Economics Bulletin

Volume 30, Issue 3

Testing the effects of crime on the Italian economy

Claudio Detotto
Dipartimento Economia, Impresa e Regolamentazione (DEIR) and CRENoS, University of Sassari

Pulina Manuela
School of Economics and Management, Fac. of Economics, Free Univ. Bolzano; CRENoS, Univ. Sassari

Abstract

This paper aims at assessing the causal and temporal relationships between crime and the economic indicators related to the aggregated demand function. The case study is Italy and a quarterly frequency is used (1981:1-2005:4). A Vector Autoregressive Correction Mechanism (VECM) is employed after having assessed the integration and cointegration status of the variables under investigation. Long and short run dynamics are estimated. A Granger causality test is also implemented to establish temporal interrelationships. The main findings are that, in the short run, crime positively effects GDP and government expenditure, while has a crowding out effect on exports. In the long run, crime positively leads imports and inflation, whereas negatively investments and government expenditure.

Citation: Claudio Detotto and Pulina Manuela, (2010) "Testing the effects of crime on the Italian economy", *Economics Bulletin*, Vol. 30 no.3 pp. 2063-2074.
Submitted: Jul 26 2010. **Published:** August 04, 2010.

1. Introduction

Crime is a social phenomenon whose determinants have been studied in many fields (e.g. sociology, psychology and economics). Only recently, an increasing number of papers in the economic literature has started investigating crime direct and indirect effects on the whole community. It is quite surprising that though crime is widely spread, it is not yet totally clear how the illegal behaviour affects the performance of the economy. In fact, the sign of the relationship between crime and economic performance is rather puzzling. On the one hand, a crowding-out effect of crime on economic growth may be expected since illegal activities may disincentive legal performance. Several studies have measured the distortion of crime on the economy using either cross-sectional or time series approaches. Part of this literature stems from the analysis of the impact of terrorism (Sandler and Enders, 2008). The empirical evidence shows that crime depresses investments (Enders and Sandler, 1996; Pellegrini and Gerlagh, 2004), tourism (Enders et al, 1992) and GDP growth (Peri, 2004; Gaibulloev and Sandler, 2008; Detotto and Otranto, 2010), while increases inflation (Al-Marhubi, 2000). On the other hand, a positive effect may occur as, changing the incentives, crime may induce virtuous behaviour. For example, corruption can help offsetting the inefficiencies of a hyper-bureaucratic or hierarchical system. De Mello and Zilberman (2008) find that property crime increases savings in the Brazilian cities of Sao Paulo. For a sample of 73 developed and developing countries and the time period 1995–1999, Egger and Winner (2005) find that corruption is an evident stimulus for foreign direct investment.

The main objective of this paper is to examine how crime affects the Italian economy by identifying the channels of economic distortions. It is hypothesised that illegal activities may impact the different components of aggregate demand with a different magnitude. Moreover, an important question is whether the sign of crime distortion is negative or positive. For instance, it may be possible that crime decreases consumption because criminal activities are likely to significantly reduce the available income to households. On the other hand, the uncertainty caused by crime may lead households to increase their actual consumption in order to reduce their risk. Hence, the total effect of crime is certainly ambiguous and a priori unknown.

Italy can be considered as an interesting case study for several reasons. First, an unprecedented increase in total crime offences has been observed over the last 25 years, passing from 39.3 per 1,000 inhabitants in 1979 to 50.7 in 2004 (+35.7%). During the time span 1993-2007, the number of total offences increased by 29.8%. This upwards trend is in contrast with many other Western countries such as the USA (-20.4%), Canada (-15.8%), the UK (-10.9%), France (-7.5%) and Germany (-6.9%) (Eurostat, 2009). Second, as Detotto and Vannini (2010) report, in 2006, the estimated total social cost of a subset of crime offences (theft, robbery, fraud, drug dealing, murder, etc.) was about € 38 billion, that represented 2.6% of Italian GDP. It is evident that in Italy the criminal activity has a significant impact on legal activities and its estimation has important policy implications.

The empirical analysis is based on quarterly data over the period 1981 up to 2005. Following Eckstein and Tsiddon (2004) theoretical specification, the present study provides an important contribution to explore the direction of the effect between crime and the economic variables within the aggregated demand framework (i.e. gross domestic product (GDP), consumption, investment, public expenditure, exports, imports and inflation). Besides, going a step further, in this paper crime is treated as an endogenous variable. This specification allows one to determine not only the existence of interactions amongst economic variables,

but also the direction of the temporal causality between crime and economic development. Given the statistical properties of the variables under investigation, a Vector Error Correction Mechanism (VECM) is carried out, where it is possible to explore multiple economic correlations both in the short and long run. A Granger causality test is also adopted for a deeper understanding on the main drivers of criminal activity.

The rest of this paper is organised as follows. Section 2 presents a literature review on crime economics related to the time series analysis. Section 3 describes the data and the methodology adopted; the empirical results are then discussed. Section 4 provides Granger causality tests. The last section presents concluding remarks.

2. Related literature

This section is aimed at giving an account on crime economic literature related to the time series analysis, giving special emphasis to the analysis of a possible bidirectional relationship between crime and macroeconomic variables. Masih and Masih (1996) estimate the relationship between different crime types and their socioeconomic determinants within a multivariate cointegrated system for the Australian case (1960-1993). Within a Granger test framework, the authors establish the direction of the temporal causation between the variables showing the criminal activity positively responds to urbanization and economic turmoil, but they fail to find an impact of crime on the socioeconomic variables under study.

Using an Australian dataset (1964-2001), Narayan and Smyth (2004), within an ARDL model, examine the relationship amongst unemployment, real wage and seven different crime categories that are homicide, motor vehicle theft, fraud, break and enter, robbery, stealing, serious assault. They found that, in the short run, robbery and stealing Granger cause real income, while robbery and motor vehicle theft Granger cause unemployment. In the long run, income is Granger caused by unemployment, homicide and motor vehicle, whereas fraud is Granger caused by real income and unemployment.

Habibullah and Baharon (2009), applying an ARDL model to the Malaysian case (1973-2003), analyse the relationship between real gross national product and different crime offences. The results indicate that, in the long run, the causal effect runs from economic variables to crime rates and not vice versa.

Chen (2009) implements a VAR model to examine the long run and causal relationships among unemployment, income and crime in Taiwan (1976-2005). The results indicate the presence of a long run relationship on the one side amongst unemployment, income and theft and on the other side amongst unemployment, income and economic fraud. Moreover, Chen shows the presence of a long run equilibrium relationship among unemployment, income and total crime. The Granger causality test depicts a neutral relationship among unemployment, income and all crime categories employed.

From this literature review, it emerges that the relationship between crime and economic variables, such as GDP and unemployment, has been extensively studied, especially within a time series framework. On the whole, ARDL models have been employed given the use of low frequency data due to the availability of relatively short span dataset. Furthermore, a great focus on the investigation of the temporal relationship between legal and illegal activity has been given via the standard Granger causality test. Overall, a rather mixed evidence

emerges on the type of temporal causality existing between the analysed variables, depending on the econometric approach and country analysed.

The literature review also shows that the use of reduced forms of growth models, to highlight the bidirectional effect between crime and macroeconomic variables, has been widely used. Such empirical models have been preferred to more sophisticated specifications due to some of their attractive empirical properties. As an advantage, the reduced forms of growth models do not require a large number of observations (rarely available on crime data) to guarantee the robustness of the estimation. Furthermore, they easy the empirical findings interpretation as only include the variables of interest. A draw back, however, is that they are less informative than fully-specified models.

3. Methodology

3.1 Data and the economic model

Following Eckstein and Tsiddon (2004) theoretical specification, who, by using a standard growth model, measure the crowding-out effect of terrorism on Israeli economic performance, the present study analyses the interrelationship between crime and the Italian economy. The function under investigation is the following:

$$LH = f\,(LGDP, LC, LIN, LG, LEX, LIM, LINFL) \qquad (1)$$

Italian quarterly data used in this study are obtained from ISTAT, *Italian National Institute of Statistics*, over the period first quarter 1981 up to fourth quarter 2005. Following Mauro and Carmeci (2007) and Detotto and Otranto (2010), the number of recorded committed intentional homicides (*LH*) are used as the crime activity indicator. Murder rate in fact shows the highest reliability among all crime variables because the underreporting is almost negligible. Furthermore, upon inspection, the homicide series is highly correlated with other crime typologies, namely drug offences, thefts, robberies, total crime. The empirical model includes the following extra variables: gross domestic production (*LGDP*), private consumption (*LC*), gross investment (*LI*), government expenditures (*LG*), imports (*LIM*), exports (*LEX*) and inflation rate (*LINF*). All economic variables, but inflation, are expressed in per capita and real terms. Murder rates are per 100,000 inhabitants. All variables are seasonally adjusted and transformed in logarithm terms assuming a non-linear relationship.

The multivariate system is mathematically defined as follows:

$$\begin{bmatrix} LH_t \\ LGDP_t \\ LC_t \\ LIN_t \\ LG_t \\ LEX_t \\ LIM_t \\ LINFL_t \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \\ \dots \\ A_{80} \end{bmatrix} + \begin{bmatrix} A_{11}^1 & A_{12}^1 & \dots & A_{18}^1 \\ A_{21}^1 & A_{22}^1 & \dots & A_{28}^1 \\ \dots & \dots & \dots & \dots \\ A_{81}^1 & A_{82}^1 & \dots & A_{88}^1 \end{bmatrix} \begin{bmatrix} LGDP_{t-1} \\ LH_{t-1} \\ \dots \\ LDR_{t-1} \end{bmatrix} + \dots\dots + \begin{bmatrix} A_{11}^k & A_{12}^k & \dots & A_{18}^k \\ A_{21}^k & A_{22}^k & \dots & A_{28}^k \\ \dots & \dots & \dots & \dots \\ A_{81}^k & A_{82}^k & \dots & A_{88}^k \end{bmatrix} \begin{bmatrix} LGDP_{t-k} \\ LH_{t-k} \\ \dots \\ LDR_{t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \dots \\ \varepsilon_{8t} \end{bmatrix} \qquad (2)$$

where $[A^1]$,… and $[A^k]$ are the p×p (or 8×8) matrices of parameters to be estimated; k is the number of lags be considered in the VAR; ε_t is the 1×8 vector of the disturbance terms that are assumed to be uncorrelated with their own lagged values and uncorrelated with all of the right hand side variables.

3.2 Integration, cointegration and long run elasticities

The methodological framework employed to investigate the relationship amongst these variables consists of three steps. The first step is to test the order of integration. Table 1 gives the results of the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test statistics.

These tests are used to detect the presence of a unit root for the individual time series and their first differences. With only the exceptions for *LH* and *LIMFL*, the test statistics are congruent and indicate that the series are integrated of order I(1) in the level but I(0) in their first differences (e.g. Engle and Granger 1987).

Table 1: Unit roots test (sample: 1981:1- 2005:4)

Variables	Status	ADF	lags	PP	Lags
LH	c - I(0) or I(1)	-1.95	1	-2.74*	3
DLH	C - I(0)	-17.58***	0	-18.61***	2
LGDP	C - I(1)	-2.03	4	-1.83	5
DLGDP	C - I(0)	-4.11***	3	-6.68***	5
LC	C - I(1)	-1.63	3	-1.69	5
DLC	C - I(0)	-3.86***	2	-9.23***	5
LI	c,t - I(1)	-2.74	3	-0.59	5
DLI	C - I(0)	-7.68***	0	-7.84***	4
LG	C - I(1)	-1.71	2	-2.15	6
DLG	C - I(0)	-3.53***	1	-663***	5
LEX	C - I(1)	-0.88	1	-1.11	1
DLEX	C - I(0)	-6.53***	1	-11.15***	3
LIM	c,t - I(1)	-2.10	4	-0.75	4
DLIM	C - I(0)	-5.43***	3	-9.92***	4
LINFL	c,t - I(0) or I(1)	-2.87	4	-6.67***	4
DLINFL	C - I(0)	-5.49***	4	-22.28***	17

Notes: (1) ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. (2) Ddenotes the first-difference operator. (3) Number of lags set in the ADF test is set upon AIC criterion, while PP test upon Newey-West bandwidth. (4) A constant and trend (c,t) are included upon a trend coefficient statistically significant.

Given the unit root results, as a second step, Johansen (1988) and Johansen and Juselius (1990) Vector Autoregressive (VAR) approach is implemented to investigate the existence of a common long run equilibrium amongst I(1) variables. The joint *F*-test and the Akaike (AIC), Schwartz (SC) and Hannan-Quinn (HQ) information criteria are used to select the number of lags required in the unrestricted VAR to ensure that residuals are white-noise (i.e. the vector autocorrelation test in this case is (F(64,277)=1.1360 [0.2425]). Thus, the chosen lag length is four accordingly. The cointegration test results are presented in Table 2.

Table 2: Johansen cointegration trace test - 4 lags (1981:1-2005:4)

Model: lh lgdp lc li lg lex lim linfl restricted constant		
H0:rank <=	**Trace**	**Max**
0	**2221.74*****	**77.19*****
1	144.55***	40.08
2	104.46**	30.49
3	73.97**	26.83
4	47.14	23.32
5	23.80	16.15
6	7.67	6.52
7	1.14	1.14

Notes: (1) **, *** denote statistical significance at the 5% and 1 % levels of significance, respectively. Test run in Eviews 6.0.

Both the maximum likelihood (Max) and trace statistic suggest for the existence of at least a single significant cointegrating vector. Hence, one concludes that all variables are cointegrated, and causally related in each model. The calculated cointegrating vector (*ECT*), that is the residual from the long run equation, is then incorporated into the error correction specification in its first lag. The long run elasticities are provided in Table 3.

Table 3: Long run elasticities

Endogenous variables	**Explanatory variables**							
	LH	**LGDP**	**LC**	**LI**	**LG**	**LEX**	**LIM**	**LINLF**
LH	-	15.68	-17.07	-13.75***	-15.57***	-14.46***	24.16***	0.35
LGDP	0.06***	-	1.09***	0.88***	0.99***	0.92***	-1.54***	0.02
LC	-0.06**	0.92**	-	-0.80***	-0.91***	-0.85***	1.41***	0.02
LI	-0.07**	1.14	-1.24*	-	-1.13***	-1.05***	1.76***	0.02
LG	-0.06**	1.01*	-1.10*	-0.88***	-	-0.93***	1.55***	0.02
LEX	-0.07**	1.08**	-1.18**	-0.95***	-1.08***	-	1.67***	0.02
LIM	0.04**	-0.65	0.71**	0.57***	0.64***	0.60***	-	0.01
LINFL	2.87**	-45.06	49.05	39.51***	44.75**	41.56***	-69.44***	-

Notes: (1) *, **, *** denote statistical significance at the 5% and 1 % levels of significance, respectively.

LGDP does not affect crime (*LH*), however, crime positively and significantly affects *LGDP*. From the first equation, it also emerges that investments (*LI*), government expenditure (*LG*) and exports (*LEX*) have a negative effect on crime, whereas imports (*LIM*) have a positive effect. From an economic perspective, it is interesting to notice that GDP is positively influenced by consumption (*LC*), *LI*, *LG* and *LEX* and negatively by *LIM*, hence validating the economic theory. Furthermore, crime has a crowding-out effect on consumption, investments, government expenditure and exports, whereas positively influences imports and inflation.

The third step of the analysis is to estimate an unrestricted vector error correction model (VECM) where the long run and short run information are simultaneously and endogenously estimated:

$$DY_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i Y_{t-i} + \mathbf{K} DV_t + \varepsilon_t \qquad (3)$$

Yt = (LHt, …. ,LINFLt) is a vector of all the endogenous variables defined above, expressed in their first difference (*D*); Π is the long run part of the model, that contains the cointegrating relations β and the loading coefficients α; Γ is the matrix of the short run parameters; *DV* contains deterministic variables such as a constant, linear trend and further dummy variables; ε_t is the vector of the disturbance terms that is assumed to be uncorrelated with its own lagged values and uncorrelated with all of the right hand side variables. In this case, the deterministic components of the system are the following: a constant and a single 0-1 impulse dummy (*d87q3)* that possibly picks up a positive turning point for the Italian economy.

3.3 VECM and short run dynamics

The system diagnostics of the unrestricted VECM suggest no problems in the residuals (Table 4).

Table 4: Unrectricted VECM, vector diagnostic statistics

Tests	distribution	statistics	p-value
Vector autocorrelation	F(320, 119)	0.86340	0.8413
Vector Normality	Chi^2(16)	17.779	0.3371
Vector heteroscedasticity	Chi^2(2412)	2389.6	0.6234

A problem of serial correlation is present at the 1% level only in the *DLH* and *DLEX* equation. However, inefficiency issues are not uncommon in core macroeconometric models (e.g. Garratt *et al.*, 2003). Overall, the model is a congruent specification as the vector diagnostics still suggest.

In terms of long run equilibrium, the ECT_{t-1} turns out to be statistically significant in four equations (*DLC, DLG, DLIMP* and *DLINFL*), and in *DLG* and *DLINFL* presents a negative sign that implies a convergence towards the long run equilibrium.

Following Pindyck and Rubinfeld (1991), the short run impact effect is assessed on the first statistically significant coefficient. From the first equation *DLH* (criminality), it emerges that investment and exports positively affect crime, while imports have a negative impact on criminality. As previously stated, these outcomes invert in the long run. While, it may be possible that in the short run crime may be trigged by private investment and exports; in the long run, an expansion of these legal activities produces a beneficial influence on reducing criminal activity.

Conversely, in the short run, an increase in imports has a crowding-out effect on criminality whereas in the long run a positive effect is detected. It is likely for example that at first criminal organisations (such as Camorra, Ndrangheta and Mafia) impose entry barriers to foreign products. In the long run, however, they may control the imports especially towards the main Italian harbour of Naples, enhancing both criminality and inbound trade.

Table 5: Parsimonious VECM (short run impact effects)

	Endogenous variables							
Exogenous Variables	**DLH**	**DLGDP**	**DLC**	**DLI**	**DLG**	**DLEX**	**DIMP**	**DLINFL**
DLHt-1	-0.633***				0.018***			0.485**
DLHt-2	-0.195*	0.008***			0.016***			
DLHt-3		-0.006*				-0.070***		
DLHt-4	0.163*	-0.006**				-0.043**		
DLGDPt-1		0.535***	0.008***	0.986***		1.598***	1.517***	
DLGDPt-2		-0.285***						
DLGDPt-3		0.285***	0.284*	0.988***	0.263**		1.089**	-15.200**
DLGDPt-4		-0.264***		-0.641*				-14.222**
DLCt-1			-0.296***					
DLCt-2					0.120*		0.962***	-8.477*
DLCt-3		-0.194***		-0.612**				
DLCt-4		0.213***	0.292***				0.619**	
DLIt-1			-0.081**					5.032**
DLIt-2		-0.047*	-0.079*					7.386***
DLIt-3	1.589**				0.084**		-0.307**	
DLIt-4								4.552**
DLGt-1				0.721***		-1.116***		-10.917*
DLGt-2		0.248***			0.485***			
DLGt-3				-0.785***				
DLGt-4					-0.244***			8.995*
DLEXt-1		0.038**	-0.093***	-0.130*			-0.127*	4.068***
DLEXt-2			-0.049**					2-172*
DLEXt-3			-0.098***	-0.117*			-0.163**	
DLEXt-4	0.793*			-0.092*			-0.112*	
DLIMt-1		0.092***	0.175***	0.209***	-0.040**		0.164*	-2.857*
DLIMt-2					-0.098***			
DLIMt-3			0.078***	0.177***	-0.064***	-0.167**	0.176**	
DLIMt-4	-0.839*				-0.049**		-0.212**	-2.870**
DLINFLt-1					-0.004***			-0.678***
DLINFLt-2			0.003**	0.006*				-0.701***
DLINFLt-3			0.002*					-0.547***
DLINFLt-4								0.182*
Cit-1			0.004***		-0.005***		0.020***	-0.299***
D87q3				-0.027*	0.009*	0.115***	0.054***	
Constant	-0.006	0.001*	-0.492	0.001	0.669***	0.008**	-2.717***	39.732***
Vector Diagnostics								
Vector Portmanteau(11)	620.006							
Nor Chi^2 (16)	17.873 [0.3314]							
Heter F-test (2412)	2370.8 [0.7215]							

Notes: (1) ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. (2) *D* denotes the first-difference operator. (3) Parsimonious VECM set upon joint F-test on coefficient restriction and information criteria. (4) Models run in Givewin 2.00 (2001). (5) **AR** = serial correlation; **Norm** = normality; **Heter**= heteroscedasticity.

As further relevant findings, a positive short run impact of criminality on *DGDP* (second equation), *DLG* (fifth equation) and *DLINFL* (last equation) emerges. The short and long run effect of crime on public expenditure may appear conflicting. Organised crime in Italy is likely to boost public expenditure, however bad investment, intrinsic economic inefficiencies

and distortion tend to substantially decrease government revenue, leading to a long run crowding-out effect. This outcome is also in line with the findings provided by Davoodi and Tanzi (1997). Notably, a short and long run homogenous positive sign is obtained for *LGDP* and *LIMFL*. The latter finding is consistent with the 41 cross-country results presented in Al-Marhubi (2000). In Italy, especially in the Southern regions, criminality has a wide control on transport of products. The transport companies, owned either by the criminal organisations or by the private, impose (or are charged with) higher prices that remarkably increase the price of products in the market. This can be regarded as one of many examples on how organised criminality may boost inflation. Finally, *LEX* both in the short and long run depicts a negative sign implying a distortion effect on the outbound trade. This outcome may be caused by the inefficiency and all sort of criminal behaviour that undermine the credibility of Italian products abroad.

4. Granger no-causality test

To test the null hypothesis of Granger no-causality (Granger, 1988) a set of restrictions on the short run and long run parameters are run on the VECM expression (3). The *t*-statistics on the coefficient of ECT_{t-1} indicates the existence of long run Granger causality, whereas, the significance of a joint Chi^2-statistics on the four lags of each explanatory variable indicates the presence of a short run Granger causality. If there is a strong Granger causality, then the Chi^2-statistics (*joint test*) on both the short and long run coefficients should lead to a rejection of the null hypothesis. Test results are provided in Table 6.

The long run causality in Granger terms, the null hypothesis fails to be accepted in the *DLI, DLG, DLIM* and *DLINFL* equations. Hence, the explanatory variables, included into the cointegrating relationship, "temporally cause" or "lead" the dependent variable. A strong Granger causality is only evident in the *DLGDP* and *DLEX* equations.

Turning to the short run no-causality hypothesis, a unidirectional Granger causality is detected running from *DLH* to *DLGDP, DLG* and *DLEX* respectively.

Table 6: Testing Granger no-causality (Chi^2-test)

Endogenous variables	Short run								Long run	Joint test
	DLH	**DLGDP**	**DLC**	**DLINV**	**DLGEXP**	**DLEX**	**DLIMP**	**DLINFL**	**ECT(-1)**	
DLH	-	0.41	1.63	1.51	2.49	2.53	3.62	0.73	0.08	14.59
DLGDP	**10.97****	-	**15.18*****	4.27	5.97	3.25	**8.63***	0.92	1.09	**59.38*****
DLC	1.30	**8.47***	-	2.57	1.44	7.29	**14.47*****	3.50	1.26	33.90
DLINV	0.52	**8.07***	5.02	**-**	6.49	6.07	**7.90***	3.00	**4.59****	**77.30*****
DLGEXP	**10.15****	**7.76***	4.92	5.06	-	2.58	**9.03***	6.58	**9.73*****	**40.46***
DLEX	**11.11****	**7.55***	2.90	0.59	**8.81***	**-**	**6.02**	1.76	**0.19**	**41.99****
DLIMP	2.23	6.51	6.95	5.21	1.53	5.55	-	4.42	**12.78*****	**83.23*****
DLINFL	2.48	5.99	2.25	5.11	6.34	2.55	3.82	**-**	**3.80****	31.50

Notes: *, **, ***, statistically significant at the 10%, 5% and 1% respectively.

5. Conclusions

The objective of this study has been to examine to what extent crime affects aggregated demand function indicators, following the theoretical model proposed by Eckstein and

Tsiddon (2004). This paper has further expanded the existing economic crime literature, by employing a more robust VECM analysis thanks to the use of quarterly data (1981:1-2005:4) that enlarge the number of observations. Italy makes an interesting case study for its structural organised crime.

The empirical findings have extensively highlighted that the connection between criminality and the economic components is highly significant. Criminal organisations, such as Mafia, often use murders as a means to gain power. Hence, it is reasonable to believe that homicides rate increases as their illicit activities enlarge along with the GDP growth. To this respect, the Association of the Confederation of Commercial Activities (Confesercenti, 2008) estimates the total revenue of organised crime accounts for € 130 billion, that represents 9% of Italian GDP. Hence, it is most likely that criminal activity can produce multiplier effects in the Italian legal economic system, as the empirical evidence has shown.

Specifically, the VECM specification has allowed for distinguishing short and long run dynamics. The empirical findings reveal that crime has an important role both as an endogenous and explanatory variable. In the long run, the Granger causality shows crime positively drives imports and inflation, whereas negatively drives investments and public expenditure.

Criminal activity produces enormous profits that need to be reinvested. Often criminal gangs launder their liquidity abroad (e.g. buying services and products) in order to evade Italian police surveillance, hence increasing national imports. Moreover, such a large liquidity may not be reinvested quickly, leading to an increase of the rate of inflation. Nevertheless, another explanation of the positive relationship between crime and inflation may be given by the fact that criminal activity raises prices through several channels, as it imposes high costs to firms, reduces market competition and increases banks interest rates.

At the same time, crime reduces investment and public expenditure. The negative effect of crime on investment can be justified by the fact that criminal activity is an obvious deterrent to entrepreneurial activity and new businesses. Besides, by reducing local and national government revenue, through undeclared work and illegal activities, crime may decrease government expenditure. Moreover, policies against crime are expensive and drain resources from more profitable activities and areas of investment. In the long run, such inefficiency may cause a reduction of available resources and, consequently, a decrease of government expenditure.

Overall, the empirical findings have revealed that in the long run private investment, public expenditure and exports reduce criminal activity. Hence, this outcome also highlights that legal activity is able to displace illegal behaviour.

Although Italian data have been employed in this study, the findings should be of interest and replicated for other countries. Economic issues, such as crowding-out effects of illegal activity have been so far under-researched despite their substantial importance to government interventions. This paper has helped to shed new light on this new strand of economic literature.

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