2002. The figure identifies two high-violence periods: the first one before 1962, and the second one after 1984.

Source: Sánchez *et al.* (2003), based on data from the National Police, the Ministry of Defense, and DANE.

<sup>9</sup> United Nations, *Seventh Survey of Crime Trends and Operations of Criminal Justice*. It covers the period 1998-2000.

of peasants took arms against government persecution. The political end of the civil war did not translate into lower homicide rates in the 1960s, as some of these resistance groups evolved into guerrillas like FARC (Revolutionary Army Forces of Colombia), the largest rebel group still active in the Western Hemisphere.<sup>10</sup> Homicide rates skyrocketed in the 1980s and 1990s when Colombia became a major producer of cocaine. Drug trafficking increased violence as the government prosecuted drug lords and, at the same time, cartels fought for market control.<sup>11</sup> Finally, during the last decades of the 20<sup>th</sup> century, powerful economic interests -some legal, some illegal- organized right-wing groups of "vigilantes" or paramilitaries to protect their businesses from guerrilla extortion.<sup>12</sup>

The dramatic increase in homicides during the 1980s and 1990s is consistent with increases in other measures of violence. In particular, Figure 3 shows that both kidnappings and guerrilla attacks rose steadily throughout the 1990s and peaked in 2000.<sup>13</sup> Kidnappings and guerrilla activity are correlated, because rebels kidnap for political reasons and also use ransoms to finance their fight against the government. Despite this high correlation, guerrillas do not have the monopoly in the kidnapping industry: rebels

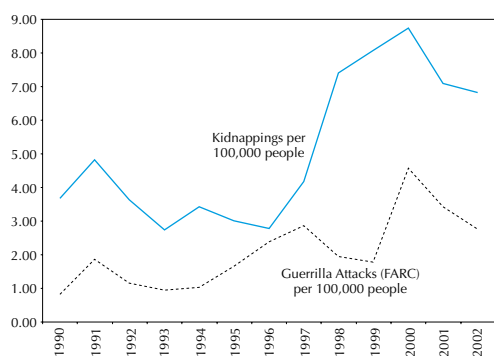
<sup>10</sup> See, for example, Safford and Palacios (2002), Chapters 11-14. However, not all guerrilla movements in Colombia evolved from peasant resistance: the still active ELN (National Army of Liberation) is an important exception.

<sup>11</sup> See Bowden (2002) and Bergquist *et al.* (2001). By looking at the relocation of coca crops across Andean countries, Angrist and Kugler (2004) provide evidence that increases in coca crops spur violence in Colombia.

<sup>12</sup> Both guerrilla and paramilitaries have been linked with drug trafficking in recent years. See, for example, Streatfield (2002), Chapters 18 and 19.

<sup>13</sup> Guerrilla attacks (FARC) include bombings, arm-trafficking, massacres, ambushes, piracy, and confrontation with Army or National Police.

**Figure 3. KIDNAPPINGS AND GUERRILLA ATTACKS, 1990-2002**



Note: Figure 3 plots yearly kidnappings and guerilla attacks per capita (in the y axis) over time (in x axis) from 1990 to 2002. Source: Sánchez *et al.* (2003), based on data from the National Police, the Ministry of Defense, and DANE.

compete against paramilitaries, gangs, and even drug cartels. In *News of a Kidnapping*, for instance, García Márquez reconstructs the story of seven notorious kidnappings in 1989, when the Medellín cartel used hostages to force the Colombian government to turn down an extradition treaty with the US. After the increase in kidnappings during the 1990s, Colombia became the country with the highest absolute number of kidnappings and the highest kidnapping rate in the world.<sup>14</sup>

The persistence of high rates of violent crime has led economists to study the problem of measuring the cost of crime and conflict.<sup>15</sup> In particular, Rubio (1995) uses aggregate data to show that recent increases in crime rates in Colombia are correlated

<sup>14</sup> Kroll, a private security advisor headquartered in New York, estimates that as of 2003 Colombia has roughly 4,000 kidnappings per year, that Mexico has 3,000 kidnappings per year, and that Argentina has 2,000 per year.

<sup>15</sup> See Montenegro and Posada (2001) and Riascos and Vargas (2003) for surveys on the literature on costs of crime and violence in Colombia.

with lower GDP growth. With a similar methodology, Cárdenas (2002) argues that Colombia's productivity slowdown in the 1990s can be partly attributed to the acceleration in overall criminal activity. (The acceleration in homicide rates, for example, is apparent in Figure 2.)

The interest shown by economists during the 1990s is one of the reasons why researchers now have access to improved statistics on criminal activity.<sup>16</sup> New and detailed datasets have made it possible to assess the effects of crime on household and individual outcomes. In recent papers, for example, Barrera and Ibáñez (2004) study the effects of crime on education and Urdinola (2004) studies the effects on infant mortality. Taking advantage of improved datasets, we use variation in different measures of violent crime (over time and across regions) to isolate the effect of crime on firm investment in Colombia.

The map in Figure 4 illustrates that Colombia is divided into 32 regions or departments. Although departments are similar to states in the US, they are not as autonomous, because Colombia is not a Federal Republic. Although departments have limited ability to legislate and to tax income or consumption, they have some autonomy to distribute government expenditure in different types of local public goods (education, health, and public works, among others). The Andean region in Colombia extends from the southern department of Nariño to the departments of Antioquia (next to Panama) and Norte de Santander (in the northeastern part of the country). The most important cities and the bulk of the population are located in the Andean departments. Tropical rain forests and plains comprise a significant part of southeastern Colombia.

<sup>16</sup> Restrepo *et al.* (2004), for example, describe the construction of a detailed dataset on the Colombian conflict.

Figure 4. MAP OF COLOMBIA



Note: Figure 4 is a map of Colombia that divides its territory into 32 departments.  
Source: Instituto Geográfico Agustín Codazzi (2000).

## B. Kidnappings and Other Types of Crime

Since 1996, FONDELIBERTAD, a governmental organization in Colombia, collects detailed information on individual kidnappings reported to Colombia's Ministry of Defense.<sup>17</sup> For each kidnapping event, FONDELIBERTAD reports the date and department in which the kidnapping occurs, the identity of the kidnapper (guerrillas, paramilitaries, common criminals, or not determined), and the number of days in captivity. More important, the dataset reports individual characteristics of the victim, including occupation and

nationality. Confidentiality restrictions, however, prevent access to detailed data on ransoms.

The first 8 columns of Table 1 summarize the main characteristics of the FONDELIBERTAD dataset. The first column shows that the dataset includes a total of 18,867 kidnappings from 1996 to 2002; on average, about 2,700 kidnappings per year.

The dataset attributes 56% of overall kidnappings to guerrillas, 14% to common criminals, and 5% to paramilitaries. (The identity of the kidnappers is unk-

**Table 1. KIDNAPPINGS, HOMICIDES, AND GUERRILLA ATTACKS BY YEAR**

Year	(1) Total Kidnappings	(2) Firm-Related Kidnappings	(3) Kidnappings of Top and Middle Management	(4) Kidnappings of Top Management	(5) Kidnappings of Firms' Owners
1996	1,091	220	193	3	1
1997	1,671	249	205	2	0
1998	3,023	453	371	25	32
1999	3,349	575	470	52	77
2000	3,697	NA	NA	NA	NA
2001	3,050	265	168	23	60
2002	2,986	223	163	22	43
<b>Total</b>	<b>18,867</b>	<b>1,985</b>	<b>1,570</b>	<b>127</b>	<b>213</b>

Year	(6) Kidnappings of Government Employees	(7) Kidnappings of Army and National Police	(8) Kidnappings of Foreigners	(9) Total Homicides	(10) Total Guerrilla Attacks
1996	23	24	41	26,130	934
1997	442	38	31	24,828	1,146
1998	280	266	43	22,673	790
1999	98	168	57	23,820	736
2000	NA	NA	42	25,859	1,931
2001	84	68	49	27,356	1,471
2002	112	57	31	28,363	1,210
<b>Total</b>	<b>1,039</b>	<b>621</b>	<b>294</b>	<b>179,029</b>	<b>8,218</b>

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 obtained from the National Police/Ministry of Defense. Guerrilla attacks considers only attacks perpetrated by FARC. Total Kidnappings are all kidnappings reported in the FONDELIBERTAD dataset. Government Employees include local and national government, except the Army and National Police. Firm-related Kidnappings correspond to kidnappings of firms' employees, owners, or contractors; Top Management includes CEOs, presidents, vicepresidents, and board members; Top and Middle Management includes division managers and supervisors plus Top Management.

Source: Data on kidnappings are obtained from FONDELIBERTAD.

<sup>17</sup> FONDELIBERTAD is short for Fondo Nacional para la Defensa de la Libertad Personal (National Fund for the Protection of Individual Liberty), and it was established by law in 1996. FONDELIBERTAD is not only responsible for processing data on kidnappings: it also provides assistance to families affected by kidnappings, and advises government policies on kidnappings.



known 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 ends. Kidnappings for economic reasons typically involve a monetary ransom. About 55% of the kidnappings in the sample are classified as having economic ends, while 10% of the kidnappings are classified as having purely political ends.<sup>18</sup> Although both Colombians and foreigners are victimized by kidnappings, only 2% of the victims are not Colombian citizens.

### **1. Kidnappings and Firms**

To focus on the subset of kidnappings that target firms, we define the following four types of kidnappings: i) *Kidnappings of Firms' Owners*, that include kidnappings in which the victim owns at least part of a firm;<sup>19</sup> ii) *Kidnappings of Firms' Top Management*, that include kidnappings in which the victims are board members or managers (CEOs, presidents, and vicepresidents); iii) *Kidnappings of Firms' Top and Middle Management*, that include kidnappings of top management plus supervisors and division managers; and iv) *Firm-Related Kidnappings*, that include kidnappings in which the victims are owners, managers, regular employees, or contractors. Table 1 reports that around 10% of the kidnappings in the FONDELIBERTAD dataset are related to firms according to our definition (Column 2), and about 80% of firm-related kidnappings target top or middle management (Column 3).

To compare the effects of kidnappings that target firms to other types of kidnappings, we consider two

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<sup>18</sup> The demands of the kidnappers are unknown for roughly 35% of the observations.

<sup>19</sup> The dataset does not disclose what fraction of the firm is owned.

other categories. We define government employees as individuals who worked for the local or national government (judiciary, executive, and legislative branches), 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 officially government employees. Columns 6 and 7 of Table 1 report that 5% of the victims in the FONDELIBERTAD dataset are government employees and that 3% of the victims work for the Army or the National Police.

Finally, a large fraction of the victims in the dataset are children or teenagers under 18 (about 10%), self-employed individuals (about 45%), and members of not-for-profit organizations such as religious communities and NGOs (about 5%). Occupation is unknown for 12% of the observations in the dataset.

### **2. 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 are closely related to the armed conflict and common crime. Based on reports from Colombia's National Police and Army, the DNP (National Planning Department) compiles a dataset 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.

It is important to note that the data on kidnappings are more detailed than the data on guerrilla attacks and homicides are. The FONDELIBERTAD dataset on kidnappings allows us to identify the identity and the occupation of the victim (and hence, whether she works for a firm). By contrast, the DNP dataset on guerrilla attacks and homicides does not allow us to identify individual victims within departments.

Guerrilla attacks in the DNP dataset 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 spread throughout the country. Homicides reported by DNP include all kinds of violent deaths and not only killings related with the armed conflict. The last two columns of Table 1 report the number of homicides and terrorist attacks from 1996 through 2002.

The maps in Figure 5 illustrate the distribution of kidnappings, homicides, and guerrilla attacks per capita across departments in Colombia.<sup>20</sup> Although these three types of crime are correlated, some differences are worth noticing. In particular, FARC are more likely to attack departments with a large fraction of rural population in the southeast of the country. Moreover, rebels strategically target departments with abundant natural resources. For example, Arauca, in the frontier with Venezuela, is rich in oil reserves and is a constant target of FARC attacks. By contrast, homicides and kidnappings are more evenly distributed across departments than guerrilla attacks.<sup>21</sup>

### C. Firms

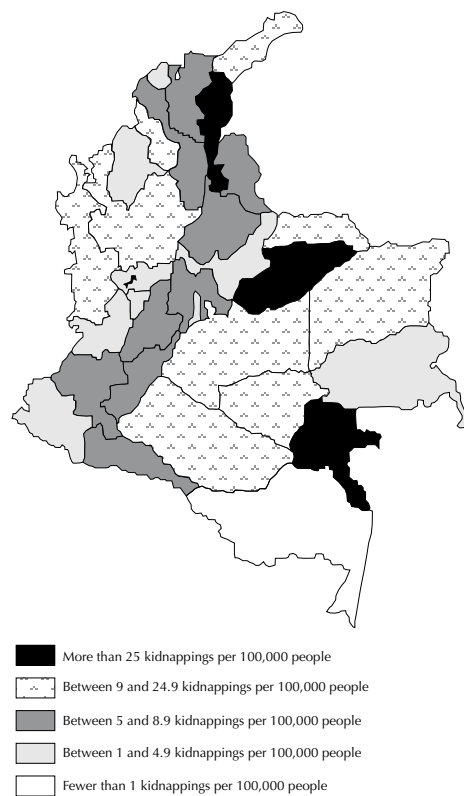
The *Superintendencia de Valores*, Colombia's SEC, collects data on all firms that trade in the Colombian stock market. Additionally, the *Superintendencia de*

<sup>20</sup> 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 Bogotá -known as the Capital District- as a separate department, because it concentrates roughly 18% of Colombia's population. Data on population are from DANE (National Department of Statistics) and are described in Appendix Table 2.

*Sociedades*, another government agency, collects income statements and balance sheets for a large sample of private firms.<sup>22</sup> Merging these two datasets

**Figure 5**  
**DISTRIBUTION OF VIOLENCE ACROSS DEPARTMENTS**

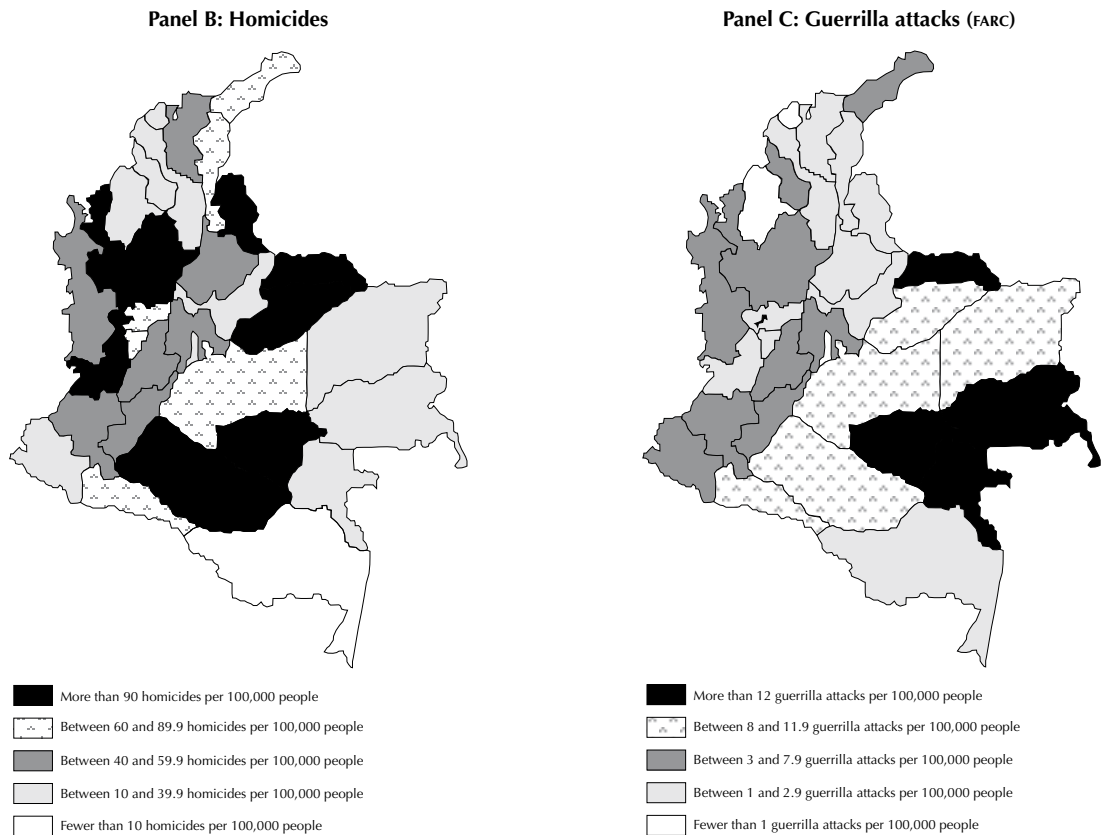
**Panel A: Kidnappings**



Note: Panel A of Figure 5 shows the distribution of average kidnapping rates (1996-2002) across Colombia's departments. Darker areas represent departments with higher kidnapping rates. The map ranges from areas with fewer than 1 kidnapping per 100,000 people to areas with more than 25 kidnappings per 100,000 people. Source: Authors' calculations.

<sup>21</sup> Collier and Hoeffler (2001) argue that the quest for social justice is not the only cause behind rebellions: in fact, many rebellions pursue the capture of rents. Díaz and Sánchez (2004) study the importance of these two types of causes for the location of FARC in Colombia.

**Figure 5**  
**DISTRIBUTION OF VIOLENCE ACROSS DEPARTMENTS**



Note: Panel B of Figure 5 shows the distribution of average homicide rates (1996-2002) across Colombia's departments. Darker areas represent departments with higher homicide rates. The map ranges from areas with fewer than 10 homicides per 100,000 people to areas with more than 90 homicides per 100,000 people.

Panel C of Figure 5 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. The map ranges from areas with fewer than 1 guerrilla attack per 100,000 people to areas with more than 12 guerrilla attacks per 100,000 people.

Source: Authors' calculations.

from 1996 to 2002 yields an unbalanced panel of 10,126 firms (37,582 firm-year observations) with

complete information for regression analysis. Table 2 summarizes the distribution of firms over time and across industries according to the International Standard Industrial Classification (ISIC). Only a small fraction of firms is publicly traded, because the Colombian stock market is not fully developed (Panel A). Roughly half of the observations in the sample are in one of two sectors: i) manufacturing and ii) wholesale and retail trade (Panel B).

<sup>22</sup> Before 2000, all firms incorporated in Colombia were obliged to report their financial statements to *Superintendencia de Sociedades*. After 2000 only firms with assets above a threshold are obliged to report. Although reporting is no longer mandatory for all firms, a large number of firms below the threshold continued reporting after 2000. The results in this paper are robust to excluding firms below the threshold during the entire sample.

**Table 2. DISTRIBUTION OF FIRMS**

Panel A: Number of Firms			
	Private Firms	Public Firms	Total
1997	6,700	115	6,815
1998	7,159	67	7,226
1999	6,870	74	6,944
2000	7,134	75	7,209
2001	4,767	77	4,844
2002	4,450	94	4,544
<b>Total</b>	<b>37,080</b>	<b>502</b>	<b>37,582</b>

Panel B: Distribution by Industry (Firm year observations)	
Agriculture, hunting, and forestry	3,263
Fishing	106
Mining and quarrying	737
Manufacturing	10,391
Electricity, gas, and water supply	54
Construction	3,849
Wholesale and retail trade	9,779
Hotels and restaurants	641
Transport, storage, and communications	1,858
Financial intermediation	1,875
Real estate, renting and business activities	4,061
Public administration and defense	0
Education	57
Health and social work	150
Other community, social, and personal service activities	745
Private households with employed persons	16
Extra-territorial organizations and bodies	0
<b>Total</b>	<b>37,582</b>

Panel A reports the distribution by year of firms in the sample. Panel B reports the distribution of firm-year observations by industry sector, according to the International Standard Industry Classification (ISIC).

Source: Data on private firms are collected by Superintendencia de Sociedades in Colombia; data on public firms are obtained from Superintendencia de Valores.

Table 3 summarizes the characteristics of the firms in the sample.<sup>23</sup> The average (median) firm-year observation has real assets of 7.77 (2.43) million dollars. Investment, defined as the change in net Property Plant and Equipment (PPE), scaled by assets is 0.29% for the average observation and -0.55% for the median. Median investment is negative partly as a con-

<sup>23</sup> Nominal variables are deflated using the Producer Price Index (PPI), which is described in Appendix Table 2. Total Assets are translated to U.S. dollars using the exchange rate in 1999, which is the base year of the PPI.

sequence of the economic downturn experienced by the country in most of the sample and partly as a consequence of the definition of investment, which includes depreciation.<sup>24</sup> The ratio of net income to total assets (ROA), a measure of profitability, is 0.03% for the average observation and 1.55% for the median. The ratio of cash to total assets is 6.50% for the average observation and 2.62% for the median. Assets, investment, profitability and cash holdings all report important dispersion, as the standard deviation is larger than the mean for the three variables.

The last two rows of Table 3 report that roughly 17% of firm-year observations correspond to foreign firms. We classify a firm as foreign if more than 10% of its shares are held by foreigners. Similarly, almost 27% of the observations correspond to a firm that has access to foreign markets, either exporting or importing. Most firms, however, are domestic and sell exclusively in the Colombian market.

As a consequence of Colombia's geography and historical development, economic activity is concentrated in a handful of large cities. The map in Figure 6, which depicts the geographic distribution of the firms in the sample, illustrates the high concentration of economic activity. Most firms are located in the north and central areas of the country, on the Andes, or in the Caribbean coast. In 2000, for example, roughly 55% of the firms in the sample locate in Bogotá, D.C., and 25% of the firms locate in the departments of Antioquia and Valle del Cauca, mainly in the capital cities (Medellín and Cali, respectively).<sup>25</sup> However, more than 1,200 firms -almost 20% of the sample-

<sup>24</sup> We have no data on gross PPE or capital expenditure in the database. The upside of not having the change in gross PPE is that the dependent variable is not censored at zero.

<sup>25</sup> In a robustness check, we confirm that our results do not change substantially by excluding firms that locate in Bogotá, D.C.

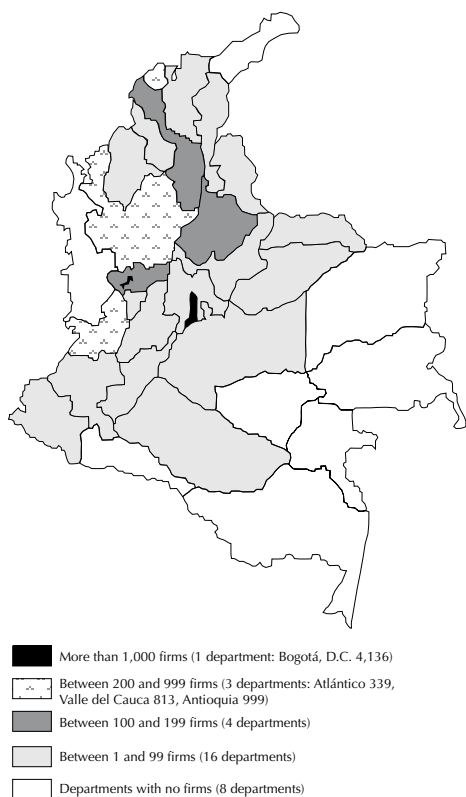
**Table 3. DESCRIPTIVE STATISTICS: FIRMS' CHARACTERISTICS**

	Mean	Median	Standard Deviation	Observations
Total Assets (million dollars)	7,773	2,433	18,558	37,582
Investment/ $\tau_A$ (%)	0.290	-0.555	13,891	37,582
Return on Assets (%)	0.033	1,547	12,313	37,582
Real Cash/ $\tau_A$ (%)	6,497	2,617	10,171	37,582
Foreign Ownership (Yes = 1. No = 0)	0.173	0.000	0.379	32,970
Exporter/Importer (Yes = 1. No = 0)	0.267	0.000	0.442	32,970

This table reports descriptive statistics for the firm variables used in the empirical analysis. Investment is the change in PPE and  $\tau_A$  denotes Total Assets. Returns on Assets is the ratio of net income to total assets. The dummy variable Foreign Ownership equals 1 if foreigners own at least 10% of the firm. Exporter/Importer is a dummy variable that equals 1 if a firm imports from or exports to other countries.

Source: Authors' calculations.

**Figure 6. GEOGRAPHIC DISTRIBUTION OF FIRMS IN COLOMBIA, 2000 (Total: 7,209 firms)**



Note: Figure 6 shows the distribution of firms across Colombia's departments in 2000. Darker areas represent departments with more firms. The map ranges from areas with no firms to areas with more than 1000 firms.

Source: Authors' calculations.

were located in 21 departments other than the largest three. Southeastern departments and the department of Chocó (next to Panama) account for a small fraction of the firms in the sample, because a large fraction of their territory is tropical rain forest.

In Table 4 we divide firm-year observations into a sample with high rates of total kidnapping and a sample with low rates. Observations in the sample with high (low) rates of total kidnappings are located in department-years where kidnapping rates are above (below) the country median. Although the sample with low kidnapping risk has three times as many firms as the high-risk sample, firms in the high-risk sample are significantly larger. While the investment rate is lower for the high-risk sample, the difference in investment rates between the two groups is not statistically significant. Additionally, firms in the high-risk sample tend to hold less cash as a fraction of assets.

### III. ¿IS INVESTMENT LOWER WHERE CRIME RATES ARE HIGHER?

#### A. Empirical Strategy

To measure the impact of kidnappings on firm investment, our empirical strategy exploits two sources of

**Table 4. CHARACTERISTICS OF FIRMS LOCATED IN DEPARTMENTS WITH HIGH AND LOW KIDNAPPINGS RATES**

		Low Kidnappings Rate	High Kidnappings Rate	High Rate - Low Rate
Total Assets (million dollars)	Mean	7,643 (0.109)	8,175 (0.201)	0.530 ** (0.223)
	Observations	28,425	9,157	-
Investment/ $\tau_A$ (%)	Mean	0.509 (0.947)	-0.393 (0.118)	-0.903 (1,669)
	Observations	28,425	9,157	-
Return on Assets (%)	Mean	-0.017 (0.074)	0.186 (0.123)	0.202 (0.148)
	Observations	28,425	9,157	-
Real Cash/ $\tau_A$ (%)	Mean	6,640 (0.062)	6,055 (0.098)	-0.580 *** (0.122)
	Observations	28,425	9,157	-
Foreign Ownership (Yes=1, No=0)	Mean	0.198 (0.003)	0.097 (0.003)	-0.102 *** (0.005)
	Observations	24,869	8,101	-
Exporter/Importer (Yes=1, No=0)	Mean	0.258 (0.003)	0.296 (0.005)	0.038 *** (0.006)
	Observations	24,869	8,101	-

\*\* Significant at 5%; \*\*\* significant at 1% using a two-tailed t-test.

This table splits the sample in two groups: (1) firm-year observations in departments with rates of total kidnappings above the country median ("high") and (2) firm-year observations in departments with rates below the median ("low"). We compare the mean of the firm-level variables used in the regression analysis.

Source: Authors' calculations.

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 of 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 characteristics 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 *et al.* (2002) find that crime rates are countercyclical and Miguel *et al.* (2004) show that negative exogenous shocks in economic growth increase the likelihood of civil conflict in a sample of African countries.<sup>26</sup> Hence, economic conditions in department  $j$  may determine not only the investment decisions of firms in department  $j$ , but also the incentives of kidnapers in department  $j$ . In our statistical analysis, we control for GDP per capita, poverty levels, public infrastructure, and primary school enrollment.<sup>27</sup>

<sup>26</sup> Recent studies challenge the conventional view that poverty generates terrorism. For example, Abadie (2004) finds that terrorist risk is not significantly higher in poor countries, after controlling for country characteristics (including political freedom).

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 crime in a similar way, we identify the effect of crime on firm investment from the differential effect of crime specifically targeted against firms.<sup>28</sup>

Empirical studies of corporate investment typically find that firms with more cash and more favorable investment opportunities (or Tobin's Q) invest more (Fazzari *et al.*, 1988; Stein, 2003).<sup>29</sup> 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. Forward-looking proxies for investment opportunities, such as the price-to-book ratio, are unavailable, because only few of the firms in the sample are publicly traded. We measure the impact of kidnappings on firm investment using the following regression, that we estimate using OLS:

$$\frac{Investment_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1 \cdot Kidnappings_{j,t-1} + \beta_2 \cdot Guerrilla\ Attacks_{j,t-1} + \beta_3 \cdot Homicides_{j,t-1} + \delta X_{i,t-1} + \gamma Z_{j,t-1} + \phi_t + \eta_i + \lambda_k + \mu_j + \varepsilon_{i,t} \quad (1)$$

where  $i$  indexes firms,  $j$  indexes departments,  $t$  indexes years, and  $k$  indexes industries. Investment is defined as the change in property, plant, and equip-

ment; and  $TA$  denotes total assets. Kidnappings, Guerrilla Attacks, and Homicides are measured at the department level and scaled by 100,000 people.  $X_{i,t}$  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: GDP per capita, primary school enrollment, a poverty index similar to the one-dollar-a-day standard, and the extension of roads in 1995.  $\phi_t$ ,  $\eta_i$ ,  $\lambda_k$ , and  $\mu_j$  represent firm, year, industry, and department fixed effects, respectively. Finally, because observations of firms in the same department are not truly independent, we cluster standard errors by department.<sup>30</sup>

Incentives to invest today are generally based on predictions about the future. If crime rates in year  $t-1$  have a negative effect on investment in year  $t$ , implicitly 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 suggest that the rates of kidnappings, homicides, and guerrilla attacks are autoregressive and stationary processes. Furthermore, positive shocks to crime rates in the past predict higher crime rates in the future.<sup>31</sup>

## B. Main Results

### 1. Kidnappings that target firms

Table 5 reports OLS estimates of equation (1) that include different types of kidnappings as explanatory variables. The first three regressions in the table

<sup>27</sup> Appendix Table 2 describes department-specific variables.

<sup>28</sup> 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 *et al.* 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.

<sup>29</sup> Some authors use cash flow or cash balances as measures of financing constraints (Fazzari *et al.* 1988). More recent findings challenge the interpretation that cash-flow sensitivities of investment are measures of financing constraints (Kaplan and Zingales, 1997).

<sup>30</sup> Results are robust to clustering by year-department.

<sup>31</sup> Results are robust to using a two-period average of kidnapping rates and to use contemporary kidnappings as opposed to lagged kidnappings.

**Table 5. THE EFFECT OF VIOLENCE ON INVESTMENT**

	Dependent Variable: $Investment_t / Total Assets_{t-1}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total Kidnappings per 100.000 pop. $_{t-1}$	-0.0021 (0.0926)	-	-	-	-	-	-
Kidnappings of Government Employees per 100.000 pop. $_{t-1}$	-	0.6890 (0.7774)	-	-	-	-	-
Kidnappings of Army and National Police per 100.000 pop. $_{t-1}$	-	-	-0.6855 (0.7350)	-	-	-	-
Firm-Related Kidnappings per 100.000 pop. $_{t-1}$	-	-	-	-0.4433 ** (0.2202)	-	-	-
Kidnappings of Firms' Top and Middle Management per 100.000 pop. $_{t-1}$	-	-	-	-	-2.5125 *** (0.7777)	-	-
Kidnappings of Firms' Top Management per 100.000 pop. $_{t-1}$	-	-	-	-	-	-3.0882 * (1.8092)	-
Kidnappings of Firms' Owners per 100.000 pop. $_{t-1}$	-	-	-	-	-	-	-5.9784 *** (2.2904)
Homicides per 100.000 pop. $_{t-1}$	-0.0087 (0.0116)	-0.0052 (0.0112)	-0.0050 (0.0123)	-0.0020 (0.0125)	0.0042 (0.0118)	-0.0033 (0.0116)	0.0031 (0.0115)
Guerrilla Attacks per 100.000 pop. $_{t-1}$	-0.0323 (0.1037)	-0.1324 (0.2151)	-0.1591 (0.2019)	-0.1061 (0.1964)	-0.1093 (0.2081)	-0.1343 (0.1997)	-0.1423 (0.1858)
Observations	37,578	32,734	32,734	32,734	32,734	32,734	32,734
Number of firms	10,126	10,037	10,037	10,037	10,037	10,037	10,037
R-squared	0.9944	0.9954	0.9954	0.9954	0.9954	0.9954	0.9954

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Standard errors (in parentheses) are adjusted for department clustering

This table reports OLS estimates of the effect on investment of kidnappings, homicides, and guerrilla attacks. The results correspond to equation (1) in the text. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include firm covariates (log assets, cash holdings scaled by assets, and ROA); 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 2002. Total Kidnappings are all kidnappings reported in the FONDELIBERTAD dataset. Government Employees include local and national government, except the Army and the 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. Guerrilla Attacks includes FARC attacks reported by the National Police/Ministry of Defense.

Source: Authors' calculations.

consider kidnappings whose victims are not directly linked to firms, and the last four regressions consider kidnappings whose victims are directly linked to firms.

Although most types of kidnappings have a negative effect on firm investment, only kidnappings that target firm-related individuals have an effect that is statistica-

lly different from zero. To illustrate the economic magnitude of the effects of different types of kidnappings, consider the thought experiment of raising kidnapping rates within a department. A one-standard deviation increase in the rate of firm-related kidnappings is associated with a reduction in investment of 0.57% (= 0.44%\*1.30) of total assets (Regression 4).<sup>32</sup> The



effects associated with kidnappings are not negligible, as average investment in the sample is 0.29% of total assets. Similar differences arise when we rank regions into quartiles based on the rate of firm-related kidnappings. Firms in the most dangerous quartile invest in terms of assets 0.40% less than firms in the least dangerous quartile.<sup>33</sup> By contrast, kidnappings whose victims are not related to firms have a statistically insignificant effect on corporate investment. In particular, kidnappings that target government employees, or the Army and National Police are unrelated to investment. Although some coefficients are large in magnitude, they are imprecisely estimated. More important, the coefficient on total kidnappings is also not statistically significant.

To compare the effects of kidnappings that target firms with the effects of general forms of crime, Table 5 reports the coefficients on the rates of homicides and guerrilla attacks in regression (1). While firm-related kidnappings have significant effects on investment, these general types of crime, that do not target firms directly, have no significant effect on investment (either economic or statistical). This finding alleviates concerns that our results with firm-related kidnappings might be explained by unobserved variables that drive both overall criminal activity and investment.<sup>34</sup> The identifying assumption in equation (1) is that unobserved variables have no differential effect across different types of crime. For example,

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<sup>32</sup> Appendix Table 3 reports summary statistics of the series of kidnappings, homicides, and guerrilla attacks.

<sup>33</sup> Comparing firms in the most violent quartile with firms in the least dangerous quartile is equivalent to comparing firms in Antioquia (where the infamous Medellín cartel operated in the 1980s and 1990s) with firms in Bogotá, D.C.

<sup>34</sup> For example, we are unable to observe attitudes towards crime, the effectiveness of local courts and local police, which are likely to affect incentives of both entrepreneurs and kidnappers.

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.<sup>35</sup>

At first glance, our results with guerrilla attacks seem to be at odds with recent papers that document a negative effect of terrorism on economic activity. In particular, from a case study of the Basque country, Abadie and Gardeazabal (2003) conclude that terrorism reduces GDP growth and stock market returns. The type of regions that terrorism targets in Colombia may explain the inconsistency. While terrorists in the Basque country attack cities, where most firms locate, terrorists in Colombia attack mainly rural areas.

## 2. *Firms directly affected*

Finding that firms directly attacked by kidnappings are forced to cut back on investment would be unsurprising. After all, kidnappings of employees disrupt production and firms may be forced to pay for ransoms. However, we find a more surprising -and perhaps more interesting- result: the negative effects of firm-related kidnappings on investment 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 dataset, we classify 1,985 as having some direct relation with firms. Of this sample of firm-related kidnappings, we are able to identify the name of the firm the victim worked for in 1,123 observations. However, only

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<sup>35</sup> As an illustration, we assume kidnappings of government employees and kidnappings of managers are equally counter-cyclical.

147 firms *in our sample* were directly affected by the kidnappings reported by FONDELIBERTAD, which represents less than 1% of the observations. Table 6 reports the results of estimating equation (1) for two groups of firms separately: i) firms that we identify as being directly attacked by kidnappings, and ii) the rest of the sample.

An important observation derives from the separate analysis of these two groups of firms: kidnappings 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 6 suggests that it is unlikely that the negative effect of firm-related kidnappings on investment is driven by the inclusion of firms whose employees are victims of kidnappings.

### 3. Kidnappings in the same industry and kidnappings in other industries

If individuals make decisions based on the conditional probability of becoming victims, the most relevant kidnappings for a CEO working on a given industry might be those occurring in the same line of business. To test this conjecture, we compute for each industry-department cell the following two variables: i) the number of firm-related kidnappings that affect the same industry in other departments (*Kidnappings Same Industry*), and ii) the number of firm-related kidnappings affecting all other industries in all other departments, divided by the number of industries (*Kidnappings Other Industries*).<sup>36</sup> More formally:

$$Kidnappings\ Same\ Ind_{j,k,t} = \sum_{department \neq j} Firm-Related\ Kidnappings_{department, k, t}$$

$$Kidnappings\ Others\ Ind_{j,k,t} = \frac{1}{(Number\ of\ industries_t)}$$

$$\sum_{\substack{Department \neq k \\ industry \neq k}} Firm-Related\ Kidnappings_{department, industry, t}$$

Using these variables, we estimate the following regression:

$$\frac{Investment_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1 \cdot Kidnappings\ Same\ Ind_{j,k,t-1} + \beta_2 \cdot Kidnappings\ Others\ Ind_{j,k,t-1} + \pi \tilde{X}_{i,t-1} + \gamma Z_{i,t-1} + \phi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t} \quad (2)$$

All definitions follow equation (1), except for the kidnappings variables explained above and the vector of department controls,  $\tilde{X}$ , which is redefined, for notational convenience, to include homicides and guerrilla attacks as well.

Panel A in Table 7 summarizes the results of estimating equation (2) by OLS. The negative effect of kidnappings on investment is statistically significant regardless of the industry affected, but the magnitude is larger for own-industry kidnappings. 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 CEOs in the same industry are kidnapped, they revise upwards the 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 proba-

<sup>36</sup> 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 6. DIRECT AND INDIRECT EFFECTS**

	Dependent Variable: $Investment_t / Total Assets_{t-1}$			
	(1)	(2)	(3)	(4)
<b>Panel A: Firms Directly Affected by Kidnappings</b>				
Firm-Related Kidnappings per 100,000 pop. $_{t-1}$	-7.0539 (5.2085)	-	-	-
Kidnappings of Firms' Top and Middle Management per 100,000 pop. $_{t-1}$	-	-10.9813 (9.2271)	-	-
Kidnappings of Firms' Top Management per 100,000 pop. $_{t-1}$	-	-	-27.8749 (37.1192)	-
Kidnappings of Firms' Owners per 100,000 pop. $_{t-1}$	-	-	-	-31.6153 (26.2885)
Observations	534	534	534	534
Number of firms	147	147	147	147
R-squared	0,3248	0,3261	0,3245	0,3255
<b>Panel B: Firms not Directly Affected by Kidnappings</b>				
Firm-Related Kidnappings per 100,000 pop. $_{t-1}$	-0.4334 ** (0.2134)	-	-	-
Kidnappings of Firms' Top and Middle Management per 100,000 pop. $_{t-1}$	-	-2.3701 *** (0.6955)	-	-
Kidnappings of Firms' Top Management per 100,000 pop. $_{t-1}$	-	-	-3.0316 * (1.6594)	-
Kidnappings of Firms' Owners per 100,000 pop. $_{t-1}$	-	-	-	-5.9561 *** (2.0742)
Observations	32,200	32,200	32,200	32,200
Number of firms	9,890	9,890	9,890	9,890
R-squared	0.9955	0.9955	0.9955	0.9955

Standard errors (in parentheses) are adjusted for department clustering.

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

This table reports OLS estimates of the effect of kidnappings on investment, corresponding to equation (1) in the text. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include firm-specific controls (log assets, cash holdings scaled by assets, and ROA); 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). 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 employees or owners were subject to kidnappings reported in the FONDELIBERTAD dataset (Panel A), and (2) firms whose employees and owners were not subject to kidnappings reported in the FONDELIBERTAD dataset (Panel B). The total sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2002.

Source: Authors' calculations.

**Table 7. INDUSTRY AND NATIONALITY EFFECTS****Dependent Variable:  $Investment_t / Total Assets_{t-1}$** **Panel A: Kidnappings in the Same****Industry vs. Kidnappings in Other Industries**

Firm-Related Kidnappings in the Same Industry <sub>t-1</sub>	-0.0345 ** (0.0160)
Firm-Related Kidnappings in Other Industries <sub>t-1</sub>	-0.0031 *** (0.0007)
Observations	32,652
R-squared	0,995

**Panel B: Firm-Related Kidnappings of Colombians and Foreign Citizens**

Firm-Related Kidnappings of Colombians per 100,000 pop. <sub>t-1</sub>	-1.1941 ** (0.5948)
Firm-Related Kidnappings of Non-Colombians per 100,000 pop. <sub>t-1</sub>	-1.6275 (5.5899)
Foreign Ownership	0.2577 (0.7541)
Firm-Related Kidnappings x (Foreign Ownership) of Colombians per 100,000 <sub>t-1</sub>	2.9903 *** (0.7623)
Firm-Related Kidnappings of x (Foreign Ownership) Non-Colombians per 100,000 <sub>t-1</sub>	-11.5103 * (6.7052)
Observations	27,960
Number of firms	7,997
R-squared	0.3617

Standard errors (in parentheses) are adjusted for department clustering.

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

Panel A of this table reports OLS estimates of the effect on investment of own-industry and other industries kidnappings, corresponding to equation (2) in the text. The sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2002. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include firm-specific controls (log assets, cash holdings scaled by assets, and ROA); 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 2-digit ISIC industry code and department, the variable Firm-Related Kidnappings in the Same Industry is the sum of firm-related kidnappings in that industry code but in other departments. Firm-Related Kidnappings in Other Industries is defined as the sum of firm-related kidnappings 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 Colombians and firm-related kidnappings of non-Colombians. The estimates correspond to equation (3) in the text. The dummy variable Foreign Ownership equals 1 if foreigners own at least 10% of the firm. Kidnapping rates are measured at the department level and are scaled by 100,000 population.

Source: Authors' calculations.

bility of kidnappings upwards when the victim is someone they know or someone they can identify themselves with.

**4. Foreign firms and kidnappings of foreign citizens**

Firm-related kidnappings of foreign citizens are likely to be more relevant for foreign CEOs than firm-related kidnappings of Colombians. To test this hypothesis, we estimate the following regression:

$$\frac{Investment_{it}}{TA_{i,t-1}} = \alpha + \beta_1 \cdot Kidnap.Colombians_{i,t-1} + \rho_1 \cdot Kidnap.Colombians_{i,t-1} \times Foreign_{i,t-1} + \beta_2 \cdot Kidnap.Foreigners_{i,t-1} + \rho_2 \cdot Kidnap.Foreigners_{i,t-1} \times Foreign_{i,t-1} + \beta_3 \cdot Foreign_{i,t-1} + \pi \tilde{X}_{i,t-1} + \gamma Z_{j,t-1} + \varphi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{it} \quad (3)$$

where *Kidnap. Colombians* is the rate of firm-related kidnappings with Colombian victims, and *Kidnap. Foreigners* is the rate of firm-related kidnappings with non-Colombian victims. Both definitions of kidnappings are scaled by 100,000 population. *Foreign* is a dummy variable that equals 1 for firms with more than 10% of foreign ownership. The definition of all other variables follows equation (2).

Panel B of Table 7 reports OLS estimates of the coefficients on kidnappings variables and interactions terms in equation (3). First, we focus on the interaction between the rate of foreign kidnappings and the foreign firm dummy. The estimate reported in Panel B suggests that foreign firms are significantly more sensitive to kidnappings of foreign citizens than Colombian firms are. Second, we focus on the interaction between the rate of kidnappings of Colombians and the foreign firm dummy. The estimate reported in Panel B suggests that Colombian firms are significantly more sensitive to kidnappings of Colombian citizens than foreign firms. These results should be treated with caution, as the number of Colombian firms is five times larger than the number of foreign firms.

## 5. Discussion

The results of this paper should be considered a conservative measure of the negative effect of kidnappings on investment for at least three reasons. First, firms choose not only how much to invest every year, but also whether to continue operating or shutting down, which can be considered an extreme form of disinvestment. The sample consists of active firms and, presumably, surviving firms invest more than firms that exit; hence biasing the estimate of the effect of kidnappings on crime towards zero. However, the importance of entry and exit decisions is hard to assess, because *Superintendencia de Sociedades* changed reporting standards in 2000, and hence not all firms that stopped reporting really shut down. The bias introduced by the change in reporting standards is also hard to quantify since we do not observe whether firms that stopped reporting invest more or less than firms that kept reporting.

A second reason why the results of this paper could be conservative is that kidnappers may target employees that work for firms that have more cash-on-hand. Criminals may follow this strategy if firms are likely to use this cash to pay ransoms, regardless of the economic status of the victim. Unfortunately, we cannot determine with the available information whether firms really use their own cash to pay ransoms and free their employees. If this is the case, however, we should expect the results to be biased towards 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.

Finally, we are only able to establish a link between an individual and a firm when the individual works for the firm. The variable *Firm-Related Kidnappings* is very conservative, since it does not take into account

other possible relations between firms and individuals. For instance, 10% of victims in the FONDELIBERTAD dataset are children or teenagers, who might be related to employees, managers, or owners. The exclusion of family members of the definition of firm-related kidnappings biases the estimates towards finding no effect of crime on investment.

On the other hand, our results may overstate the detrimental effect of kidnappings on firm-level investment if kidnappers specifically target low-investment firms. We cannot totally rule out this possibility, but there are reasons to believe that this might not be true. In particular, although many kidnappings in Colombia have an economic motive, 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 US.<sup>37</sup> In more recent times, businessmen, majors, soldiers, and even presidential candidates have been abducted to negotiate the release of imprisoned 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.<sup>38</sup> In addition, the average GDP per

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<sup>37</sup> García Márquez (1994) and Bowden (1998).

<sup>38</sup> United Nations, *Seventh Survey of Crime Trends and Operations of Criminal Justice*. It covers the period 1998-2000. The countries with the ten highest rates of homicides are, in order: Colombia, South Africa, Jamaica, Venezuela, Russia, Mexico, Lithuania, Estonia, Latvia, and Belarus.

capita of the ten most violent places is, in 2000 US dollars, 7,340, while the average GDP per capita of Colombia is 6,340.<sup>39</sup> 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.

#### IV. WHY DOES CRIME REDUCE INVESTMENT? PRELIMINARY EVIDENCE

*"It's bad enough when you read about it in the paper, but when it happens to someone you know -he shakes his head- that really brings it home to you."*

*Coetzee (Disgrace, 1999, p. 102)*

From a theoretical point of view, several hypotheses may explain why firm-related kidnappings reduce investment. In this section, we discuss some of these explanations and use firm and industry characteristics to analyze which of them are plausible. Although the evidence presented in this section is far from conclusive, we believe it is helpful to clarify the mechanisms that are most likely to affect investment decisions in situations that endanger personal security.

The threat posed by kidnappings may affect investment broadly through four mechanisms. First, a high probability of kidnapping may induce managers to operate under the fear of being expropriated, deprived from their liberty, or killed. Fear may distract managers from exploiting investment opportunities, because investing in physical capital is a commitment to stay in a particular place. Managers are likely to be reluctant to create physical ties to an unsafe environment. We call this hypothesis the *fear channel*.

Second, 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*.

Third, 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. This decision of banks may reduce the supply of external funds especially if banks rely mostly on soft information. We call this hypothesis the *credit constraints channel*.

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

The evidence in Section III is not necessarily inconsistent with the demand, the credit, or the cost channels; however, our results tend to favor the fear channel. In particular, our analysis suggests that when firms perceive an increase in the conditional probability of being the target of kidnappings, they tend to invest less. Firm-related kidnappings of foreigners, for example, have a stronger effect on the investment of foreign firms.

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<sup>39</sup> World Bank, World Development Indicators, 2002.

Similarly, firm-related kidnappings in a given industry have a strong impact on that industry. Perhaps, more important, we control for a number of determinants of investment that should take into account the risk of expropriation and demand conditions (for example, profitability). The objective of this section is to provide more detailed evidence on the mechanisms through which crime deters investment.

### A. Fear Channel

Investing in physical capital typically involves a commitment to stay in the place where capital is installed. If physical capital and human capital are complements, managers that fear for their lives, health, and property may be reluctant to invest during times when kidnapping rates are unusually high. In this section, we provide evidence that links a threat to human capital (i.e., kidnappings) to the incentive to invest in physical capital, by identifying firms that are more likely to be committed to a particular place after investing.

Firms with a large fraction of fixed assets are typically more committed to the place where they invest than firms with a small fraction of fixed assets. Table 8 compares the effect of firm-related kidnappings across industries that differ in the tangibility of their assets. We measure industry tangibility using PPE as a percentage of assets. Notably, the interaction between firm-related kidnappings and industry tangibility is negative and statistically significant. This finding suggests that the negative effect of firm-related kidnappings is stronger on firms that are highly committed to the place where they operate.

### B. Demand Channel

The results in Section III provide indirect evidence that the mechanism through which kidnappings re-

duce investment is not a fall in demand, because the baseline regressions already control for net income scaled by assets (ROA) at the firm level and GDP at the department level. This section, however, provides additional evidence that is not easy to reconcile with the demand channel hypothesis. In particular, we compare the response of firms that depend on Colombian markets to the response of firms with access 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 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 9 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:

$$\frac{Investment_{i,t}}{TA_{i,t-1}} = \alpha + \beta_1 \cdot Kidnappings_{j,t-1} + \beta_2 \cdot Industry\ Tradability_k + \rho \cdot Kidnappings_{j,t-1} \times Industry\ Tradability_k + \pi \tilde{\lambda}_{i,t-1} + \gamma Z_{j,t-1} + \varphi_i + \eta_t + \lambda_k + \mu_j + \varepsilon_{i,t} \quad (4)$$

where *Industry Tradability* is the fraction of exports in total sales.<sup>40</sup> The definition of all other variables follows equation (2). The interaction terms between industry tradability and different rates of kidnappings that target firms are not statistically significant. Although the evidence is not conclusive, the results in Table 9 are hard to reconcile with the demand channel hypothesis. Perhaps more important, the absence of a differential effect for firms that depend

<sup>40</sup> For each 4-digit ISIC industry code, we average the tradability measure from 1991 to 1995 (before the first year in our sample). See Appendix Table 2 for more details.

**Table 8. ASSET TANGIBILITY AND THE EFFECT OF KIDNAPPINGS ON INVESTMENT**

	Dependent Variable: $Investment_t / Total Assets_{t-1}$			
	(1)	(2)	(3)	(4)
Firm-Related Kidnappings per 100,000 pop. $_{t-1}$	1.5219 (1.1971)	- -	- -	- -
Firm-Related Kidnappings x ( Industry Tangibility $_{t-1}$ ) per 100,000 pop. $_{t-1}$	-0.0838 * (0.0445)	- -	- -	- -
Kidnappings of Firms' Top and Middle Management per 100,000 pop. $_{t-1}$	- -	2.1177 (2.0088)	- -	- -
Kidnappings of Firms' Top and x ( Industry Tangibility $_{t-1}$ ) Middle Management per 100,000 pop. $_{t-1}$	- -	-0.1583 (0.1058)	- -	- -
Kidnappings of Firms' Top Management per 100,000 pop. $_{t-1}$	- -	- -	13.8862 (8.8206)	- -
Kidnappings of Firms' Top x ( Industry Tangibility $_{t-1}$ ) Management per 100,000 pop. $_{t-1}$	- -	- -	-0.7882 * (0.4429)	- -
Kidnappings of Firms' Owners per 100,000 pop. $_{t-1}$	- -	- -	- -	16.4253 *** (5.8181)
Kidnappings of Firms' Owners x ( Industry Tangibility $_{t-1}$ ) per 100,000 pop. $_{t-1}$	- -	- -	- --	-0.9778 *** (0.3190)
Industry Tangibility $_{t-1}$	0.5605 *** (0.0316)	0.5443 *** (0.0179)	0.5643 *** (0.0354)	0.5435 *** (0.0286)
Observations	32,447	32,447	32,447	32,447
Number of firms	9,965	9,965	9,965	9,965
R-squared	0,9962	0.9962	0.9962	0.9963

Standard errors (in parentheses) are adjusted for department clustering

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

This table reports OLS estimates of the effect on investment of firm-related kidnappings and their interaction with average industry tangibility. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include firm covariates (log assets, cash holdings scaled by assets, and ROA); 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). Industry tangibility is the average by ISIC code of PPE as a percentage of total assets. Rates of kidnappings are measured at the department level and are scaled by 100,000 population. The sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2002.

Firm-related Kidnappings correspond to kidnappings of firms' employees, owners, or contractors; Top Management includes CEOs, presidents, vicepresidents, and board members; Top and Middle Management includes division managers and supervisors plus Top Management.

Source: Authors' calculations.



**Table 9. FIRM-RELATED KIDNAPPINGS AND INDUSTRY TRADABILITY**

	Dependent Variable: $Investment_t / Total Assets_{t-1}$			
	(1)	(2)	(3)	(4)
Firm-Related Kidnappings per 100,000 pop. $_{t-1}$	-1.8006 *** (0.6301)	- -	- -	- -
Firm-Related Kidnappings x (Industry Tradability) per 100,000 pop. $_{t-1}$	0.0432 (0.0578)	- -	- -	- -
Kidnappings of Firms' Top and Middle Management per 100,000 pop. $_{t-1}$	- -	-2.7547 *** (1.0655)	- -	- -
Kidnappings of Firms' Top and x (Industry Tradability) Middle Management per 100,000 pop. $_{t-1}$	- -	0.0449 (0.0801)	- -	- -
Kidnappings of Firms' Top Management per 100,000 pop. $_{t-1}$	- -	- -	-3.4916 * (1.9982)	- -
Kidnappings of Firms' Top x (Industry Tradability) Management per 100,000 pop. $_{t-1}$	- -	- -	0.0917 (0.1520)	- --
Kidnappings of Firms' Owners per 100,000 pop. $_{t-1}$	- -	- -	- -	-5.6704 ** (2.5337)
Kidnappings of Firms' Owners x (Industry Tradability) per 100,000 pop. $_{t-1}$	- -	- -	- -	-0.0507 (0.1108)
Industry Tradability	-0.1655 * (0.0921)	-0.1638 * (0.0949)	-0.1561 * (0.0815)	-0.1503 * (0.0804)
Observations	32,542	32,542	32,542	32,542
Number of firms	10,035	10,035	10,035	10,035
R-squared	0.9954	0.9954	0.9954	0.9954

Standard errors (in parentheses) are adjusted for department clustering

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

This table reports the effect on investment of the interaction between firm-related kidnappings and industry tradability. The results correspond to equation (4) in the text. The sample is an unbalanced panel of firms in Colombia with annual observations from 1996 to 2002. The dependent variable is the change in Property, Plant, and Equipment scaled by lagged assets. Regressions include firm covariates (log assets, cash holdings scaled by assets, and  $ROA$ ); 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-related Kidnappings correspond to kidnappings of firms' employees, owners, or contractors; Top Management includes CEOs, presidents, vicepresidents, and board members; Top and Middle Management includes division managers and supervisors plus Top Management.

Source: Authors' calculations.

exclusively on local markets alleviates the concern that our results may be driven by omitted demand variables.

### C. 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. If kidnappings that target firms reduce investment through a tightening in credit constraints, firms should contract less debt when kidnapping rates go up. To test this hypothesis, Table 10 reports OLS estimates of the effects of kidnappings on individual firm borrowing. The dependent variable in the regression is the change in bank debt scaled by assets.<sup>41</sup> While the results in Section III suggest that firm-related kidnappings are negatively correlated with firm investment, there is no consistent evidence that firms contract less (or more) debt when kidnappings target firms.

In Appendix Table 4 we report the effect of firm-related kidnappings on the change in aggregate bank loans by department. Firm-related kidnappings are not strongly correlated with changes in aggregated bank debt. Moreover, there is no differential effect of firm-related kidnappings on loans to firms over loans to individuals.

### D. Cost Channel

If kidnappings increase security costs, firms that face high kidnappings rates should report larger administrative costs. Table 11 reports the results of running a regression similar to equation (1), with administrative expenses scaled by assets as the dependent

variable. We use the same regional controls and firm-specific controls as in equation (1), with the exception of return on assets, which is replaced by sales over assets. We also add the Herfindahl Index on sales as a proxy for industry concentration.

The coefficients of the kidnapping rates are negative for firm-related kidnappings and kidnappings of top and middle management, which implies that costs are reduced, rather than increased, by kidnappings. We find evidence that kidnappings of top managers significantly increase costs, which is consistent with firms protecting people at the top. However, the fact that kidnappings of owners do not increase costs in a similar way is counterintuitive. Therefore, it is unlikely that the effect of kidnappings on investment is caused 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, which is the most obvious component to be affected by kidnappings.

### E. Discussion

A number of different mechanisms may explain the negative effect of firm-related kidnappings on corporate investment. Although we are not able to completely rule out other stories, the evidence in this section is consistent with the hypothesis that managers do not invest when they are afraid of becoming victims of kidnappings. The fact that administrative costs and bank debt are not negatively affected by firm-related kidnappings suggests that property and income is not the only concern of investors and managers. Personal security is likely to be an important concern for investors; perhaps more important than the security of property.

The evidence in this section suggests that firm-related kidnappings have no differential effect on the

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<sup>41</sup> The regression is in the spirit of the evidence about capital structure that Rajan and Zingales (1995) present for industrialized countries.

**Table 10. THE EFFECT OF VIOLENCE ON FIRM BORROWING**

	Dependent Variable: $\Delta \text{Bank Debt}_t / \text{Total Assets}_{t-1}$			
	(1)	(2)	(3)	(4)
Firm-Related Kidnappings per 100,000 pop. $_{t-1}$	0.0863 (1.3872)	- -	- -	- -
Kidnappings of Firms' Top and Middle Management per 100,000 pop. $_{t-1}$	- -	2.7795* (1.4683)	- -	- -
Kidnappings of Firms' Top Management per 100,000 pop. $_{t-1}$	- -	- -	3.0019 (3.5050)	- -
Kidnappings of Firms' Owners per 100,000 pop. $_{t-1}$	- -	- -	- -	-1.0257 (5.7009)
Homicides per 100,000 pop. $_{t-1}$	0.0139 (0.0304)	0.0045 (0.0201)	0.0131 (0.0231)	0.0157 (0.0236)
Guerrilla Attacks per 100,000 pop. $_{t-1}$	0.2995 (0.2345)	0.2993 (0.2411)	0.3196 (0.2333)	0.2957 (0.2327)
Observations	28,581	28,581	28,581	28,581
Number of firms	8,995	8,995	8,995	8,995
R-squared	0.4065	0.4065	0.4065	0.4065

Standard errors (in parentheses) are adjusted for department clustering

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

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 firm-specific controls (log sales, cash holdings scaled by total assets, ROA, and PPE scaled by total assets), 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 2002.

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. Guerilla attacks includes FARC attacks reported by the National Police/Ministry of Defense.

Source: Authors' calculations.

investment of firms that depend on local markets. This finding helps our identification strategy, because if omitted demand variables explain the negative correlation between firm-related kidnappings and corporate investment, one should expect a more negative correlation for firms that sell their products in Colombia.

## V. CONCLUSIONS AND DIRECTIONS FOR FURTHER RESEARCH

Cross-country studies provide useful evidence of the existence of a negative relation between investment and political instability (or other variables closely related with criminal activity). Although it is sugges-

**Table 11. THE EFFECT OF VIOLENCE ON FIRMS' COSTS**

	Dependent Variable: <i>Administrative expenses<sub>t</sub> / Total Assets<sub>t-1</sub></i>			
	(1)	(2)	(3)	(4)
Firm-Related Kidnappings per 100,000 pop. <sub>t-1</sub>	-0.0228 * (0.0117)	- -	- -	- -
Kidnappings of Firms' Top and Middle Management per 100,000 pop. <sub>t-1</sub>	- -	-0.0028 (0.0271)	- -	- -
Kidnappings of Firms' Top Management per 100,000 pop. <sub>t-1</sub>	- -	- -	0.3145 * (0.1875)	- -
Kidnappings of Firms' Owners per 100,000 pop. <sub>t-1</sub>	- -	- -	- -	0.0200 (0.1016)
Homicides per 100,000 pop. <sub>t-1</sub>	0.0004 ** (0.0002)	0.0003 * (0.0002)	0.0001 (0.0002)	0.0002 (0.0002)
Guerrilla Attacks per 100,000 pop. <sub>t-1</sub>	-0.0003 (0.0022)	-0.0006 (0.0024)	0.0014 (0.0029)	-0.0006 (0.0024)
Observations	33,045	33,045	33,045	33,045
Number of firms	10,309	10,309	10,309	10,309
R-squared	0.7211	0.7211	0.7211	0.7211

Standard errors (in parentheses) are adjusted for department clustering

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

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 2002).

Firm-Related Kidnappings correspond to kidnappings of firms' employees, owners, or contractors that are reported in the FONDELIBERTAD dataset; Top Management includes CEOs, presidents, vice-presidents, and board members; Top and Middle Management includes division managers and supervisors plus Top Management. Guerrilla Attacks includes FARC attacks reported by the National Police/Ministry of Defense.

Source: Authors' calculations.

tive, this evidence cannot be used to infer a causal effect of crime on investment, because crime itself may be influenced by economic activity.

In this paper, we exploit variation in different forms of crime within regions in Colombia to measure the effect of crime on investment. Using firm-level data on a single country is useful to alleviate the problems faced by 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 identify the effect of firm-related crimes on investment. Finally, we are also able to exploit cross-sectional differences in firms' characteristics

to address particular omitted variables stories. As an example of the last point, we use the industry's export share to identify firms that depend on Colombian demand.

We find that kidnappings that target firms directly (attacking their employees, managers, or owners) have a non-negligible 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. 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, we have not totally solved here the identification problem of finding a causal effect of violent crime on investment.

This paper presents evidence suggesting that firm-related kidnappings reduce investment, because managers operate under the distraction of fear. Individuals are not only scared away because of the probability of expropriation, but also because of threats to their personal security. Although we cannot totally rule out other explanations of why firm-related kidnappings reduce investment, we provide evidence suggesting that the mechanism is unlikely to operate through demand conditions, credit constraints, or administrative costs.

The dataset in this paper suggests a number of interesting questions for further research. First, using data on individual loans, we will test more explicitly the hypothesis that banks ration borrowers in more violent places. With data on interest rates charged on individual loans, it will be possible to further test for the existence of a "violence premium". Second, Colombia is an interesting laboratory for comparing the effects of crime against property to the effects of crime against individuals. Third, if we treat crime as a distortionary tax, we are able to compute the deadweight loss of criminal activity.

Recent empirical studies show that institutions that protect property rights foster investment and long-run economic growth (Besley, 1995; Acemoglu *et al.*, 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, 2004). The empirical challenge, therefore, is to dismantle the black box of property rights. Similarly, the results in this paper 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 particular aspects of crime are particularly relevant for economic activity and investment.

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## Appendix 1. CROSS-COUNTRY EVIDENCE: INVESTMENT AND INTERNATIONAL KIDNAPPINGS

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In this appendix, we present simple cross-country results linking kidnappings by international terrorists and investment. We present them here for two reasons. First, existing cross-country studies do not focus on the effect of crime itself, but rather on political instability. Second, kidnappings by international terrorists are closer to the forms of crime we analyze in this paper (kidnappings, homicides, and guerrilla attacks).

Investment is measured using Gross Capital Formation and net Foreign Direct Investment (FDI) as a fraction of GDP. We use an unbalanced panel of 196 countries from 1968 to 2002 to estimate the following equation using OLS with country- and year-fixed effects:

$$Investment_{i,t} = \alpha + \beta \cdot Kidnappings_{i,t} + \gamma \cdot GDP_{i,t} + \delta \cdot Population_{i,t} + \zeta_i + \eta_t + \varepsilon_{i,t} \quad (A1)$$

where  $i$  indexes countries and  $t$  indexes years. Investment, GDP, and population data are taken from the World Bank's World Development Indicators.

The variable  $Kidnappings_{i,t}$  is the number of kidnappings per 100,000 population committed by international terrorists. These data are taken from the ITERATE dataset (International Terrorism: Attributes of Terrorist Events).\*

To prevent our results from being driven by outliers, we exclude two country-year observations for which net FDI is larger than the GDP and one for which Gross Capital Formation is larger than the GDP. We also exclude two observations for which the kidnappings rate is larger than 1 per 100,000 people. Results are similar when we keep these observations.

Appendix Table 1 summarizes the results of this regression. The first two columns show the results for net fdi and the last two show the results using gross capital formation. Columns (1) and (3) are a simple regression of investment on kidnappings and a constant with no other controls. The regression lines in Figure 1 correspond to the regressions in columns (1) and (3).

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\* For a description of the dataset, see Mickolus *et al.* (2003).

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**Appendix Table 1. CROSS-COUNTRY EVIDENCE**

Dependent Variable:	Net FDI <sub><i>i,t</i></sub> (% of GDP)		Gross Capital Formation <sub><i>i,t</i></sub> (% of GDP)	
	(1)	(2)	(3)	(4)
Kidnappings per 100,000 people <sub><i>i,t-1</i></sub>	-14.1041 ** (6.6213)	-17.7092 * (10.2079)	-38.9887 ** (17.4799)	-17.1976 ** (8.2632)
Log (GDP per capita) <sub><i>i,t</i></sub>	- -	0.2131 (0.6481)	- -	-0.3087 (1.2615)
Constant	2.2227 *** (0.1919)	-0.0392 (4.6986)	23.0562 *** (0.4791)	25.3302 *** (9.3247)
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-squared	0.0012	0.3498	0.0031	0.5514

Standard errors (in parentheses) are adjusted for country clustering.

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

This table reports the OLS estimate of the effect of kidnappings on investment in an unbalanced panel of 196 countries from 1968 to 2002. 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 dataset; 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 WDI dataset. 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.

Source: Authors' calculations.

**Appendix Table 2. DEPARTMENT AND INDUSTRY VARIABLES: DATA DESCRIPTION**

Variable Name	Description	Years Covered	Level of Aggregation	Source
Poverty index	<i>Necesidades Básicas Insatisfechas</i> (Unfulfilled Basic Needs). Similar to the one-dollar-per-day poverty measure.	1990-2002	Municipality	DANE, CEDE
GDP per capita	Real GDP divided by population. 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	Country-wide producer price index.	1990-2003	Country-wide	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
Gross Credit	Total bank loans to individuals and firms (in current Colombian pesos).	1996, 1997, 1999, 2000, 2001	Department	Superintendencia Bancaria
Net Credit	Gross credit minus provisions for bad loans (in current Colombian pesos).	1996, 1997, 1999, 2000, 2001	Department	Superintendencia Bancaria
Commercial Loans	Bank loans to firms (in current Colombian pesos).	1996, 1997, 1999, 2000, 2001	Department	Superintendencia Bancaria
Loans to Individuals	Bank loans to individuals for the purchase of consumption goods.	1996, 1997, 1999, 2000, 2001	Department	Superintendencia Bancaria

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. DANE is the National Administrative Department of Statistics (Departamento Administrativo Nacional de Estadísticas); CEDE is the Center for Research on Economic Development (Centro para Estudios Sobre el Desarrollo Económico) at Universidad de Los Andes; and Superintendencia Bancaria is an agency of the Colombian government in charge of the prudential regulation and supervision of financial institutions.

### Appendix Table 3. KIDNAPPINGS BY YEAR AND DEPARTMENT

Panel A: Average Rates by Department, 1996-2002 (per 100,000 pop.)

Department	Total Kidnappings	Firm-Related kidnappings	Kidnappings of Top and Middle Management	Kidnappings of Top Management	Kidnappings of Owners	Kidnapping of Government Employees	Kidnappings of Army and National Police	Kidnappings of Foreigners	Total Homicides	Total Guerrilla Attacks
Antioquia	9.30	1.28	1.05	0.05	0.09	0.52	0.27	0.10	126.87	3.33
Atlántico	1.02	0.15	0.14	0.02	0.00	0.01	0.01	0.01	30.22	0.03
Bogotá, D.C.	1.68	0.26	0.21	0.02	0.05	0.01	0.00	0.06	39.64	0.06
Bolívar	6.44	0.51	0.37	0.04	0.09	1.03	0.09	1.03	24.04	1.78
Boyacá	4.04	0.33	0.21	0.01	0.05	0.12	0.11	0.04	20.30	2.21
Caldas	4.20	0.53	0.36	0.03	0.04	0.05	0.06	0.06	88.10	1.16
Caquetá	14.24	0.73	0.67	0.03	0.03	1.27	3.22	0.15	107.33	11.52
Cauca	5.40	0.39	0.29	0.02	0.07	0.82	0.18	0.16	43.02	6.43
Cesar	25.92	2.39	1.48	0.12	0.06	1.22	0.47	0.16	71.03	2.98
Córdoba	1.64	0.10	0.10	0.00	0.01	0.04	0.02	0.00	27.79	0.55
Cundinamarca	8.17	0.85	0.73	0.10	0.15	0.36	0.07	0.20	40.22	6.02
Chocó	12.30	1.74	1.15	0.04	0.29	0.70	0.71	0.45	50.42	5.40
Huila	5.96	0.71	0.57	0.02	0.12	0.36	0.20	0.01	51.87	4.51
Guajira	13.78	1.84	1.48	0.06	0.24	1.00	0.21	0.52	61.11	4.77
Magdalena	8.87	0.97	0.64	0.15	0.08	0.15	0.06	0.13	49.73	2.54
Meta	16.29	1.79	1.51	0.06	0.35	0.83	1.00	0.17	65.60	11.01
Nariño	3.06	0.15	0.11	0.03	0.02	0.85	0.31	0.03	29.64	4.19
Norte de Santander	8.25	1.19	0.89	0.08	0.11	0.81	0.41	0.26	90.54	1.59
Quindío	1.61	0.16	0.16	0.03	0.02	0.03	0.03	0.00	65.43	1.88
Risaralda	4.16	0.62	0.46	0.09	0.07	0.25	0.03	0.04	99.06	2.52
Santander	8.31	1.02	0.76	0.04	0.10	0.57	0.16	0.11	46.46	2.92
Sucre	9.37	0.93	0.77	0.13	0.05	0.37	0.16	0.05	31.42	2.75
Tolima	7.38	0.84	0.74	0.06	0.16	0.34	0.31	0.04	52.48	3.54
Valle del Cauca	4.06	0.55	0.48	0.04	0.11	0.13	0.02	0.12	92.77	1.19
Arauca	12.88	1.58	1.09	0.24	0.07	1.44	0.25	0.70	104.81	21.78
Casanare	29.20	5.06	3.14	0.16	0.30	0.69	0.20	0.18	99.36	9.81
Putumayo	5.72	0.63	0.17	0.00	0.04	0.59	0.66	0.03	65.12	10.45
Amazonas	0.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	9.32	1.99
Guania	3.08	0.80	0.80	0.00	0.00	0.00	0.00	0.00	16.44	35.86
Guaviare	17.31	0.00	0.00	0.00	0.00	0.00	10.04	0.00	115.76	31.02
Vaupés	35.82	0.00	0.00	0.00	0.00	0.53	12.90	0.00	23.32	31.86
Vichada	10.99	3.64	3.34	0.00	0.00	1.59	1.59	0.14	23.50	9.95
<b>Colombia</b>	<b>6.39</b>	<b>0.75</b>	<b>0.58</b>	<b>0.05</b>	<b>0.08</b>	<b>0.39</b>	<b>0.22</b>	<b>0.10</b>	<b>62.89</b>	<b>2.88</b>

Panel B: Means and Standard Deviation, 1996-2002

	Total Kidnappings	Firm-Related Kidnappings	Kidnappings of Top and Middle Management	Kidnappings of Top Management	Kidnappings of Firms' Owners	Kidnapping of Government Employees	Kidnappings of Army and National Police	Kidnappings of Foreigners	Total Homicides	Total Guerrilla attacks
Observations	224	192	192	192	192	192	192	224	224	224
Mean	8.95	0.46	0.39	0.04	0.04	0.29	0.71	0.13	58.21	7.43
Std. deviation	20.24	1.47	1.44	0.10	0.10	0.68	6.49	0.27	35.78	15.09
Std. dev. within department	18.21	1.30	1.30	0.09	0.09	0.59	4.65	0.22	15.55	11.85

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 32 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 FARC. Data on kidnappings were obtained from the FONDOLIBERTAD dataset. Total Kidnappings are all kidnappings reported in the FONDOLIBERTAD dataset. 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, vicepresidents, and board members; Top and Middle Management includes division managers and supervisors plus Top Management. Annual population is projected by DANE. Source: Authors' calculations.

**Appendix Table 4. EFFECT OF FIRM-RELATED KIDNAPPINGS ON AGGREGATE LOANS**

Dependent Variable:	$\Delta$ Net Credit (% of GDP) (1)	$\Delta$ Gross Credit (% of GDP) (2)	$\Delta$ Commercial Loans (% of GDP) (3)	$\Delta$ Loans to Individuals (% of GDP) (4)
Firm-Related Kidnappings per 100,000 pop. $t_{-1}$	0.1666 (0.3635)	0.5416 (0.5659)	0.0237 (0.1137)	0.0856 (0.1012)
Homicides per 100,000 pop. $t_{-1}$	-0.1070 (0.1007)	-0.0927 (0.0837)	-0.0009 (0.0170)	-0.0187 (0.0150)
Guerrilla Attacks per 100,000 pop. $t_{-1}$	0.0881 (0.1205)	0.0547 (0.0960)	0.0043 (0.0167)	0.0055 (0.0169)
GDP per capita $t_{-1}$	0.1829 (1.6269)	0.2050 (1.3462)	-0.2862 (0.5133)	0.0835 (0.2301)
Constant	1.2765 (4.0710)	-0.5551 (2.0935)	-0.4514 (1.1084)	0.0121 (0.5769)
Observations	96	96	96	96
R-squared	0.3718	0.5098	0.5834	0.5671

Standard errors (in parentheses) are adjusted for department clustering.

\* Significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.

We regress four measures of aggregate loans at the department level on the rates of firm-related kidnappings, homicides, and guerrilla attacks (FARC) also at the department level. Data on homicides and guerrilla attacks were obtained from the National Police/Ministry of Defense. Data on kidnappings were obtained from the FONDELIBERTAD dataset. Annual population data is projected by DANE. Firm-Related Kidnappings correspond to kidnappings of firms' employees, owners, or contractors. Data on aggregate loans are from Superintendencia Bancaria for the years 1996, 1997, 1999, 2000, and 2001. Net credit, gross credit, commercial loans, and loans to individuals are all scaled by department GDP. All regressions include department and year fixed effects.

Source: Authors' calculations.