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MONEY UNDER THE MATTRESS: ECONOMIC CRISIS AND CRIME

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Abstract

The paper investigates the effect of a (semi-) deposit run during a debt crisis on crime rates. The study focuses on Greece's protracted debt crisis (2009-2018) and analyzes the response of crime to deposit outflows. It shows that deposit outflows corresponded to a significant increase in property crimes (thefts and burglaries), but not other types of offenses. Our findings suggest that policy makers should also consider the potential criminogenic effects of financial destabilization.

JEL-classification: K42

Keywords: Crime rate, Greece, crisis, bank deposits, property crime

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1. Introduction

The literature on the economics of crime, as pioneered by scholars like (Becker 1968) and (Ehrlich 1973), examines criminal activity through the framework of rational behavior under uncertainty: individuals compare the expected benefits to the expected costs of engaging in a criminal activity. Building on this tradition is an abundance of research analyzing the socioeconomic and demographic determinants of criminal behavior (Eide, Aasness, and Skjerpen 1994; Freeman 1999; Buonanno 2003), as well as the criminogenic effects of recessions and economic downturns (Box and Hale 1982; Mustard 2010; de Blasio, Maggio, and Menon 2016). These studies introduce a host of explanatory variables hypothesized to influence the quantity and quality of legal and illegal labor market opportunities, which may be socioeconomic (e.g., educational attainment, wage inequality, income, unemployment), demographic (e.g., population density, urbanization) or proxies of the expected cost of criminal activity (e.g., police effectiveness, severity of punishment) (Buonanno and Montolio 2008). Central to these approaches is the assumption that individuals rationally respond to new crime opportunities. Understudied, however, is the extent to which economic crises produce such new opportunities that then generate increased criminal behavior.

This paper investigates the effect of a (semi-) deposit run during a debt crisis on crime rates. The study focuses on Greece's protracted government-debt crisis (2009-2018)[1] and analyzes the response of crime to large deposit outflows. Greece is of special interest as it is among a group of Southern European countries that were deeply hurt by global financial crisis but is the only country in the Eurozone to have also experienced a (semi-) deposit run. Although several recent works explore the determinants of crime in Southern Europe (Buonanno and Montolio 2008; de Blasio, Maggio, and Menon 2016)study of the Greek case is conspicuously absent.

As demonstrated by (Anastasiou and Drakos 2021), the Greek debt crisis created cross-time volatility in depositors' uncertainty about the future currency. At several points during the debt crisis, Greeks feared that their euro deposits might be automatically converted to a new ”drachma” currency if the country left the Eurozone and would lose value, or that they could face a ”haircut” to their deposit accounts if

[1] This was, in fact, a quite heterogenous period for the Greek economy. The Greek debt crisis started in late 2009 and led to a series of three bailout programs, the last of which ended successfully in 2018.

banks went bankrupt[2] This uncertainty sparked significant deposit outflows, increased the amount of cash in circulation (money under the mattress), and potentially reshaped the opportunity structure for crime, especially property crimes like theft and burglary.

Figure 1 shows the level of the deposits (scaled on the right axis, in million euros) and the property crime incidents (scaled on the left axis). Deposits decreased by 63 billion euros (27%) between 2009 and 2011. During this period, property crime increased by 39%. Additionally, deposits decreased by 37 billion euros from 2014 to 2015 (23%), while property crime incidents increased by 7% in this period (Data from the Greek Police and from Bank of Greece, authors' calculations). While we observe a sharp, negative growth of the level of the deposits in 2010 and in 2015, we note a phenomenal increase in the property crime rate, providing us with an indication of a strong negative association. Next, we subject these unconditional statistics to more rigorous econometric tests.

2. Data and variables

Our panel dataset comprises annual observations at the regional unit level (or combinations of thereof) for 46 Greek regions over the period from 2009 to 2018. Table 1 provides descriptive statistics, and we provide more details on the construction of the variables in the Appendix.

We obtained crime measures at the NUTS3 level by request from the Greek Police. We then match the police departments in the data to the regions defined by Eurostat. Our measure of property crime includes theft and robbery data. Theft is a crime type involving the unlawful taking of the personal property of another person or business and includes burglaries (illegally entering a property in order to steal from it). Robbery involves the use or threat of force, and is thus considered a violent crime, that is more serious than theft. Thus, we further dis-aggregate property crime into robberies and thefts and examine them separately. This is important as the former crime type has mainly economic incentives. This approach allows us to avoid aggregation bias. Cherry and List (2002) stress that because "it is inappropriate to pool crime types into a single decision model … much of the existing empirical estimates suffer from aggregation

[2] For the estimated amount of deposit outflows that remained under the mattress see (Dimitriadou et al. 2016).

bias” (p. 81).

It is common practice to proxy “money under the mattress” with the total of currency in circulation[3]. Unfortunately, the estimate is not available on a regional unit (NUTS3) level, as the Bank of Greece provides an annual estimate of the currency in circulation[4] only on a national level. Instead, we use the level of deposits as a proxy, noting a significant negative relationship between the two variables which is evident also in Figure 2. Further, since household deposits are available only at a national level, we use the combined deposits from household and firms which are available on a NUTS3 level and show a very strong negative correlation with the currency in circulation on a national level (*corr= -0.9*). We match the 52 regional units with the 46 NUTS3 regions as defined by Eurostat. In order to capture the impact of the sharp decrease of the deposits, we control for the lagged growth rate of the variable.

In line with the existing literature on crime determinants, we also include a number of other socioeconomic and demographic variables theorized to shape the opportunity structure for crime. First, following (Bianchi, Buonanno, and Pinotti 2012; Entorf and Spengler 2000), we measure police effectiveness using the clear-up rate. This is constructed as the ratio of the number of cleared-up crime incidents to the number of all reported crime incidents.

$$Clear\ up\ rate = \frac{Cleared\ up\ crimes}{Committed\ crimes + Attempted\ crimes}$$

We also include a lagged version of the dependent variable, as it has been documented that there can be crime inertia (Buonanno and Montolio 2008)

Given scholars’ interest in the relationship between immigration and crime (Bell, Fasani, and Machin 2013) we include the ratio of residence permits over the population (Bianchi, Buonanno, and Pinotti 2012). We obtain data for residence permits, upon request from the Greek Ministry of Interior and match the 53 departments that record the permits to the 46 NUTS3 regions as defined by Eurostat. These are monthly flows

[3] See for example (Dimitriadou et al. 2016)

[4] These estimates are based on the Eurosystem convention for calculating national contributions to the euro area banknotes in circulation. According to this convention, the Greek contribution to banknotes in circulation is derived assuming that the amount of banknotes put into circulation by the Bank of Greece is proportional to its subscription key to the ECB’s capital, excluding 8% that represents the ECB’s share of total euro banknote issue. Thus, the metric for currency in circulation provided in monetary aggregates is only a rough estimate of actual currency in circulation.

that we convert to stock annual data, calculating the permits issued each year.[5]

We draw data from Eurostat for the rest of the socio-economic and demographic determinants (see for example Buonanno and Montolio 2008) at a NUTS3 level (regional unit level). Here we include measures for the employment rate, (real) per capita GDP, and squared GDP to check for a non-linear relationship. Since it has been indicated in many studies (see for example Fajnzylber, Lederman, and Loayza 2002) that males are more prone to engage in criminal activities, we also use the share of male population aged between 15 and 64 years old. Finally, we account for population density, which is constructed as the ratio of the population of the area of each province (in squared km). It is well documented that there is more crime in urban areas than in small cities or rural locations (Glaeser and Sacerdote 1999), as the returns from crime may be higher and the probability of arrest may be lower in urban areas (Buonanno and Montolio 2008).

3. Empirical Strategy

To test whether deposit outflows had criminogenic consequences in the Greek case, we first employ a fixed effect estimator to account for possible unobserved province fixed effects. Following, we employ a GMM estimator (Hazra and Aranzazu 2022), as property crime is expected to be highly correlated with business cycles and likely to be affected by recidivism, both of which could explain the significant own-lagged coefficient (Buonanno and Montolio 2008).

The empirical procedure we use closely follows that of the respective literature (see e.g., Fajnzylber, Lederman, and Loayza 2002; Buonanno and Montolio 2008), with the specification:

$$CRIME_{i,t} = \beta_1 CRIME_{i,t-1} + \beta'_2 X_{i,t} + \varphi_t + \eta_i + \varepsilon_{i,t} \qquad (1)$$

where the subscripts i, t denote the region and time dimension of the panel. The dependent variable $CRIME_{i,t}$ denotes the natural logarithm of the crime rate of a certain

[5] Population is given on the 1st of January of each year, while residence permits on the 31st of each year. To account for this, we construct the variable $foreign\ population = permits[n-1]/population * 100$, that reports the share of resident permits in the population on the 1st of January.

crime type in region i at time t. Furthermore, η_i is a region fixed effect, φ_t is a year effect, $X_{i,t}$ is a set of explanatory variables and $\varepsilon_{i,t}$ is the error term. In order to estimate (1) we employ the GMM-system estimator proposed by (Arellano and Bover 1995) and (Blundell and Bond 1998).

The aforementioned technique uses the dynamic properties of the data to generate proper instrumental variables and, more specifically, it combines the regression equation both in first differences and levels into a single system. The instruments are chosen in a way that accounts for the fixed effects and at the same time the potential endogeneity of the explanatory variables with the dependent variable in the same time period.

Naturally, the crime rate we use as the dependent variable is based on reported crimes and as such it is subject to measurement error. If we use $CRIME^{*}_{i,t}$ to denote the true unobserved crime rate of region *i* at time *t*, then the specification we have chosen is a result of an underlying model for the true crime rate of the following form:

$$CRIME_{i,t} = \beta_1 CRIME_{i,t-1} + \beta'_2 X_{i,t} + \varphi_t + \eta_i + \varepsilon_{i,t} \qquad (2)$$

The true crime rate is commonly assumed to be related to the observed reported crime rate through the following equation where $CRIME_{i,t}$ is the observed crime rate which was described earlier and λ_i is a region-specific error, that is, it is assumed that the measurement error is driven by specific characteristics of each region. Then we have that:

$$CRIME_{i,t} = CRIME^{*}_{i,t} + \lambda_t \qquad (3)$$

where $CRIME_{i,t}$ is the observed crime rate which was described earlier and λ_i is a region-specific error, that is, it is assumed that the measurement error is driven by specific characteristics of each region.

Then we have that:

$$CRIME_{i,t} = \beta CRIME_{i,t} + \beta_1 CRIME_{i,t-1} + \beta'_2 X_{i,t} + \varphi_t + \omega_i + \varepsilon_{i,t} \qquad (4)$$

where $\omega_i \equiv \lambda_i(1-\beta_1) + \eta_i$

The estimation of the above model is complicated for several reasons. Firstly, the presence of the fixed effect ω_i in the right-hand side of the equation and in $CRIME_{i,t-1}$, makes the pooled OLS inconsistent even if the ω_i is uncorrelated with the other explanatory variables in X_{it}. Furthermore, the explanatory variables contained in X_{it} are potentially endogenous implying a correlation with $\varepsilon_{i,t}$ for the same time period t.

In order to overcome these issues, we employ a GMM-system approach selecting appropriate instruments by exploiting the dynamic structure of the model. First note that by taking the first difference of (1) it is possible to eliminate the fixed effects:

$$CRIME_{i,t} - CRIME_{i,t-1} = \beta(CRIME_{i,t-1} - CRIME_{i,t-2}) + \beta'_2(X_{i,t} - X_{i,t-1}) + \varphi_t - \varphi_{t-1} + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \qquad (5)$$

Note however that $(CRIME_{i,t-1} - CRIME_{i,t-2})$ is correlated with the new error term $\varepsilon_{i,t} - \varepsilon_{i,t-1}$, as they both share the term $\varepsilon_{i,t-1}$. At the same time, $(X_{i,t} - X_{i,t-1})$ is potentially endogenous as explained earlier. In order to estimate the above equations, we will use a GMM estimator exploiting the following moment conditions:

$$E\left[CRIME_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})\right] = 0 \; for \; s \geq 2; t = 3, \dots, T \qquad (6)$$

and

$$E\left[X_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})\right] = 0 \; for \; s \geq 2; t = 3, \dots, T \qquad (7)$$

Furthermore, assuming stationarity of $CRIME_{i,t}$ and X_{it}, the following moment conditions can be used for the level equation:

$$E\left[(CRIME_{i,t-s} - CRIME_{i,t-s-1})(\omega_i + \varepsilon_{i,t})\right] = 0 \; for \; s = 1; t = 3, \dots, T \qquad (8)$$

and

$$E\left[(X_{i,t-s} - X_{i,t-s-1})(\omega_i + \varepsilon_{i,t})\right] = 0 \; for \; s = 1; t = 3, \dots, T \qquad (9)$$

Exploiting all the aforementioned moment conditions in (6), (7), (8) and (9), we follow (Arellano and Bover 1995) in order to simultaneously estimate the system of equations consisting of (1) and (5) by a GMM procedure. In order for the parameter estimates to be consistent, the chosen instruments must be valid. We will therefore provide two specification tests suggested by (Arellano and Bover 1995) to test that. The Sargan test of overidentifying restrictions tests the null hypothesis that all the moments conditions hold. We expect this test to fail to reject the null hypothesis which will then give support to the choice of the instruments. Furthermore, we provide the test for serial correlation of the error term in the differenced equation, which tests the null hypothesis that the (differenced) error term is first and second order serially uncorrelated. Failure to reject the null hypothesis of no second-order serial correlation implies that the original error term is serially uncorrelated, and the moment conditions are correctly specified.

4. Results

The regression results for each crime type are presented in Table 2, Table *3* and Table *4*. The regressions for the overall property crime rate are presented in Table 2. Separate regressions results for theft and robbery are in Table 3 and Table 4 respectively.

We observe that a decrease in the lagged growth rate of deposits is associated with a rise in property crime rate. When thefts and robberies are analyzed separately, the lagged growth rate of deposits is significantly associated with a rise in thefts, but not robberies. The coefficient of the lagged deposits growth on robberies is still negative, but we have no indication of a significant association. The sharp decreases in bank deposits thus seem to be associated with the rise in thefts but not with its violent version.

The coefficient of the lagged property crime rate is positive and strongly significant across the three crime measures (all property crimes, theft, and robberies), indicating that there is crime inertia. Furthermore, the deterrence hypothesis is confirmed by the negative and strongly significant clear up rate coefficient.

Interestingly, when we look at a number of other non-property crimes (homicide, guns, drugs, smuggling and assault), we find no indication of a relationship with bank deposits. Table 5 shows these results.

Regarding the GMM specification tests, the insignificance of the Sargan statistic gives support to the instruments used and as expected, there is evidence of first-order serial correlation in the errors of the equation in differences, while there is no evidence of second-order serial correlation.

5. Conclusions

The economic effects of Greece's debt crisis have been well explored, but less is known about the crisis' social repercussions. In this paper we studied one possible set of repercussion–criminal activity–and thereby contribute to a growing literature on the effects of economic down-turns on criminality (Bell, Bindler, and Machin 2018; de Blasio, Maggio, and Menon 2016). Our results show that even a (semi-) deposit run during a debt crisis can have pronounced ramifications in the crime sector. Given that financial crises have also been found to go hand in hand with substantial radicalization and fragmentation of the political landscape (Funke, Schularick, and Trebesch 2016), future scholarship may wish to explore the links between financial crisis, crime, and the rise of political extremism. Our findings suggest that policy makers should also consider the potential criminogenic effects of financial destabilization.

References

Anastasiou, Dimitrios, and Konstantinos Drakos. 2021. "Nowcasting the Greek (Semi-) Deposit Run: Hidden Uncertainty about the Future Currency in a Google Search." *International Journal of Finance & Economics* 26 (1): 1133–50. https://doi.org/10.1002/ijfe.1841.

Arellano, Manuel, and Olympia Bover. 1995. "Another Look at the Instrumental Variable Estimation of Error-Components Models." *Journal of Econometrics* 68 (1): 29–51.

Becker, Gary S. 1968. "Crime and Punishment: An Economic Approach." In *The Economic Dimensions of Crime,* 13–68. Springer.

Bell, Brian, Anna Bindler, and Stephen Machin. 2018. "Crime Scars: Recessions and the Making of Career Criminals." *The Review of Economics and Statistics* 100 (3): 392–404. https://doi.org/10.1162/rest_a_00698.

Bell, Brian, Francesco Fasani, and Stephen Machin. 2013. "Crime and Immigration: Evidence from Large Immigrant Waves." *Review of Economics and Statistics* 21 (3): 1278–90.

Bianchi, Milo, Paolo Buonanno, and Paolo Pinotti. 2012. "Do Immigrants Cause Crime?" *Journal of the European Economic Association* 10 (6): 1318–47.

Blasio, Guido de, Giuseppe Maggio, and Carlo Menon. 2016. "Down and out in Italian Towns: Measuring the Impact of Economic Downturns on Crime." *Economics Letters* 146 (September): 99–102. https://doi.org/10.1016/j.econlet.2016.07.034.

Blundell, Richard, and Stephen Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87 (1): 115–43.

Box, Steven, and Chris Hale. 1982. "ECONOMIC CRISIS AND THE RISING PRISONER POPULATION IN ENGLAND AND WALES." *Crime and Social Justice*, no. 17: 20–35.

Buonanno, Paolo. 2003. "The Socioeconomic Determinants of Crime. A Review of the Literature."

Buonanno, Paolo, and Daniel Montolio. 2008. "Identifying the Socio-Economic and Demographic Determinants of Crime across Spanish Provinces." *International Review of Law and Economics* 28 (2): 89–97.

Cherry, Todd L, and John A List. 2002. “Aggregation Bias in the Economic Model of Crime.” *Economics Letters* 75 (1): 81–86.

Dimitriadou, Anna, Ioannis Gkionis, Stylianos G Gogos, Paraskevi Petropoulou, Theodoros Stamatiou, and Platon Monokroussos. 2016. “One Year Capital Controls in Greece: Impact on the Domestic Economy & Lessons from the Cypriot Experience.” Eurobank Economic Research.

Ehrlich, Isaac. 1973. “Participation in Illegitimate Activities: A Theoretical and Empirical Investigation.” *Journal of Political Economy* 81 (3): 521–65.

Eide, Erling, Jørgen Aasness, and Terje Skjerpen. 1994. *Economics of Crime: Deterrence and the Rational Offender*. 227. North-Holland.

Entorf, Horst, and Hannes Spengler. 2000. “Socioeconomic and Demographic Factors of Crime in Germany: Evidence from Panel Data of the German States.” *International Review of Law and Economics* 20 (1): 75–106.

Fajnzylber, Pablo, Daniel Lederman, and Norman Loayza. 2002. “Inequality and Violent Crime.” *The Journal of Law and Economics* 45 (1): 1–39.

Freeman, Richard B. 1999. “The Economics of Crime.” *Handbook of Labor Economics* 3: 3529–71.

Funke, Manuel, Moritz Schularick, and Christoph Trebesch. 2016. “Going to Extremes: Politics after Financial Crises, 1870–2014.” *European Economic Review* 88 (September): 227–60. https://doi.org/10.1016/j.euroecorev.2016.03.006.

Glaeser, Edward L, and Bruce Sacerdote. 1999. “Why Is There More Crime in Cities?” *Journal of Political Economy* 107 (S6): S225–58.

Hazra, Devika, and Jose Aranzazu. 2022. “Crime, Correction, Education and Welfare in the U.S. – What Role Does the Government Play?” *Journal of Policy Modeling* 44 (2): 474–91. https://doi.org/10.1016/j.jpolmod.2022.03.007.

Mustard, David B. 2010. *How Do Labor Markets Affect Crime: New Evidence on an Old Puzzle.* Edited by Bruce Benson and Paul Zimmerman. Handbook on the Economics of Crime. Edward Elgar.

Tables and Figures

Figure 1: Property crime and bank deposits in million euros

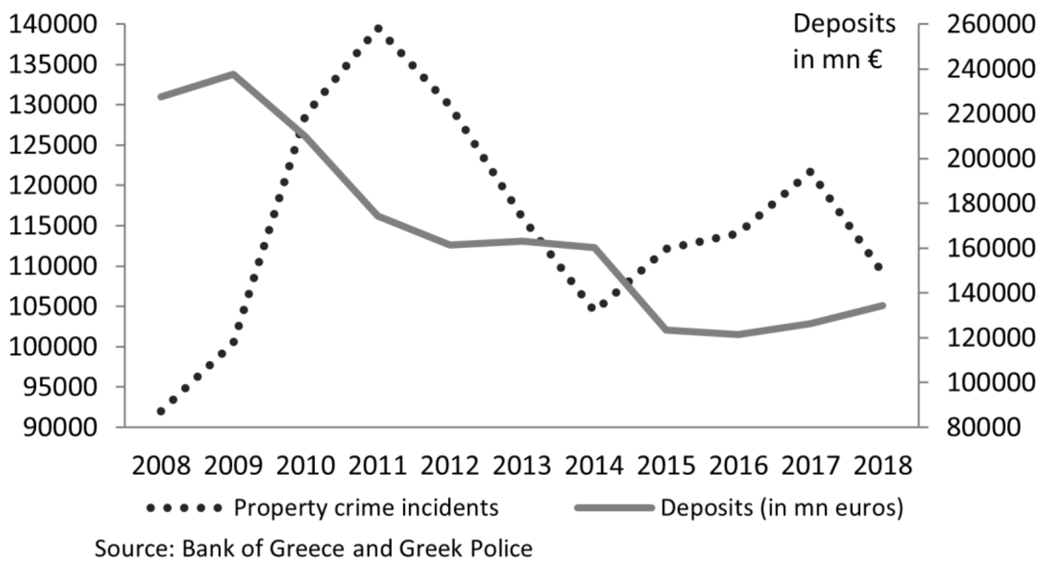

Figure 2: Bank deposits and currency in circulation in million euros

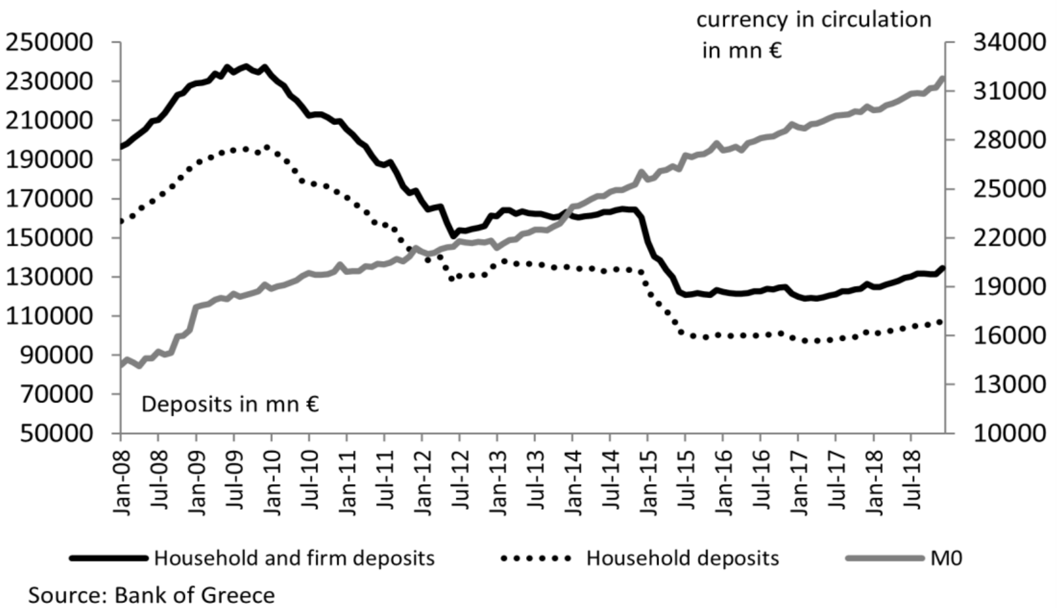

Table 1: Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Property Crimes per 100,000 inhabitants	overall	489.33	405.19	32.9	2141.34	N=506
	between		375.38	84.25	1756.94	n=46
	within		161.42	-214.77	1222.89	T=11
Burglaries and thefts per 100,000 inhabitants	overall	476.84	391.43	32.9	2049.09	N=506
	between		362.16	81.2	1658.76	n=46
	within		157.02	-215.87	1202.07	T=11
Robberies per 100,000 inhabitants	overall	12.49	17.03	0	132.26	N=506
	between		15.66	1.42	98.17	n=46
	within		7.04	-25.72	59.2	T=11
Resident permits over population (%)	overall	0.05	0.02	0.01	0.11	N=506
	between		0.02	0.01	0.1	n=46
	within		0	0.03	0.06	T=11
Real GDP per capita in 2015 constant prices, in thousand euros	overall	14.67	3.8	9.3	31.58	N=506
	between		3.12	10.32	24.58	n=46
	within		2.21	10.87	22.66	T=11
Population density: inhabitants per square kilometer	overall	80.33	147.6	10.19	1048.7	N=506
	between		149.04	10.71	1020.81	n=46
	within		3.78	43.66	108.22	T=11
Clear-up rate for property crimes (%)	overall	39.14	13.48	13.01	79.62	N=503
	between		11.07	16.29	61.14	n=46
	within		7.88	16.74	76.29	T=10.94
Percent of males aged 15-64 in population (%)	overall	32.07	1.26	27.71	36.01	N=506
	between		1.1	29.5	34.84	n=46
	within		0.64	29.87	34.16	T=11
Deposits per capita in thousand euros, in 2015 constant prices	overall	11.05	3.92	5.45	34.95	N=506
	between		2.97	7.26	23.08	n=46
	within		2.59	4.55	22.92	T=11
Population	overall	238273	569561	19050	4002871	N=506
	between		575104	20029	3896418	n=46
	within		14300	98309	344727	T=11
Employment rate (%)	overall	37.27	6.31	23.44	69.12	N=506
	between		5.76	26.52	61.93	n=46
	within		2.71	32.06	48.06	T=11

Table 2: Property crime

Variable	Pooled OLS	Fixed Effects	GMM-differences	GMM-system
Crime (-1)			0.534***	0.669***
			(0.071)	(0.046)
Clear-up rate	-0.032***	-0.011***	-0.010***	-0.008***
	(0.006)	(0.003)	(0.002)	(0.002)
Foreign population	0.030	0.049	0.023	0.048***
	(0.044)	(0.072)	(0.036)	(0.018)
Population density	0.001*	-0.001	-0.000	0.000**
	(0.001)	(0.004)	(0.002)	(0.000)
GDP	0.124	-0.136	-0.078**	-0.045*
	(0.111)	(0.100)	(0.038)	(0.027)
GDP squared	-0.003	0.003*	0.001*	0.001
	(0.003)	(0.002)	(0.001)	(0.001)
Employment rate	0.005	0.008	0.003	0.002
	(0.004)	(0.008)	(0.005)	(0.003)
Males 15-64	0.120**	0.072	0.053	0.048*
	(0.059)	(0.084)	(0.039)	(0.029)
Deposits growth (-1)	0.004	-0.008**	-0.005***	-0.005***
	(0.004)	(0.003)	(0.002)	(0.002)
R^2	0.518	0.371		
N	420	420	420	420

*** p<0.01, ** p<0.05, * p<0.1

Note: Results for constants and year dummies are not reported. Standard errors are heteroscedasticity robust. Instruments for differenced equation in GMM model are $CRIME_{i,t-j}, X_{i,t-j,}\ j = 2, \ldots, T$. Standard errors for GMM model are calculated using the Arellano-Bond robust estimator. Chi2 from Sargan tests for overidentifying restrictions: 465.391.
Arellano-Bond test for 2nd order autocorrelation: 0.90.

Table 3: Thefts

Variable	Pooled OLS	Fixed Effects	GMM-differences	GMM-system
Crime (-1)	-1.055***	-0.590***	0.533***	0.673***
	(0.258)	(0.183)	(0.070)	(0.048)
Clear-up rate	-0.032***	-0.012***	-0.010***	-0.008***
	(0.006)	(0.003)	(0.002)	(0.002)
Foreign population	0.030	0.053	0.019	0.045**
	(0.044)	(0.072)	(0.036)	(0.019)
Population density	0.001*	0.001	-0.000	0.000**
	(0.001)	(0.005)	(0.002)	(0.000)
GDP	0.091	-0.090	-0.079**	-0.046
	(0.095)	(0.091)	(0.038)	(0.031)
GDP squared	-0.002	0.002	0.001*	0.001
	(0.002)	(0.002)	(0.001)	(0.001)
Employment rate	0.005	0.009	0.003	0.003
	(0.004)	(0.008)	(0.005)	(0.003)
Males 15-64	0.133**	0.056	0.051	0.053*
	(0.059)	(0.078)	(0.038)	(0.028)
Deposits growth (-1)	0.001	-0.006***	-0.005***	-0.005**
	(0.004)	(0.002)	(0.002)	(0.002)
R^2	0.526	0.446		
N	465	465	465	465

*** p<0.01, ** p<0.05, * p<0.1

Note: Results for constants and year dummies are not reported. Standard errors are heteroscedasticity robust. Instruments for differenced equation in GMM model are $CRIME_{i,t-j}, X_{i,t-j,}\ j = 2, \ldots, T$. Standard errors for GMM model are calculated using the Arellano-Bond robust estimator. Chi2 from Sargan tests for overidentifying restrictions: 466.50.
Arellano-Bond test for 2nd order autocorrelation: 0.93.

Table 4: Robbery

Variable	**Pooled OLS**	**Fixed Effects**	**GMM-differences**	**GMM-system**
Crime (-1)			0.300***	0.358***
			(0.071)	(0.066)
Clear-up rate	-0.027***	-0.011**	-0.008*	-0.009**
	(0.005)	(0.005)	(0.004)	(0.004)
Foreign population	0.001	0.069	0.102	0.033
	(0.040)	(0.121)	(0.102)	(0.034)
Population density	0.002***	-0.009*	-0.009**	0.002***
	(0.000)	(0.005)	(0.005)	(0.000)
GDP	0.039	-0.014	-0.056	-0.030
	(0.084)	(0.137)	(0.083)	(0.054)
GDP squared	-0.001	0.002	0.001	0.000
	(0.002)	(0.002)	(0.002)	(0.001)
Employment rate	0.007**	0.001	-0.008	0.004
	(0.003)	(0.012)	(0.011)	(0.004)
Males 15-64	0.177***	0.129	0.150	0.161***
	(0.039)	(0.144)	(0.119)	(0.053)
Deposits growth (-1)	-0.004	-0.002	-0.011	-0.003
	(0.010)	(0.008)	(0.007)	(0.009)
R^2	0.545	0.339		
N	438	438	423	423

*** p<0.01, ** p<0.05, * p<0.1

Note: Results for constants and year dummies are not reported. Standard errors are heteroscedasticity robust. Instruments for differenced equation in GMM model are $CRIME_{i,t-j}, X_{i,t-j,}\ j = 2, \ldots, T$. Standard errors for GMM model are calculated using the Arellano-Bond robust estimator. Chi2 from Sargan tests for overidentifying restrictions: 477.33.

Arellano-Bond test for 2nd order autocorrelation: 2.90.

Table 5: Other crimes

Variable	**Homicide**	**Guns**	**Drugs**	**Smuggling**	**Simple assault**
Crime (-1)	0.038	0.712***	0.523***	0.568***	0.510***
	(0.047)	(0.044)	(0.055)	(0.068)	(0.049)
Clear-up rate	-0.007**	0.004	0.003	-0.003	-0.008*
	(0.003)	(0.004)	(0.003)	(0.007)	(0.005)
Foreign population	0.038	0.069*	0.039	0.075	-0.028
	(0.040)	(0.035)	(0.026)	(0.064)	(0.046)
Population density	0.000	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP	-0.007	-0.067	-0.103**	-0.105	0.082
	(0.080)	(0.069)	(0.048)	(0.089)	(0.079)
GDP squared	-0.001	0.002	0.002*	0.002	-0.001
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Employment rate	0.021***	0.002	-0.007**	0.002	-0.012
	(0.007)	(0.003)	(0.003)	(0.004)	(0.008)
Males 15-64	0.140**	-0.089**	0.030	0.098	0.128*
	(0.063)	(0.041)	(0.035)	(0.094)	(0.075)
Deposits growth (-1)	-0.004	0.009	-0.004	0.004	0.002
	(0.003)	(0.007)	(0.003)	(0.008)	(0.005)
N	265	359	392	273	379

*** p<0.01, ** p<0.05, * p<0.1

Note: Estimates from GMM system estimator. Results for constants and year dummies are not reported. Instruments for differenced equation in GMM model are $CRIME_{i,t-j}, X_{i,t-j,}\ j = 2, \ldots, T$. Standard errors are heteroscedasticity robust. Standard errors for GMM model are calculated using the Arellano-Bond robust estimator.

Appendix

Data description

Residence permits

We obtain data for residence permits, upon request from the Greek Ministry of Interior *(Enquiry: 18615)*. We matched the 53 departments that record the permits to the 46 NUTS3 regions as defined by Eurostat. These data cover the period 2006-2018 and they are monthly flows that we converted to stock annual data, calculating the permits issued each year. Population is given on the 1st of January of each year, while residence permits on the 31st of each year. To account for this, we construct the variable $foreign = \frac{permits[n-1]}{population} * 100$, that reports the share of resident permits in the population on the 1st of January.

Bank deposits

We acquire the bank deposits data from the Bank of Greece. Deposits are available on a peripheral level, so we match the 52 peripheries with the 46 NUTS3 regions as defined by Eurostat. That is a stock variable in million euros at the end of each year, covering the period 2004-2018.

Gross Domestic Product

Gross Domestic Product (GDP) is available in million euros by Eurostat on a NUTS3 level, for the period 2004-2017 and NUTS2 level for 2018. We calculate the growth of GDP for the NUTS2 peripheral level and apply it to the NUTS3 2017 level to interpolate the NUTS3 2018 level observations.

Population

Population in 1st of January is available by Eurostat on a NUTS3 level, for the period 2004-2018. Males aged between 15 and 64 are also available from the same source for the respective timespan.

Population density

We calculate the population density as persons per square kilometer. Both population and NUTS3 areas (in km) are obtained by Eurostat for the period 2004-2018.

Employment rate

Employed persons (in thousands), is available by Eurostat at the NUTS3 level, for the years 2004-2017 and in NUTS2 level for 2018. We calculate the growth of employment for the NUTS2 peripheral level and apply it to the NUTS3 2017 level to interpolate the NUTS3 2018 level observations.

Harmonized Index of Consumer Prices

The Harmonized Index of Consumer Prices (HICP) (including all items, base year 2015) is available by Eurostat for 2004-2018.

Crime data

We obtained the NUTS3 data by request from the Greek Police *(Enquiry: 1507/ 17/ 1543007, (1020/1)).* We match the 68 police departments to the 46 regions defined by Eurostat. Attiki has central departments that record some of the crimes that have already been recorded by the designated police station, resulting in overlapping which does not allow us to match them from this data. Attiki is the only region that is both a prefecture (NUTS3) and a periphery (NUTS2) in Greece. The Greek Police also reports aggregate crime data on NUTS2 level, so we use this time series for Attiki, to avoid any double counting from aggregating the police station data.

Property crime includes theft and robbery data. Theft is a crime involving the unlawful taking of the personal property of another person or business and is an offence under the Greek Penal Code. Robbery involves force and it is often considered a more serious crime than theft. Specifically, one commits a robbery if they steal from a person using force or make them think force will be used. Theft means taking someone's property but does not involve the use of force. Burglary means illegally entering a property in order to steal property from it.

Data were provided from Greek Police's "Statistiki Epetirida" in a pdf format from 2004-2015 and an excel format from 2016 to 2018. The tables format was consistent from 2004-2012. It then changed to a different format from 2013-2018. In order to match the two formats, we added up all theft crimes, i.e., those who were carried out with a burglary and those that were not. Robbery constitutes a separate category, as it is a violent crime.

To construct the clear-up rate, we use the ratio of solved thefts and robberies over the overall reported thefts and robberies (NUTS2 level). Greek Police reports this data on pdf format for each of the 13 peripheries (and Thessaloniki) for the period 2008-2018. We add the committed and attempted reported cases, the obtain the overall reported cases. We add all theft types to obtain theft and all robbery types to obtain robbery. Thessaloniki is reported separately from the rest of Kentriki Makedonia. We add the data of the two files to get the total for the periphery of Kentriki Makedonia.

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