

A Structural Model of Political Murder in Colombia, 1950-1999

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Abstract: We estimate a theoretically and statistically satisfying model to account for politically motivated murder in Colombia, 1950-1999. The variables that together account for between eighty to eight-four percent of the variation in political murder are the years of Colombia's *La Violencia* period, the years of the so-called National Front political collusion between the two main establishment parties, the real trade balance and the real social expenditures, both in per capita terms, and the size of Colombia's military forces as a proxy for all armed forces (military, para-military, guerrilla, and drug-related) in the country.

Keywords: Colombia, political homicide

JEL classification codes: C22, D63, D74, H56, K42, N46, O54

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Introduction

Latin American countries record, by far, the highest homicide rates in the world, averaging 20 to 30 murders per 100,000 people, i.e., two to three times as many as in the next most violent regions of the world (see, e.g., Guerrero, 1998; and, especially, Londoño, 1998, p. 72). Within Latin America, Colombia is known for its extremely high levels of homicidal violence, resulting in one of the highest murder rates in the world. According to Colombian National Police statistics, homicides increased from around 5,000 per year in the 1950s and 1960s to about 10,000 per year by 1980 and to about 25,000 per year by 1990. A further surge to nearly 30,000 murders per year was seen in the early 1990s. This has moderated somewhat but, in absolute numbers, still hovers between 20,000 to 25,000 per year or around 50 murders per 100,000 people (figure 1).

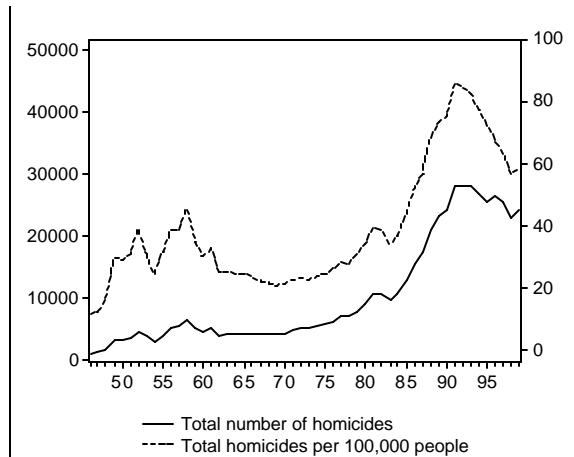


Figure 1: Homicides in Colombia, 1946-1999

Source: see appendix on data sources

The country's murder rate varies substantially not only over time, but also from region to region (e.g., Dinar and Keck, 1997, pp. 9-10; Guerrero, 1998, pp. 96-97; Londoño, 1998, p. 76), with rates as low as 16/100,000 that would be regarded as not too far off "normal" for the world to rates as high as 900/100,000 (Guerrero, 1998, p. 97).

These numbers underestimate the truth. Following a survey, Rubio (1998a, p. 606) writes that even for murder, "more than half

of the households victimized stated that they had 'not done anything,' and only 38 percent reported that they had made a formal complaint" to the authorities. Incredibly, by comparing separate statistical reporting by the police and the justice agencies Rubio finds wide disparities for more than a quarter of Colombia's municipalities. The disparities are largest in municipalities characterized by the presence of any armed force (military, para-military, drug-gangs, guerrillas; Rubio, 1998a, p. 607). Apparently, victims fear reprisals.

Without doubt, Colombia's murderous violence is related to two of its most salient

features, the drug trade and the political violence, both of which have marred the country for decades. But less well-known and appreciated is that these two factors account only for a small portion of all murders in the country (Guerrero, 1998, p. 98). For murder, the primary risk factors are alcohol consumption, possession of firearms, and weekends. For example, a quarter of all murders take place on Sundays, more than half on Friday, Saturday, and Sunday, with disproportionate increases on holidays. Most murders are non-political, take place at night, in urban areas, are committed by poor people on poor people, and alcohol is frequently found in the victims (Londoño, 1998, especially p. 75; Guerrero, 1998), although Guerrero observes that while alcohol consumption might explain the high levels it cannot explain the drastic *increase* in violence in Colombia in the 1980s and 1990s (1998, p. 98).

Also contrary to popular perception, several studies have failed to establish links between murderous violence and poverty rates, unemployment rates, urbanization rates, or rates of economic growth (Londoño, 1998, p. 74; Guerrero, 1998, p. 97). Indeed, Rubio (1997) and others have made persuasive arguments according to which the educated *and* uneducated classes both engage in criminal and violent activity for the simple reason that crime pays well. Income and education are no longer linked, but income and crime are (Rubio, 1997, p. 812). Average annual incomes from crime have been variously estimated at up to \$70,000 per person, a huge premium over Colombia's *per capita* 1995 GDP of around \$1,800 (Bejarano, 1997, p. 12). The break-down of the Colombian justice system further encourages criminal and violent behavior, as the probability of being caught, tried, and convicted is becoming smaller over time. By 1994, convictions rates had dropped to below four percent (Rubio, 1998a, p. 606), and sentences rarely exceeded six months of jail time (Rubio, 1998b, p. 91).

There is wide-spread agreement among analysts of all stripes that Colombia's violence is costly, both at the microeconomic level (e.g., Dinar and Keck, 1997) and at the macroeconomic level – estimated at up to 15 percent of GDP (Bejarano, 1997, p. 10) – and there is good evidence that major perpetrators of violence – the military and paramilitary forces, the drug-traders, and the various guerrilla groups – act in semi-collusive fashion to keep the spoils of war going (Richani, 1997), evidence almost perfectly in line with the theory suggested by Brito and Intriligator (1992).

Brauer, Gómez-Sorzano, and Sethuraman (2002) have applied the Hodrick-Prescott and Beveridge-Nelson business-cycle decomposition methods to separate the Colombian homicide time-series into a permanent and a cyclical component. They interpret the latter as due to political violence and, when matching their estimated cyclical murder series with the political events in the country, they appear to generate

a good overlap between the political violence the narrative suggests and the data they extracted, at least for the time period 1946 to 1991. However, they do not provide an underlying structural model that would capture the causal reasons why political violence would move in the way it does. To provide such a model is the purpose of this paper.

Data and methods

Data were collected in Colombia from various Colombia sources and adjusted for inflation and population growth (see data source appendix for a detailed description). The estimation method used is multiple regression analysis. Attention was paid to functional form and regression diagnostics. Because Brauer, Gómez-Sorzano, and Sethuraman (2002) were more confident about their estimates of political murder for 1946-1991 than for the 1946-1999 period, we run our models separately for these two time-periods. In the end, we restricted our analysis to begin with 1950 since data on armed forces personnel are unavailable prior to 1950.

Initial model

Political variables

Political murder might be thought of as an “output,” the result of politically motivated violence (which is the “input”). In Colombia, the time-period from 1946 to 1957 (or, in Bushnell’s, 1993, discussion from 1947 to 1960) is generally referred to as *La Violencia*, a period of intense power clashes between the “liberal” and “conservative” parties, mingled with a brief, overt military intervention (1954-1958) and incipient guerrilla activity. But from 1958 to 1978, the two main establishment parties came to a peace of sort and, under the name of National Front, arrived at a power-sharing agreement according to which the presidency would be swapped between the parties every four years, and – within each four-year term – cabinet and other high-ranking political posts would be divided up as well. During those years, political murder fell, even as guerrilla activity continued and intensified. After 1978, the power sharing arrangement broke down and intense struggles over political dominance reemerged, now intensified by cocaine riches. The latter brought drug-cartels into the political struggle as well, as drug-lords sought control over land to grow cocoa leaves. This, in turn, appears to have drawn owners of large-scale land-holdings into the conflict and various para-military groups emerged to participate in the struggle.^{1, 2}

A structural model explaining political murder then should contain variables for the *La Violencia* and the National Front years, and as a first approximation this is done in the simplest and most effective way with the use of dummy variables. Following Bushnell (1993), we code *La Violencia* equal to 1 for 1947 to 1960, and we call the variable “B” (for *Bogotazo*, which refers to the violent, murderous rioting in Bogotá on 9 April 1948). The National Front years (“CL” – conservative/liberal) are coded equal to 1 for 1958 to 1978.

It is not so clear how to best represent the post-1978 years. Whereas we do have numbers on the strength of the police and armed (i.e., military) forces, we understandably are not in possession of such numbers for para-military, guerrillas, and drug-gangs.³ It might be argued, however, that the police and military personnel numbers reflect information about the strength and intensity of the various opposing forces so that, from a modeling perspective, the police and military forces can stand as a *proxy* for all armed groups in the country.

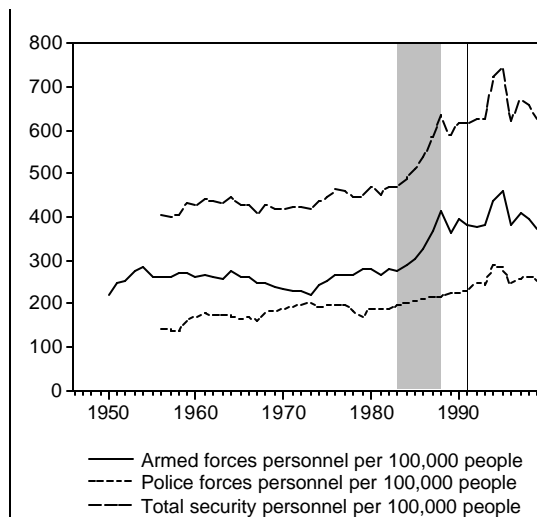


Figure 2

Figure 2 indeed does show a remarkably constant level of total police (PFp100) and military (AFp100) forces – from 400 to 450 per 100,000 people – during the National Front years, 1958 to 1978. Thereafter, we note a drastic force increase, lasting, especially, from 1983 to 1988 (the shaded area; we refer to the line drawn at 1991 later on). The 1983-1988 time-period saw heightened, often spectacular, guerrilla activity. This is also the time when cocaine became so profitable as to spur competition for control over land and

corresponding political influence. This mingling of old and new economic interests and political control, in which established political parties, the police and military, the drug-lords, landowners and para-military participated, lasted, roughly, from 1978 to 1991, when Colombia adopted a new constitution and when, in June that year, infamous drug-lord Pablo Escobar turned himself in for a jail term in Colombia. With the exception of a total security force spike in 1994 and 1995, the post-1991 period

shows a stable level of total security forces and reflects relative *political* quietude, even as violent conflict carried on among the drug cartels. Bushnell (1993) is explicit in referring to the post-1991 era as the “end of war” period (and we will return to this point).

But to characterize *political* murder, it is not clear that both police and military force data should be included. Examining figure 2 more closely, it does appear as if police and armed force strength respond to different underlying motivations. In particular, note that during the National Front years, the armed force variable declines, picking up in the mid-1970s as the National Front consensus begins to break apart, and increases drastically during the 1980s. The police force variable moves quite differently. *A priori*, the movement of the armed force variable is more closely associated with what we want to measure, and it is this variable therefore that we will use in our model. It also has the advantage of reaching back to 1950, giving us additional degrees of freedom. In fact, the sharp rise in this variable in the early fifties is entirely consistent with the initial *La Violencia* years, slightly declining as the military under General Rojas Pinilla (1954-1958) assumed direct governmental power.

A different way to characterize the post-1978 period might be with the further use of dummy variables such as “all-out-war” (1979-1991) and “end-of-war” (post-1991) but the use of a continuous, relevant variable such as AFp100 that stretches across almost the entire time-period (1950-1999) is statistically preferred. One might also try multiplicative effects, such as BxAFp100, CLxAFp100, etc. but it is not clear on theoretical grounds why that would be an improved functional form and thus why one should test for such variables. (One exception is discussed later on in this paper.)

Economic variables

If there was revolutionary ferment in Colombia is that not a reflection of some underlying economic shortcoming? Is it not true that economic variables undergird the political variables? Perhaps so. We would agree that political activity reflects economic interests, at least in part, and certainly in Colombia. But economic *interests* and economic *variables* are not the same thing. One needs to exercise caution when adding economic variables to the structural model.

Repeatedly, the Colombian literature has noted a seemingly curious link between commodity-export booms and political violence, i.e., between economic well-being and increases in murder. One hypothesis is that commodity booms increase the pot-of-gold over which it is “worth” fighting.⁴ One might therefore speculate and test the hypothesis that, for Colombia, movements in the inflation-adjusted trade balance per

capita ($rTBpcap$) is an explanatory variable for politically motivated murder. An inspection of the descriptive graph (in figure 3) is suggestive. There are four time-periods of pronounced improvements in the balance of trade (1955-1959; 1971-1975; 1982-1991; and 1994-1999; the shaded areas in figure 3). Levels of murderous violence in the first and third period are strongly associated with trade balance improvements; the second period shows no relation to the trade balance, and the fourth shows an opposite movement. But trade balance data are distorted by import substitution or export promotion policies and attending tariff protection and exchange rate regimes, so that there might well be something to the argument, at least as from the mid-1950s onward, and we will include this variable in our final model.

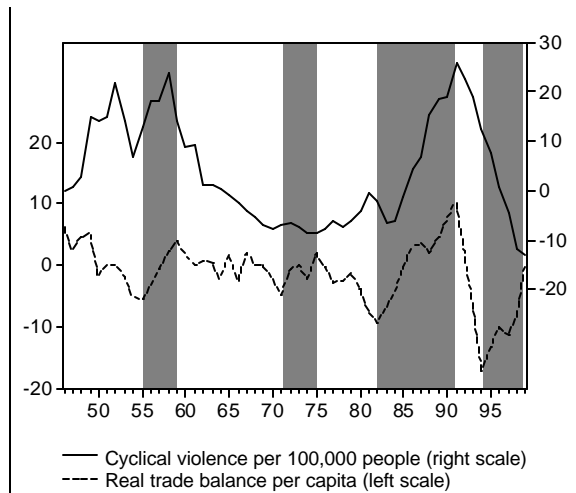


Figure 3

Other relevant economic variables are inflation-adjusted private consumption per capita levels ($rCpcap$) and, perhaps, social consumption as reflected in government real social expenditure per capita ($rSpcap$) or real government total consumption expenditure per capita ($rGOCpcap$). Unlike the trade balance variable, private and social consumption are not so directly linked to export success and pot-of-gold attractions. The hypothesis is that improvements in private and social consumption

are associated with reduced levels of political unrest, violence, and murder. Since social consumption (health and education) in Colombia is incredibly small, we at first thought that the more encompassing government consumption variable should be used in our model. However, $rGOCpcap$ is highly correlated with the police and armed forces variables (on the order of $r=0.8$), and the expenditure on these forces is part of $rGOCpcap$. It turns out that $rSpcap$ also is highly correlated with the force numbers, but at least the variables are conceptually different. We therefore decided to use $rSpcap$, instead of $rGOCpcap$, as our measure of social consumption.⁵

Results and interpretation

Our initial model to be tested thus is (with expected signs preceding the variables):

$$(1) \text{ cvp100} = f(+B, -CL, +rTBpcap, -rCpcap, -rSpcap, +AFp100)$$

where

cvp100	estimated cyclical violence per 100,000 people
B	years of <i>La Violencia</i> (1947-1960, following Bushnell's dating)
CL	years of the National Front (1958-1978)
rTBpcap	real trade balance level per capita
rCpcap	real private consumption level per capita
rSpcap	real social (health and education) consumption per capita
AFp100	number of armed (i.e., military) forces per 100,000 people

The monetary variables are measured in millions of pesos. Since data for the armed forces is available only as from 1950, the model is run for 1950-1999. To gauge the pronounced "kink" in the cyclical violence data in 1991 (figure 3), the model is also run for 1950-1991. The initial results are displayed in table 1.

Table 1: Initial estimation results

Dependent variable: cvp100; all numbers are rounded

The first reported numbers are for 1950-1991; **bold numbers are for 1950-1999**

Estimates for 1950-1999 are Newey-West HAC (see text)

<i>Variable</i>	<i>coefficient</i>	<i>std. error</i>	<i>t-stat</i>	<i>p-value</i>
constant	- 13.77 (- 25.71)	12.70(5.95)	-1.08 (- 4.32)	0.2858 (0.0001)
B	10.62 (7.45)	3.23 (3.75)	3.29 (1.99)	0.0023 (0.0533)
CL	- 4.76 (- 5.32)	2.38 (2.02)	-2.00 (- 2.64)	0.0538 (0.0116)
rTBpcap	0.74 (0.52)	0.26 (0.24)	2.84 (2.22)	0.0074 (0.0319)
rCpcap	- 0.23 (- 0.03)	0.28 (0.21)	-0.82 (- 0.12)	0.4187 (0.9059)
rSpcap	- 20.45 (- 354.34)	270.78 (179.83)	-0.08 (- 1.97)	0.9402 (0.0552)
AFp100	0.13 (0.15)	0.03 (0.04)	3.84 (3.91)	0.0005 (0.0003)

adj. $R^2 = 0.84$ (**0.74**); DW = 1.63 (**0.98**); F-stat = 36.77 (**24.38**); p-value (F) = 0.0000 (**0.0000**)

We first discuss the estimates for the shorter time-period, 1950-1991. All coefficient

estimates conform to our prior expectations. The *La Violencia* dummy is positive and statistically significant; the National Front dummy is negative and statistically significant.⁶ Of the monetary variables, the trade balance effect is positive, as predicted, and is also statistically significant. Even though they do show the expected negative sign, neither the private nor social consumption variables are statistically significant. Finally, the armed force variable is statistically significant and carries, as expected, a positive sign. The adjusted R^2 is large at 0.84. The Durbin-Watson statistic (DW=1.63) appears low. But residual tests do not show evidence of serial correlation. Not shown here, for 24 lags, all autocorrelations and partial correlations show low Q-statistics and high p-values. Also, the Breusch-Godfrey Serial Correlation LM Test (with two lags) shows no evidence of serial correlation. It appears that our model characterizes the data well, but that neither social nor private consumption should affect political violence puzzled us. Upon further investigation, we then found a theoretically (and also statistically) more satisfying model which we discuss in another section (see “amended model”).

When considering the time-period beyond 1991 (in **bold typeface** in table 1), the conclusion of having found a satisfactory model did not hold so easily. Even though the signs of all coefficients were as expected and only the coefficient for private consumption was statistically insignificant, the Durbin-Watson statistic suggested – and the Q-statistics and the Breusch-Godfrey Serial Correlation LM Test confirmed – severe positive serial correlation. But – with two possible exceptions to be discussed shortly – there seemed no obvious misspecification problem. If there is no misspecification, we would be dealing with pure serial correlation, and the coefficient estimates are then unbiased. In this case only the standard errors, and thus the t-stats and p-values would be affected. Thus, we employed the relatively new Newey-West method to produce heteroskedasticity and autocorrelation consistent (HAC) estimates (see, e.g., Studenmund, 2001, pp. 334-335). The standard errors, t-stats, and p-values reported in table 1 are the HAC values. But this still left the problem of severe serial correlation of the error terms.

Model misspecification

We can think of two reasons for potential model misspecification. One is the possibility of *violence inertia* (e.g., revenge motives; renegade troops) so that the models should include a lagged term, say $cvp100_{-1}$ (a one-period lag of the dependent variable). A second possibility is that we encounter in 1991 a *systemic change*, requiring an altogether different model for the post-1991 period. *A priori* we like the

notion of systemic change better. Whereas for weekly or even monthly data, we would more readily accept the concept of violence inertia, it is not clear why inertia should last for the duration of one or more years. For annual data it seems more likely that other factors are at work.⁷ In contrast, the notion of a systemic change is more appealing on the grounds of what actually happened in the country. President Gaviria (1990-1994) became, at age 43, the youngest Colombian president in the 20th century, and the first president of the post-*Violencia* generation. This was an important break in Colombian political culture. Gaviria pushed through a new constitution, adopted in 1991, that was greeted with enthusiasm across the country. And he appointed a former M-19 guerrilla leader, Antonio Navarro Wolf, to the post of minister of health. Colombian social consumption (health and education expenditure) rose drastically, as did other government and private consumption. The spending differences to the pre-1991 period are striking (see figure 4).

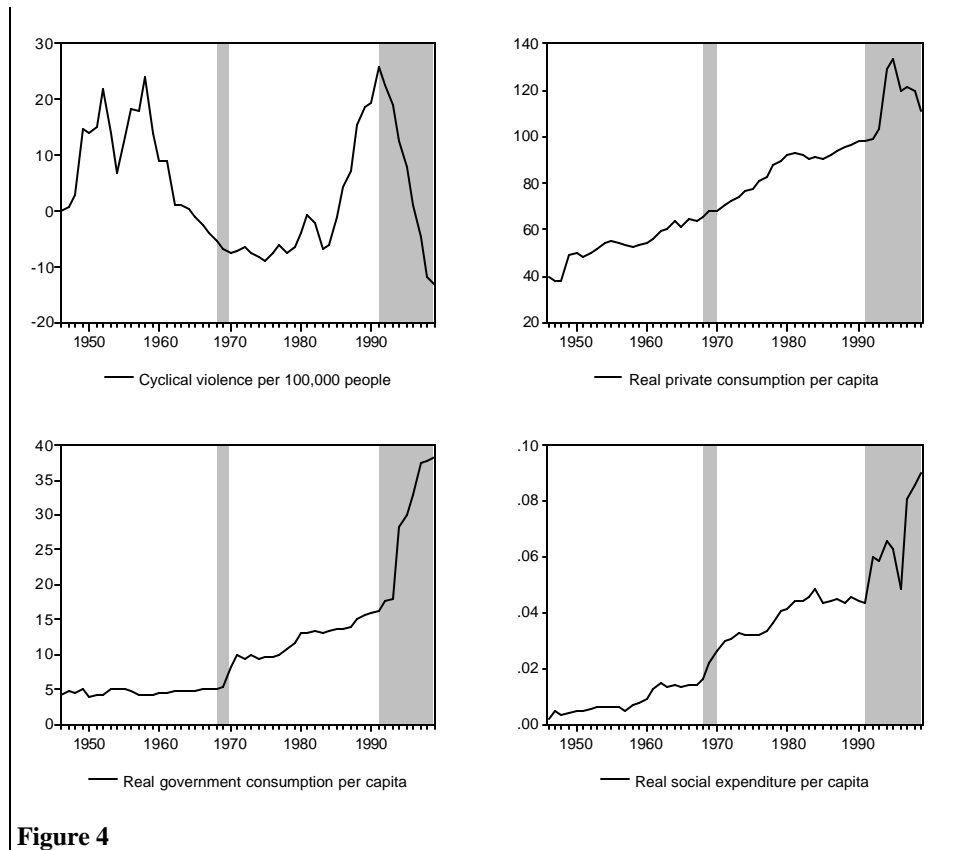


Figure 4

We therefore decided to test for a structural break between 1991 and 1992. This, in turn, required a correct model for 1950-1991 to carry forward to 1992-1999 and allowed us to revisit the puzzling question of why, in our initial model, social and private consumption did not result in statistically significant coefficients.

Amended model

Starting, then, with the initial 1950-1991 model results as reported in table 1, we applied Ramsey's Regression Specification Error Test (RESET) which indeed suggested misspecification. We also ran another stability test, Recursive Coefficient Estimation, which permits the investigator to gauge coefficient instabilities as data points are added to the model. A particularly obvious coefficient jump occurred from 1968 to 1970 for the social consumption variable (confirmed by figure 4). This, combined with the fact that, in table 1, the rCpcap and rSpcap coefficients were statistically insignificant prompted us to first test whether either or both were redundant. Both variables turned up redundant, but rCpcap (private consumption) much more clearly so.⁸ We thus dropped rCpcap from the model. Next, we added a shift dummy (DS) to account for the social consumption-slope shift that occurred in 1969 (and another slope-shift in 1996, see figure 4, so that DS is coded as 1950-1968=1; 1969-1995=2; 1996-1999=3). The results are reported in table 2.⁹

Table 2: Amended model

Dependent variable: cvp100; all numbers are rounded

The first reported numbers are for 1950-1991; **bold numbers are for 1950-1999**

Estimates for 1950-1999 are Newey-West HAC (see text)

<i>Variable</i>	<i>coefficient</i>	<i>std. error</i>	<i>t-stat</i>	<i>p-value</i>
constant	- 22.09 (- 30.51)	8.73 (4.82)	-2.53 (- 6.32)	0.0159 (0.0000)
B	12.16 (10.74)	2.85 (2.32)	4.27 (4.64)	0.0001 (0.0000)
CL	- 4.64 (- 4.38)	2.36 (1.72)	-1.96 (- 2.55)	0.0574 (0.0145)
rTBpcap	0.79 (0.51)	0.26 (0.15)	3.06 (3.33)	0.0041 (0.0018)
DS*rSpcap	- 87.79 (- 119.27)	35.89 (17.98)	-2.45 (- 6.63)	0.0195 (0.0000)
AFp100	0.11 (0.14)	0.03 (0.02)	3.94 (7.89)	0.0004 (0.0000)

adj. R² = 0.84 (**0.80**); DW = 1.61 (**1.24**); F-stat = 44.24 (**39.85**); p-value (F) = 0.0000 (**0.0000**)

For 1950-1991, while the DW-statistic remains low (DW=1.61), neither the Q-tests nor the Breusch-Godfrey Serial Correlation LM Test came close to suggesting serial

correlation. The RESET still suggests misspecification but the recursive coefficient estimates now are “clean,” statistically speaking. We therefore decided to accept this model as our final model for the 1950-1991 time period. All coefficients conform to prior expectations, and all are statistically significant. *La Violencia* increased political murder, the National Front years decreased it. The trade balance is in fact associated, over this time period, with political murder. Increases in social consumption, when adjusted for its break in 1969, are significantly related to lower political-murder rates, and the increased presence of armed (i.e., military) forces is significantly related to higher murder rates. (Recall, though, that we use armed forces as a proxy to stand for all fighting forces in the country.)

We now turn to the numbers reported in **bold typeface** in table 2 and to the question of whether or not the earlier time-period model can be carried over to the longer period, i.e., to the possibility of a structural break. Note that all coefficients are of the expected sign, and all are statistically significant. The adjusted R^2 is high (0.80) but there now exists severe serial correlation again. The Chow Breakpoint Test itself could not be run since we have only eight data points for the 1992-1999 period. Thus, we employed the Chow Forecast Test which runs the 1950-1991 model, forecasts the values of the dependent variable, *cvp100*, and then compares the forecast with the actual values. This test decisively rejects the null hypothesis of no structural break ($F=2.87$, $p=0.014$; $LR=24.65$, $p=0.0018$).

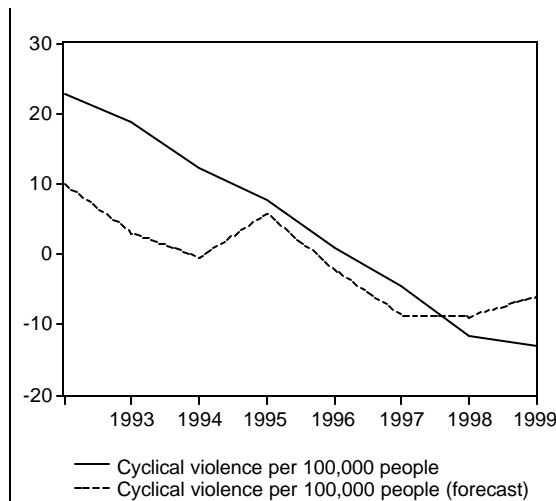


Figure 5

It is, however, not clear just what this statistically identified structural break would consist of. Except for *rSpcap*, the estimated coefficients between the 1950-1991 and the 1950-1999 time periods are nearly identical. Moreover, as may be seen in figure 5, when we took the shorter-period model and did an ordinary forecast of *cvp100* and then compared that forecast to the actual *cvp100* data, the model certainly captures the “spirit” of the post-1991 period. Despite the Chow test we therefore accept

our model.^{10, 11} Consisting of variables for *La Violencia*, the National Front years, the

real trade balance per capita, real social consumption per capita, and armed force personnel (as a proxy for all armed forces in the country), the model explains eighty to eighty-four percent of the observed movement in the political murder variable for the years 1950 to 1999.

Conclusion

To conclude, provided with a data series of political murder in Colombia 1946-1999, we built a structural model to explain the movements in that time series of data. In the final model, data limitations restrict us to an examination of the 1950-1999 time period. We find that obvious variables, such as coding for the *La Violencia* and the National Front years, are indeed statistically significant (and of the expected sign). We also find that, as the narrative literature suggests, an increase in the real trade balance leads to higher levels of political murder. The underlying theoretical point is that trade balance improvements derive from commodity booms (coffee, cocaine) that make land more valuable and therefore the contest over land more severe. This finding is worth investigating in greater detail. Further, we find that increases in real social expenditure (on health and education) reduce political murder and that increases in the size of the armed forces of all fighting factions increase political murder.

Notes

We thank Matthias Spoerle for assistance with literature research and Iván Darío Montoya Larota for assistance with data collection in Colombia. For useful comments on the econometrics we thank Jülide Yildirim and Nadir Öcal.

1. The information in this paragraph is uncontroversial. For a history of Colombia see, e.g., Bushnell (1993).
- 2.. On the role and links between and among police, army, and para-military troops in the Colombian conflict see, e.g., Giraldo (1996).
3. Following reports in *The Wall Street Journal* and *The Economist*, numbers for 2002 run at about 22,000 members for FARC and ELN, the two largest rebel groups, perhaps 10,000 to 12,000 para-military troops, and another 5,000 or so drug-related troops. The Colombian armed forces weigh in at about 150,000 (including 50,000 salaried, professional troops) and the police force at 100,000.

4. We know from the African experience that natural-resource riches may exert powerful effects to attract contestants (see Sambanis, 2002, for a literature review on this and other aspects of the economics of civil wars).

5. In the statistical work reported later on in this paper, we used two measures for real social consumption per capita, both derived from Colombian data sources but differing in magnitude. Both however resulted in nearly identical findings for our models. We therefore report the model results using only one of the two social consumption variables (see appendix).

6. Note the overlap of the B and CL dummy variables for 1958, 1959, and 1960. For these years, the combined effect on $cvp100$, relative to the intercept, would be the sum of the coefficients for these two variables (i.e., 5.86 for the 1950-1991 model). To learn what difference the coding might make, we also coded the *La Violencia* years (variable B) to last only until 1957. Although magnitudes change, the signs of all coefficients are unchanged and, in most cases, their statistical significance is unaffected. In any event, our final coding (with the overlap) follows the descriptive literature on Colombia and is the theoretically preferred measure to use.

7. The use of lagged dependent variables introduces its own estimation validity problems. Nonetheless, we modeled a one-period time-lag and examined the statistical results. In our case, the serial correlation problem disappears but the estimates of some of the substantive independent variables, while retaining the correct sign, turn out statistically insignificant. We did not pursue the use of the lagged independent variable.

8. The correlation coefficient between these two variables is 0.95, suggesting the presence of a multicollinearity problem in the initial model. Simply dropping a variable in the presence of multicollinearity is inappropriate when the variable in question is theoretically relevant. In our case, though, there is a stronger theoretical case in favor of retaining the social consumption, rather than the private consumption, variable since cyclical violence, i.e., political murder, is a social variable.

9. Coding the step-dummy (DS) as 1, 2, and 3 implies that the effect between the first and second period is the same as that between the second and third period. When using values of 1, 2, and 4 as well as of 1, 2, and 5, we retain all signs as well as, roughly, the magnitudes and statistical significance for all variables except of course for $DS * rSpcap$ (which changes in magnitude only, becoming smaller) and for CL (which changes in statistical significance only, becoming statistically insignificant at $DS=5$).

10. It has been shown that the Chow Breakpoint and Forecast tests can be misleading. For an instructive example see, e.g., *E-Views4 User's Guide*, pp. 364-366.

11. It is important to realize that we took the 1950-1991 model – in which $DS = 1, 2$ – and forecast the *cvp100* values for 1992 to 1999. The forecast of downward cyclical violence as depicted in figure 5 is thus not due to a $DS = 3$ coding.

Appendix: data sources

All monetary variables were obtained in nominal terms and converted with the implicit GDP deflator (1994=100). The deflator is obtained for 1946-49 from CEPAL, for 1950-1980 from *Banco de la República* (Central Bank of Colombia), and for 1981-1999 from *Departamento Administrativo Nacional de Estadística* (DANE).

Per capita adjustments are made on the basis of total population (millions) counts coming from the censuses of 1953, 1968, 1973, 1978, 1983, 1985, 1993 and projections by DANE.

Nominal social expenses (in millions of Colombian pesos) consists of health expenditures and education expenditures. For 1946-1970, taken from “Estado y Hacienda Publica en Colombia, 1934-1990,” by César Giraldo (*Contraloría General de La República*); for 1971-1999, taken from financial reports of the General Comptrollers Office of Colombia.

Nominal trade balance data (millions of Colombian pesos) is obtained as the difference of exports and imports of goods and services; *Banco de la República* (Colombian Central Bank), DANE, and calculations by the *Departamento Nacional de Planeación* (National Planning Department), Macroeconomic Studies Unit. Nominal private consumption (millions of Colombian pesos); *Banco de la República*, DANE, and calculations by the National Planning Department, Macroeconomic Studies Unit. Nominal government consumption (millions of Colombian pesos); *Banco de la República*, DANE, and calculations by the National Planning Department, Macroeconomic Studies Unit.

The data for the total number of personnel of the Colombian police (PF) and for the total number of active members of the armed forces both come from the National Planning Department, Justice and Security Unit.

The coding for the years of *La Violencia* and the National Front years are taken from Bushnell, 1993.

Total homicides are the sum of four murder series: murder (*homicidio*), aggravated murder (*homicidio agravado*), murder with terrorist intent (*homicidio con fin terrorista*), and death associated with the exercise of official duties (*homicidio con*

función, razón cargo o ejercicio de sus funciones). The data are taken from various issues of *Revista Criminalidad*; Colombian National Police. Finally, the cyclical component of total homicides is computed by and reported in Brauer, Gómez-Sorzano, and Sethuraman (2002).

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