

Homicide data, third revision

Background paper prepared for the WDR 2011 team

James D. Fearon
Department of Political Science
Stanford University

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Summary points

- Homicide rates have been increasing markedly in Latin American and Caribbean countries since the early 1990s. There has been a slight tendency for higher homicide levels in drug producing or trafficking countries, but not very large. Basically, there has been an increase in homicide rates in the whole region.
- Elsewhere homicide rates appear to have either stayed steady or declined over the last 20 years, although for several regions we only have time-series data for a few countries (Africa, Asia, North Africa/Middle East in particular).
- Homicide rates tend to be highest in middle income countries, although this could be due to some correlated regional effect (esp. Latin America) rather than a causal effect of income level.
- Homicide rates tend to be higher in countries with greater income inequality, and this pattern seems to hold even when we compare countries within the same region. It is not clear why this is the case, and whether it is a causal effect.
- Homicide rates tend to be higher in democracies versus autocracies. This is true both across countries and when we look at the effect of transitions to democracy within countries. This may be a causal effect – it may be that authoritarian states have more aggressive, oppressive, and/or competent police forces than do typical new democracies, making for less crime in general. It could also be a measurement issue – perhaps autocracies are less inclined to report homicides.

- Higher economic growth rates predict lower homicide rates, even comparing periods within countries.
- Most of the correlates of civil war/conflict onset do not predict higher homicide rates. Higher income works the same way for both; richer countries have lower conflict risk and lower homicides. Democracy is essentially unrelated to conflict risk (controlling for income level), but associates with higher homicide rates.
- Measures of better governance in 1996 and 1998 are associated with lower homicide rates in the period 2000-2005. This relationship appears even when we control for income in 2000-2005. Interestingly, it *only* appears if we also control for degree of democracy, because it turns out that democracy is correlated with better governance but also with more homicides. Thus, comparing countries at similar levels of income and democracy, the ones judged to be better governed in terms of corruption, “government effectiveness,” regulatory quality, and (perhaps not surprisingly) “rule of law” in the late 1990s had lower homicide rates in 2000-2005.

1 Introduction

This brief paper summarizes results from an analysis of the WDR Homicide dataset (February 24, 2010), which is based primarily on estimates from the UNODC, with some changes or additions from national sources and the WHO.¹

The main findings have already been summarized above, so I will use the introduction to stress some concerns about the data and interpretation of the results.

Although homicide rates appear to be the most reliable cross-national measure of crime, the best estimates we have are still probably much less reliable than parallel measures we have for presence and scale of civil conflict involving organized armed groups. This is so for two main reasons. First, the data are collected and reported by country agencies (police, usually), and procedures, definitions, and competence can vary greatly across countries and over time within them. Looking at the time series for particular countries suggests in many cases that large changes must be due to changed procedures or data collection policies, rather than changes in actual homicide rates.

Second, there is a great deal of missing data. About 62% of all country years since 1960 have no homicide rate estimate, and about 47% of all country years since 1990. And of course, the data is not “missing at random” at all. Coverage is particular poor for lower income countries as indicated by Table 1, which shows the number of countries with homicide estimates, by region, for

¹A comparison with the data used by Eric Neumayer in his 2003 *Journal of Peace Research* article shows a strong positive correlation. Neumayer says that his data are primarily based on the WHO numbers, which he says are “widely regarded as the most reliable.”

the year with the largest number of observations (2005). Notice that we have data for only 14 of 48 subSaharan Africa countries even in the best year, and for only 16 of 37 countries in Asia.

Table 1: # countries with/without homicide data in 2005, by region

	Asia	EEur	LA/Ca	NA/ME	SSA	West
with data	16	27	30	14	13	25
no data	21	0	3	6	35	2
# countries	37	27	33	20	48	27

It is entirely possible, even likely, that results for “global” models run below would be change if we had data for more of these missing Africa and Asian low income countries. As it is, it should be kept in mind that the global sample effectively overweights Western, Eastern European/FSU, and Latin American countries.

2 Some descriptive statistics

The data set has 3,288 homicide rate observations for 165 independent countries² between 1960 and 2009, which is an average of about 20 per country. Only four or five countries have observations in the 1960s; 50-70 do in the period from 1970-1989; and 110-120 or observations per year from 1990 to about 2005 (after that, many fewer).

Homicide rate is highly left-skewed across countries. The mean for all countries and years in the data 7.46 homicides per 100,000 deaths, while the median is 3.32. Three small countries reported zero homicides in 2005 and/or 2006 – Liechtenstein, Malta, and Brunei – while Jamaica 1982 has the highest reported rate, at 97.2. Morocco 1972 is very close with 96.11, and in more recent years Swaziland had estimated rates around 90 for 1998-2000.

Most of the variation in homicide rates is across countries rather than within countries over time. Indeed 72% of the total variation is across countries. This means that there is no great loss in treating the data as purely cross-sectional by taking averages over a period of years for each country, and there are gains in reducing the impact of year-to-year measurement error. Farther below, however, I will also consider what can be learned from a panel version of the data (looking at changes over time within countries).

There are striking differences across regions in homicide rates, as the following table shows. Latin America and subSaharan Africa record much higher rates than the rest of the world. Overall, about 50% of cross-national variation in the log of homicide rates in the period considered in the table

²There are 20 or so micro-states or non-independent entities with some homicide data. I am dropping these in the analysis here. I doubt this make much difference to anything.

(200-2005) is “accounted for” by region! (The log of the homicide rate is approximately normally distributed in these data, and almost all of the regression models considered below fit better when the dependent variable is log of homicide rate. So this is what I will mainly be considering in the statistical models.)

Table 2: Homicides per year per 100,000 population, 2000-2005

	Average	Median	# countries w/ data
Latin America/Caribbean	17.47	13.01	33
SubSaharan Africa	10.53	5.22	21
FSU/E. Europe	5.39	3.29	27
Asia	3.63	2.24	21
North Africa/Middle East	1.80	1.22	18
West	1.65	1.34	25
World	7.54	3.13	145

3 Trends in homicide

What about trends over time? A significant problem with using these data for trying to identify trends over time around the world, or within regions, is that the set of countries with estimates changes from year to year. This means that if we compute averages for all countries with data year by year, then changes in a trend line may be due to changing average rates, *or* it could be due to different countries are coming in and out of the sample year by year.

The set of countries with data is moderately stable from 1990 to 2005. Figure 1 below shows average homicides by region and for the world for this period, using the 96 countries that had at least some homicide estimates for each of the four five-year periods (1990-94, 1995-99, 2000-04, 2005-09). Note, then, that these are average rates for each country for each five-year period, then averaged for each country in the region.

Coverage varies a lot from region to region, which should be kept in mind – the averages for Asia (eight countries with data in all four periods), North Africa/Middle East (four countries), and subSaharan Africa (seven countries) may not accurately reflect the trends for the whole region.³ The averages for the Western countries (23 countries with continuous data), FSU/Eastern Europe (25), and Latin America (29) have much better coverage and so are probably more indicative.

Things to note about trends, using these data:

³The Asia countries in the sample are South Korea, Japan, India, Sri Lanka, Thailand, Malaysia, Singapore, and Philippines. North Africa/Middle East: Cyprus, Turkey, Israel, Qatar. SubSaharan Africa: Ghana, Nigeria, Kenya, South Africa, Swaziland, Mauritius, and Seychelles.

- The estimated rate of homicides at the level of the whole world (or these 96 countries), shows no change at all over this period (1990-2007 or so).
- However, at the level of regions, we see that this “no change” is actually an average of (a) gradual decline in homicide rates in all parts of the world except Latin America and the Caribbean, and (b) a striking upward trend in homicides in Latin America, which went from about 12.6 per 100,000 in the early 1990s to almost 20 per 100,000 in recent years. Since we have continuous data on 29 out of 33 Latin American and Caribbean countries, this is probably a good reflection of the trend in the whole region.
- SubSaharan Africa shows a striking increase in 1995-99, and then a decline, but this should be taken with a grain of salt because we have data for only 7 countries here.

Because the data coverage is good and because the striking upward trend is in Latin America/Caribbean, I also include in Figure 2 a plot of the rates for each country in that region. Countries that show increases in homicide rates in this period include Jamaica, Belize, Honduras, El Salvador, Trinidad, and Columbia (very large increases), and Guyana, Paraguay, Guatemala, Brazil (smaller increases). Few countries show significant declines.

It is interesting that Mexico’s data shows no significant increase (in fact a slight decline), despite reports of very large amounts of killing linked to drug trafficking in the last 10 years.

There is little indication that the Latin America countries that have seen the largest increases in homicide rates are also those most affected by the drug trade. Figure 6 plots the homicide rates for countries in this region (and the Caribbean) divided by whether they are listed in the U.S. State Department’s 2009 classification of having significant drug production or trafficking. The mean values are also shown in the figure. Although the mean is somewhat higher for countries afflicted with significant drug production or trafficking problems (by this measure anyway), the difference is not statistically significant.

4 Correlates of homicide

Table 3 below shows a set of regressions where the dependent variable is the log of average homicide rate by country for 2000-2005.

The main points to be noted are:

1. Lower middle income countries tend to have the highest homicide rates. Above about \$4,300 (in 2005 dollars), higher per capita income associates with lower homicide rates. Below this level, lower per capita income associates with lower homicide rates.

Table 3: Determinants of homicide rates, 2000-05

	Model 1	Model 2	Model 3	Model 4	Model 5
constant	-23.64*** (6.32)	-21.84*** (5.77)	-24.59*** (6.00)	-10.97 (7.51)	-7.83 (7.47)
log(income)	6.09*** (1.43)	5.00*** (1.34)	5.69*** (1.39)	2.39 (1.79)	1.63 (1.78)
log(income) ²	-0.37*** (0.08)	-0.30*** (0.08)	-0.34*** (0.08)	-0.14 (0.10)	-0.10 (0.10)
Polity (democ)	0.05*** (0.01)	0.04** (0.02)	0.05** (0.02)	0.02 (0.02)	
Polity > 5					0.51* (0.19)
WB Gini		0.06*** (0.01)		0.05*** (0.01)	0.05*** (0.01)
WIDER Gini			0.05*** (0.01)		
EEur				0.62* (0.26)	0.62* (0.25)
LA/Ca				0.80** (0.30)	0.71* (0.29)
NA/ME				-0.49 (0.31)	-0.39 (0.31)
SSA				0.26 (0.30)	0.29 (0.29)
West				-0.19 (0.37)	-0.27 (0.36)
<i>N</i>	125	112	117	112	112
<i>R</i> ²	0.32	0.49	0.44	0.59	0.61
adj. <i>R</i> ²	0.30	0.47	0.42	0.55	0.57

Standard errors in parentheses

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Model 4, which includes region dummies, shows that it is hard to distinguish this income “effect” from other unmeasured factors that are common to regions (e.g., religion, culture, history ...). For a graphical illustration, see Figure 3, which plots log homicide against log income, uses the first letters of country name for points, and colors points by region. Notice that the poorest countries, which are mainly in subSaharan Africa, and the richest, which are mainly in the West, anchor the curve with relatively low levels of reported homicides in each. Middle income Latin American countries, but also some middle income African and Eastern European countries, have the highest homicide rates. In Asia and North Africa/Middle East, the raw association between income and homicide is just negative over the whole range of income.⁴

⁴The parabola in Figure 3 is from the regression of log homicide rates on log income and log income squared, unlike

2. Controlling for income, more democratic countries had higher homicide rates on average, at least in this period from 2000 through 2005. Why would this be the case?

Inspection of Figure 4, which plots log homicide rate against the Polity index and uses colors to distinguish by region, suggests that this might be either (a) an accident produced by the fact that Latin America is both relatively democratic and has high homicide while North Africa/Middle East is very authoritarian and has low homicides, or (b) a causal relationship – it may be that more authoritarian states invest more in repression and competent, aggressive police forces while new democracies have trouble here. Less crime in general in authoritarian countries might associate with fewer homicides. Another possibility is that authoritarian states and/or MENA might underreport homicide more than other countries.

Both Figure 4 and Model 5 in Table 3 suggest that the idea of a causal connection between recent democracy and higher homicide rates has some plausibility. Note first that in Model 5, where we use a dummy variable to distinguish democracies from nondemocracies, democracy is still associated with significantly higher homicide rates on average, even controlling for regions. Substantively, homicide rates are on average 67% higher in democracies, even controlling for income levels, inequality, and region-specific factors.

Second, looking region by region, notice that within MENA, the most democratic countries report some of the highest homicide rates in the region (Turkey, Israel, Lebanon). Within Latin America, the least democratic countries have the lowest homicide rates (Cuba and Haiti, although Haiti doesn't fit the model of capable authoritarianism). Within Asia, autocratic Myanmar has a very low reported homicide rate, compared to the very high rate in (recently) democratic Mongolia.

3. As other studies have found, income inequality is associated with higher homicide rates. Inspection of Figure 5 suggests that this is partly due to Latin America and Africa having high homicide and high inequality, but also partly because within regions the more unequal countries tend to have more homicide. This “effect” is particularly striking within Africa, but also appears in Eastern Europe/Former Soviet Union, and perhaps a bit in Latin America and the West.

It is not clear whether this is a causal effect. Even in principle, why would income inequality cause more homicides? Perhaps homicide is correlated with property crime, and property crime is higher with more inequality? We would need to good property crime data to check this.

4. Not shown in Table 3, but (a) oil producers have somewhat higher homicide rates on average, although the difference is only marginally statistically significant; and (b) civil war experience in the 2000-2005 period is related to slightly higher homicide rates, although again the difference is at best marginal. Also, for (b), it is not clear if this is an effect of civil war on

Model 1 in Table 2, which also has a democracy covariate. This is why the maximum is at a slightly different income level than what I mention above.

homicide (or homicide on war), or if civil war deaths are getting counted as homicides in some places.

The positive estimated coefficient for oil producers appears even when controlling for region. Why oil producers would have higher homicide rates on this account is not at all clear. Perhaps this is another dimension of inequality. Perhaps it is an indicator of poor governance in general.

5 Panel data

As noted above, homicide rates are quite persistent within countries, so there is not much “within” variation that we can use to help identify causes of homicide. Since homicide rates are also probably measured with considerable error, there is also the problem that in looking at changes over time within countries we may be reducing the variation to mainly noise rather than signal.

Table 4 reports results for a panel version of the homicide data, where I have used five year periods beginning in 1960 and ending with 2005-08. For the dependent variable I take the log of the median homicide rate in the five-year period for each country. (I use the median because this is a better measure of central tendency with these sometimes-erratic homicide data.) Independent variables are usually taken from the first year in the five-year period, but are sometimes averages over the five years. Standard errors are clustered by country to try to deal with serial correlation and different variances across countries.

Model 1 includes five-year period fixed effects but no country fixed effects, as a baseline for comparison. The results are similar to those reported for the cross sectional analysis above: Lower-middle income countries have higher homicide rates, as do democracies and countries with greater income inequality. Homicide rates are higher in periods when there is at least one year of civil war. Anocracy (partial democracy) is inconsistently associated with slightly higher homicide rates, as compared to full autocracies.⁵

Models 2 through 4 introduce country fixed effects, so the estimates are now for the effect of changes in the independent variable over time within a country. Notice that:

1. Not surprisingly, the “*middle income country*” association largely disappears, though not quite entirely.⁶ If one drops the squared term on income – which is probably appropriate

⁵Democracy here means average Polity score in the five year period was greater than 5; anocracy is average Polity score between -5 and 5.

⁶The partial significance in Model 3 comes from the change in sample that results when we lose a lot of cases because of missingness on income inequality. Not clear what to make of this.

given that no countries will traverse the whole range of income in this short period – one finds a slight negative association between income and homicide rate. That is, as a country grows richer it tends to get less homicide on average, but the relationship is not particularly strong or consistent. (Doubling GDP/capita correlates within about a 23% reduction in homicide rate on average, although the uncertainty of this estimate is large.)

2. Faster *rates of income growth* associate with lower homicide rates, both across countries and within countries over time. Within countries, the substantive size of the effect is small on average: A 10 percent higher average annual growth in a five-year period associates with about a 15% decrease in homicide rate (this is using the -.016 estimate). By contrast, a country with a 10% higher growth than another has on average about a 35% lower homicide rate.

3. *Civil war* has a quite consistent and large association with higher reported homicide rates, with the estimated effect being similar whether we are comparing across countries or over time within them. Having at least one year with civil war in the five year period associates with about a 50% greater reported homicide rate in that period! Surely some of this is due to battle or other conflict deaths getting counted as homicides, although the size of the estimate makes me wonder if something else may be going on as well.

Ghobarah, Huth and Russett (2003) found increased homicide rates *following* civil wars, using WHO data on 1999 and considering civil wars between 1991 and 1997. Such a “post conflict” effect on homicide does not appear in the data considered here – the lag of the civil war variable does not associate with greater homicide rates in either the pooled times series or the fixed effects models.

4. Interestingly, *democracy* continues to show a positive relationship with homicide rates. The country fixed-effect models imply that if a country transitions to democracy, it can expect its homicide rate to increase by about 22% on average.

Again, this could be because authoritarian regimes have more competent and motivated police forces than do new democracies, or it could be because autocracies report fewer homicides for appearance’s sake, or it could be some mixture of both.

5. Not surprisingly, *income inequality* shows no relationship with homicide rates when we consider over time variation within countries. This is to be expected since there is so little over time variation in either homicide rates or (even worse) the inequality measures. So this may be close to regressing noise on noise.⁷

6. Transitioning to *anocracy* (partial democracy), whether from democracy or autocracy, is not associated with an increase in homicide rates on average.

⁷To maximize cases, I use the WIDER Gini estimates here, and linearly interpolate for missing values within country series.

One of the best of the published studies on cross-national determinants of homicide rates is Neumayer (2003). He conducts a fixed effects analysis of similar WHO-based data for the period 1980-97, and gets results that are broadly similar to those reported in this section. However, he interprets the lack of significance of the inequality measures in the fixed effects models as implying that inequality does not have a positive causal effect on homicide. This could be true, but it is almost surely not demonstrated by the panel data, given the lack of temporal variation, and measurement error, in both the homicide and (even more) the income inequality series.

Table 4: Panel data and country/five-year-period fixed effects, 1960-2008

	Model 1	Model 2	Model 3	Model 4
Country fixed effects	No	Yes	Yes	Yes
Five-year period fixed effects	Yes	Yes	Yes	Yes
log(gdp/cap)	4.689*** (1.120)	0.117 (1.158)	2.571 [†] (1.528)	0.100 (1.159)
log(gdp/cap) ²	-0.283*** (0.066)	-0.019 (0.066)	-0.198* (0.089)	-0.018 (0.066)
gdp/cap growth rate	-0.044* (0.017)	-0.016 [†] (0.009)	-0.037* (0.015)	-0.016 [†] (0.009)
civil war	0.474* (0.196)	0.394*** (0.085)	0.328* (0.140)	0.390*** (0.087)
Democracy	0.494** (0.183)	0.207* (0.099)	0.121 (0.102)	0.230* (0.103)
WIDER gini	0.031*** (0.008)		-0.007 (0.007)	
Anocracy	0.293 (0.217)			0.040 (0.139)
constant	-19.475*** (4.789)	2.113 (5.172)	-4.336 (6.676)	2.147 (5.161)
<i>N</i>	472	665	472	665
<i>R</i> ²	0.346	0.765	0.773	0.765
adj. <i>R</i> ²	0.323	0.699	0.688	0.699

Dependent variable is log of median homicide rate in 5-year period.

Robust standard errors in parentheses

[†] significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

6 Governance indicators and homicide rates

In this section I consider the relationship between our measure of homicide rates and two sets of governance measures: the Worldwide Governance Indicators (WGI) developed by Kaufmann, Kraay and Mastruzzi (2009) and some of the International Country Risk Guide (ICRG) measures.

WGI provides measures of six dimensions of governance – which the authors term government

effectiveness, voice, political stability, rule of law, control of corruption, and regulatory quality – providing estimates for almost all countries for 1996, 1998, 2000, and 2002-2008. The measures are derived from a factor analytic process, with multiple measures drawn from a large number of different expert survey-based constructs for each dimension. ICRG measures are produced and sold by the company Political Risk Services to businesses and other customers interested in the political risks of investment, or doing business, in various countries. I will use here their measures for “investment profile” (a general assessment of business climate), rule of law, corruption, and bureaucratic quality. For both WGI and ICRG measures, higher values represent better governance on the relevant dimension.

6.1 WDI governance measures

One of the main problems for an attempt to estimate the effect of governance on homicide rates is that the experts’ governance ratings may themselves be based, in part, on homicide levels (or the perception of crime more broadly). For example, both WGI and ICRG have indicators for the level of “rule of law” in a country. This is undoubtedly inferred in part by looking at how safe or unsafe the country is. So if we regress homicide rates on rule of law and find that better rule of law is strongly associated with lower homicide levels, this isn’t really telling us much, even if we are controlling for other determinants of homicide rates like income, inequality, and so on.

This concern is clearly greatest for “rule of law.” It is also a worry for the WGI indicator “government effectiveness,” which is probably inferred in part (for various of the expert rating measures that go into it) by observation of crime and prevalence of homicide. “Control of corruption” and “regulatory quality” are less likely to be direct measures of homicide rates themselves, so these are probably the most interesting dimensions to consider.⁸

Because of the “experts inferring governance from homicide rates” problem, probably the best way to use the WGI indicators here is to use examine the relationship between the governance indicators from 1996 and 1998 and homicide from 2000 to 2005 (which is also when we have the most homicide data). It can’t be that homicide rates between 2000 and 2005 caused expert perceptions of governance before 2000. It could be, however, that prior homicide levels caused late-90s governance perceptions, and homicide rates are persistent; we will check this below, to some extent, by controlling for late 1990s homicide rates.

A useful way to begin is by examining correlations between average log(homicide) (2000-2005), some of the most strongly related covariates considered in the cross-sectional analysis above, and the average of the governance indicators for 1996 and 1998. Consider column 1 in the Table 5 below. We see that homicide rates are higher in poorer, more democratic, and more unequal

⁸“Voice,” which is essentially a democracy measure, and “political stability,” which is a kind of generalized political conflict indicator, are also of less interest here.

countries, as shown above. There are also fairly strong negative correlations between post-99 homicide rates and pre-2000 WGI indicators, except for “voice,” which makes sense given the findings on democracy. Note next that in the third column, we see that the Polity democracy measure is strongly positively related to all of the governance measures. The governance measures are also strongly related to income.

That governance measures, income, and democracy are all positively related to each other, while only the first two are negatively related to homicides (and democracy is positively related) is interesting. In the regression models below, if we omit democracy as a control, the size and significance of the governance measures tend to drop, usually by a factor of about two. Failing to control for democracy mixes two offsetting effects for governance – a positive association holding regime type constant, and a negative association due to the relationship with democracy.

Table 5: Correlations of homicide with gov indicators

	log(hom.)	log(income)	polity	gini	ge	corr.	rol	req.qual.	voice	polstab
log(homicide)	1									
log(income)	-0.3	1								
polity	0.21	0.32	1							
gini	0.57	-0.4	-0.15	1						
ge	-0.32	0.79	0.53	-0.42	1					
corruption	-0.33	0.75	0.48	-0.38	0.94	1				
rule of law	-0.41	0.77	0.47	-0.43	0.94	0.96	1			
reg.qual.	-0.28	0.75	0.6	-0.39	0.94	0.88	0.9	1		
voice	-0.03	0.6	0.85	-0.31	0.79	0.79	0.82	0.82	1	
pol. stab.	-0.22	0.64	0.4	-0.29	0.72	0.77	0.83	0.69	0.73	1

Gov. indicators are averaged for 1996 and 1998. Others are avg'ed for 2000-2005.

Table 6 shows the results of cross-section regressions with the log of average homicide rates from 2000 to 2005 as the dependent variable. Note that the governance indicators are significantly negatively related to homicide rates, controlling for income, inequality, and democracy (measured here as a dichotomous variable that equals 1 if Polity > 5). By far the largest coefficient is observed for the rule of law measure, which is not surprising, and probably also not very meaningful. The substantive size of the estimates is large; because the standard deviation of the WGI measures is always about 1, the coefficients correspond roughly to the percentage decrease in homicide rates associated with a one standard deviation increase in the governance measure. (Thus a country with one s.d. better rating on “government effectiveness” in the late 90s on average had about 33% lower homicide rate from 2000 to 2005.)

The negative associations between measures of governance quality and subsequent homicide rates could arise because better control of corruption, “government effectiveness,” and “regulatory quality” cause, to some degree, less crime and societal violence. However, in principle it could be that instead these aspects of government performance have no causal effect on homicide in a country whatsoever. It could be that homicide levels are caused by other factors that also drive perceived

Table 6: Homicide (avg 2000-2005) and WGI governance indicators (avg 1996 & 1998)

	Model 1	Model 2	Model 3	Model 4
log(gdp)	2.93 [†] (1.60)	0.96 (1.57)	2.27 (1.67)	3.48* (1.47)
log(gdp) ²	-0.17 [†] (0.09)	-0.05 (0.09)	-0.13 (0.10)	-0.20* (0.09)
democracy	0.91*** (0.20)	1.01*** (0.19)	0.92*** (0.19)	0.95*** (0.21)
gini	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.01)
ge	-0.33 [†] (0.18)			
rol		-0.62*** (0.16)		
corrupt			-0.36* (0.16)	
reg. qual.				-0.25 [†] (0.14)
constant	-13.78* (6.65)	-6.07 (6.57)	-11.16 (6.91)	-15.80* (6.25)
<i>N</i>	117	117	117	117
<i>R</i> ²	0.49	0.54	0.50	0.49

Standard errors in parentheses

[†] significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

quality of governance, such as culture, or unmeasured influences like drug trafficking.⁹ There is no clean way to sort this out with the cross-sectional data we have here. The best we can do is to control for other possible influences on homicide rates and then hope that the residual variation that remains in the governance indicators is at least partly random with respect to unmeasured “other causes.”

Though it raises new econometric issues, one additional control worth considering is the level of homicides in the 1990s. Because homicide rates are persistent over time within countries, the negative associations seen in Table 6 could arise in part or all because the expert raters of governance in the late 1990s were considering homicide rates (or more likely, crime and safety in general) in their assessments of governance quality. Adding lagged homicide rates may also go some way towards controlling for other relatively stable determinants of homicide rates in a country, so that we are now asking whether “surprisingly good governance” (i.e., good governance conditional on

⁹One very rough proxy for “culture” is regional dummy variables. Adding these to the models in either Table 6 or Table 7 tends to reduce the coefficients towards insignificance on everything except democracy and income inequality. This is a blunt instrument, however, due to the high correlations between income levels, governance measures, and regional dummies.

income, gini, etc) predicts a change for the better in homicide rates in the next five or so years.

Table 7 presents these results. There is still some evidence of a negative association between the governance indicators and lower homicide rates in 2000-2005, although the size of the coefficients decreases and only rule of law and regulatory quality are statistically significant at conventional levels.¹⁰

Table 7: Homicide and governance indicators, with lagged homicide rates

	Model 1	Model 2	Model 3	Model 4
log(hom.) ₁₉₉₀₋₉₉	0.73*** (0.06)	0.70*** (0.06)	0.73*** (0.06)	0.73*** (0.06)
log(gdp)	0.73 (1.02)	0.26 (1.02)	0.54 (1.07)	0.68 (0.94)
log(gdp) ²	-0.04 (0.06)	-0.01 (0.06)	-0.03 (0.06)	-0.03 (0.05)
democracy	0.35* (0.13)	0.39** (0.13)	0.35** (0.13)	0.42** (0.14)
gini	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)
ge	-0.16 (0.11)			
rol		-0.24* (0.10)		
corrupt			-0.15 (0.10)	
reg.qual.				-0.20* (0.09)
constant	-4.27 (4.31)	-2.43 (4.33)	-3.47 (4.52)	-4.05 (4.06)
<i>N</i>	102	102	102	102
<i>R</i> ²	0.83	0.84	0.83	0.84

Standard errors in parentheses

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

6.2 ICRG governance measures

The longer ICRG series allows us to examine the relationship between the ICRG governance indicators and homicide rates over time as well as across countries. There is not much gain here,

¹⁰Part of the low significance is due to collinearity between governance measures and income. If the income variables are dropped, all of the governance measures are “significant.” Of course, this is to say that it is unclear if the negative association is due to quality of governance or to something about the level of economic development that could, on average, promote less societal violence, irrespective of governance.

in light of the persistence of homicide rates within countries and the presumably large amounts of year to year measurement error. But it's worth a look.

I use five-year periods, hoping that this is a good compromise in terms of trading off number of periods against year-to-year measurement error in the dependent variable, and also in terms of lessening contamination of the governance ratings by rater observations or anticipations of the dependent variable (log homicide rate). In terms of dynamics, I first consider using a lagged dependent variable, which provides a fairly tough test for the governance indicators since lagged homicides picks up so much of the action. Indeed, the coefficient on lagged homicide rate is large enough that we should worry about the process being non-stationary. So, in the next table I look at changes in homicide rates from the first year of the five-year period to the last.

Table 8 shows the results of a similar model to the cross-sectional analysis above, with the lagged dependent variable.¹¹ Perhaps surprisingly, the governance measures in the previous five-year-period are all significantly negatively related to homicide rates in the next period, even controlling for lagged homicide rates. It is interesting, and possibly reassuring, that we find the strongest relationships for rule of law and for bureaucratic quality, as with the WGI indicators above.

Table 8: Homicide and ICRG governance, 5-yr period panel from 1985

	Model 1	Model 2	Model 3	Model 4
$\log(\text{hom.})_{t-1}$	0.92*** (0.04)	0.89*** (0.04)	0.91*** (0.04)	0.91*** (0.04)
$\log(\text{gdp})_{t-1}$	-0.06† (0.03)	-0.02 (0.04)	-0.05 (0.03)	-0.02 (0.03)
democ_{t-1}	0.01† (0.00)	0.01* (0.00)	0.01† (0.01)	0.01* (0.01)
ip_{t-1}	-0.03* (0.01)			
rol_{t-1}		-0.09** (0.03)		
corrupt_{t-1}			-0.06* (0.03)	
bq_{t-1}				-0.11** (0.04)
constant	0.78* (0.34)	0.55† (0.33)	0.68* (0.33)	0.44 (0.31)
N	355	355	355	355
R^2	0.82	0.82	0.82	0.82

Robust standard errors in parentheses

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

¹¹I omit the gini measure of income inequality because many cases are lost if it is included. However, the results are quite similar even in that case; the coefficients on the governance indicators are smaller, but still similarly “statistically significant.” Also, the democracy measure in this model is the average Polity score for the five year period in question.

Seeing that the coefficients on the lagged dependent variable are around .9, I consider in Table 9 a model where the dependent variable is change in log homicide rate from the first to the last year of the five-year period. Note that this greatly adds to the measurement error problem, since the variable is now a difference of individual annual observations rather than an average of five of them. The model includes log homicide rate in the previous period, lagged log income, lagged democracy, and the average of an ICRG governance indicator for the previous five year period. We find that although the estimated coefficients are still negative, they are substantively very small and statistically insignificant now. So the level of governance in one five-year period does not do much to predict the direction of change in the homicide rate in the next five-year period.

Table 9: Homicide and ICRG governance, panel, differences

	Model 1	Model 2	Model 3	Model 4
$\log(\text{hom.})_{t-1}$	-0.07 [†] (0.04)	-0.08 [†] (0.04)	-0.07 (0.04)	-0.07 (0.04)
$\log(\text{gdp})_{t-1}$	-0.12 (0.09)	-0.12 (0.09)	-0.14 [†] (0.09)	-0.14 (0.09)
democ_{t-1}	0.02* (0.01)	0.02* (0.01)	0.01 [†] (0.01)	0.01 [†] (0.01)
ip_{t-1}	-0.03 (0.02)			
rol_{t-1}		-0.03 (0.04)		
corrupt_{t-1}			-0.01 (0.04)	
bq_{t-1}				-0.01 (0.05)
constant	1.25 (0.78)	1.17 (0.80)	1.26 (0.78)	1.26 (0.83)
N	223	223	223	223
R^2	0.04	0.04	0.04	0.04

Robust standard errors in parentheses

[†] significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

7 Civil war onset models with homicide as the dependent variable

Table 10 shows how the typical covariates used in a statistical model of civil war *onset* do when the dependent variable is log homicide rate instead. Models 1-3 are logit models where the dependent variables are, respectively, onset of civil war as coded by (an updated version of) Fearon and Laitin (2003), onset of a major civil war as coded by PRIO/Uppsala, and onset of a minor conflict as coded by PRIO/Uppsala. In Model 4, the dependent variable is the log of homicide rate, using the annual country year data considered throughout this paper. Notice that the number of observations

drops precipitously for Model 4 due to missing homicide data for many countries and years.

The results for the independent variables are as follows:¹²

- *Civil war*_{*t*-1} codes whether there was a civil war already occurring in the prior country year. This is inconsistently related to civil war onset, but strongly related to higher homicides in the current year, which is consistent with the results of the previous section.
- *Per capita income* (based mainly on Penn World Tables 6.3) is negatively related to both civil war/conflict onset and homicide rates across countries.
- Country *population*. Bigger countries have more civil war/conflict onsets, but are not systematically different in terms of homicide rates.
- *Mountainous countries* tend to be more civil war prone. There is no difference on homicide rates.
- Countries with a *divided-up land area* (e.g., Indonesia) tend to be a bit more civil war prone. No difference on homicide rates.
- *Oil producers* have been more prone civil war onsets, but are no difference on homicide rates on average.
- *New states* (within two years of independence) are much more prone to have civil wars begin, but do not have significantly higher homicide rates.
- *Political instability* – measured here by a variable marking whether there was any change in the Polity measure from year *t* – 2 to *t* – 1 – is positively associated with civil war/conflict onset in year *t* but is not associated with more homicide.
- *Anocracy* (partial democracy) associates with higher risk of civil war or minor conflict onset than in autocracies, and also associates with somewhat higher homicide rates than typical in autocracies, although the relationship with homicide is tenuous.
- *Democracy* has no significant relationship with civil war or conflict onset (compared to autocracy), but is positively related to homicide rates (consistent with the results above).
- *Ethnic fractionalization* is weakly positively related to civil war onset/conflict, depending somewhat on which dependent variable formulation you use. It is completely unrelated to homicide rates in this pooled cross section data.

¹²Keep in mind that the dependent variables are on different scales – 0/1 vs a continuous range for homicide – so the coefficients aren't directly comparable.

Table 10: Log homicide rate as Dep. Var. in a typical civil war onset model

	Model 1	Model 2	Model 3	Model 4
Dep. Var.	FL civil war	UACD war	UACD conflict	log(homicides)
civil war _{t-1}	-0.614** (0.198)	-0.103 (0.250)	0.192* (0.082)	0.686* (0.302)
log(gdp/cap) _{t-1}	-0.467*** (0.119)	-0.521*** (0.146)	-0.392*** (0.094)	-0.345*** (0.103)
log(Population) _{t-1}	0.286*** (0.063)	0.188** (0.059)	0.211*** (0.049)	-0.068 (0.070)
log(% mountains)	0.180* (0.074)	0.298*** (0.086)	0.158* (0.065)	0.044 (0.056)
Noncontiguous land mass	0.346 (0.268)	0.415 (0.287)	0.265 (0.191)	-0.332 (0.212)
Oil producer	0.660** (0.244)	0.813** (0.291)	0.648** (0.223)	0.009 (0.274)
New state	1.686*** (0.311)	1.435*** (0.376)	1.102*** (0.283)	0.097 (0.201)
Political instability _{t-1}	0.643** (0.204)	0.601* (0.242)	0.361* (0.169)	0.061 (0.084)
Anocracy _{t-1}	0.629** (0.241)	0.470† (0.273)	0.411* (0.167)	0.377† (0.195)
Democracy _{t-1}	-0.301 (0.341)	-0.166 (0.423)	0.075 (0.191)	0.653** (0.205)
Ethnic fractionalization	0.502 (0.322)	0.705† (0.360)	1.110*** (0.282)	0.003 (0.414)
constant	-4.053** (1.314)	-3.118* (1.425)	-3.588*** (0.926)	4.974*** (1.421)
<i>N</i>	7985	7985	7985	2731
<i>R</i> ²				0.181
Estimation method	Logit	Logit	Logit	OLS

Robust standard errors in parentheses

Five-year period dummies included in all models, coefficients not shown.

† significant at $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

**Figure 1. Homicide rates by region,
5-year periods from 1990**

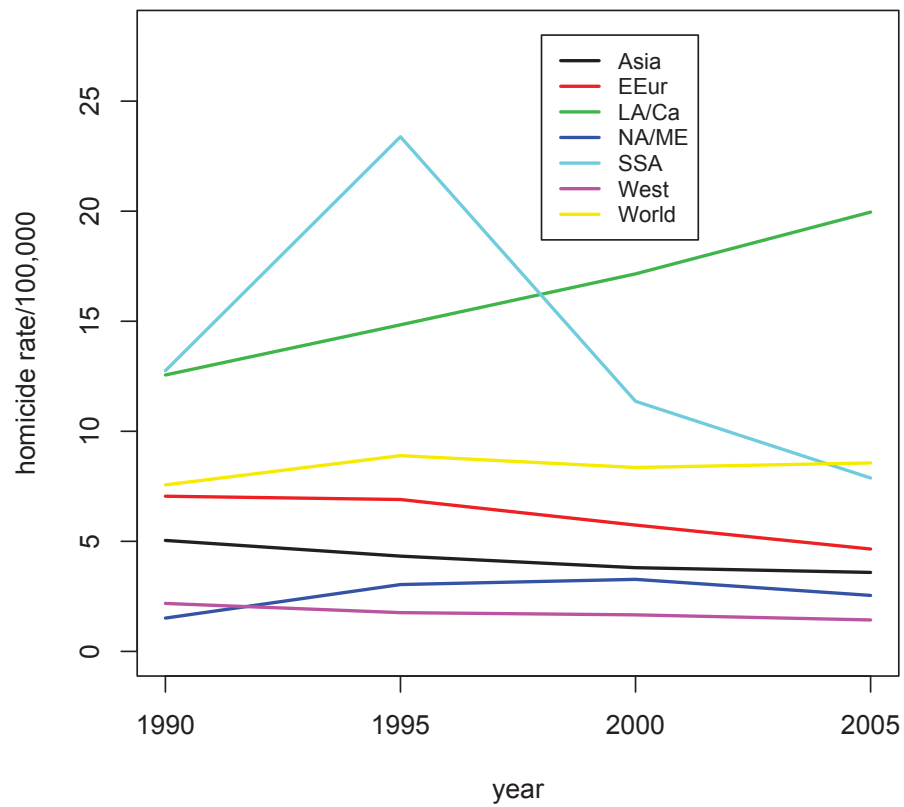


Figure 2. Homicides in Latin America/Carib.

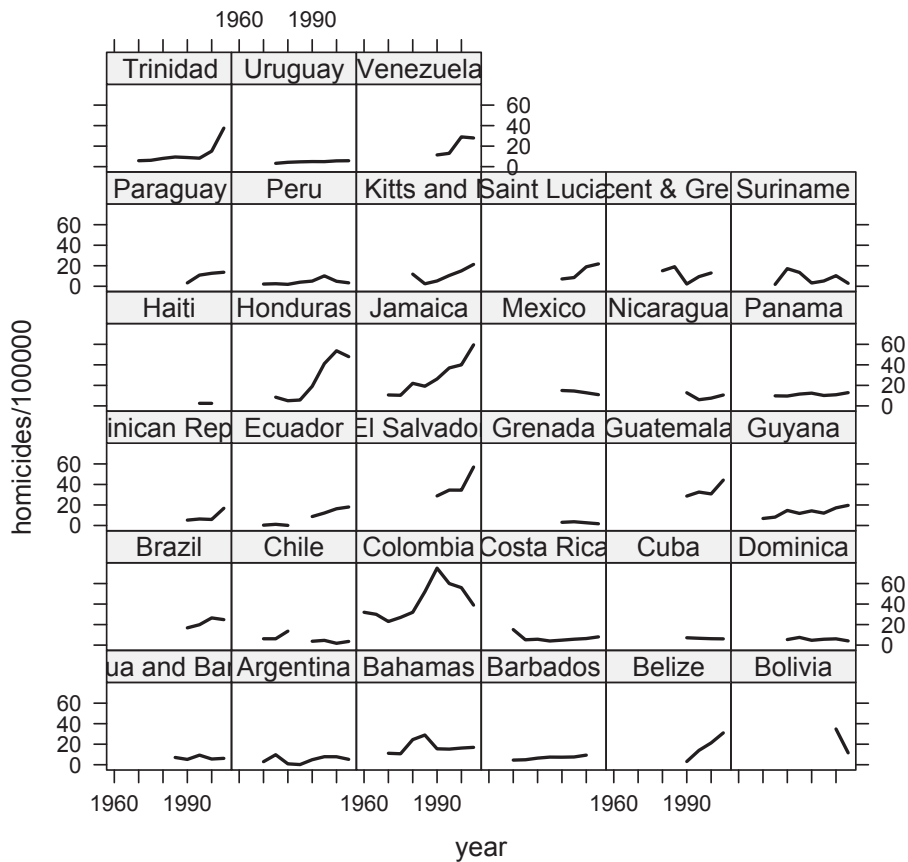


Figure 3. Homicide rates by income level and region

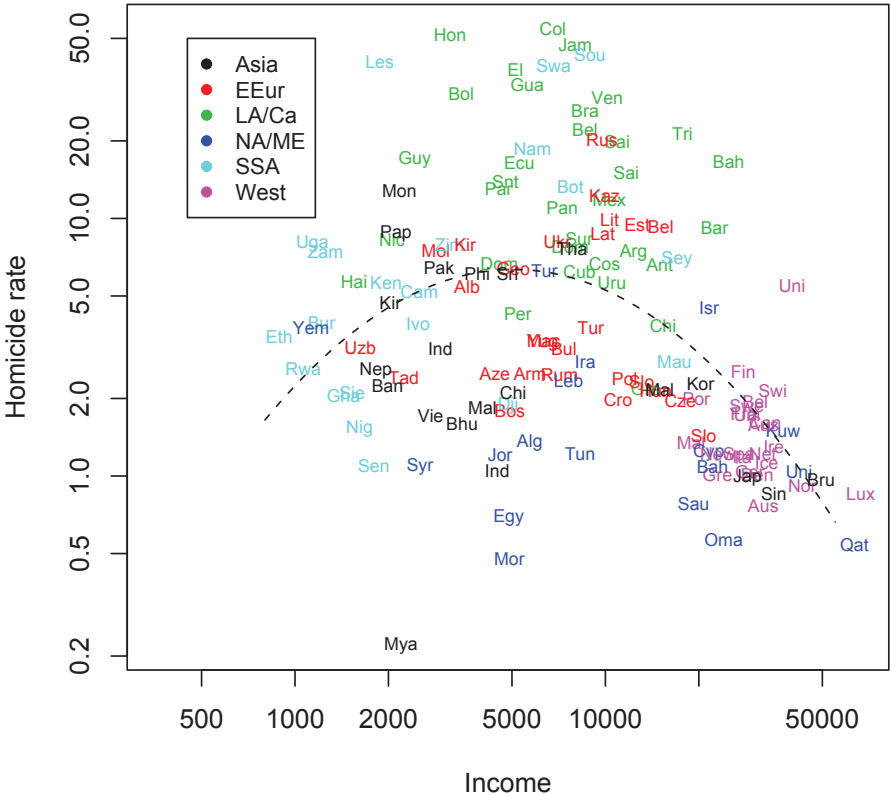


Figure 4. Homicide rate (2000–05) versus level of democracy

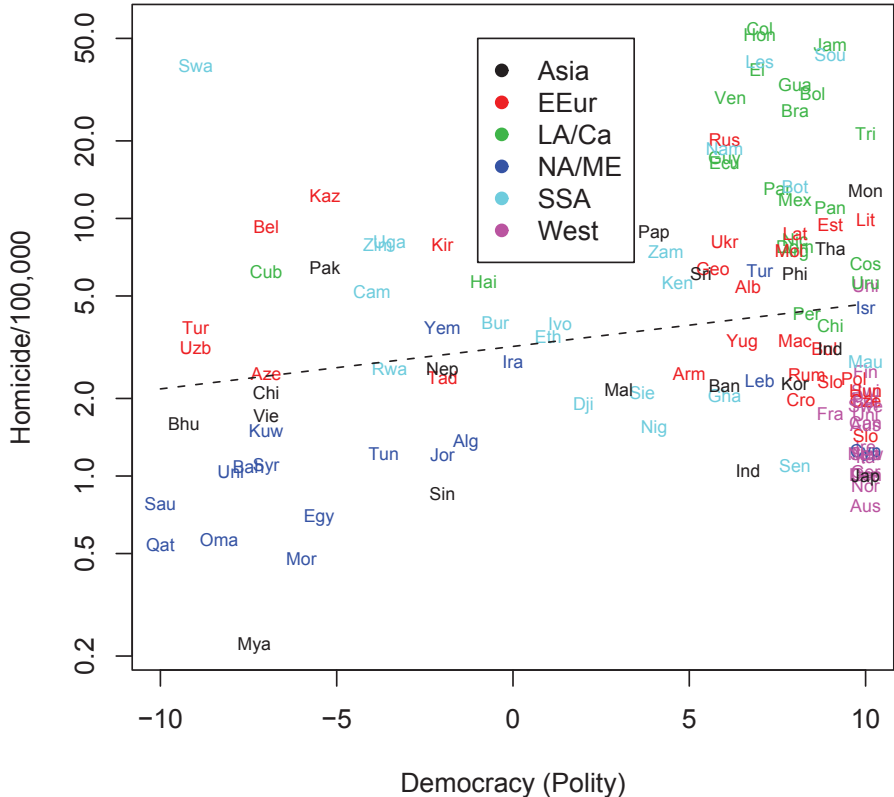
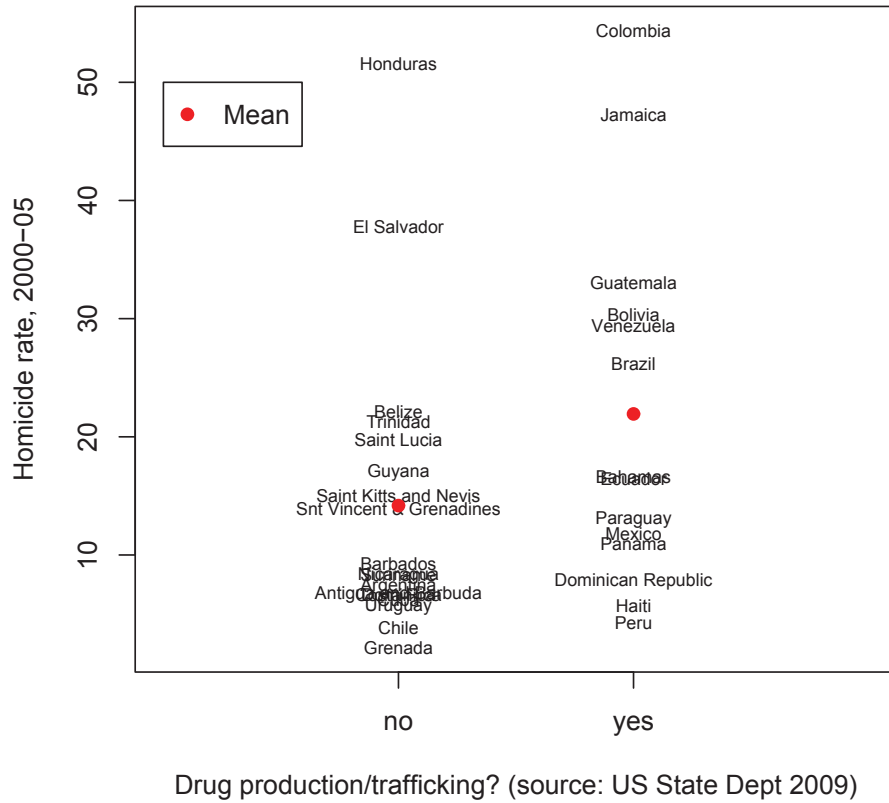


Figure 6. Homicide rates by drug involvement, LAC



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