# Losing the lottery: Household financial shocks and crime*

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**Abstract**

This study delves into the ramifications of negative economic shocks on criminal activities. I collected criminal records and administrative records of more than 160,000 investors affected by the closure of a Colombian informal financial institution in 2008. I employed a regression discontinuity design, exploiting the serendipitous timing of deposit expiration dates relative to the institution's shutdown to dissect the shock's effects at an individual level. The results reveal an increase of 0.5% in the number of total criminal records, 0.26% in property crimes, and 0.17% in violent crimes. This could be attributed to the loss of well-being due to the depletion of savings or a significant portion of their capital, thereby reducing the opportunity cost of engaging in crime. However, individuals with pre-existing deposits experienced a diminished effect, with a decrease of 0.2%, resulting in a net increase of 0.3% in crime. This suggests that access to savings and the ability to withdraw funds can mitigate the financial repercussions of an economic shock.

**Keywords:** Economic shock, Informal financial sector, Criminal records
**JEL classification:** D31, F13, F16, H41, K42, O17, O19.

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# 1 Introduction

Negative economic shocks have the potential to change the trade-offs involved in engaging in criminal behavior, as indicated by the economic model of crime (Becker, 1968; Ehrlich, 1973). Specifically, they can lead to an increase in crime rates by creating circumstances that push individuals towards criminal activities as a strategy for dealing with economic adversity (Street, 2023). This paper uses the intervention of a firm in the informal financial sector in Colombia to study, at the intensive margin, the effect of a negative economic shock on the number of legal processes of an individual.

The impact of economic shocks on crime is influenced by various factors, including the source of the shock (legal or illegal), the specific effects it has on different variables, and the characteristics of the market affected by the shock (Ferraz et al., 2022). Even within the context of legal sources, certain economic shocks make engaging in criminal activity more appealing. This can be attributed to the 'repacity effect', wherein increases in income raise the value of potential gains from criminal acts, thereby promoting criminal behavior (Dube et al., 2016; Tornell and Lane, 1999).

Similarly, when employment opportunities decline and incomes are affected by factors such as economic recessions, mass layoffs, or uncontrolled inflation, individuals may resort to criminal activities as a desperate means of ensuring their survival or maintaining their standard of living (De Blasio et al., 2016; Dix-Carneiro et al., 2018; Fougere et al., 2009; Gould et al., 2002; Khanna et al., 2019; Lin, 2008; Raphael and Winter, 2001). Sudden changes in economic conditions can heighten stress and anxiety levels in the population, which in turn can increase the likelihood of criminal behavior (Artello and Williams, 2014; Felson et al., 2012; Piehl, 1998). Financial concerns, such as the inability to repay debts, sustain a household, or meet basic needs, can foster feelings of hopelessness and desperation, driving some individuals to seek quick and often illegal solutions to their economic problems (Haynes and Rader, 2015; Hoeve et al., 2014; Weatherburn and Schnepel, 2015).

Economic uncertainty can also contribute to a climate of distrust and resentment towards institutions and authority (Goulas and Zervoyianni, 2013). Specifically, the relationship between financial sector bankruptcies and their impact on crime is complex and influenced by multiple factors. Bankruptcies in the financial sector can have ramifications for criminal activities, particularly in cases involving fraud and financial crimes associated with bankruptcy proceedings. Financial crimes, including bankruptcy fraud, can serve as significant sources of illicit funds, affecting both creditors and consumers (Barth et al., 2020; Box et al., 2013; Francis, 2010; Jha and Joshi, 2023).

The bankruptcy of financial institutions can trigger a cascade of consequences that further exacerbate the propensity for crime. For instance, the declaration of bankruptcy by a financial institution can lead to an upsurge in fraud cases, as dishonest individuals seek to exploit the resulting confusion and financial instability for personal gain (Geldrop, 2011; Rezaee, 2005). Moreover, financial sector bankruptcies can have a ripple effect on the broader economy, intensifying financial pressures on individuals and businesses. Consequently, this can drive an increase in criminal activity, as some individuals may succumb to the temptation of committing fraud, theft, or other financial crimes as a means of coping with their economic adversity (Collomb and Sok, 2016; Pillai and Sanjeev, 2015; Song and Zhao, 2024).

However, despite recent literature examining negative economic shocks at an individual level (Bennett and Ouazad, 2018; Khanna et al., 2019; Rose, 2018), there is limited knowledge within this literature regarding the effects on crime at the intensive margin of an economic shock, as well as the heterogeneity of the shock across the wealth distribution of individuals.

This paper examines the heterogeneous effects of an individual-level negative economic shock. To accomplish this, it utilizes certain characteristics of the operation and subsequent intervention of DMG, which involved around of 224,000 users in Colombia at the end of 2008 (Hofstetter et al., 2018). By employing web-scraping techniques, I collected a database of administrative records for approximately 165,000 DMG investors, upon which queries for criminal records are conducted on the website of the entity responsible for managing the resources of the Judicial Branch in Colombia. I employed a regression discontinuity design, exploiting the serendipitous timing of deposit expiration dates relative to the institution's shutdown, to dissect the shock's effects at an individual level.

The findings indicate a 0.5% increase in overall criminal records, with property crimes rising by 0.26% and violent crimes by 0.17%. This trend may stem from the deterioration of well-being following significant financial losses, thereby lowering the opportunity cost associated with committing crimes. However, the impact was less pronounced among individuals with pre-existing deposits, who saw a 0.2% reduction, leading to an overall crime increase of 0.3%. These results imply that having savings and the ability to access these funds could lessen the negative financial impacts of economic shocks.

This paper contributes to the literature on economic shocks and crime in two dimensions. As far as I know, among the literature studying the effect of a negative economic shock on individual-level crime (Bennett and Ouazad, 2018; Khanna et al.,

2019; Rose, 2018), this is the first paper to study this effect on the intensive margin. Similarly, it contributes to the literature exploring potential mechanisms of the effect of a negative economic shock on crime. This paper is structured into three main sections: the first provides the context of the natural experiment, the second describes the empirical strategy and the collection of databases used in the estimations, and finally, the results and conclusions of the paper are presented.

## 2 Data and background

This section provides an overview of the data sources utilized in the paper, covering administrative records, legal proceedings, and socioeconomic databases. I explore the relationship between economic shocks and criminal behavior using the administrative registers of firm DMG, and subsequent criminal records obtained from the Colombian accusatory penal system. Additionally, I integrated demographic, socioeconomic, and financial inclusion information at the individual level.

### 2.1 Who, when, and how much did they invest?

In the mid-2000s, several firms dedicated to illegally collecting money were established in Colombia (Cortés et al., 2016). These firms attracted clients with attractive return ratios up to 30 times higher than the interest rates offered by formal financial institutions. DMG GRUPO HOLDING S.A. was the largest firm in the market, with approximately 356,000 users in 47 cities throughout the country and deposits for a value close to 0.4% of Colombia's GDP in 2008 (Carvajal et al., 2009). DMG sold prepaid cards rechargeable for up to $21,440[1] that promised yields varying[2] between 50% and 300% over a six-month period. Customers could capitalize the total investment at the end of the period or use these cards to access discounts for buying goods and services at DMG's shopping partners (Hofstetter et al., 2018).

On November 17, 2008, the Colombian government shut down DMG for carrying out financial activities without legal authorization[3]. At the same time, the government appointed a legal auditor to liquidate the assets seized from DMG. In the months following the interceding, the legal auditor collected information on 224,892 [4] investors. At the time of the intervention, only 20% of the users had managed to recover their

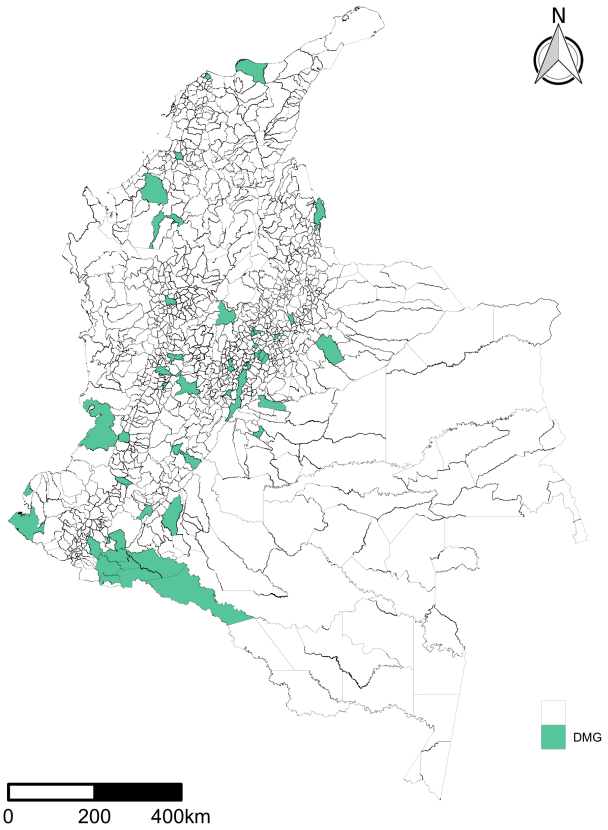
[1]Using the average exchange rate of November 2008.
[2]Return on each deposit was subject to a multilevel marketing scheme in which points were awarded to each user for voice-to-voice advertising and recruiting new customers.
[3]Decree 4343 of November 17, 2008.
[4]Only 84.39% of investors were selected to receive part of the capital recovered by the auditor.

investments while the remaining 80% lost, on average, a figure close to Colombia's GDP per capita in that year (Hofstetter et al., 2018). In the middle of 2009, the Colombian government returned the money recovered by legal auditor in the intervention. However, each investor was given $118.6, equivalent to 3.33% of the average value of deposits in DMG firm.

The databases with administrative records are available on the webpage of the liquidator[5]. Each record contains the name and national identification number of the user, as well as the city, date, and value of deposits, purchases, and yields received. Likewise, for each deposit account, both the deposit date and the expiration date can be observed. For this paper, I collected the administrative records of 357,000 deposits made by 164,721 investors between April 2, 2007, and November 16, 2008. In Map 1, it can be seen that DMG has offices and investors in five of the main capital cities and in another 42 municipalities in the country.

[5] http://dmg.dmgholdingintervenida.com

**Map 1**
**Regions with presence of DMG**




Source: DMGLJ, own elaboration.

## 2.2 Legal proceedings

On the other hand, I obtained criminal records of DMG users using administrative registers of Colombian Accusatory Penal System. The accusatory criminal procedure in Colombia is divided into two distinct stages: the initial stage, which can be called the inquiry-investigation stage, and the trial stage [6]. In the initial phase, a criminal report is produced after a person is apprehended by one of the organizations with judicial police duties. Subsequently, the equivalent of the Attorney General's Office appoints a prosecutor, who presents the accused before a judge[7] in charge of determining in a preliminary hearing whether the apprehension was legal and whether the accused should face trial in preventive detention or not.

[6]Act 3329 of the Superior Council of the Judiciary.
[7]Within the Colombian criminal procedural system, they are called Judges of Control of Guarantees (Jueces de Control de Garantías).

Subsequently, only 17.8% of criminal cases continue to the trial stage Arteaga (2018) and are assigned to a second judge [8], who is responsible for issuing a sentence (acquittal or conviction) or precluding the investigation. The administrative records of the criminal cases known to the judge in charge of the trial stage are public and can be consulted individually on the website[9] of the Superior Council of the Judiciary (CSJ, acronym in Spanish) for 21 of the 33 judicial districts of the country. These 21 districts cover 85.1% of the municipalities where the DMG was present and account for 97.8% of the investors.

To collect the judicial processes of the users of the DMG firm, I used *web-scraping* to consult the national identification number of each user in each of the 21 Courts of Execution of Sentences and Security Measures of the CSJ website. I retrieved information on 6,809 judicial processes for crimes committed until 2022. Each administrative record contains information on the type of crime, date and place of the act, sentence data, legal status, and other variables with information on the defendant.

## 2.3 Socioeconomic characteristics and financial market access

Finally, I integrated the DMG investors dataset with two sources of administrative data by utilizing individual identification numbers. The first source is the Sistema de Selección de Beneficiarios para Programas Sociales (SISBEN II, System for the Identification of Potential Beneficiaries of Social Programs) database from the Department of National Planning (2009). The Colombian government conducted this census of the low-income population for the second time between 2008 and 2010, collecting data on 25.6 million Colombians. Each record includes information on the subject's age, gender, level of education, marital status, number of children, and other characteristics. Additionally, these datasets allow me to identify family members and addresses of households.

Secondly, I employed the Sistema Integrado de Captura de la Superintendencia de la Economía Solidaria (SICSES, Integrated Capture System of the Superintendency of the Solidarity Economy) database from Superintendencia de Economía Solidaria. SICSES captures financial and operational information from 5,000 firms. The individual records contains the socio-economic and demographic information from more than 10 million people, as well as SICSES allows for the tracking of monthly records of around 5 million active credit operations in the sector.

[8] They are referred to as Judges of Knowledge (Jueces de Conocimiento) in Colombia's criminal justice system.

[9] https://procesos.ramajudicial.gov.co

# 3 Methods

## 3.1 Empirical strategy

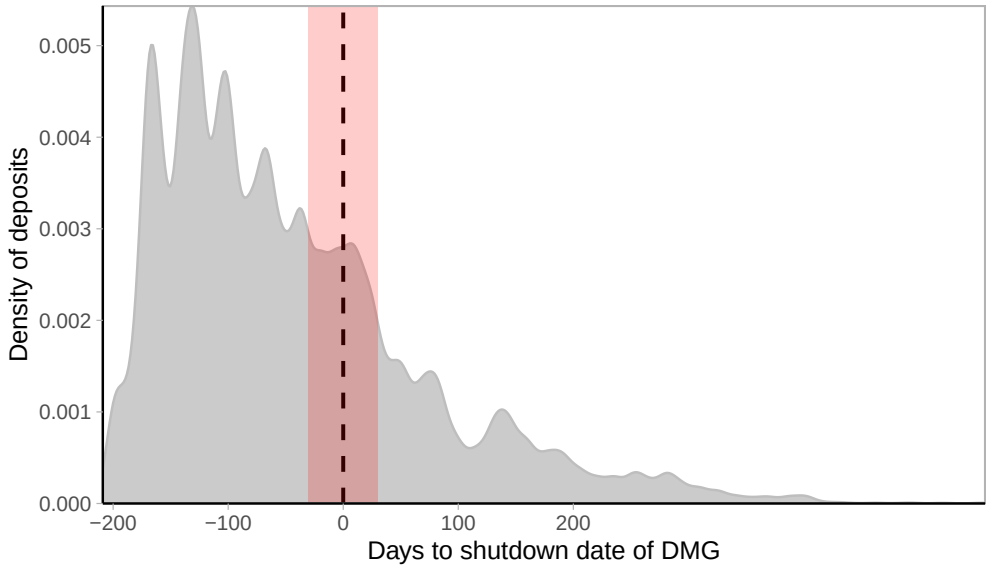
To assess the causal effect of a negative economic shock on the number of criminal records, I utilized an element on the modus operandi of DMG that allows to exploit a variation at the individual level that is plausibly exogenous to both observable and unobservable characteristic of investors. As mentioned in the data section (2), investors were required to wait six months before claiming deposits and yields[10]. Alternatively, investors could use the prepaid cards at any time to make purchases at associated commercial establishments, thereby reducing their investment returns.

However, only one in five investors used the cards to make purchases, and the total value of these purchases amounted to only 6.3% of the total value of deposits. This suggests that six months before the expiration date, investors could not predict the exact date of bankruptcy or shutdown of the DMG firm. Therefore, the shutdown of DMG provides quasi-randomization for individuals with deposits due around the intervention date. This variation assigns those individuals with deposit expiration dates in the days following the shutdown of DMG to the treatment group, while those individuals who claimed the yields and withdrew their deposits just a few days before the shutdown are assigned to the control group.

Figure 1 depicts the difference in days between the expiration date of deposits and the shutdown date of DMG for 357,000 investments made between April 2, 2007, and November 16, 2008. The shutdown date of DMG is represented by a black dashed line, and deposits with an expiration date 30 days before (right side) or 30 days after (left side) are show in the shaded area. This means that on the right side are the deposits made between 6 and 7 months before the shutdown date, while on the left side are the deposits made between 5 and 6 months before the intervention of DMG.

[10]The 90% of the deposits were made at least 150 days before the expiration date.

**Figure 1**
Difference (in days) between the expiration date of deposits and the shutdown date of DMG.




**Note:** The dashed line marks the shutdown day of DMG. The gray shaded area shows deposits with expiration dates within a 30-day band around the shutdown date.

To evaluate the reduced form impact of the economic shock on crime, I utilize a standard local Regression Discontinuity Design (RDD):

$$Crime_i = \alpha_0 + \phi \cdot Shock_i + f(Distance_i) + Previous\_crime_i + \epsilon_i \quad (1)$$

Where $Crime_i$ represents the number of criminal records for individual $i$ in the years following the shock. $Shock_i$ is an indicator variable that equals 1 if individual $i$ had a deposit with an expiration date in the days following the shutdown date of DMG, and 0 otherwise. $Distance_i$ denotes the continuous distance between the deposit expiration date for individual $i$ and the shutdown date, and $f()$ is a functional form that models the relationship between the dependent variable and the distance in days to the intervention date. Additionally, I included the criminal history prior to the shock $Previous_crime$ to control for the predisposition to commit crimes (Eren and Owens, 2023). Finally, as the error term among DMG investors within an office $\epsilon_i$ may be correlated (Abadie et al., 2017), the error terms are clustered at the DMG office municipality level.

## 3.2 Identification assumptions

There are two main related assumptions that must be met for the effects estimated by the methodology to be interpreted as causal effects. Firstly, our main identification

assumption is that apart from the treatment variable, the remaining characteristics of the observations are continuous, which implies that they vary smoothly near the cutoff. This essentially means that the only difference between individuals near the date of intervention for DMG is that some were within the six-month window to withdraw their deposits while others were not. Secondly, it must be assumed that there is no manipulation by individuals near the cutoff to affect the outcome of the intervention, meaning there was no way for individuals to change the time at which they could choose the expiration date to withdraw their deposits to be either before or after the intervention.

**Table 1**

Continuous distribution of baseline characteristics around the shutdown date

| | **Descriptives** | | **Permutation test** | |
|---|---|---|---|---|
| | **Mean** | **Std. Error** | **t** | **p-value** |
| **A. DMG Covariates** | | | | |
| Investment (USD) | 2559.33 | 38.33 | 0.06 | 0.11 |
| Purchases (number) | 0.81 | 0.03 | 0.01 | 0.76 |
| Purchases (USD) | 176.69 | 7.75 | 0.00 | 0.77 |
| **B. Financial Covariates** | | | | |
| Credits in 2007 (number) | 0.19 | 0.01 | 0.01 | 1.00 |
| Credits in 2008 (number) | 0.19 | 0.01 | 0.01 | 1.00 |
| Deposits in 2007 (number) | 0.17 | 0.01 | 0.00 | 1.00 |
| Deposits in 2008 (number) | 0.18 | 0.01 | 0.01 | 1.00 |
| Credits in 2007 (USD) | 277.33 | 15.26 | 0.01 | 1.00 |
| Credits in 2008 (USD) | 321.64 | 17.87 | 0.01 | 1.00 |
| Deposits in 2007 (USD) | 123.84 | 9.59 | 0.00 | 1.00 |
| Deposits in 2008 (USD) | 132.47 | 16.59 | 0.01 | 1.00 |
| **C. Socio-economic Characteristics** | | | | |
| Women | 0.53 | 0.01 | 0.02 | 0.68 |
| Age | 41.73 | 0.15 | 0.06 | 0.16 |
| Head of Household | 0.45 | 0.01 | 0.00 | 1.00 |
| SISBEN score | 26.83 | 0.22 | 0.07 | 0.13 |
| Annual Household Income (USD) | 4514.45 | 57.37 | 0.02 | 0.81 |

*Note:* Columns 1 and 2 present the descriptive statistics of investors within a 30-day bandwidth around the shutdown date. The last two columns present the test statistic and p-value of the Canay and Kamat (2018) permutation test for the continuous distribution of covariates at the cutoff. Values in USD are expressed as the average exchange rate of November 2008.

Regarding the first identification assumption, as previously discussed, individuals could not have predicted when and where the intervention could have taken place, as it was reported to be dealt with in secrecy by the authorities and took immediate effect throughout the national Colombian territory. This means that within a certain

timeframe, the individuals within it could be similar enough so that the assumption is validated. This is further supported by the Canay and Kamat (2018) permutation test of the continuous distribution of covariates for 30 days around the shut down date found in Table 1. As the joint and individual tests fail to reject the null hypothesis of a continuous distribution of variables at the cutoff. This indicates that both groups are comparable near the cutoff in everything but treatment.

Finally, the remaining assumption apart from the given fact that no prediction of the time of intervention was possible, the distribution of individuals between the chosen bandwidth in Figure 1 does not show any concentration that indicates possible manipulation. Instead, the fact that a larger portion of deposits is situated after the expiration date is simply a function of how multilevel ponzi schemes work.

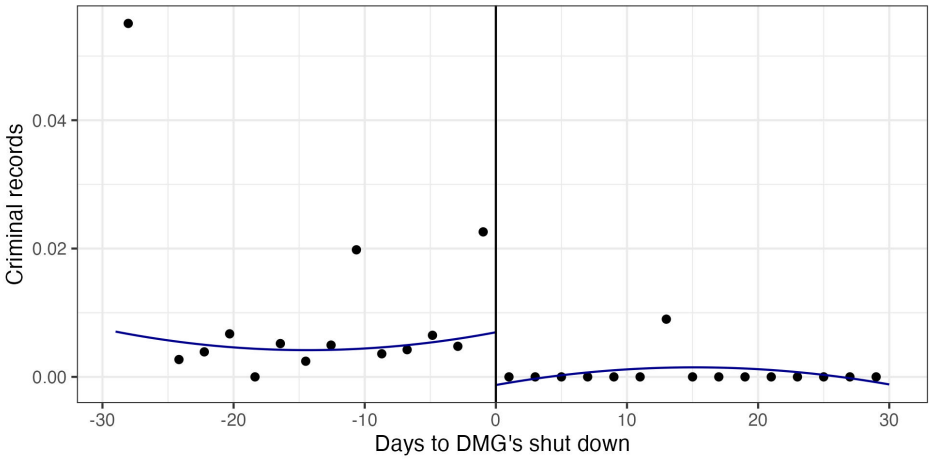
# 4 Results

This section presents the estimation of Equation 1 for users whose deposits expired within a 30-day window of the shutdown date. All results are based on a second-order local polynomial for bias correction and estimation. However, the results remain robust across different functional forms of the distance to the cutoff (Table A1) and various bandwidths (Figure 2). Following this, I explore the heterogeneous effects and test the potential mechanisms identified in the literature on economic shocks and crime.

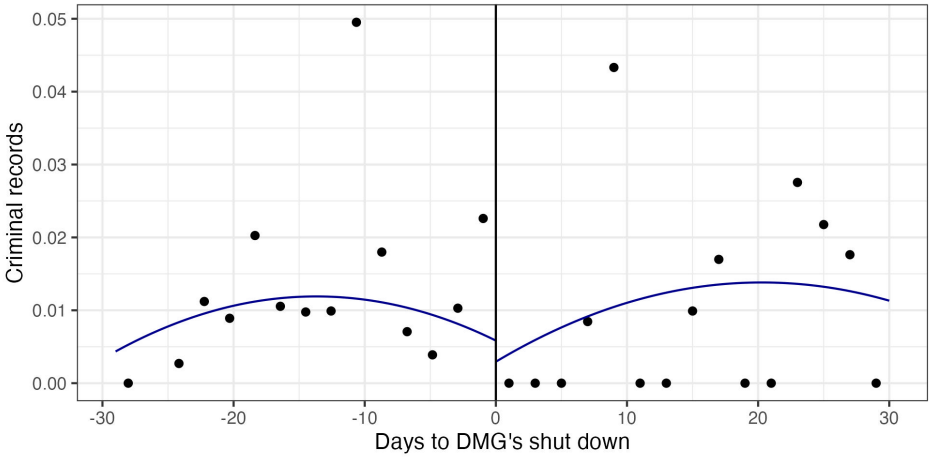
## 4.1 Effects of Economic Shock on Crime

Figure 2 shows the findings with RD plots for the number of criminal records before and after economic shock. The x-axis represents the distance to the shutdown date, and the y-axis represents the inverse hyperbolic sine transformation for the number of criminal records. For ease of interpretation, observations are binned in 2-day intervals. As expected, the figure shows a discontinuity in the number of total criminal records around the shutdown date after economic shock. However, it is crucial to highlight that the absence of discontinuity before the economic shock indicating no significant difference in the baseline number of criminal records, supports the local continuity assumption.

**Figure 2**
Regression discontinuity effect of economic shock on número of total criminal records




**(a)** After




**(b)** Before

**Note:** The number of criminal records is expressed as the inverse hyperbolic sine transformation. Observations are binned with 2-days intervals and smoothed using a second-order local polynomial.

Adittionally, Table 2 show that the treatment has a statistically significant effect on the crimes committed by individuals. The regression table shows that within the 30-day bandwidth, the economic shock increases the amount of crimes committed by 0.47% without controlling for previous criminal records. Once this control is included, the effect increases slightly to 0.5%. When examining types of crimes, focusing on property crimes as our outcome variable reveals that the effect, while not controlling for previous crime levels, results in an increase of 0.25% in property crimes committed by individuals who

suffered the economic shock compared to those who were fortunate enough to withdraw their deposits. The effect remains consistent at 0.26% when controlling for previous criminal records. Similarly, when looking specifically at violent crimes as outcomes, a comparable phenomenon is observed. Table 2 indicates that whether or not previous crimes are controlled for, the effect on violent crimes is an increase of 0.17% in this subset of crimes.

**Table 2**
RD estimates on criminal records

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | 0.0047*** | 0.0050*** | 0.0025** | 0.0026** | 0.0017** | 0.0017** |
| | (0.0014) | (0.0016) | (0.0012) | (0.0011) | (0.0008) | (0.0008) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Controls | | ✓ | | ✓ | | ✓ |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |
| Observations | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The number of criminal records is expressed as the inverse hyperbolic sine transformation. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

These findings suggest that compared to individuals who could withdraw their money, those who were victims and lost their money experienced, on average, an increase in the amount of crimes committed. This could possibly be attributed to the loss of well-being due to losing their savings or a significant portion of their capital, thereby reducing the opportunity cost of turning to crime. Consequently, a proportion of individuals affected by this Ponzi scheme may have decided to resort to criminal activities. The disparity between the effect size of other crimes and violent crimes could be explained by a higher opportunity cost associated with the latter subset of crimes.

## 4.2 Spillovers to Family Members

Incarceration's economic impact extends beyond the individual to affect their family through employment challenges, reduced income, and the depletion of financial resources due to legal costs (Khanna et al., 2021). It hampers access to higher education and stable housing, leading to significant mental, emotional, and physical health repercussions for family members (Kelley, 2019). The resulting stress, stigma, and discrimination can

strain social relations and civic engagement (Wildeman and Western, 2010). However, the incarceration may deter crime among family members, potentially due to perceived higher costs or reduced opportunities for criminal involvement (Philippe, 2017).

**Table 3**
RD estimates on criminal records in family

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | −0.0041*** | −0.0034*** | −0.0014** | −0.0014** | −0.0023*** | −0.0023*** |
| | (0.0014) | (0.0013) | (0.0006) | (0.0006) | (0.0008) | (0.0008) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Controls | | ✓ | | ✓ | | ✓ |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |
| Observations | 14,631 | 14,631 | 14,631 | 14,631 | 14,631 | 14,631 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The number of criminal records is expressed as the inverse hyperbolic sine transformation. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

With the previous context in mind, it is extensively clear that the latter effect is what seems to be corroborated. Table 3 show that all point to a reduction of the crimes committed by the family of those negatively affected by the intervention of DMG. With total crimes as the outcome and not controlling for previous criminal acts committed we can observe that the effect is a reduction of 0.41% while controlling for the previous amount of crimes it turns into a decrease of 0.34%. Looking specifically at the amount of property crimes there is both, controlling and non-controlling regressions, a decrease of 0.14%. On the other hand, for violent crimes both estimates point also to a reduction of 0.23%. This effect could be a corroboration of the previously mentioned phenomenon that the incarceration of the affected individual in the DMG incident may deter crime among family members, potentially due to perceived higher costs or reduced opportunities for criminal involvement.

## 4.3 The Role of Financial Market Access

In this section I explore the role of financial market access as a mechanism to address the relationship between economic shocks and criminal behavior. I estimate a model in which I fully interact a indicator of credit and saves in baseline with the economic shock variable as follows:

$$Crime_i = \alpha + \phi \cdot Shock_i + \tau \cdot Previous\_crime_i + \Phi Financial_i + \Psi \cdot Financial_i \cdot Shock_i + \epsilon_i \quad (2)$$

Where $Financial_i$ is an indicator variable that equals 1 if individual $i$ had a save or credit in the baseline. After applying the regression model, the findings unveil a significant correlation between individuals affected by the economic shock and their subsequent involvement in criminal activities. This association is further underscored by the attenuation of the effect when considering whether the individual had deposits before the intervention. Analysis of Table 4 demonstrates that the coefficient of the shock variable regarding total crime, when not adjusting for previous crime levels, indicates a 0.5% increase in crime for affected individuals without deposits compared to those able to withdraw their funds. This effect remains at 0.51% when controlling for previous criminal behavior. Conversely, individuals with pre-existing deposits experience a diminished effect, with a decrease of 0.34% in the non-controlled regression and an increase of 0.16% when controlling for previous crime, resulting in a net increase of 0.30% in crime.

**Table 4**
Heterogeneous effects on crime by deposits

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | 0.0050*** | 0.0051*** | 0.0027** | 0.0027** | 0.0018** | 0.0018** |
| | (0.0015) | (0.0016) | (0.0012) | (0.0011) | (0.0008) | (0.0009) |
| Deposit | −0.0009 | −0.0015 | 0.00001 | −0.0003* | 0.00001 | −0.0001 |
| | (0.0010) | (0.0009) | (0.00002) | (0.0002) | (0.00001) | (0.0001) |
| Deposit-Shock | −0.0034*** | −0.0021** | −0.0021*** | −0.0015*** | −0.0013*** | −0.0012*** |
| | (0.0011) | (0.0011) | (0.0003) | (0.0004) | (0.0003) | (0.0004) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |
| Observations | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The number of criminal records is expressed as the inverse hyperbolic sine transformation. Deposit is an indicator that records whether an investor had deposit at baseline. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

Regarding property crimes as the outcome, both controlled and uncontrolled regressions yield similar estimates for the shock's effect on crime for individuals lacking deposits. However, the effect diminishes by 0.21% in the controlled exercise for individuals with deposits, compared to 0.15% in the non-controlled scenario, resulting in a diminished effect of 0.06% and 0.12% in crime increase for those affected who possessed savings prior to the intervention. Similar trends are observed for violent crimes. In the non-controlled and controlled regressions, the shock increases the crime rate by 0.18%, with diminishing effects of 0.13% and 0.12%, respectively. This translates to an estimated increase of only 0.05% and 0.06% in violent crime for individuals with pre-existing savings.

These findings suggest that access to savings and the ability to withdraw funds mitigate the financial repercussions of losing deposits in the DMG scheme. This is consistent with the notion that the opportunity cost of engaging in criminal activities diminishes when individuals have savings, alleviating financial distress and resulting in better outcomes compared to those lacking pre-existing savings.

**Table 5**
Heterogeneous effects on crime by access to credit

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | 0.0050*** | 0.0052*** | 0.0027** | 0.0027** | 0.0017* | 0.0017* |
| | (0.0015) | (0.0016) | (0.0012) | (0.0011) | (0.0009) | (0.0009) |
| Credit | −0.0009 | −0.0009 | −0.00002 | −0.0003* | −0.00001 | −0.0001 |
| | (0.0010) | (0.0009) | (0.00002) | (0.0002) | (0.00001) | (0.0001) |
| Credit-Shock | −0.0033*** | −0.0023** | −0.0020*** | −0.0014*** | 0.000003 | 0.0002 |
| | (0.0011) | (0.0010) | (0.0003) | (0.0004) | (0.0008) | (0.0009) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |
| Observations | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The number of criminal records is expressed as the inverse hyperbolic sine transformation. Credit is an indicator that records whether an investor had credit at baseline. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

In the same way, findings underscore a complex interplay between credit accessibility and criminal behavior. Table 5, reveals that individuals exposed to the economic shock exhibit a notable increase in criminal activities, with a 0.5% rise in total crimes,

further dissected into a 0.27% hike in property crimes and a 0.17% uptick in violent crimes. This pattern suggests a distress-induced shift towards criminality, potentially as a coping mechanism for financial losses. Intriguingly, the presence of pre-existing credit arrangements appears to mitigate these effects, with individuals possessing prior credit showing a reduced propensity towards crime following the shock.

Specifically, the interaction term Credit-Shock illustrates a significant attenuation in the increase of total and property crimes, indicating a nuanced 0.3% net increase in overall criminal activities. This suggests that access to credit before the shock acts as a financial cushion, dampening the shock's adverse effects on criminal tendencies. Such findings highlight the pivotal role of financial stability and access to credit in influencing individuals' responses to economic shocks, offering insights into potential preventative strategies against shock-induced criminal behavior.

**Table 6**
Heterogeneous effects on crime by risk exposure

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | 0.0008 | 0.0019 | −0.0002 | 0.0002 | −0.0003 | −0.0002 |
| | (0.0020) | (0.0018) | (0.0009) | (0.0008) | (0.0005) | (0.0005) |
| Risk Exposure | 0.0013 | 0.0015 | 0.00001 | 0.0001** | 0.00001 | −0.00003 |
| | (0.0015) | (0.0016) | (0.00002) | (0.0001) | (0.00001) | (0.00005) |
| Risk Exposure-Shock | 0.0041* | 0.0032 | 0.0029*** | 0.0025*** | 0.0021*** | 0.0020*** |
| | (0.0022) | (0.0022) | (0.0005) | (0.0006) | (0.0004) | (0.0005) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |
| Observations | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 | 8,902 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The number of criminal records is expressed as the inverse hyperbolic sine transformation. Risk Exposure is measured as the relationship between the value of investment in DMG and the combined value of DMG investment and deposits at baseline. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

Finally, Table 6 shows that the economic shock does not have an effect on crime overall. Nevertheless, individuals with greater risk exposure exhibit a 0.41% increase in total crimes, underscoring the heightened vulnerability of those with more to lose. Further scrutiny into the types of crimes reveals a discernible impact on property and

violent crimes, contingent on the degree of risk exposure. The interaction between risk exposure and the economic shock yields a significant surge in property crimes (0.29% to 0.25%) and violent crimes (0.21% to 0.20%), starkly illustrating how financial precarity can escalate into diverse forms of criminal activities. These outcomes highlight the crucial role of financial stability in mitigating the adverse effects of economic shocks, suggesting that individuals with higher exposure to financial risk are more likely to resort to crime as a coping mechanism. This analysis not only enriches our understanding of the direct effects of economic shocks on crime rates but also emphasizes the significance of underlying financial vulnerabilities in shaping these outcomes.

## 5 Conclusions

The study's exploration into the nuanced relationship between economic shocks, financial market access, and criminal behavior yields significant insights. The differential effects observed across individuals based on their financial vulnerability underscore the complex interplay between economic conditions and crime. For those directly affected by the economic shock—evidenced by the sudden closure of the DMG financial institution—a notable increase in criminal records indicates an immediate response to financial distress. Yet, this effect is modulated by pre-existing financial conditions; individuals with access to savings or who had the ability to withdraw funds faced a less pronounced increase in criminal activities. This finding highlights the protective role of financial stability and access to credit in buffering the adverse effects of economic shocks on societal well-being.

Moreover, the analysis reveals that the increase in criminal behavior is not uniform across all types of crimes. Property and violent crimes, in particular, saw varied increases, reflecting perhaps the different ways in which financial desperation influences criminal decisions. The increase in property crimes could be interpreted as a direct attempt to compensate for financial losses, while the rise in violent crimes suggests a more complex set of motivations, possibly tied to increased stress and social unrest triggered by the shock. These distinctions are crucial for policymakers, indicating that interventions aimed at mitigating the impact of economic shocks on crime should be nuanced and targeted to address specific types of criminal behavior.

In conclusion, this paper contributes significantly to the discourse on economic shocks and crime by delineating the conditions under which financial distress leads to increased criminal activity. It emphasizes the importance of financial market access as a mitigating factor, suggesting that policies aimed at enhancing financial stability and access to credit could serve as effective strategies to curb the rise in crime following

economic downturns. The findings advocate for a multi-faceted approach to crime prevention, one that incorporates economic support mechanisms as a fundamental component of reducing the societal impact of financial crises. Finally, I conclude by discussing some of the limitations of this paper. The fact that the variable I use to measure criminal records that reach the trial stage—could be influenced by judicial system biases that cause this variable to be correlated with some observable characteristics of individuals, potentially biasing my heterogeneus effect analysis.

## References


Abadie, A., Athey, S., Imbens, G. W., and Wooldridge, J. (2017). When should you adjust standard errors for clustering? Technical report, National Bureau of Economic Research.

Arteaga, C. (2018). The cost of bad parents: Evidence from incarceration on children's education. Technical report, UCLA Working Paper.

Artello, K. and Williams, S. (2014). Stress and crime. The Wiley Blackwell encyclopedia of health, illness, behavior, and society, pages 2283–2285.

Barth, J. R., H. J. J. J. S. L. K. B. S. Y. et al. (2020). Payday lending, crime, and bankruptcy: Is there a connection? Journal of Consumer Affairs, 54(4):1159–1177.

Becker, G. (1968). Crimen and punishment: An economic approach. Journal of Political Economics, 76:169–217.

Bennett, P. and Ouazad, A. (2018). Job displacement, unemployment, and crime: Evidence from danish microdata and reforms. Journal of the European Economic Association.

Box, M., G. K. L. X. et al. (2013). Economic growth and crime: does uncertainty matter? Applied Economics Letters, (5):420–427.

Canay, I. A. and Kamat, V. (2018). Approximate permutation tests and induced order statistics in the regression discontinuity design. The Review of Economic Studies, 85(3):1577–1608.

Carvajal, A., Monroe, H. K., Pattillo, M. C. A., and Wynter, B. (2009). Ponzi schemes in the Caribbean. Number 9-95. International Monetary Fund.

Collomb, A. and Sok, K. (2016). Blockchain/distributed ledger technology (dlt): What impact on the financial sector? Digiworld Economic Journal, 103.

Cortés, D., Santamaría, J., and Vargas, J. F. (2016). Economic shocks and crime: Evidence from the crash of ponzi schemes. Journal of Economic Behavior & Organization, 131:263–275.

De Blasio, Guido, M. G., Menon, C., et al. (2016). Down and out in italian towns: measuring the impact of economic downturns on crime. Economics Letters, 146:99–102.

Dix-Carneiro, R., Soares, R. R., and Ulyssea, G. (2018). Economic shocks and crime: Evidence from the brazilian trade liberalization. American Economic Journal: Applied Economics, 10(4):158–95.

Dube et al. (2016). From maize to haze: Agricultural shocks and the growth of the mexican drug sector. European Economic Association, (5):1181–1224.

Ehrlich, I. (1973). Participation in illegitimate activities: A theoretical and empirical investigation. Journal of political Economy, 81(3):521–565.

Eren, O. and Owens, E. (2023). Economic booms and recidivism. Journal of Quantitative Criminology, pages 1–30.

Felson, Osgood, H. W. et al. (2012). Having a bad month: General versus specific effects of stress on crime. Journal of Quantitative Criminology, pages 347–363.

Ferraz et al. (2022). Unbundling the relationship between economic shocks and crime. Modern Guide to the Economics of Crime, pages 184–204.

Fougere, D., Kramarz, F., and Pouget, J. (2009). Youth unemployment and crime in france. Journal of the European Economic Association, 7(5):909–938.

Francis, L. (2010). Banking on robbery: the role of fraud in the financial crisis. Casualty Actuarial Society E-Forum, 2:1–54.

Geldrop, A. J. (2011). Bankruptcy fraud; what factors indicate an increased risk of bankruptcy fraud?

Goulas, E. and Zervoyianni, A. (2013). Economic growth and crime: does uncertainty matter? Applied Economics Letters, (5):420–427.

Gould, E. D., Weinberg, B. A., and Mustard, D. B. (2002). Crime rates and local labor market opportunities in the united states: 1979–1997. Review of Economics and statistics, 84(1):45–61.

Haynes, S. H. and Rader, N. E. (2015). Concerns about crime for self and others: An analysis of individual and contextual effects. Criminal Justice Review, 40(3):303–321.

Hoeve, M., S. G. J. J. v. d. Z. M. V. M. J. K. A. J. J. et al. (2014). A systematic review of financial debt in adolescents and young adults: Prevalence, correlates and associations with crime. PloS one, 9(8).

Hofstetter, M., Mejía, D., Rosas, J. N., and Urrutia, M. (2018). Ponzi schemes and the financial sector: Dmg and drfe in colombia. Journal of Banking & Finance, 96:18–33.

Jha, C. K. and Joshi, S. (2023). Municipal bankruptcies and crime. International Review of Financial Analysis, 89.

Kelley (2019). Mass incarceration. Human Ecology, 47(1):15–15.

Khanna, G., Medina, C., Nyshadham, A., Posso, C., and Tamayo, J. A. (2019). Job loss, credit and crime in colombia. Technical report, National Bureau of Economic Research.

Khanna, G., M. C. N. A. P. C. . T. J. et al. (2021). Job loss, credit, and crime in colombia. American Economic Review: Insights, (1):97–114.

Lin, M.-J. (2008). Does unemployment increase crime? evidence from us data 1974–2000. Journal of Human resources, 43(2):413–436.

Philippe (2017). Incarcerate one to calm the others? spillover effects of incarceration among criminal groups. Toulouse School of Economics (TSE).

Piehl, A. M. (1998). Economic conditions. The Handbook of Crime  Punishment.

Pillai, D. and Sanjeev, T. (2015). Global financial crisis and indian economy-interface. SAMVAD, 8.

Raphael, S. and Winter, R. (2001). Identifying the effect of unemployment on crime. The Journal of Law and Economics, 44(1):259–283.

Rezaee, Z. (2005). Causes, consequences, and deterence of financial statement fraud. Critical perspectives on Accounting, 16(3):277–298.

Rose, E. (2018). The effects of job loss on crime: Evidence from administrative data. Available at SSRN 2991317.

Song, H. and Zhao, X. (2024). The unexpected consequences of company bankruptcy: An investigation into the spillover effect of local economic liquidation. Finance Research Letters, 61.

Street, B. (2023). The impact of economic opportunity on criminal behavior: Evidence from the fracking boom. Available at SSRN 4542165.

Tornell, A. and Lane, P. R. (1999). The voracity effect. American economic review, (1):22–46.

Weatherburn, D. and Schnepel, K. T. (2015). Economic adversity and crime: old theories and new evidence. Australian Journal of Social Issues, (1):89–106.

Wildeman and Western (2010). Incarceration in fragile families. The future of children, pages 157–177.

# Anexos

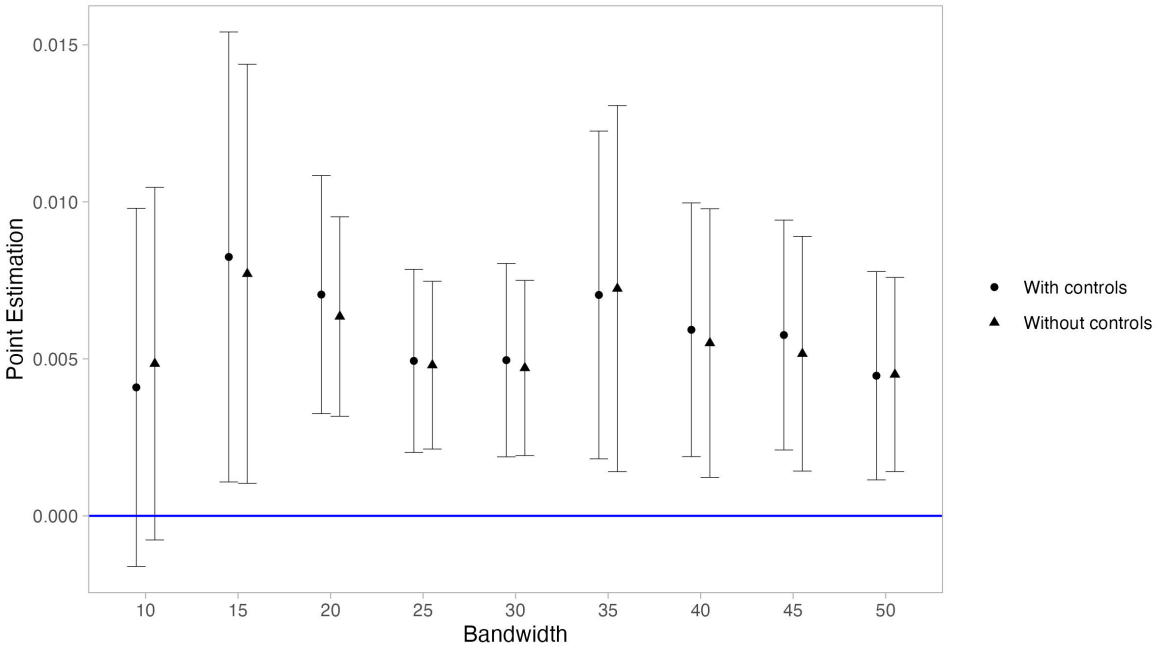
## A.1 Data and background

**Figure 1**
**DMG prepaid cards**


**Source:** Photo collected from https://www.eltiempo.com

## A.2 Robussnets

**Figure 2**
Regression discontinuity effect of economic shock on total of criminal records




**Note:** The number of criminal records is expressed as the inverse hyperbolic sine transformation. All results are based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

**Table A1**
RD estimates on criminal records

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | 0.0050*** | 0.0054*** | 0.0027* | 0.0028** | 0.0019** | 0.0019** |
| | (0.0016) | (0.0018) | (0.0015) | (0.0013) | (0.0009) | (0.0009) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Controls | | ✓ | | ✓ | | ✓ |
| Controls | No | Yes | No | Yes | No | Yes |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The dependent var is expressed as number of criminal records. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.

**Table A2**
RD estimates on criminal records in family

| | Criminal records: | | | | | |
|---|---|---|---|---|---|---|
| | Total crimes | | Property crimes | | Violent crimes | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Shock | −0.0058 | −0.0049 | −0.0014 | −0.0014 | −0.0030 | −0.0030 |
| | (0.0061) | (0.0060) | (0.0026) | (0.0026) | (0.0036) | (0.0036) |
| Period | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 | 2009-2022 |
| Controls | | ✓ | | ✓ | | ✓ |
| Controls | No | Yes | No | Yes | No | Yes |
| Bandwidth (days) | 30 | 30 | 30 | 30 | 30 | 30 |

Note: *** p<0.01; ** p<0.05; * p<0.1. The dependent var is expressed as number of criminal records. I present the results based on a second-order local polynomial for bias correction and estimation; however, the results remain robust to different model specifications. Standard errors, shown in parentheses, are clustered at the DMG office municipality level.