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<u>Technical Presentation - "Crime in Europe and in the US: Dissecting the 'Reversal of Misfortunes'"</u>

When evaluating urban development, one area of interest to many policy-makers is the rate of crime. While much research has been conducted regarding crime rates in the United States, a smaller number of studies have tried to tackle these issues outside of the United States. In their 2011 investigation, Paolo Buonanno, Francesco Drago, Roberto Galbiati, and Giulio Zanella seek to correct this information gap by comparing crime rates in the United States and seven European countries from 1970 to 2008. The authors use demographic information, immigration information, abortion rates, unemployment statistics, and incarceration figures as their five explanatory variables for determining levels of crime. The results show that, although crime was higher in the United States than it was in Europe in the 1970's, since then European crime rates have exceeded crime rates in the United States, a phenomenon referred to as the 'reversal of misfortunes' (Buonanno et al. 2011). This paper will analyze the model constructed in their paper, and it will explore potential implications and extensions of their assumptions and equations.

Upon surveying the economic literature regarding determinants of crime, Buonanno et al. highlight five factors as being relevant toward the study of crime rates: demographic changes, incarceration rates, abortion rates, unemployment rates, and immigration figures. Within a demographic structure, for instance, Buonanno et al. argue that young males are more likely to commit a crime than women or seniors. For incarceration, they identify two effects – one effect is that the threat of incarceration deters individuals from committing crimes, and additionally, those who are incarcerated cannot commit more crimes while they are in prison. The authors posit that abortions may have removed from society individuals who would have been more likely to commit a crime due to potential socioeconomic conditions in their families. For individuals who are unemployed, the lack of resources available to them lowers the opportunity cost of committing a crime. Due to age structure and low socioeconomic factors, immigrants are also statistically more likely to commit a crime. Based on these assumptions, the model constructed by Buonanno et al. includes the five aforementioned factors in order to investigate their relevance as measures of poverty in the United States and Europe (Buonanno et al. 2011).

In order to implement these factors into a model, Buonanno et al. establish several assumptions regarding the variables. Crime is measured in three categories: total crime, property

crime, and violent crime. To categorize Europe as a whole, the study groups Austria, France, Germany, Italy, the Netherlands, Spain, and the United Kingdom together, since these seven nations account for more than eighty percent of the pre-2004 population (Buonanno et al. 2011). When constructing the equation for the model, one challenge the authors confront is the endogeneity of the variables. If the demographic structure of a population and the legalization of abortion, for instance, are exogenous with respect to crime, incarceration, unemployment, and immigration all have the potential to be endogenous. To account for this, the model utilizes several instrumental variables (IVs) to measure these factors. Amnesties and collective pardons serve as instruments to explain the relationship between incarceration and crime rates, the interaction between oil price and the share of manufacturing in GDP is an instrument for unemployment, and exogenous supply-push components are instruments immigration trends. Lastly, the model includes a measure of country fixed effects and common year dummy variables in order to ensure that the results are country and time specific. To calculate the results, the authors use OLS estimation, as well as 2SLS estimation for the IV analysis (Buonanno et al. 2011).

The resulting mathematical equation that the study estimates for its model is:

$$\ln(crime_{it}) = \alpha_i + \beta\ln(x_{it}) + td_i + \lambda_t + \varepsilon_{it}$$

where $crime_{it}$ represents the level of crime (total, property, or violent), α_i is a country-fixed effect, x_{it} contains explanatory variables for country i at time t (a constant, the share of males between 15 and 34 years old in the population, the immigration rate, the share of potential adults aborted, the unemployment rate, and the incarceration rate), t is a polynomial in time, d_i is a dummy variable for country, and λ_t is a dummy variable for common year (Buonanno et al. 2011). For the explanatory variables, the values for each variable is inserted individually in order to evaluate their respective coefficients. Because the natural logs of these variables are used, the resulting coefficients can be interpreted as elasticities with respect to the corresponding rates. In order to evaluate country-specific time trends, the model relies on a quartic trend to explain the independent variables, since quartic trends have been used in other empirical literature as the most effective method for explaining life cycles similar to those evaluated in the variables (Buonanno et al. 2011).

Buonanno et al. break down the resulting coefficients of the model into two categories: OLS estimates and IV estimates. The authors warn that one cannot regard the OLS estimates as causal effects due to the endogeneity of incarceration, immigrant, and unemployment with respect to crime. For demographic structure, the effect of age structure on crime is positive and statistically significant with most coefficients exceeding 1.5, whereas the coefficient on abortion is close to zero

(Buonanno et al. 2011). When speculating about potential sources of bias surrounding these coefficients, the authors identify the endogeneity of the other three variables as the primary potential source. When looking at the IV estimates, the authors first check the strength of the IVs used in order to evaluate whether or not they are appropriate instruments for the model. Amnesties are very strong as an instrument, with an F statistic that exceeds 10. In fact, during the first stage of the regressions, the estimates show that an amnesty on average reduces the incarceration rate by 13% (Buonanno et al. 2011). Conversely, the instruments constructed for unemployment and immigration are very weak; the authors are never able to reject the null hypothesis of weak instruments for these two variables. The IV estimates continue to uphold the assertion that demographic structure is a significant determinant for crime rates, while abortion rates are found as insignificant for explaining crime as found in the OLS estimates (Buonanno et al. 2011).

Upon evaluating the findings in the model created by Buonanno et al., several limitations stand out. With the use of instrumental variables throughout the model, narrowing down *how* the factors studied affect crime rates becomes difficult. The model highlights variables that are and are not relevant, but it does not provide deeper insight into the specific manner in which the relevant variables make a contribution to the crime rate beyond intuitive conjecture. Additionally, some of the instrumental variables are constructed using inconsistent methods of data evaluation. With immigration, for instance, because there is only data available starting from 1980, a large portion of data are lost for the years from 1970 to 1979 that cannot be found in this component of the model. Furthermore, a central limitation of the model is the choice of variables. While the five factors the authors choose to study are intuitively reasonable to include, they are by no means the only explanatory factors driving the current trends in crime. The authors are aware of the limitations of their model and acknowledge them openly before presenting their findings. They make it a point to "emphasize that we regard our empirical exercise as a starting point for further research rather than a conclusive word on an admittedly complicated question" (Buonanno et al. 2011). So while their model may not come to the in-depth, causal conclusions needed to prove a direct relationship, it never seeks to do this. Rather, it accomplishes its function of shedding light on further areas for explanation when evaluating the 'reversal of misfortunes.'

Since the model serves as the beginning of further study regarding crime trends, it is important to consider what extensions are possible for future analyses. Despite finding mixed results for the variables included, Buonanno et al. affirm that, of the variables included, demographic structure and incarceration rates are both significant toward evaluating crime rates. Breaking down

the segment of young men from ages 15 to 34 into smaller segments may narrow down analysis of crime rates even further to a more specific age group. For incarceration rates, amnesties serve as one explanatory instrument, but it is certainly not the only potential instrument to evaluate incarceration. Examining the proportion of prisons at maximum capacity rates of incarceration is a possible alternative angle from which to analyze the effect of incarceration on crime. Additionally, there are additional variables to consider beyond the five primary factors identified by Buonanno et al. Levels of education, for instance, would be a highly relevant factor to explore in future studies, since individuals who do not complete certain levels of education may have a higher potential to commit a crime. Additionally, policy incentives to deter individuals from committing a crime – for example, higher levels of probation, or the prevalence of the death penalty – seem appropriate to cite in further investigations.

In their concluding remarks regarding their model, Buonanno et al. posit several policy implications of their work. An important consideration to note is what can and cannot be heavily altered by a change in policy. Demographic structure, for instance, cannot easily be manipulated by new policies, with the exception of family planning laws similar to China's one-child policy to control the number of individuals in each age segment, which would be improbable legislation for the countries being studied. Factors including in the model such as immigration, incarceration, and abortion, however, are all easily influenced by policy. With the model concluding that abortion was not highly relevant to the reversal of misfortunes, as well as finding instruments for immigration to be weak, focus shifts toward analyzing incarceration. One theory that the authors explore is the notion that incarceration rates may not be set an efficient level, since incarceration is proven to be highly relevant toward reducing crime. Upon further investigation, however, the authors discard this hypothesis, finding that the marginal benefits exceed the marginal costs of incarceration, suggesting that imprisonment is fixed at an approximately efficient level (Buonanno et al. 2011). For variables to consider in the future, such as education or incentives to deter crime, if these variables were found to be highly relevant for predicting crime rates, the findings would highlight devoting resources toward increasing education and creating incentives against crime as strong solutions to lower crime rates.

In their study of crime rates between the United States and Europe, Buonanno et al. seek to identify the principal factors influencing the 'reversal of misfortunes' that has caused crime rates in Europe to exceed similar rates in the United States. The authors focus on demographic structures, immigration rates, unemployment figures, abortion rates, and levels of incarceration as the five main

factors to analyze in both the United States and Europe. Using OLS and IV estimations, the results show that demographic figures and incarceration rates are relevant variables for predicting crime levels, while abortion is an insignificant factor in their model. Based on the instrumental variables constructed, there is insufficient evidence to make conclusions regarding the relevance of immigration and unemployment as variables in the model. Though the findings presented in the model do not properly establish in-depth, causal effects regarding its variables and its outcomes, the study serves as a starting point for further postulation regarding appropriate policies that would mitigate the most prevalent determinants of crime.

References

Buonanno, Paolo, Francesco Drago, Roberto Galbiatim, and Guilio Zanalla, 2011, "Crime in Europe and in the US: dissecting the "reversal of misfortunes," unpublished ms.