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HOMICIDE RATES IN A CROSS-SECTION OF COUNTRIES: EVIDENCE AND INTERPRETATIONS

Julio H. Cole
Professor of Economics

Andrés Marroquín Gramajo
Professor of Economics

Universidad Francisco Marroquín – Guatemala

Abstract:

This paper uses a regression analysis to explore the cross-country variation in homicide rates for a large sample of countries. It starts by identifying seven significant regional dummy variables, to which traditional socio-economic, cultural, and institutional variables are added and tested. The importance of institutions, culture, and other factors affecting homicide rates are discussed. One unexpected finding is a curious relationship between the level of education and homicide rates: while an increase in male education tends to reduce homicide rates, an increase in female education tends to increase homicides. Several possible interpretations for this phenomenon are proposed. The study points to relatively unexplored areas of research in order to better understand homicide variation around the world.

Corresponding Author:

Dr. Andrés Marroquín Gramajo, andresmg@ufm.edu

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1. INTRODUCTION.

Although violent death has been declared a leading public health problem worldwide (Krug, Powell and Dahlberg 1998: 214), the rate of violent death—and particularly the homicide rate—varies a great deal from one country to another. This study examines the cross-country variation in homicide rates for a large sample of countries. We start by providing a descriptive summary of the data for 2002 (the most recent year for which data of wide coverage are available), stressing particularly the differences between seven major regions of the world. We then investigate to what extent this pattern of regional variation can be explained in terms of underlying socio-economic variables.

Following Reza, Mercy and Krug (2001), we define homicides as fatal injuries inflicted by another person with intent to injure or kill, by any means. Specifically, our study focuses on the W-158 category, "deaths caused by intentional injuries (violence)," in the WHO (2004b) tabulation.[1] This measure excludes self-inflicted deaths, as well as deaths resulting from civil wars, both of which are treated as separate categories in the WHO cause-of-death tables. (We purposely refrain from using the word "murders" in this study, since the data we use report only the cause of death, and there is no way of knowing, from this epidemiological classification scheme, what proportion of "violent deaths" actually involve criminal intent. It seems reasonable to assume, on the other hand, that in most countries most reported violent deaths are in fact crime-related, even though many homicides are not themselves crimes.[2]) The WHO tabulation of "Death Rates by Cause of Death" for 2002 covers 187 countries, with a mid-2002 population of 6.179 billion (i.e., 99.2 percent of the estimated world total). Thus, this source provides essentially complete coverage of cause-of-death data around the world.[3]

2. HOMICIDE RATES AROUND THE WORLD.

2.1. Some Descriptive Statistics.

Homicide rates vary, often by a wide margin, across time. As Gartner (1990: 92) indicates in her study of homicides in developed democracies:

> Homicide rates in western societies appear to have declined over the last several hundred years, but more recently, they experienced sharp, short-term upsurges in the early 19th century and in the last two decades (Gurr 1981). Even over relatively brief periods, the risk of violent death can vary greatly: homicide rates in developed democracies averaged 60 per cent higher in the late 1970s than in the late 1950s.

At any point in time the homicide rate also varies greatly across countries. Moreover, the distribution of countries by homicide rates is highly skewed: a few countries have very high homicide rates, while most countries have relatively low rates. Figure 1 shows the frequency distribution of countries according to their homicide rates (per 100,000 pop.) in 2002:

********** INSERT FIGURE 1 ABOUT HERE **********

The unweighted mean for 187 countries was 9.38 per 100,000. Weighting by population yields an essentially similar number: 9.08 per 100,000. For comparison, Reza, Mercy and Krug (2001) found that in 1990 the world average homicide rate was 10.5 per 100,000. As noted above, most countries have low homicide rates—half have under 5.7 per 100,000—but the world average is boosted upward by a relatively few countries with very high rates.[4] Indeed, in 2002 just over half of all homicides in the world (52.6 percent) were accounted for by the 25 countries (comprising a total population of 970.8 million) with rates above 20 per 100,000 (i.e., over twice the world average). The (weighted) average homicide rate for these 25 countries was 30.3 per 100,000, over three times the world average.[5]

2.2. Regional Variation.

There is a very marked degree of regional variation in worldwide homicide rates. This can be appreciated by comparing averages for countries grouped along geographic and/or socio-economic lines. For this purpose, we follow the regional groupings used by Reza, Mercy and Krug (2001), who classified countries into six categories:

1. EME = Established Market Economies
2. FSE = Formerly Socialist Economies
3. MEC = Middle East Crescent
4. OAI = Other Asia and Islands[6]
5. SSA = Sub-Saharan Africa
6. LAC = Latin America and the Caribbean.

This is a useful classification, although we found it convenient to disaggregate the LAC countries into two distinct categories:

6a. LA = Spanish- and Portuguese-speaking countries of the Western Hemisphere
6b. CAR = English-, French- and Dutch-speaking countries of the Caribbean.

The reason for this separation is that these two groups of countries, though geographically close, have markedly different homicide rates. Appendix 1 lists the countries in each of the seven regional groups and their homicide rates.

Table 1 reports both weighted (by total population) and unweighted average homicide rates and other summary statistics for each regional grouping. For most regions the population-weighted averages and the simple, unweighted averages are closely similar. The exception is the Formerly Socialist Economies (FSE) group, in which the weighted average is affected by the Russian Federation, which has both a large population and an exceptionally high homicide rate.

********** INSERT TABLE 1 ABOUT HERE **********

Homicide rates in Latin American and Sub-Saharan African countries tend to be much higher than in the rest of the world. Note that most of the 25 countries with over half of all homicides in the world (listed in Note 5) are from these two regions. Homicide rates in the

developed countries (the EME group) and in the Middle East Crescent, on the other hand, are much lower than the world average. As a group, the FSE region is above the world average, though, as noted, this is largely the effect of a single large country. If Russia is excluded, the average homicide rate for that region is slightly below the world average.

********** INSERT TABLE 2 ABOUT HERE **********

Another way to summarize these results is to compute a regression of homicide rates on regional dummies (Table 2, Panel A). In this regression, EME, FSE, MEC, OAI, SSA, LA and CAR are dummy variables (= 1 if the country belongs to the corresponding region, = 0 otherwise) so, by construction, the estimated regression coefficients equal the (unweighted) averages for each region. As noted, the Sub-Saharan Africa (SSA) and Latin America (LA) regions are well above the world average, while the Established Market Economies (EME) and Middle Eastern Crescent (MEC) regions are well below the world average. The FSE, OAI and CAR regions are not significantly different from one another.[7]

Given the highly skewed nature of the dependent variable, it is useful to check if these results are driven by a few extreme values in some of the regional groupings. The regression was therefore repeated using the natural logarithm of the homicide rate as the dependent variable. (A visual inspection of the histogram for the logarithm of the homicide rate shows a fairly symmetric and roughly bell-shaped distribution.) The results are shown in Table 2 (Panel B). The interpretation is analogous to the previous regression, although now each estimated coefficient equals the logarithm of the *geometric* average of the homicide rates for each region. (For example, the coefficient on the FSE dummy is 1.496, and $e^{1.496} = 4.46$, which is the geometric average homicide rate for that group of countries, and similarly for each of the other regional dummies.) Geometric averages are much less sensitive to extreme values, so any observed differences in this regression are much less likely to merely reflect the influence of a few outliers in some regions. *Mutatis mutandis*, the results for Panel B are in fact qualitatively similar to those for Panel A: the EME and MEC regions have lower than average homicide rates, while the SSA and LA regions are well above the world average. The FSE, OAI and CAR regions are not significantly different from one another.[8]

Of course, there is no numerical difference between measuring the regional effects this way and computing the regional averages directly as in Table 1. The point to note about these regressions, however, is that they "explain" about 32 per cent of the cross-country variation in homicide rates—and about 50 per cent of the variation in the logarithm of the homicide rate—using only the regional dummies. One major purpose of this study, then, will be to examine the extent to which this "region effect" can be explained in terms of variation in underlying socio-economic variables (i.e., how much of the region effect persists after controlling for other, more fundamental variables).

3. Empirical Correlates of Violence – Literature Review.

There is a vast social science literature on factors affecting levels of lethal violence, and many different variables have been found to be correlated with homicide at the macro-level.

Many of these variables relate to ongoing debates within the field of criminology. (For reviews of the theoretical literature on macro-level predictors of homicide see Neuman and Berger 1988; Land, McCall and Cohen 1990; Pridemore 2002; Neumayer 2003: 620-623; and Pratt and Cullen 2005.) We are not interested in taking sides in these debates, so we focus mainly on the empirical literature in order to identify the socio-economic variables that are most commonly associated with homicide rates in cross-national studies. Each of these variables finds support in at least some studies, but there is far from a uniform consensus.

3.1. Age Structure.

It is well known that young males, in the age range between 15 and 29, are more likely that other age groups and than females to be engaged in crime in general, and in violent activities in particular (Wolfgang 1968; Hirschi and Gottfredson 1983; Wilson and Herrnstein 1985: 126-147). The *victims* of homicide are also predominantly young male adults (Fingerhut and Kleinman 1990; Reza, Mercy and Krug 2001). Therefore an increase in the proportion of young males in the population is expected, other things equal, to elevate the homicide rate. Plausible as this notion may seem, it actually finds little support in cross-national studies. Gartner and Parker (1990) and Pampel and Gartner (1995) argue that this effect holds in some countries, such as the United States, but that it cannot easily be generalized across all countries, since it is context-specific: the presence or absence of certain types of institutional arrangements will mitigate or strengthen the age-effect on homicides in any given country. Differences in cultural norms regarding alcohol-consumption and firearms possession (see below) are almost surely a factor as well.

3.2. Urbanization.

Urbanization has also been linked with criminality (Wilson and Hernnstein 1985: 411, 430-431, 444-46; Fajnzylber, Lederman and Loayza 2002: 26), although it is not clear that it necessarily has a strong effect on homicide *per se* (with the exception, perhaps, of homicides that are incidental to property crimes). It is expected that a high level of urbanization, which goes hand in hand with rural-to-urban migration, especially in developing countries, leads to a more intense competition for resources in overcrowded cities, characterized by high unemployment and urban poverty. Rising criminality within the context of the greater anonymity provided by urban settings might result from such social changes. As Wilson and Herrnstein put it: “A migrant from the countryside with any preexisting tendency to commit crime will find the tendency strengthened when the risk of recognition is slight, and where he finds property owned by people he does not know” (1985: 445). These latter considerations also suggest that the active factor might not be the level of urbanization itself, but *rising* urbanization. Thus, in our regression analysis below we consider both the level and the change in urbanization as possible explanatory variables.

3.3. Income Inequality and Poverty.

Income inequality has received much attention in the literature on crime and homicide. Some important studies find a positive correlation between income inequality, as measured

by the Gini coefficient, and violent crime rates (Krohn 1976; Krahn, Hartnagel and Gartrell 1986; Bourguignon 2001; Fajnzylber, Lederman and Loayza 2002), although others do not find a strong correlation (Neumayer 2005). Wilson and Herrnstein note that the effect of inequality may be enhanced by urbanization: "Wealth tends to be accumulated unequally, and to those not possessing it, it may seem … inequitable as well as unequal. The contrast between the haves and have-nots becomes more, not less, palpable, the theory says, as affluence grows, if people are separated by wider gaps in wealth, especially if they live side by side in cities" (1985: 446).

The connection between inequality and violence has often been explained in terms of the so-called "relative deprivation theory of homicide," according to which "aggression is held to be spurred by a sense of frustration and relative poverty" (MacKellar 2003: 498). Other studies argue, however, that it is not inequality as such (relative deprivation), but *poverty* (absolute deprivation) that is the driving factor. Pridemore (2008), for instance, notes that most studies based on United States data find a significant relationship between poverty and homicide rates, but that cross-national studies rarely consider this variable, focusing instead on inequality. This is largely due to lack of internationally comparable poverty measures. He proposes the use of infant mortality rates as a proxy for poverty, and finds that once poverty is controlled for, the effect of inequality disappears. His study, however, is based on a sample of only 46 countries. One of our objectives in this study is to replicate this analysis for a larger sample of countries.

3.4. Population density.

Although the relationship between population density and homicide rates has never been the main focus of a cross-national empirical study, this variable is often included as a control variable in studies focused on other explanatory variables (see, for instance, Hansmann and Quigley 1982; Avison and Loring 1986; Neumayer 2003). It has been suggested that "high density can highlight inequalities and can provide more opportunities for crime (Gillis, 1974). It may make distinctions between rich and poor more visible and so generate conflict. It might also increase contact between individuals and thus increase the likelihood of interpersonal violence" (Krahn, Hartnagel and Gartrell 1986: 287). This seems plausible, although Neuman and Berger (1988: 294) note that "[m]ost theorists expect high density to be associated with high crime rates, but low crime rates are found in both high and low density societies." Thus the effect of population density is ambiguous, at best. We will nonetheless include this variable in order the see if it has an effect on homicides in our sample of countries.

3.5. Ethno-linguistic and religious heterogeneity.

It is frequently argued that a high degree of heterogeneity within a society is conducive to conflict, and that the interaction of heterogeneous social groups tends to increase the homicide rate (Hansmann and Quigley 1982; Avison and Loring 1986). (Often it is the converse argument that is proposed, namely that relatively homogenous societies tend to be *less* conflict-prone.) It has also been suggested that ethnic diversity can bring conflict because of political competition, since in a fragmented society it might be particularly

difficult to agree on the amount and kind of public goods the government should provide, and that ethnic differences can lead to conflict when public policies benefit some groups at the expense of others (Easterly and Levine 1997). Most recent cross-country studies of the effects of ethnic diversity have been based on the so-called "ethno-linguistic fractionalization" (ELF) index, which was compiled by Russian scholars in the 1960s, and updated in the 1980s (see Roeder 2001). This index is interpreted as the probability that two randomly selected individuals in any given country will correspond to different ethno-linguistic groups. One problem with this index is that it conflates two different types of heterogeneity, linguistic and ethnic, that might not induce conflict to the same degree. In fact, it has been suggested that as far as homicides are concerned they might even have opposite effects (Hansmann and Quigley 1982: 215). To overcome these difficulties, Alesina *et al*. (2003) recently compiled a database of measures of heterogeneity for a large number of countries along three dimensions: ethnic, linguistic and religious. We use this data source to examine the effect of these three types of heterogeneity on homicide rates in our sample of countries.

3.6. Education.

As in the case of population density, education has also been used mainly as a control variable, rather than as the main focus of analysis. Education can be related with homicides in several ways. Low education among poorer sectors of society might lead to high unemployment and to poverty-related crimes and homicides. Fajnzylber, Lederman and Loayza (2002) found that educational attainment, as measured by the Barro and Lee (2001) dataset, has a negative and significant effect on homicides. They also used an index of education inequality and found that it does not affect homicides, although it has an effect on robberies. Pridemore (2008) uses the education component of the Human Development Index as a control variable to explain variation in homicide rates, and Macmillan and Gartner (1999) use an education attainment index to explain spousal violence against women. In their meta-analysis of quantitative criminological research from 1960 to 1999, Pratt and Cullen (2005) also examined the effect of education on crime, and found that this effect was rather weak.

Given the well-known gender patterns in homicide rates, it is perhaps surprising that past studies have never considered the possibility that male and female education might differ in their effect. One of our objectives is to examine whether there is a gender effect in the relationship between education and homicide rates.

3.7. Governance indicators.

In a well-functioning social system, efficient institutional mechanisms will both help to prevent crimes and prosecute them effectively when they occur. The quality of a country's government institutions should therefore have some relevance for crime rates. Over the past several years, a major research project at the World Bank has been developing an internationally comparable "World Governance Indicator" (see Kaufmann, Kraay and Mastruzzi 2008, for an up to date description of this project and the results achieved so far). Several components of this indicator—such as the "rule of law," "political stability," and

"control of corruption" components—might be correlated with the level of crime and homicides. For example, one would expect that an effective judiciary system (which includes effective criminal prosecution and certainty in punishment) might provide a deterrent effect and therefore contribute to lower rates of criminality in general. In addition, an effective court system provides an alternative to violence for conflict resolution, and it has been suggested that this explains the long-run historical decline of homicide rates in European countries. LaFree (2005: 193, citing Johnson and Monkkonen 1996), writes, "as disputes were increasingly resolved in courts rather than on street corners and in bars, violent crime rates declined." Countries with weak justice systems, in contrast, would be expected to have relatively higher levels of violence.

Other factors often mentioned in the empirical literature are the prevalence of firearms possession, and the consumption of alcohol (Killias 1993; Krug, Powell and Dahlberg 1998; Lester 1995; Parker and Cartmill 1998; Rossow 2001). Divorce has also been linked to homicides. Williams and Flewelling (1988), for instance, found that cities with high divorce rates have significantly higher rates of both family and non-family homicides, while Gartner (1990) found that rates of divorce are correlated with homicide rates, but only for a certain age-range of victims. It would be difficult to incorporate such factors in this study, however, given the lack of reliable and comparable data for a large enough sample of countries, although we revisit some of these factors when we interpret the empirical results obtained.

4. Regression Analysis.

Regressions of the logarithm of the homicide rate on the socio-economic variables described above are reported in Table 3. The analysis is based on 91 countries for which data were available for all of the variables in Regression 1 (see Appendix 2 for data sources and for the list of countries). Thus, because of data limitations our original sample of 187 countries is essentially cut in half. On the other hand, the 91 countries in the reduced sample had a combined population of 5.2 billion in 2002 (83 per cent of the world total), and their homicide rates per 100,000 were fairly similar to rates for the world as a whole, as indicated by the following comparison:

	Average			Standard		
	Weighted	Unweighted	Median	Deviation	Max	Min
Sample (N = 91)	8.12	9.89	6.2	12.28	72.4	0.5
World (N = 187)	9.08	9.38	5.7	10.61	72.4	0.2

The summary statistics for the reduced sample are quite similar to those for the full 187 countries, so we feel confident that a regression analysis based on this cross-section of

countries will not suffer from sample-selection bias.

Regression 1 includes the following explanatory variables:

Young men = Males aged 15 to 29, as percent of total population (2002).

Income distribution = Gini coefficient (2002, or nearest available year), measured on a scale from 0 (lowest inequality) to 100 (highest inequality).

Infant mortality = Number of deaths among children under one year of age per 1000 live births, 2000.[9]

Urbanization = Urban population as percent of total population (2002).

Change in Urbanization (1980-2002) = Change in the percent of urban population between 1980 and 2002.

Population density = Number of inhabitants per square km (2002).

ELF = Index of ethno-linguistic fractionalization, a number ranging from 0 (totally homogeneous population) to 1 (totally heterogeneous population), for 1985.[10]

Male schooling = Average years of schooling for the male population aged 15 and over, in 2000.[11]

Female schooling = Average years of schooling for the female population aged 15 and over, in 2000.

WGI = World Governance Indicator, a number ranging from –2.5 (lowest possible quality of governance) to +2.5 (best possible governance), in 2002.[12]

********** INSERT TABLE 3 ABOUT HERE **********

Interestingly, most of the "usual suspects"—proportion of young males, poverty (as proxied by the infant mortality rate), level and/or change in urbanization, population density—are not statistically significant.[13] The main exception is the Gini index, which suggests (*pace* Pridemore 2008) that, in the inequality versus poverty debate, it is inequality that is the driving factor. It should be noted, however, that the effect of this variable, although statistically significant by conventional standards, is in fact quite small. Recall that in our data the Gini index is measured on a scale from 0 to 100. Thus, according to the regression estimate, a one point increase in inequality would increase the homicide rate by about 2.4 per cent. It would take a 10 point increase in the Gini index (say, from 30 to 40, a very large change) to increase the homicide rate by about 24 per cent. This is not a large effect.

On the other hand, two variables not often stressed in the empirical literature, ethno-

linguistic fractionalization and the quality of governance, are both highly significant and with the expected signs. The schooling variables are also significant, and the results suggest that the higher the average years of schooling for males, the lower the homicide rate. A seemingly aberrant finding, however, is the direction of the effect for female schooling: the higher the average years of schooling for women, these data would suggest, the *higher* the rate of homicides per 100,000 inhabitants.

Regression 2 experiments with disaggregating the ethno-linguistic fractionalization measure, using data from the Alesina *et al*. (2003) database:

Ethnic = Index of ethnic heterogeneity

Language = Index of linguistic heterogeneity

Religion = Index of religious heterogeneity

These three heterogeneity indexes are similar to the ELF index: they are interpreted as the probability that two randomly selected individuals in any given country will correspond to different ethnic, linguistic or religious groups, and they are all measured as numbers ranging from 0 (totally homogeneous population) to 1 (totally heterogeneous population).

Three observations are lost because values for the linguistic variable for El Salvador, Haiti and Rwanda are missing. Although the coefficients for the other variables are quite similar to the results for Regression 1, the explanatory power is somewhat lower, and only the ethnic index approaches the margin of 5 % significance. If the linguistic and religious indexes are dropped (Regression 3), the ethnic index is highly significant, and its coefficient is comparable to that of the ELF index in Regression 1. This seems to suggest that ethnic diversity, not linguistic diversity, is the driving factor. However, the explanatory power of Regression 3 is somewhat lower than for Regression 1, so ELF must add something that is not reflected in the ethnic variable. This can be seen clearly in Regression 4, which includes both variables, of which only the ELF index is significant. Thus, the ELF index apparently captures all of the information contained in the ethnic variable, plus some additional interactions between ethnic and linguistic diversity that are not reflected in the ethnic variable alone. It may well be that the ethno-linguistic fractionalization index, which conflates ethnic and linguistic differences, is on the right track after all. The coefficients for the other variables are practically identical to those for Regression 1.

The purpose of Regression 5 is to see whether Regression 1 adequately captures the regional variation in homicide rates. To the list of regressors in Regression 1 it adds the dummy variables for six of the regions defined in Table 2 (the reference point for the regional dummies is the Established Market Economies region, which has the lowest average homicide rate). With regard to the non-dummy regressors, the main difference between Regressions 1 and 5 is that income distribution is no longer significant. None of the regional dummies is individually significant, which suggests that most of the regional variation is in fact reflected in Regression 1. However, the addition of the regional dummies significantly increases the adjusted R-square in Regression 5, indicating that

some residual regional variation remains unaccounted for by Regression 1. The coefficients on the regional dummies indicate that this effect is likely coming from Latin America.

Regression 6 drops all non-significant regressors, but retains the Latin America dummy. In this regression all of the variables are statistically significant at the 1 percent level of confidence. The regression indicates that four basic variables—ethno-linguistic fractionalization (ELF), average years of schooling (both male and female), and the World Governance Index (WGI)—plus one regional dummy variable (Latin America) explain practically 70 per cent of the variation in the logarithm of the homicide rate in the sample of 91 countries. The following results stand out:

a) The Latin America dummy remains statistically significant, with a positive effect on the dependent variable. This means that, other things equal, countries located in Latin America tend to have homicide rates that are, on average, roughly twice as high as those in similar countries located outside this region ($e^{0.7133} = 2.041$) (see Halvorsen and Palmquist 1980 on the interpretation of dummy variables in semi-logarithmic regressions). Recall from Table 1 that average homicide rates in Latin America are in fact roughly twice the world average.

b) An increase in the ELF index from 0 to 1 (i.e., the difference between a totally homogeneous population and a totally fragmented one) implies a roughly 250 per cent increase in the average homicide rate ($e^{1.2607} = 3.528$).

c) Other things equal, an increase of one year in the average level of male schooling *reduces* the homicide rate by about 29 percent, whereas an increase of one year in the level of *female* schooling *increases* the homicide rate by about 26 percent. This result, if correct, should be kept in proper perspective. Note that the negative coefficient on male schooling is larger, in absolute value, than the positive coefficient on female schooling. Thus, if both male and female schooling increase by about the same amount, then the net effect is a slight decrease in the homicide rate. An increase in homicide rates associated with more female education would show up if women's schooling increased at a significantly greater rate than male schooling. (This would be the case in a country where educational attainment for females traditionally lagged behind male educational attainment, and were to suddenly catch up. It seems intuitively plausible that a social transition of this sort might create significant maladjustments, at least in some cultures. We return to this point in the following section.) We should also mention that the opposite direction of the effects of male and female education is quite robust, since it does not depend on the particular measure of education that is used. Indeed, we find the same effect in Regression 7, which uses literacy rates as the measure of education. Data on male and female literacy rates are from the *World Development Indicators* (World Bank), and are measured as percentages. Years of schooling is a better measure of educational *attainment*, since literacy rates only indicate the proportion of the population that has achieved a given *minimum* level of education. In any case, both *female literacy rates* and *female years of schooling* are positively and significantly correlated with homicide rates.

d) A one point increase in the World Governance Index reduces the average homicide rate by about 74 percent. The WGI is defined over a range from –2.5 to +2.5, with countries with "average" governance having a rating of 0. Therefore, other things equal, countries at the extreme low end of this range (worst possible governance) would be expected to have a homicide rate about 6 times higher than a country with "average" governance ($e^{-0.7377\times(-2.5)} = 6.323$), while a country at the high end of this range (best possible governance) would have a homicide rate about 6 times *lower* than a country with average governance ($e^{-0.7377\times2.5} = 1/6.323 = 0.158$).

5. Summary and Analysis of Main Results.

5.1. Relative Unimportance of Conventional Social Variables.

Most of the variables commonly thought to influence country-level homicide rates according to the social science literature (income inequality, proportion of young males, urbanization, and population density) are not statistically significant in our study. This suggests that past cross-country studies might have omitted important explanatory variables. The present analysis suggests that such variables include ethno-linguistic heterogeneity, the *separate* effects of male and female education, the quality of governance, and some cultural or institutional factors that are related to one main region (Latin America).

5.2. Role of ethno-linguistic heterogeneity.

Although there is a growing consensus that the interaction of heterogeneous social groups within countries often tends to promote conflict and associated social pathologies, there is no consensus on how population heterogeneity should be measured. The ethno-linguistic fractionalization index (ELF) has been used for this purpose, though it has been criticized on the grounds that its conflation of ethnic and linguistic diversity is unwarranted. In this study we tested the old ELF index and compared it to separate measures of ethnic, linguistic and religious diversity drawn from a new database for a large sample of countries. Among other things, we find that religious diversity appears to have no effect on homicide rates, but ethno-linguistic diversity tends to increase the homicide rate. In addition, we find that the original ELF index is a much better predictor of homicide rates than the ethnic and linguistic measures considered separately.

5.3. Importance of Institutions.

In this study we conceptualized institutions mainly by the degree of good governance as defined by the World Bank Governance index. This variable was found to be a highly significant predictor of homicide rates. Quality of government, law enforcement, and political stability appear to be critical factors in understanding the observed variation in homicide rates around the world.

5.4. Unexpected Results for Female Education – Possible Interpretations.

At first glance, the unexpected result for female education is counterintuitive. Nevertheless, it is possible to propose plausible hypotheses that can explain this result.[14]

(1) One might expect that as women become more educated, larger proportions of them leave home for work and, as a consequence, devote less time to early childrearing. This early neglect might have adverse effects among offspring later in life. The positive effect of female education on homicide rates might also be traced through a different route: higher female education leads to more women participating in the labor market, leaving more children vulnerable to violence at home. Gartner (1990: 101) remarks that the "strongest effects of the shift away from nuclear family-based activities appear among children. The greater the ratio of women in the labor force to households, the greater the rates of child homicide, a result also found by Fiala and LaFree (1988)."

(2) As women become more competitive in the job market, one consequence might be higher levels of male unemployment and/or lower real wages (particularly among less skilled male workers), which in turn might lead to more crime in general. One study that supports this view is Kapuscinski, Braithewaite, and Chapman (1998), who found that female employment is a significant determinant of homicides in Australia (see especially their Figure 2, on p. 230). More recently, Hansen (2006: 1–2) also found that rising female employment is positively associated with crime in England and Wales, and argues that this is because (i) increased female employment lowers wages as a result of the increased supply of labor, (ii) low wages and crime are known to be related, and (iii) "because women tend to have less labour market experience than men, or because they are discriminated against, they tend to enter the job market lower down the earnings distribution, putting downward wage pressure on males in lower skilled jobs who are more likely to be on the margins of crime."

(3) It is well-known that a higher level of female education delays the average age at which females get married. Accordingly, this also delays the average age at which males get married. Thus, as female education increases, more young men remain single for a longer period of time (and precisely at the ages at which they are most prone to engage in criminal activities). Hence one would expect that, keeping other factors constant, a higher proportion of relatively young single males increases the likelihood of occurrence of illegal activities that might lead to crime and homicides. Colloquially, one could say that marriage domesticates males and makes them less violent. In the absence of this domestication, males tend to have more risky lifestyles, and, among other social pathologies, homicides are more likely to occur. (Akerlof 1998 provides a detailed discussion of behavioral differences between married and unmarried men.)

(4) Some men tend to be intimidated by highly educated women. In such cases, an increase in the general level of female education might increase the general level of male insecurity in society, which might tend to increase male violence. Macmillan and Gartner (1999) propose a slightly different hypothesis, noting that women who work are at less risk of spousal violence when their male partners are also employed, but that they are at substantially greater risk when the male partner is unemployed. Hansen (2006: 23) makes a similar claim: " … increasing male crime is an attempt by men to reassert their masculinity,

to reclaim their status and power and reaffirm their role as breadwinner and provider. This was once achieved in the workplace, but is now challenged by the rising number of females entering employment."

These four hypotheses are not mutually exclusive, and they might all be part of the explanation for our finding that female education increases the homicide rate. (On the other hand, they might all be wrong as well.) Note also that any explanation for this phenomenon must be consistent with the stylized facts regarding gender patterns in homicides. Most homicides are committed by men, and most victims of homicide also are men, so any tenable explanation must be in terms of the effect that female education has upon male-on-male violence. Hypotheses (2), (3) and (4) are consistent with this requirement. The first hypothesis, on the other hand, would have to explain, in addition, why a lesser degree of maternal investment in childrearing could affect male children more than female.

5.5. Latin America dummy.

There is clearly something special about homicide rates in this region of the world. One element that probably contributes to high levels of violence in Latin America is the "alcohol culture." Latin America is the region with the second highest alcohol consumption per capita (WHO 2004a). Granted, it is even higher in Europe, but good governance probably mitigates the effect of high alcohol consumption there.

There is evidence that homicide rates generally tend to increase in countries that have experienced periods of civil war. Collier and Hoeffler (2004: 11) argue that this is due to a combination of several factors: a large stock of guns in the hands of the civilian population, the sudden demobilization of many violent men into civil society, and "a legacy of scores to be settled across the society, and reduced inhibitions about settling them through violence." Homicidal violence in some Latin American countries might therefore be partly explained by the experience of long-lasting and intense civil wars during the second half of the twentieth century—for example, Colombia (since *La Violencia* in 1948), El Salvador (1979-92), Guatemala (1968-96), Nicaragua (1981-88), and Peru (1981-95).[15] The prevalence of civil wars in the recent past has also created a "culture of violence," where people in society accept and approve of violence to defend themselves and to solve disputes.[16]

Circumstances have not improved since 2002. Indeed, violence has increased in some Central American countries, with the emergence of large organized street gangs known as *maras* (for an analysis of this phenomenon see Pinheiro 2007). Nor do our data reflect the recent upsurge in drug-related violence in Mexico, which by some accounts has reached the level of a civil war (González 2009).

6. CONCLUSIONS.

Our initial goal was to explain the cross-country variation of homicide rates in a large sample of countries, using data for the most recent year for which suitable data were available. We showed that regional dummies can explain a large proportion of this

variation, and our challenge became to include socio-economic variables that have been proposed in the literature, in order to account for the regional effects. We found that socio-economic variables do indeed explain most of the regional effects, with the exception of the Latin America dummy.

One major finding was that countries with high levels of cultural and ethnic heterogeneity tend to have relatively higher homicide rates. On the other hand, countries with a high ranking on the World Bank's quality of governance indicator tend to have lower rates. In short, "culture matters," but so do institutions.

Education was also found to be significantly associated with homicide rates, and to the best of our knowledge this is the first study that separates male and female education as explanatory variables. Our most novel (and unexpected) finding was that female education appears to increase the homicide rate. This finding, on which sociological, economic, demographic and psychological hypotheses may shed some light, deserves further scrutiny.

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APPENDIX 1. COUNTRIES BY REGIONAL GROUP, WITH HOMICIDE RATES PER 100,000 INHABITANTS (2002).

ESTABLISHED MARKET ECONOMIES (EME)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Andorra	ADO	0.9	1	0.1
Australia	AUS	1.5	285	19.7
Austria	AUT	0.9	75	8.1
Belgium	BEL	1.7	173	10.3
Canada	CAN	1.5	456	31.4
Denmark	DNK	1.0	56	5.4
Finland	FIN	3.2	166	5.2
France	FRA	0.7	407	59.6
Germany	DEU	0.7	594	82.5
Greece	GRC	1.2	130	11.0
Iceland	ISL	0.6	2	0.3
Ireland	IRL	1.0	39	3.9
Italy	ITA	1.1	628	57.2
Japan	JPN	0.6	785	127.4
Luxembourg	LUX	1.7	8	0.4
Monaco	MCO	1.0	0	0.03
Netherlands	NLD	1.1	181	16.1
New Zealand	NZL	1.2	48	3.9
Norway	NOR	1.1	50	4.5
Portugal	PRT	1.4	143	10.4
Spain	ESP	1.0	423	41.3
Sweden	SWE	1.0	92	8.9
Switzerland	CHE	0.9	67	7.3
United Kingdom	GBR	1.1	631	59.3
United States	USA	5.4	15569	288.1
Sub-totals		2.44	21,009	862.4

FORMERLY SOCIALIST ECONOMIES (FSE)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Albania	ALB	6.0	184	3.1
Belarus	BLR	13.0	1291	9.9
Bosnia and Herzegovina	BIH	2.0	76	3.7
Bulgaria	BGR	3.0	235	7.9
Croatia	HRV	1.9	86	4.4
Czech Republic	CZE	1.3	135	10.2
Estonia	EST	15.4	210	1.4
Hungary	HUN	2.4	243	10.2
Latvia	LVA	12.6	295	2.3
Lithuania	LTU	10.7	370	3.5
Macedonia, FYR	MKD	3.0	61	2.0
Moldova	MDA	12.3	496	4.0
Poland	POL	1.8	683	38.2
Romania	ROM	3.6	788	21.8
Russian Federation	RUS	32.9	47862	145.3
Serbia	SRB	1.8	136	7.5
Slovak Republic	SVK	2.2	119	5.4
Slovenia	SVN	0.8	16	2.0
Ukraine	UKR	15.5	7448	48.2
Sub-totals		18.34	60,736	331.1

MIDDLE EAST CRESCENT (MEC)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Afghanistan	AFG	4.0	485	12.1
Algeria	DZA	12.0	3763	31.4
Armenia	ARM	3.7	111	3.1
Azerbaijan	AZE	2.9	240	8.2
Bahrain	BHR	1.1	7	0.7
Cyprus	CYP	0.2	2	0.7
Egypt, Arab Rep.	EGY	1.2	796	69.0
Georgia	GEO	3.8	175	4.6
Iran, Islamic Rep.	IRN	3.8	2522	66.0
Iraq	IRQ	2.9	706	24.4
Israel	ISR	0.7	47	6.6
Jordan	JOR	2.9	148	5.0
Kazakhstan	KAZ	19.7	2921	14.9
Kuwait	KWT	1.4	32	2.3
Kyrgyz Republic	KGZ	8.9	442	5.0
Lebanon	LBN	2.6	99	3.9
Libya	LBY	2.5	142	5.6
Malta	MLT	1.5	6	0.4
Morocco	MAR	1.1	322	29.2
Oman	OMN	2.1	51	2.4
Pakistan	PAK	3.7	5330	144.9
Qatar	QAT	1.1	8	0.7
Saudi Arabia	SAU	3.0	641	21.6
Syrian Arab Republic	SYR	2.7	469	17.4
Tajikistan	TJK	6.4	404	6.3
Tunisia	TUN	1.9	189	9.8
Turkey	TUR	3.4	2382	69.6
Turkmenistan	TKM	10.2	471	4.6
United Arab Emirates	ARE	1.0	35	3.6
Uzbekistan	UZB	3.7	935	25.3
Yemen, Rep.	YEM	2.1	414	19.3
Sub-totals		3.93	24,295	618.6

OTHER ASIA AND ISLANDS (OAI)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Bangladesh	BGD	7.4	10751	144.9
Bhutan	BTN	4.4	26	0.6
Brunei Darussalam	BRN	1.4	5	0.3
Cambodia	KHM	17.1	2266	13.3
China	CHN	3.0	38184	1280.4
Fiji	FJI	0.9	7	0.8
India	IND	5.5	57390	1048.6
Indonesia	IDN	9.4	20001	211.8
Kiribati	KIR	6.5	6	0.1
Korea, Dem. Rep.	PRK	19.5	4541	23.3
Korea, Rep.	KOR	1.8	880	47.6
Lao PDR	LAO	5.7	309	5.4
Malaysia	MYS	8.7	2109	24.3
Maldives	MDV	7.1	20	0.3
Marshall Islands	MHL	1.8	1	0.1
Mauritius	MUS	2.6	31	1.2
Micronesia, Fed. Sts.	FSM	1.5	2	0.1
Mongolia	MNG	3.5	87	2.4
Myanmar	MMR	16.7	7799	46.8
Nepal	NPL	14.8	3784	25.5
Palau	PLW	1.0	0	0.02
Papua New Guinea	PNG	15.6	885	5.7
Philippines	PHL	21.1	16762	79.5
Samoa	WSM	1.1	2	0.2
Seychelles	SYC	3.7	3	0.1
Singapore	SGP	0.8	35	4.2
Solomon Islands	SLB	2.1	9	0.4
Sri Lanka	LKA	7.9	1504	19.0
Thailand	THA	9.4	5795	61.7
Timor-Leste	TMP	17.6	146	0.8
Tonga	TON	0.7	1	0.1
Vanuatu	VUT	1.3	3	0.2
Vietnam	VNM	4.2	3350	79.7
Sub-totals		5.65	176,692	3,129.4

SUB-SAHARAN AFRICA (SSA)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Angola	AGO	39.6	5831	14.7
Benin	BEN	10.0	774	7.7
Botswana	BWA	6.2	110	1.8
Burkina Faso	BFA	13.1	1663	12.7
Burundi	BDI	18.0	1270	7.0
Cameroon	CMR	10.8	1792	16.6
Cape Verde	CPV	2.2	10	0.5
Central African Republic	CAF	23.5	940	4.0
Chad	TCD	11.6	1059	9.1
Comoros	COM	7.5	42	0.6
Congo, Dem. Rep.	ZAR	21.3	11398	53.5
Congo, Rep.	COG	16.2	545	3.4
Cote d'Ivoire	CIV	27.4	4846	17.7
Djibouti	DJI	3.5	27	0.8
Equatorial Guinea	GNQ	13.0	59	0.5
Eritrea	ERI	7.6	306	4.0
Ethiopia	ETH	20.5	14294	69.6
Gabon	GAB	9.3	114	1.2
Gambia	GMB	10.0	148	1.5
Ghana	GHA	9.2	1942	21.1
Guinea	GIN	23.8	2030	8.5
Guinea-Bissau	GNB	12.1	176	1.5
Kenya	KEN	14.9	4907	32.9
Lesotho	LSO	7.5	145	1.9
Liberia	LBR	32.8	1067	3.2
Madagascar	MDG	9.9	1697	17.1
Malawi	MWI	8.9	1088	12.3
Mali	MLI	12.7	1350	10.6
Mauritania	MRT	12.8	348	2.7
Mozambique	MOZ	8.8	1682	19.1
Namibia	NAM	27.0	525	1.9
Niger	NER	14.2	1699	11.9
Nigeria	NGA	23.1	30294	131.3
Rwanda	RWA	20.0	1750	8.8
Sao Tome and Principe	STP	4.6	7	0.1
Senegal	SEN	11.0	1194	10.9
Sierra Leone	SLE	50.3	2479	4.9
Somalia	SOM	33.1	2483	7.5
South Africa	ZAF	43.2	19538	45.2
Sudan	SDN	30.4	10559	34.8
Swaziland	SWZ	6.0	66	1.1
Tanzania	TZA	24.0	8543	35.6
Togo	TGO	10.5	601	5.7
Uganda	UGA	20.8	5467	26.3
Zambia	ZMB	3.7	398	10.9
Zimbabwe	ZWE	11.3	1449	12.9
Sub-totals		21.01	148,711	707.7

SPANISH- AND PORTUGUESE-SPEAKING COUNTRIES OF THE WESTERN HEMISPHERE (LA)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Argentina	ARG	8.8	3299	37.6
Bolivia	BOL	4.0	346	8.7
Brazil	BRA	32.6	58491	179.2
Chile	CHL	5.5	870	15.8
Colombia	COL	72.4	31133	43.0
Costa Rica	CRI	6.5	264	4.1
Cuba	CUB	5.3	596	11.2
Dominican Republic	DOM	10.2	921	9.0
Ecuador	ECU	23.1	2915	12.6
El Salvador	SLV	38.4	2453	6.4
Guatemala	GTM	37.1	4370	11.8
Honduras	HND	13.4	866	6.4
Mexico	MEX	10.2	10159	100.0
Nicaragua	NIC	11.4	598	5.3
Panama	PAN	9.7	297	3.1
Paraguay	PRY	16.9	939	5.6
Peru	PER	3.6	941	26.3
Uruguay	URY	5.6	184	3.3
Venezuela, RB	VEN	35.2	8889	25.2
Sub-totals		24.98	128,531	514.6

ENGLISH- , FRENCH- AND DUTCH-SPEAKING COUNTRIES OF THE CARIBBEAN (CAR)

		Total Homicides (2002)		
Country Name	Country Code	Rate 1/	Number	Mid-year Population 2/
Antigua and Barbuda	ATG	10.2	8	0.1
Bahamas	BHS	21.2	66	0.3
Barbados	BRB	8.5	25	0.3
Belize	BLZ	12.0	32	0.3
Dominica	DMA	4.6	3	0.1
Grenada	GRD	4.7	5	0.1
Guyana	GUY	9.9	73	0.7
Haiti	HTI	10.2	900	8.9
Jamaica	JAM	0.5	12	2.6
St. Kitts and Nevis	KNA	11.9	6	0.05
St. Lucia	LCA	7.6	12	0.2
St. Vincent & Grenadines	VCT	13.0	15	0.1
Suriname	SUR	4.2	19	0.4
Trinidad and Tobago	TTO	8.8	115	1.3
Sub-totals		8.38	1,291	15.4

World totals (187 countries)		9.08	561,265	6,179.2

Notes: 1/ Homicide rates are per 100,000 inhabitants. 2/ Population in millions.

Sources: (a) Homicide rates (2002): World Health Organization (2004b), Table 3; (b) Mid-year population (2002): World Bank, *World Development Indicators* (online version). The number of homicides in 2002 is calculated by applying the reported homicide rates for 2002 to the reported mid-year population for 2002.

APPENDIX 2 — DATA SOURCES

(Basic data for this study are contained on an Excel spreadsheet, available upon request to: andresmg@ufm.edu)

Homicide rates: WHO (2004b), Table 3

Gini index, Infant mortality, Urbanization, Population density, Literacy rates: World Bank, *World Development Indicators* (Online version)

Proportion of Males (15-29): Computed from data in Census Bureau, International Data Base, "Table 094. Midyear Population, by Age and Sex, 2002" (www.census.gov/ipc/www/idb)

Ethno-linguistic fractionalization: Roeder (2001)

Ethnic, linguistic and religious heterogeneity: Alesina *et al*. (2003)

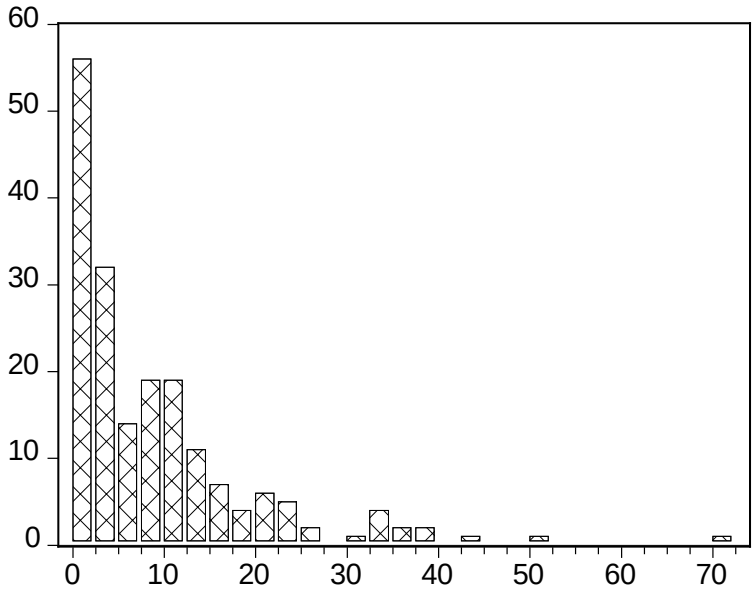
Male and Female years of schooling: Barro and Lee (2001) (dataset downloaded from http://www2.cid.harvard.edu/ciddata/barrolee/Appendix.xls)

World Governance Indicator: World Bank, "Governance Matters 2008" (http://info.worldbank.org/governance/wgi/index.asp)

Countries included in the regression analysis:

Algeria	Finland	Lesotho	Senegal
Argentina	France	Malawi	Sierra Leone
Austria	Gambia, The	Malaysia	Singapore
Bangladesh	Germany	Mali	Slovak Republic
Belgium	Ghana	Mexico	Slovenia
Benin	Greece	Mozambique	South Africa
Bolivia	Guatemala	Nepal	Spain
Botswana	Guinea-Bissau	Netherlands	Sri Lanka
Brazil	Guyana	New Zealand	Swaziland
Bulgaria	Haiti	Nicaragua	Sweden
Cameroon	Honduras	Niger	Switzerland
Central African Republic	Hungary	Norway	Thailand
Chile	India	Pakistan	Trinidad and Tobago
China	Indonesia	Panama	Tunisia
Colombia	Iran, Islamic Rep.	Papua New Guinea	Turkey
Costa Rica	Ireland	Paraguay	Uganda
Croatia	Israel	Peru	United Kingdom
Czech Republic	Italy	Philippines	United States
Denmark	Jamaica	Poland	Uruguay
Dominican Republic	Japan	Portugal	Venezuela, RB
Ecuador	Jordan	Romania	Zambia
Egypt, Arab Rep.	Kenya	Russian Federation	Zimbabwe
El Salvador	Korea, Rep.	Rwanda	

Figure 1. Frequency Distribution of 187 Countries According to their Homicide Rates (per 100,000) in 2002.



Series: HOMICIDES	
Observations 187	
Mean	9.383957
Median	5.700000
Maximum	72.40000
Minimum	0.200000
Std. Dev.	10.61194
Skewness	2.311700
Kurtosis	10.53200
Jarque-Bera	608.5830
Probability	0.000000

Source: World Health Organization (2004b), Table 3.

Table 1. Worldwide Homicide Rates by Region, 2002.

	Average		Median	Standard Deviation	Max	Min	N
	Weighted	Unweighted					
EME	2.44	1.34	1.1	0.99	5.4	0.6	25
FSE	18.34	7.48	3.0	8.11	32.9	0.8	19
MEC	3.93	3.81	2.9	4.00	19.7	0.2	31
OAI	5.65	6.84	4.4	6.25	21.1	0.7	33
SSA	21.01	16.48	12.75	10.90	50.3	2.2	46
LA	24.98	18.42	10.2	17.67	72.4	3.6	19
CAR	8.38	9.09	9.35	4.97	21.2	0.5	14
World	9.08	9.38	5.7	10.61	72.4	0.2	187

(For the full list of countries in each regional category, see Appendix 1.)

Table 2. Regressions of Homicide Rates in 2002 on Regional Dummy Variables.

Panel A.

Dependent Variable: HOMICIDE RATE
Method: Least Squares
Included observations: 187

Regional dummies	Coefficient	Std. Error	t-Statistic	Prob.
EME	1.340000	1.777623	0.753816	0.4519
FSE	7.484211	2.039073	3.670399	0.0003
MEC	3.812903	1.596352	2.388510	0.0180
OAI	6.842424	1.547222	4.422394	0.0000
SSA	16.47609	1.310481	12.57255	0.0000
LA	18.41579	2.039073	9.031452	0.0000
CAR	9.092857	2.375448	3.827849	0.0002
R-squared	0.321126	Mean dependent var		9.383957
Adjusted R-squared	0.298496	S.D. dependent var		10.61194
S.E. of regression	8.888113	Akaike info criterion		7.244021
Sum squared resid	14219.74	Schwarz criterion		7.364972
Log likelihood	-670.3160	F-statistic		14.19079
Durbin-Watson stat	2.273860	Prob(F-statistic)		0.000000

Panel B.

Dependent Variable: LN(HOMICIDE RATE)
Method: Least Squares
Included observations: 187

Regional dummies	Coefficient	Std. Error	t-Statistic	Prob.
EME	0.150120	0.170151	0.882278	0.3788
FSE	1.496358	0.195176	7.666695	0.0000
MEC	0.953643	0.152800	6.241119	0.0000
OAI	1.449637	0.148097	9.788407	0.0000
SSA	2.590041	0.125437	20.64816	0.0000
LA	2.542693	0.195176	13.02766	0.0000
CAR	1.976873	0.227374	8.694381	0.0000
R-squared	0.499948	Mean dependent var		1.629487
Adjusted R-squared	0.483280	S.D. dependent var		1.183522
S.E. of regression	0.850754	Akaike info criterion		2.551328
Sum squared resid	130.2810	Schwarz criterion		2.672279
Log likelihood	-231.5492	F-statistic		29.99378
Durbin-Watson stat	2.004988	Prob(F-statistic)		0.000000

Table 3. Homicide Rates, 2002: Regression Results

(* indicates significance at the 5 % level, ** indicates significance at the 1 % level)

Dependent Variable: LN (HOMICIDE RATE)

Regression Number:	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Constant	**1.5997**	**1.4925**	**1.5904**	**1.6033**	**1.3801**	**1.4637 ** **	**2.2669 ** **
	[1.4050]	[1.2651]	[1.3531]	[1.3970]	[1.0692]	[4.2087]	[3.6296]
Young men	**-0.0756**	**-0.0821**	**-0.0743**	**-0.0760**	**-0.0067**		
	[-1.1175]	[-1.1576]	[-1.0603]	[-1.1105]	[-0.0757]		
Income distribution	**0.0241 ***	**0.0308 ***	**0.0286 ***	**0.0241 ***	**0.0017**		
	[2.1030]	[2.5651]	[2.4464]	[2.0868]	[0.1261]		
Infant mortality	**-0.0016**	**-0.0017**	**-0.0018**	**-0.0016**	**0.0011**		
	[-0.4070]	[-0.3802]	[-0.4356]	[-0.4057]	[0.2038]		
Urbanization level	**-0.0036**	**-0.0050**	**-0.0048**	**-0.0037**	**-0.0061**		
	[-0.6623]	[-0.8279]	[-0.8362]	[-0.6566]	[-0.8772]		
Urbanization (1980-2002)	**0.0166**	**0.0144**	**0.0169**	**0.0167**	**0.0169**		
	[1.3906]	[1.1403]	[1.3643]	[1.3818]	[1.3984]		
Population density	**-0.0001**	**-0.0001**	**-0.0001**	**-0.0001**	**-0.00007**		
	[-0.8064]	[-0.8207]	[-0.8035]	[-0.7997]	[-0.5080]		
ELF index	**1.1598 ** **			**1.1385 ***	**1.0177 ** **	**1.2607 ** **	**1.4031 ** **
	[3.5196]			[2.2149]	[3.0318]	[4.2525]	[4.6045]
Ethnic		**0.9949 ***	**1.0385 ***	**0.0322**			
		[1.9881]	[2.6437]	[0.0542]			
Language		**0.2369**					
		[0.5465]					
Religion		**-0.1628**					
		[-0.4156]					
Male schooling (years)	**-0.3010 ***	**-0.2833 ***	**-0.3105 ***	**-0.3014 ***	**-0.2604 ***	**-0.2944 ** **	
	[-2.5888]	[-2.3398]	[-2.5969]	[-2.5802]	[-2.2478]	[-3.0366]	
Female schooling (years)	**0.2909 ** **	**0.2824 ***	**0.2926 ** **	**0.2913 ** **	**0.2725 ***	**0.2577 ** **	
	[2.7855]	[2.5798]	[2.7113]	[2.7649]	[2.5312]	[2.8485]	
Male literacy rate (%)							**-0.0363 ***
							[-2.3976]
Female literacy rate (%)							**0.0226 ***
							[2.0527]
WGI index	**-0.7932 ** **	**-0.7454 ** **	**-0.7415 ** **	**-0.7924 ** **	**-0.6972 ** **	**-0.7377 ** **	**-0.7108 ** **
	[-4.8300]	[-4.3456]	[-4.4041]	[-4.7736]	[-3.8720]	[-6.1960]	[-6.6338]
FSE dummy					**0.0884**		
					[0.2656]		
MEC dummy					**-0.4358**		
					[-0.8021]		
OAI dummy					**0.2333**		
					[0.4913]		
SSA dummy					**0.1816**		
					[0.3102]		
LA dummy					**0.8118**	**0.7133 ** **	**0.8548 ** **
					[1.6931]	[3.6797]	[4.2665]
CAR dummy					**-0.5245**		
					[-0.8736]		
Adjusted R-square	0.6676	0.6452	0.6470	0.6634	0.7109	0.6974	0.6863
N	91	88	91	91	91	91	91
White test (p-value)	0.4960	0.6446	0.4903	0.5935	0.0840	0.5577	0.1713

Note: All of the regressions were estimated by OLS. Numbers in brackets are *t*-values of the estimated coefficients.

NOTES

The authors would like to thank Olufunmilayo Odushola for help in data processing, and several anonymous referees for helpful comments and suggestions.

[1]The basic dataset is from Table 3, "Estimated deaths per 100,000 population by cause, and Member State, 2002 (a)," line W158, "Intentional injuries (violence)," Dec 2004 (http://www.who.int/healthinfo/statistics/bodgbddeathdalyestimates.xls).

[2]Thus, our "homicide" rates include so-called "justifiable homicides," i.e., killing in self-defense, as well as delinquents killed by police forces in the course of law-enforcement.

[3]Although coverage is therefore not an issue here, *accuracy* is quite another matter, and concerns are often expressed about the degree of under-reporting in cause-of-death statistics. This is especially problematic in cross-country comparisons, since the degree of under-reporting will vary from country to country. To be sure, homicide is an extreme situation and could well be better registered than other causes of death, but not enough to think that registration could ever be complete even in countries with well-developed statistical systems. On the other hand, if it is reasonable to assume that the quality of official statistics improves with a country's overall level of socio-economic development, then it is somewhat encouraging (though only in this sense) to find that less developed countries do not generally tend to show very low levels of reported homicide rates, which would be expected if under-reporting on a massive scale were the norm rather than the exception in such countries. Even so, we are obliged to state the conventional *caveat* regarding the validity of our conclusions, which are only as good as the quality of the underlying data.

[4]The geographic distribution of homicides has a certain "fractal" quality, and since there is nothing special about the nation-state as a geographic unit, it is not surprising to find that the same skewed distribution of homicides shows up *within* countries as well: in any given country some regions are much more homicide-prone than others. This same pattern recurs right down to the city level—see, for instance, the interactive map on the *New York Times* website (http://projects.nytimes.com/crime/homicides/map?ref=nyregion). We would like to thank Dr. Paul Demeny for calling this item to our attention.

[5]In 2002 the 25 most homicide-prone countries (and their homicide rates per 100,000 population) were: Colombia (72.4), Sierra Leone (50.3), South Africa (43.2), Angola (39.6), El Salvador (38.4), Guatemala (37.1), Venezuela (35.3), Somalia (33.1), Russia (32.9), Liberia (32.8), Brazil (32.6), Sudan (30.4), Cote d'Ivoire (27.4), Namibia (27.0), Tanzania (24.0), Guinea (23.8), Central African Rep. (23.5), Ecuador (23.1), Nigeria (23.1), Congo (Dem.) (21.3), Bahamas (21.2), Phillipines (21.1), Uganda (20.8), Ethiopia (20.5), and Rwanda (20.0). Although these countries account for over half of all homicides in the world, they represent only 16 percent of world population.

[6]This regional group includes the two demographic giants, China and India, which almost merit treatment as separate regions in their own right. For a study of homicides in India see Drèze and Khera (2000).

[7]The equality of the coefficients for FSE, OAI and CAR was tested by means of a Wald test. The hypothesis of equal coefficients was not rejected.

[8]Again, the equality of the coefficients for FSE, OAI and CAR was tested using a Wald test. The hypothesis of equal coefficients was not rejected.

[9]The source for this variable (*World Development Indicators*, online version) reports many missing values for 2002. Country coverage for 2000, in contrast, is fairly complete.

[10]The source for this index (Roeder 2001) only reports values for 1960 and 1985.

[11]The source for Male and Female schooling (Barro and Lee 2001) reports values at five-year intervals, up to 2000. Figures on male schooling for 2000 were derived from data on average total schooling and female schooling.

[12]The source for this indicator actually reports six separate indicators, measuring different dimensions of quality of governance: Control of Corruption, Rule of Law, Regulatory Quality, Government Effectiveness, Voice and Accountability, and Political Stability & Absence of Violence/Terrorism. For our purposes, we have defined and calculated each country's "total WGI index" as the simple average of the six component indicators.

[13]We experimented with using the logarithm of population density, but this did not change any of the results. We also experimented with different time horizons to measure the change in urbanization (e.g., 10-year, 30-year, and 40-year changes), but none of these alternative measures was significant either, and the resulting regressions are essentially the same.

[14]Several of these hypotheses were suggested by our colleagues, including Joseph Cole, Marco Antonio del Río, and Enrique Ghersi.

[15]Note that three of these countries were among the top six countries with the highest homicide rates in 2002, and Colombia had by far the highest rate in the world. (Colombia, where civil conflict began earlier than in other Latin American countries, was already the world's top homicide-rate country as far back as 1960, with 34 per 100,000 [Wolfgang 1968: 490].)

[16]There might be some path-dependence trajectories in homicide rates in certain highly violent countries. This might be due to "habituation" or "desensitization": societies might simply become accustomed to high homicide rates (see Bandura 1973).