Centralized vs Decentralized Police Hiring in Italy and the US

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Abstract

This paper documents differences in the police hiring procedure between Italy and the US. In Italy police officers can only be hired through lengthy national public contests that generates sizable delays in the deployment of new police officer, while in the US the grand majority of police officers are hired at the local level. We exploit these differences to look at the police-crime relationship. Preliminary evidence shows the Italy presents some similarities but also striking differences with respect to the US. In particular, yearly changes in crime lead to larger and more immediate adjustments in police enforcement in the US than they do in Italy.

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1 Introduction

Provision of public safety is one the primary policy objectives of both central and local government. Police forces are responsible for public safety and the way in which they change in accordance with policy intervention represents a relevant aspect to many extents. Indeed, one of the most common strategies to tackle crime is to increase or redeploy police forces. In this paper we address two issues. First, we document substantial differences in hiring procedures between Italy and the US. In particular, Italian police officers are hired nationally through a centralized public contest, while in the US police department are organized at city level thus police forces are hired locally. Second, we provide preliminary and explorative analysis on the effect of police hiring with particular attention to crime reduction.

Previous works, even focussing mainly on the effects of police force on crime rates, exploit some peculiar features in police hiring process that allows to properly identify the crime-police elasticities. As briefly discussed above, in the US police forces are notoriously hire at local level. Levitt (1997) stresses the link between elections and the timing of change in the size of city police forces. He argues that given the political relevance of crime incumbents may have incentives to increase police to show their willingness in fighting crime, thus aiming at being reelected. This is especially true for mayors, since police departments are organized at city level and represent an ideal target for political manipulation. Also governors might play a role in affecting the level of city police even if indirectly. In fact, state government provide significant aid to big cities. Moreover, intergovernamental programs provide substantial grants to state and local law enforcement agencies. For instance, in 1994 the US congress passed the Violent Crime Control and Law Enforcement Act (VCCA) that authorized over $ 30 billion for local law enforcement and crime prevention program. Evans and Owens (2007) exploit the Community Oriented Policing Services (COPS) program included in the VCCA, to study its effect on crime.

COPS program authorized the US Department of Justice to provide grants for the sizable amount of $ 8.8 billion from 1994 to 2000 to local police agencies for crime prevention programs. In particular, centralized federal grants covered up to 75% of the cost for new police officers. As a result over 64,000 new police officers were hired at local level. The VCCA is an example of a centralized intervention that has favored a substantial increase of police forces locally. Both Levitt (1997) and Evans and Owens (2007) exploit, even if in a different way, changes in local police officers to deal with endogeneity issues in the relationship between police and crime. A relevant issue in the police hiring process is related to the effective deployment of officers in the streets. As stressed by Purdum (1990) "even if Mayor David N. Dinkins agrees next week, as expected, to hire thousand of new police officers for New York City, the process of recruiting and training them is so complex that the last of them would probably not ready for duty on the streets for the two years, with luck." Corman and Mocan (2000) take advantage of the fact that new police officers are required to attend a six-months course at the Police Academy before their effective deployment to eliminate simultaneity issue between police and crime.

Our analysis also rely on a centralized policy intervention, as in Evans and Owens (2007), but we also exploit documented delays between the time the hiring procedures started and the time the newly recruited police officer become operational, as in Corman and Mocan (2000). Italian recruiting procedures have some advantages over the one based on the COPS program analyzed in Evans and Owens (2007): i) local police offices do not need to apply to hire more officers; ii) several years pass between the centralized financial decision to increase the number of police forces and the actual hiring making it less likely that hirings depend on expected changes in crime rates; the relative changes in police forces that are driven by our centralized hiring system tend to be larger.[1]

In section 3 we present an intuitive model of optimal size of police that help us in understanding the endogeneity of hiring and firing decisions of police officers. Its main

[1]Only 1 to 2 percent of police officers receive a COPS grant

implication is that the level of police depends on the optimal level of police and how changes changes in police introduce hiring and firing costs, both immediately and in expectations for the future. We use data on police and crime for Italian regions over the period 1980-1997 and for the 59 large US cities from 1970 to 1992. As we widely discuss in the next section, Italy displays very interesting features for the purpose of our analysis. In those years every police officer was hired through a centralized public contest (*concorso pubblico*). The parliament would sign a law establishing the total number of allowed hirings, over the following 2 to 3 years. In section 2 we document that it would take at least 3 years before these hirings were implemented. On the other hand, the US present very different characteristics since police officer are hired locally.

Our empirical analysis helps us understanding how crime rates are related to hiring procedures. We observe that Italy presents some similarities but also striking differences with respect to the US. The raw elasticity between police and crime is only slightly lower than in the US (50 versus 75 percent), but once we control for year and region fixed effects the similarities end. In particular, for Italy the police-crime elasticity turns to be negative, while for the US cities the elasticity decreases in magnitude but remains positive. This shows that yearly changes in crime lead to larger and more immediate adjustments in police enforcement in the US than they do in Italy.

Another set of papers have tried to solve the reverse causality problem between crime and police relying on small scale experiments or quasi-experiments: following a quasi-randomized experiment different districts in Kansas city received different levels of patrolling Kelling (1974) finds little evidence of deterrent effect of police on crime rates. Di Tella and Schargrodsky (2004), instead, show that after terrorists' attacks reinforced police deployment around mosques and temples in Buenos Aires generates sudden reductions in crime. Similarly, Draca et al. (2011), exploiting the large and unanticipated redeployment of police officers to central London after the terrorist attacks that hit central

London in July 2005, show an elasticity of crime with respect to police of approximately -30 percent. While these papers certainly use clever identifying variations the external validity of their results might be limited.

2 Mass Hirings in Italy

Law n. 121 of 1981 rules the present organization of Italy's public safety and police forces. There are a total of five police forces: *Polizia di Stato*, *Carabinieri*,[2] *Guardia di Finanza*, *Polizia Penitenziaria* and *Corpo Forestale dello Stato*. *Polizia di Stato* and *Carabinieri* are responsible for maintaining public security and keeping public order, while *Guardia di Finanza*, as the name suggests, fights financial or white collar crimes, frauds, and smugglings. The *Polizia Penitenziaria* is responsible for security and surveillance in Italian prisons, while *Corpo Forestale dello Stato* officers are park ranger force responsible for protecting Italy's natural resources, the environment, countryside and ecosystems, especially national parks and national forests. Both these forces are not interesting for the focus of the present study.

Polizia di Stato and *Carabinieri* have identical functions. *Polizia di Stato* is a civil force that depends on the Minister of Interior, while *Arma dei Carabinieri* is a military force (gendarmerie) that depends on the Minister of Defense. Historically, *Carabinieri* was created by King Victor Emmanuel I of Savoy with the aim of providing the Kingdom of Sardinia with a police corps. After Italian reunification in 1861 the Carabinieri were appointed the "First Force" of the new national military organization. The *Polizia di Stato* was established in 1852 (they were called *Corpo delle Guardie di Pubblica Sicurezza*) and subsequently merged to the *Carabinieri* in 1922. In 1925 the Fascist regime decided that the ministry of interior had to oversee the *Polizia*. For our analyses we are going to focus on the *Polizia* and the *Carabinieri*.

[2] *Carabinieri* is the shortened (and common) name for the *Arma dei Carabinieri*

As briefly discussed in Section 1, police officers are hired nationally through centralized public contests.[3]. The law establishes the procedure that needs to be followed to hire new police officers. This generates a considerable time lag between the time the law gets approved and the time the newly recruited police officers become operational. Let us briefly describe how the procedure works and later provide a specific example to clarify the extent of these delays[4]. Bills need to be discussed in both chambers of the parliament, which typically requires around one year. Once approved, the law needs to be signed by the President of the Republic and, every time the law needs at least some funding, to be approved by the *Corte dei Conti* (the Italian Court of Auditor). In order to become effective, the law must be published in the Gazzetta Ufficiale (G.U.). For example, in 1986 the Minister of Interior started the procedure to hire 3,000 police officers. The decree was approved by the *Corte dei Conti* January 9, 1987 and then published on the G.U. on March 3, 1987. Once published, potential candidates have to apply for the position within one month. The oral and written examinations took place one year later, on February 23 and 24, 1988. On average after six months candidates are notified about the results of the examination. Successful candidates must complete a one-year training course (Law n.121/1981). Thus, on average new police officers become effective 3 years after the approval of the law. This hiring procedure introduces a significant and sizable lag, that might help breaking the simultaneity between police and crime. In addition, in many cases the law itself establishes the year in which new police officers should be hired.[5]

Since the hiring system is centralized, new police officers need to be allocated to regional police offices. The rules that govern these allocations are not transparent and publicly available. In order to understand the allocation process we contacted police

[3] Hiring procedures were set in 1981 (art. 47 and 48 of Law n. 121). This law was later modified in 1982 (Decree Law n. 335) and in 2000 (Decree Law n. 234)

[4] A complete list of laws is presented in Table 1

[5] For example, Law n. 410/1985 established how many of the 8,800 new *Carabinieri* had to be hired in each year up until 1989.

officers that were enrolled during the time considered in our analysis. A new police officer at the end of his/her training course had to express up to three preferences for his/her geographical destination. However, the Minister of Interior could allocate police officers disregarding these preferences, following a detailed manning schedule (or *pianta organica*) that determines the number of police officers each province and city should have.[6]

3 Model of Police Hiring and Firing

This section is going to provide a very simple model of optimal size of police that is going to help us understand the endogeneity of hiring and firing decisions.

Assume that policy makers minimize the expected cost of crime and police:

$$W\left(p_t, p_{t+1,..}\right) = E_t\left[\sum_{i=0}^{\infty}\left(1+\delta\right)^{-i}\left(c\left(p_{t+i}\right) + k_H 1\left(\Delta p_{t+i} > 0\right) + k_F 1\left(\Delta p_{t+i} < 0\right)\right)\right] \quad (1)$$

where $c\left(p_{t+i}\right)$ represents the total cost of crime and police (wages, cars, etc) as a function of police p and we assume constant decreasing marginal reductions $c'\left(\cdot\right) < 0\,, c''\left(\cdot\right) = k > 0$. Given that $1\left(true\right) = 1$ in the second part of the expression k_H and k_F measure "hiring" and "firing" costs, that do not depend on the change in police forces. Assuming that these costs are proportional to the change the results are qualitatively the same. The discount rate $\delta \leq 1$ shows that policy makers care more about current levels of crime than about future ones.

To simplify the expression we are going to use a second order approximation of each $c\left(p_{t+i}\right)$ around the *frictionless* optimal level of policing p^*_{t+i}, where $\frac{\partial c(p_{t+i})}{\partial p_{t+i}} = 0$. Equation

[6] We found out that a ministerial decree published on March 16, 1989 changed the preexisting schedule, but even the police labor unions have no access to these schedules.

1 is therefore equal to a constant that does not depend on the vector p and

$$E_t\left[\sum_{i=0}^{\infty}(1+\delta)^{-i}\left(\frac{k}{2}\left(p_{t+i}-p^*_{t+i}\right)^2+k_H 1\left(\Delta p_{t+i}>0\right)+k_F 1\left(\Delta p_{t+i}<0\right)\right)\right]$$

.

This function has a very intuitive interpretation, of top of hiring and firing costs there is a loss from having the police that is far from it's optimal level.

The optimal plan of policing is obtained by differentiating this expression with respect to each level of police $p_{t+i.}$ This problem has no general solution (see Hamermesh and Pfann, 1996), unless one assumes static expectations about p^*_{t+i}. If the optimal size of police forces depends linearly on crime, this means that $E_t\left(p^*_{t+i}\right)=E_t\left(\alpha c_{t+i}\right)=\alpha c_t$. In this case the solution is

$$\begin{aligned} p_{t+i} &= \alpha c_t,\ i=0,1,...,\ \text{if } k_H \leq z_t \text{ and } z_t>0; \text{or } k_F \leq -z_t \text{ and } z_t<0 \\ p_{t+i} &= p_{t-1},\ i=0,1,...,\ \text{otherwise,} \end{aligned}$$

where $z_t=\frac{(1+\delta)}{\delta}\left(p^*_t-p_{t-1}\right)$.

This solution has a very intuitive interpretation. The level of police depends on the optimal level of police and on how changes in police introduce hiring or firing costs, both immediately, and in expectation for the future. If the optimal size of police changes because there has been a sudden large change in crime that given the "random walk" assumption is believed to persist, law enforcment is going to adjust the size of the police forces. If, instead, those changes and the implied long-term losses z_t are not large enough to compensate the hiring or firing costs police forces are not going to change from one period to the next. Larger discount rates, and larger costs are thus going to increase the attrition of police forces. Moreover, if hiring costs are extremely large compared to firing costs, like in the Italian case, adjustments when crime increases are less likely than when crime decreases.

Relaxing the assumption on static expectations one can show that adjustments are less likely to occur the smaller is the persistence of crime shocks.

4 Data Description

We exploit the peculiarities of this hiring system using a balanced, yearly, regional panel over the period that goes from 1980 to 1997. Our main explanatory variable is the total number of *Carabinieri* and *Polizia di Stato* force, in short "police force."[7] Crime data are taken from the official crime statistics that are recorded by the police and are published yearly by the Italian Statistics Institute (ISTAT) at region level and by type of crime. For the purpose of our analysis we consider: robbery, murder, assault, burglary, car theft, bag snatching, larceny, fraud and smuggling.

We also collected a set of socioeconomic and demographic variables that are usually included in crime regressions. We include the percentage of men aged 15-35. Young men are said to be more prone to engage in criminal activities than the rest of the population (Freeman, 1991, Grogger, 1998). Turning to the socioeconomic variables, we include the (log of) real GDP per capita and the unemployment rate which measure the legitimate and illegitimate earning opportunities (Ehrlich, 1973, Gould et al., 2002, Raphael and Winter-Ember, 2001). We complete our dataset by including education measures: the percentage of population with high school diploma, and the percentage of population with university degree.[8] Our list of control variables is likely to be incomplete. In order to control for unobserved factors we exploit the panel structure of our data either differencing the data or including region-specific fixed effects. We also include year dummies in order to adjust

[7] These data have been used by Marselli and Vannini (1997), and provided to us by the authors.

[8] Education may have a sort of "civilization" effect reducing crime over and above its effect through labor market opportunities (Buonanno and Leonida, 2009, Fajnzylber et al., 2002, Lochner and Moretti, 2004).

for exogenous shocks in crime rates that are common to all regions.

Table 2 presents the summary statistics of the variables used in our analysis. Over the period 1980 to 1997 there were on a yearly basis an average of close to 3,000 crimes per 100,000 inhabitants. It clearly emerges that the vast majority of recorded crime are property crimes. Italian crime rates differ from US ones in many ways. Having in mind that crime categories may not be perfectly comparable due to significant differences in the judicial system, crime rates in Italy are significantly lower than in the United States. While for our empirical analysis we use crime data for a panel of 59 U.S. large cities from 1970 to 1992[9], to compare the Italian crime rates to the US ones we use the 1995 Uniform Crime Reports. For instance, both property crimes and violent crimes seem less frequent in Italy (respectively 1,880 versus 4,590 and 96 versus 684). Because of their specific nature some types of crimes allow a better comparison, like murders and motor vehicle thefts. Nevertheless, even for these crimes these differences remain: Italy had on average 1.87 murders per 100,000 inhabitants, the US 8.2. The differences are lower for motor vehicle thefts: 324 per 100,000 inhabitants in Italy versus 560 in the US.

5 Evidence on police-crime relationship in the US and Italy

In this section we present some preliminary and explorative evidence on the police-crime relationship. Substantial differences in the police hiring procedure between Italy and the US offer the possibility to test to what extent crime rates are responsive to policy interventions. It is worth to stress that we are considering simple correlations and we do not make claims of causality, but still we believe that this represent a useful and interesting exercise for a better understanding of how policy interventions work. Moreover, at the

[9]See Levitt (1997) for a complete and detailed description of the data

light of the theoretical implication of our model, we are able to isolate some channels through which this occurs.

We start by considering the Italian case. Figure 1 shows the average total number of crimes and total number of police forces across Italian regions, with (right panel) and without (left panel) controlling for year and region fixed effects. The raw data clearly shows that over time crime and police move together, at least until 1991. The correlation between the residual of crime levels and police levels after controlling for region and year fixed effects is instead negative (right panel). One possible interpretation of these patterns is that Italy presents a simultaneity issue when analyzing the country as a whole (more police officers are hired when crime goes up), but that centralism and delays in the allocation of police forces across space make the simultaneity issue less serious once we control for time effects.

Next we show that the same is not true in the US, where police forces are notoriously hired at a more local level (Levitt, 2002, McCrary, 2002). In the first column of Table 3 we simply regress the logarithm of total crime rates on the logarithm of the number of police forces per 100,000 inhabitants. The elasticity is clearly positive, significant, and large (75 percent). Controlling for year fixed effects reduces the elasticity by one half, but the elasticity keeps on being positive and significant. Columns 3 and 4 show that even controlling for potential confounders does not eliminate the endogeneity of police, while columns 5 and 6 shows that first-differencing the data does not prevent the elasticity from being positive and significant. What this means is that for US cities the evidence is that local police hiring depends on local changes in crime rates. Fixed effects panel data estimates would thus be unable to identify the effect of police on crime, requiring the use of alternative strategies, for example instrumental variables (Levitt, 2002), or regression discontinuities (Di Tella and Schargrodsky (2004), Klick and Tabarrok (2005).

In Table 4 we show, in line with Figure 1, that Italy presents some similarities but also striking differences with respect to the US. Column 1 shows that the raw elasticity between police and crime is only slightly lower than in the US (50 versus 75 percent). Controlling for year and region fixed effects the similarities end. Column 2 shows that adding the fixed effects the elasticity goes from positive 0.50 to negative 0.24 percent. Remember that for the US cities after controlling for the same fixed effects the elasticity would be smaller but would still be positive. Column 4 shows that controlling for additional confounders does not alter this result, while column 5 and 6 show that first-differencing the data lowers the elasticity from -22.6 to -12.5 percent. This difference might be due to measurement error in the number of police officers. Since we don't have a way to assess the importance of measurement error bias we are going to benchmark our results to the -12.5 percent figure. It is also worth noting that after first-differencing the data all the other independent variables stop being significant, while police forces don't.

We just showed that differencing the data alleviates the simultaneity issue. As further evidence we compare OLS estimate (-12.5 percent) and estimates based only on positive variations in the number of police officers, the ones that are driven by national mass hirings. Given that each hiring is based on national contests, one way to identify the elasticity is to separately estimate the effect of police on crime depending on whether the change in police is positive, thus due to mass hirings or negative, thus more likely to be endogenous. Empirically it is enough to separately control for positive and negative changes in police forces in our crime regressions.

The first two columns of Table 5 show the OLS results as a benchmark. In columns 3 and 4 we split the changes in (log) police forces depending on the sign of these changes. A clear discontinuity emerges: positive changes induce a negative and significant elasticity of 15.4 percent. Negative changes instead lead to an elasticity that is not significantly different from zero.

6 Conclusions

This paper documents differences in the police hiring procedure between Italy and the US. Italian police hiring is characterized by a centralized and lengthy procedure that generates substantial delays in the effective deployment of new police officers. Instead, US police departments are organized at the city level, including their decisions to hire additional officers.

We exploit these differences between the Italian and US police hiring system to present evidence about heterogeneity in the endogeneity within the police-crime relationship. Our empirical findings show that the raw elasticity between police and crime is only slightly lower in Italy than in the US, but controlling for year and region fixed effects the police-crime elasticity in Italy turns to be negative, while it remains positive for the US cities, despite being lower in magnitude. Our interpretation of these patterns is that yearly changes in crime lead to larger and more immediate adjustments in police enforcement in the US than they do in Italy because of the different police hiring procedures.

Despite the apparent inefficiencies in the allocation of Italian police forces, preliminary evidence shows that the estimated elasticities of crimes with respect to regular police officers, which might still contain some endogeneity bias and thus be even smaller are only slightly larger than in the US.

Future research may exploit what we learned about the optimal investment in police and about where the endogeneity between crime and police resides to provide new estimates about the causal effect of police on crime.

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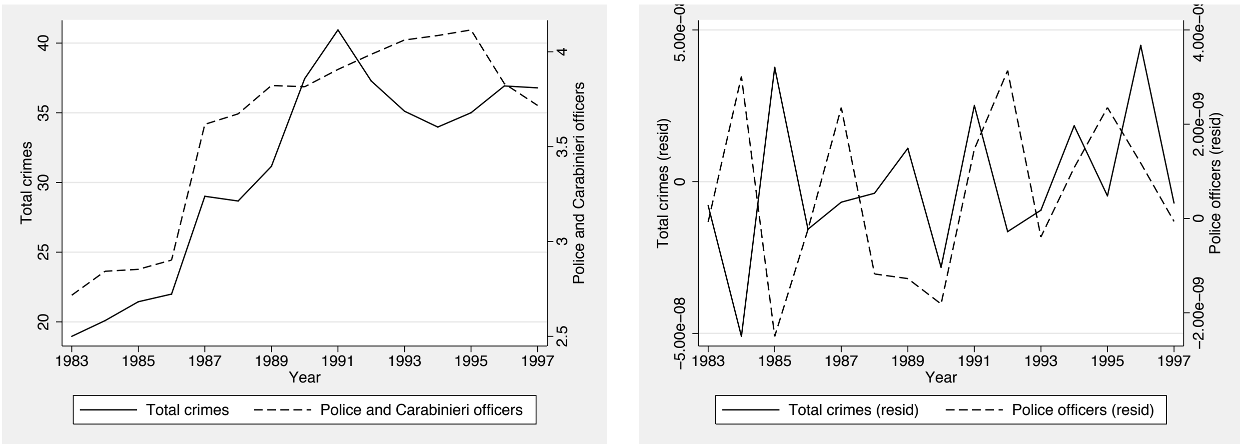

Figure 1: Crime and Police, with (right panel) and without controlling for time and region fixed effects.

Source: ISTAT Statistiche Giudiziarie Penali 1983-1997.

Table 1: Police Force and Carabinieri Recruiting Laws

Law	Contents
Law. n. 121/1981	Set hiring procedures (art. 47 and 48 of Law n. 121). This law was later modified in 1982 (Decree Law n. 335) and in 2000 (Decree Law n. 234)
DPCM (*Decreto Presidente Consiglio dei Ministri*) March 2, 1984	Recruiting procedure for 5,000 *Carabinieri*
DPCM January 21, 1985	Recruiting procedure for 6,700 *Carabinieri*
Law n.150/1985	Recruiting procedure for 5,206 Police Officers (2,000 in 1985, 1,500 in 1986 and 1,000 in 1987)
Law n. 410/1985	Recruiting procedure for 8,800 *Carabinieri* (1,500 in 1985, 1,500 in 1986, 1,500 in 1987, 1,500 in 1988 and 1,800 in 1989)
Minister of Interior November 10, 1986	Recruiting procedure for 3,000 Police Officers
Decree Law n. 9/1992	Recruiting procedure for 3,799 Police Officers (in 1993 and 1994)

Table 2: Summary Statistics

variable	obs	mean	std.dev.	min	max
Police officers	285	359.67	132.82	86.87	750.40
Financial police officers	285	101.41	61.86	25.77	278.68
Population	285	3,014.29	2,211.196	330	8,974
Fraction pop. aged 15-35	285	.325	.019	.28	.36
Percentage of population with high school diploma	285	.17	.04	.08	.27
Percentage of population with university degree	285	.04	.01	.02	.08
Gross domestic product	285	14.13	3.68	7.49	21.97
Unemployment rate	285	9.22	3.98	3.19	23.48
Total crimes per 100,000 inh.	285	3,098.77	1,318.66	1,031.57	7,709.80

Table 3: Police and Crime in the US

	(1)	(2)	(3)	(4)	(5)	(6)
		log total crime			Δlog total crime	
	OLS	OLS	OLS	OLS	OLS	OLS
log or Δlog Police officers	0.749***	0.368***	0.180*	0.174	0.167***	0.132***
	(0.139)	(0.104)	(0.098)	(0.105)	(0.052)	(0.048)
log or Δlog SMSA % pop 25-29			0.552**	0.463		0.391
			(0.214)	(0.384)		(0.344)
log or Δlog State real income per capita			0.547**	0.099		-0.127
			(0.225)	(0.372)		(0.185)
log or Δlog % city pop black (interpolated)			0.052	-0.015		0.021
			(0.088)	(0.089)		(0.058)
log or Δlog State unemployment rates			0.175***	0.181***		0.086***
			(0.038)	(0.066)		(0.021)
log or Δlog real State+local educ spending per capita			0.340***	0.378***		-0.009
			(0.099)	(0.137)		(0.053)
log or Δlogreal State+local public welfare spending per caita			-0.048	-0.048		0.019
			(0.068)	(0.081)		(0.042)
Year and region effects	no	yes	no	yes	yes	yes
First stage F-stat						
Observations	1,332	1,332	1,084	1,084	1,259	1,015
R-squared	0.611	0.803	0.787	0.835	0.374	0.404

Notes: In columns (1)-(4) regressors are in *log*, while in columns (5) and (6) regressors are expressed in *log* changes. Regressions are estimated using ordinary least squares. Clustered (by city) standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Police and Crime in Italy

	(1)	(2)	(3)	(4)	(5)	(6)
		log total crime			Δlog total crime	
	OLS	OLS	OLS	OLS	OLS	OLS
log or Δlog Police officers	0.501**	-0.238***	-0.100*	-0.244***	-0.109***	-0.105***
	(0.229)	(0.049)	(0.050)	(0.044)	(0.037)	(0.034)
log or Δlog Fraction pop. aged 15-35			4.388***	0.411	0.000	0.000
			(0.907)	(1.555)	(0.000)	(0.000)
log or Δlog Gross domestic product			2.191***	1.188***		-0.843
			(0.393)	(0.382)		(2.053)
log or Δlog Percentage of population			0.043	-0.107		0.032
with high school diploma			(0.117)	(0.065)		(0.228)
log or Δlog Percentage of population			0.060	0.116		0.023
with university degree			(0.116)	(0.116)		(0.037)
log or Δlog unemployment rate			-0.056	0.008		-0.048
			(0.083)	(0.069)		(0.094)
Year effects	no	yes	no	yes		-0.085
First stage F-stat						(0.060)
Observations	285	285	285	285	266	266
R-squared	0.704	0.947	0.922	0.952	0.549	0.553

Notes: In columns (1)-(4) regressors are in *log*, while in columns (5) and (6) regressors are expressed in *log* changes. Regressions are estimated using ordinary least squares. Clustered (by region) standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: OLS: Postive and negative changes in police forces

	(1)	(2)	(3)	(4)
Estimation method	OLS	OLS	OLS	OLS
Δlog Police officers	-0.109***	-0.105***		
	(0.037)	(0.034)		
Negative Δlog Police officers			0.095	0.106
			(0.107)	(0.108)
Positive Δlog Police officers			-0.130***	-0.127***
			(0.042)	(0.038)
Δlog Fraction pop. aged 15-35		-0.843		-0.900
		(2.053)		(2.049)
Δlog Gross domestic product		0.032		0.011
		(0.228)		(0.222)
Δlog Percentage of population		0.023		0.022
with high school diploma		(0.037)		(0.037)
Δlog Percentage of population		-0.048		-0.046
with university degree		(0.094)		(0.093)
Δlog unemployment rate		-0.085		-0.088
		(0.060)		(0.059)
Observations	266	266	266	266
R-squared	0.549	0.553	0.551	0.555