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# Ethnic fragmentation and police spending

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## Abstract

Using a Two-Stage Least Squares procedure, we estimate the relationship between ethnic fragmentation and police spending using a cross-section of United States counties. Our results show that, when controlling for community characteristics and accounting for simultaneity bias, ethnic fragmentation is positively related to police spending. Our paper contributes to the understanding of the stylized fact that public spending on police increased over a period in which the incidence of crime decreased.

JEL codes: H76, J15

Keywords: ethnic fragmentation, police spending, police, crime, fragmentation

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## I. Introduction

In the early 1990s, the United States witnessed a surge in crime rates. Violent crime increased from a rate of 666.9 per 100,000 in 1989 to 757.7 per 100,000 in 1992.<sup>1</sup> Predictably, this was accompanied by an increase in local expenditures on police. Per-capita police expenditures (listed in 2002 dollars) increased from \$132.87 in 1989 to \$162.05 in 1992. Thereafter, crime rates did not continue to increase but rather began to decrease. After 1992, violent crime decreased every year to 523.0 per 100,000 in 1999. Over the same period however, despite this decrease in crime, spending on police continued to increase. Per-capita police expenditures (in 2002 dollars) increased every year after 1992 to \$232.30 in 1999.

In this paper, we show that ethnic fragmentation<sup>2</sup> is significantly related to spending on police services. We are not the first to suggest such a relationship, as Alesina, Baqir and Easterly (1999) show that ethnic fragmentation is positively related to spending on police services. As this result was not a main point of their paper, the authors do not control for factors, such as crime, which are purportedly related to spending on police services. Here we control for several factors considered to be related to spending on police services and use a two-stage least squares model to account for simultaneity bias.

We view our paper as contributing to the understanding of the overall picture of crime and police spending. For instance, Levitt (2004) discusses the significant and insignificant factors in the decline of crime rates in the 1990s. The author cites increases in the size of police departments as a significant factor in the decline. Our paper contributes to the explanation of why communities increased the size of police departments despite that the incidence of crime was actually decreasing: the country became more ethnically fragmented.

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<sup>1</sup> All crime statistics are from the Bureau of Justice Statistics.

<sup>2</sup> Throughout the paper we use *fragmentation* as our measure of heterogeneity. Fragmentation is defined as the probability that two randomly selected people in a community are of a different ethnicity. We focus on ethnic fragmentation rather than racial fragmentation as we wish to distinguish between Hispanics and other racial groups.

## II. Data and Methodology

Our sample is a cross-section of 3,122 United States counties in 2000. Our dependent variable is per-capita police expenditures. Our independent variables include characteristics which possibly affect the demand for spending on police services. Our main independent variable is the fragmentation index: Ethnic Fragmentation =  $1 - \sum(\pi_i)^2$ , where  $\pi_i$  is the fraction of the population that is of ethnicity  $i$ . Higher values of Ethnic Fragmentation indicate that the population is more diverse or fragmented.<sup>3</sup> The other explanatory variables include the fraction of owner-occupied housing, median household income, elderly population share, population density, per-capita federal aid and the various ethnic group shares.<sup>4</sup>

We include the incidence of crime as an independent variable because it possibly affects the demand for spending on police services. We consider two measures of crime. In one specification we consider the aggregation of violent and property crime rates. In the second specification we only consider violent crime.

There are possibly simultaneity bias issues with the relationship between the incidence of crime and police spending. While it would seem that additional police would reduce crime rates, it would also seem to be the case that communities with higher crime rates tend to have larger police forces. Several authors have attempted to address this issue through different econometric techniques. Marvell and Moody (1996) use the Granger causality test to determine the direction of causality between police levels and crime rates.<sup>5</sup> Levitt (1997) uses the timing of elections and the number of firefighters as instrumental variables for spending on police.<sup>6</sup> These papers find

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<sup>3</sup> A number of authors have used it as a measure of diversity, for instance Alesina, Baqir and Easterly (1999) and Hero and Tolbert (1996).

<sup>4</sup> These are the customary variables used in the demand for public spending literature. For instance, see Poterba (1997).

<sup>5</sup> Kovandzic and Sloan (2002) perform a similar analysis of a different data set and arrive at similar conclusions.

<sup>6</sup> The results in Levitt (1997) are not uncontroversial. See Levitt (2002) and McCrary (2002) for a discussion.

that increasing the size of the police force reduces crime rates.<sup>7</sup> We address the relationship between crime and police spending by using the two-stage least squares method.

The demographic variables, taken from the Census Bureau, are merged with the financial variables, which are taken from the Census Bureau's *Census of Governments*.<sup>8</sup> Table 1 provides a summary of the variables.

Table 1 here

We employ a two-stage least squares model to estimate the relationship between ethnic fragmentation and police spending. We contend that police spending and crime levels are simultaneously determined therefore per-capita police spending is a dependent variable for the first equation while the crime rate is a dependent variable in the second. These equations are:

$$\text{Police Spending}_i = a_0 + a_1 * \text{Crime Rate}_i + a_2 * \text{Ethnic Fragmentation}_i + a_3 * X_i + e_i$$

$$\text{Crime Rate}_i = b_0 + b_1 * \text{Police Spending}_i + b_3 * Z_i + u_i$$

The explanatory variables in the first equation are the crime rate, ethnic fragmentation and the demographic measures described earlier, which are denoted by  $X_i$ . The crime rate equation includes several factors which are potentially related to crime, such as income inequality as measured by the Gini index, the share of the population which is male and aged 15 to 24 and the share of the population with less than a high school education. These variables, standard in the crime literature, are denoted by  $Z_i$ . Kelly (2000) shows that income inequality is positively related to crime. Doyle, Ahmed and Horn (1999) do not find that inequality is related to crime, but they do find that the male youth population is positively related to crime. Lochner and Moretti (2004) show that educational attainment is negatively related to crime. There is also a potential endogeneity problem with Ethnic Fragmentation therefore we instrument for it using the prior Census value of the index.<sup>9</sup> All variables are in logarithms.

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<sup>7</sup> The deployment of police to certain neighborhoods has also been demonstrated to reduce crime in those particular neighborhoods (Di Tella and Schargrotsky, 2004).

<sup>8</sup> Several counties were lost during the merge of the demographic and financial variables. Also not included are counties in Alaska, Hawaii and the District of Columbia.

<sup>9</sup> This method has also been used by Alesina, Baqir and Easterly (1999).

Table 2 here

The results suggest that ethnic fragmentation is positively related to police expenditures. Specifically, we find that when controlling for factors related to the demand for spending on police services, counties which are more ethnically fragmented have higher levels of police expenditures. This result is consistent across both of our specifications. In the violent crime model, ethnic fragmentation has a stronger effect on the demand for police spending. The crime rate is not significantly related to police spending but violent crime has a mild positive effect on police spending. This finding is similar to the results of Kovandzic and Sloan (2002). In the literature, the effect of police spending on the crime rate is usually stronger than the reverse. Marvell and Moody (1996) state, “The impact of crime on the number of police is slight, but the impact of police on most crime types is substantial.” The balance of the coefficients of the explanatory variables are consistent with the literature.

### **III. Conclusion**

Our paper presents evidence that ethnic fragmentation is positively related to police expenditures. We view this result as suggesting an explanation for the stylized fact that spending on police services increased over a period in which the incidence of crime decreased. The nationwide mean ethnic fragmentation index increased from 0.18 in 1990 to 0.25 in 2000. Further, in 3,016 of the 3,122 counties, ethnic fragmentation increased from 1990 to 2000. Our analysis suggests that part of the explanation that police expenditures increased at a time in which crime decreased, is that demand for police services was driven by increasing ethnic fragmentation.

At this point we can only speculate about the causes of the relationship between ethnic fragmentation and spending on police services. We suspect that individuals exhibit a larger fear of crime when the ethnic fragmentation of the neighborhood increases (Bursik and Grasmick, 1993). If this is the case then there is “too much” spending on police relative to the community characteristics, other than those related to ethnicity. We view this possibility as troublesome

because in an era where state and local governments are facing increased roles in social welfare spending (from devolution) and limited funding opportunities (from tax and expenditure limitations), excessive police spending may crowd out other programs like education and housing. Another view would be that there is “not enough” spending on police in ethnically homogenous communities. This would imply a needlessly large incidence of crime in such municipalities and this condition could possibly hamper economic growth.

However, given the available data, we cannot rule out the explanation that intraethnic crime is more brutal or more frequent than interethnic crime. If this is the case then increases in ethnic fragmentation would trigger an appropriate increase in police spending. We hope that future work will be able to better resolve the causes of the relationship between police spending and ethnic fragmentation.

### **Acknowledgement**

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Table 1. Summary of Variables (n=3,122)

Variable	Mean	St.Dev.	Min	Max
Police Spending	117.15	72.88	0.61	1,208.61
Crime Rate	0.024	0.02	0.00	0.098
Violent Crime	0.003	0.003	0.00	0.035
Ethnic Fragmentation	0.25	0.18	0.01	0.73
Owner-Occupied	0.74	0.07	0.20	0.90
Median Household Income	32,626.89	8,042.59	14,178.00	77,513.00
Share College	0.17	0.08	0.05	0.64
Female population	0.34	0.03	0.18	0.42
Elderly population	0.15	0.04	0.02	0.35
Population Density	210.9	1,384.6	0.0	66,835.0
Per-Capita Federal Aid	1,285.29	545.12	72.83	6,862.58
Share Black	0.09	0.14	0.00	0.86
Share Native	0.02	0.07	0.00	0.92
Share Asian	0.01	0.02	0.00	0.54
Share Other	0.01	0.01	0.00	0.24
Share Latino	0.06	0.12	0.00	0.98
Male Youth Population	0.07	0.02	0.03	0.30
Gini Index	42.39	3.51	32.19	56.38
No Diploma	0.23	0.09	0.03	0.65

Table 2. Two-Stage Least Squares Estimation

	Police Spending	Police Spending
Crime Rate	-0.103; (0.07)	
Violent Crime		0.138* (0.07)
Ethnic Fragmentation	0.263*** (0.03)	0.387*** (0.07)
Owner-Occupied	-0.977*** (0.12)	-0.455 (0.28)
Median Income	0.987*** (0.06)	1.023*** (0.08)
Elderly population	0.366*** (0.04)	0.415*** (0.05)
Share College	0.161*** (0.03)	0.254*** (0.06)
Population Density	-0.047*** (0.01)	-0.011 (0.02)
Per-Capita Federal Aid	0.326*** (0.02)	0.380*** (0.04)
Share Black	-0.005 (0.01)	-0.036* (0.02)
Share Native	-0.030** (0.01)	-0.010 (0.01)
Share Asian	0.031*** (0.01)	0.042*** (0.01)
Share Other	-0.051* (0.03)	-0.117*** (0.04)
Share Latino	0.0002 (0.01)	0.006 (0.01)
Constant	-7.150*** (0.80)	-6.603*** (0.88)

  

	Crime Rate	Violent Crime
Police Spending	-0.460*** (0.08)	-1.092*** (0.13)
Male Youth Population	0.416*** (0.13)	-0.121 (0.21)
No Diploma	-0.255*** (0.09)	-0.291** (0.15)
Gini Index	0.243 (0.41)	2.674*** (0.66)
Constant	-1.281 (1.65)	-10.839*** (2.66)

\*\*\* Significant at the 1% level; \*\* significant at the 5% level; standard errors are given in the parentheses.