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A MODEL OF CYCLICAL TERRORIST MURDER IN COLOMBIA, 1950-2004. Forecasts 2005-2019

By Gustavo Alejandro Gómez-Sorzano*

Abstract: This paper continues a research born in 1993 as a consequence of the growing concern regarding the escalation of violence in Colombia; its objective is to create an econometric model capable of forecasting the path of terrorist murder under different policy options and helping the country in the design of state policy drawing the lineaments for reaching the pacification of the country. I claim that the approach presented here is the only way of creating an econometric model for terrorist murder in Colombia. In the first part I use The Beveridge and Nelson decomposition of economic time series to estimate the cyclical component of murder, which is used later to construct a theoretically and statistically satisfying model to account for cyclically motivated terrorist murder in Colombia, 1950-2004. The variables that together account for eighty three percent of the variation in cyclical terrorist murder are the years of Colombia's *La Violencia* period when the peasant self-defense movements appeared, the years of the so-called National Front political collusion between the two main establishment parties, the real trade balance, the size of Colombia's military forces as a proxy for all armed forces (military, para-military, guerrilla, and drug-related) in the country, the unemployment rate, the number of students matriculated in all modalities and people displaced in the country. The forecasts for cyclical terrorist murder for 2003-2004 show the big dilemma facing the Colombian authorities: the strong reduction of displaced people from 212,000 in 2003 to 117,000 in 2004 boosted the cyclical terrorist murder in the countryside, erasing the initial results by president Uribe's administration at controlling the intensity of the conflict and implying that any future policy at diminishing it should control the number of displaced people, one of the biggest problems facing Colombia today. The final section presents forecasts for 2005-2019 suggesting, that peace will be attained around year 2008 and, that the way, at this point to reach *sustainable peace* is through the continuation of the *Democratic Security Policy* and strong presidential leadership headed towards disarmament of all armed actors in the country combined with the implementing of political and social changes that will secure lasting peace before year 2019.

Keywords: Colombia, Beveridge and Nelson, cyclical terrorist murder, democratic security policy, sustainable peace, permanent peace, lasting peace.

JEL classification codes: C22, C53, D63, D74, D78, H42, H56, K42, N46, O54.

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Introduction

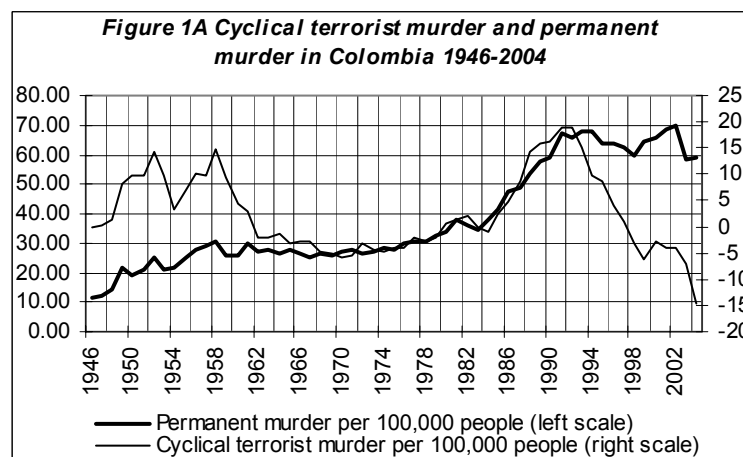
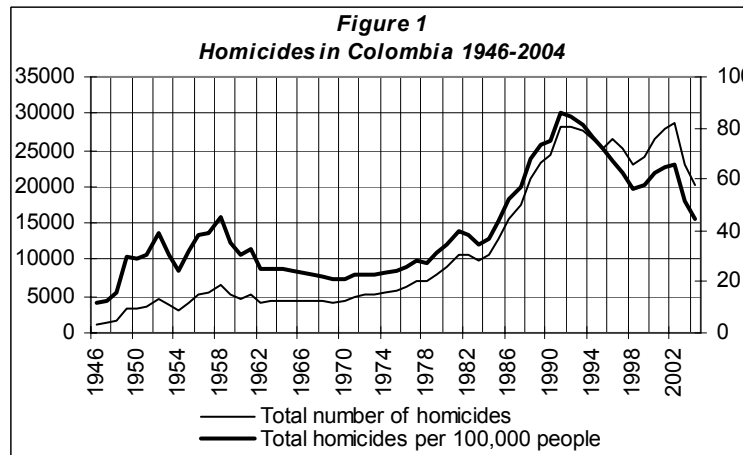
Latin American countries record, by far, the highest homicide rates in the world, averaging 20 to 30 murders per 100,000 people, i.e., two to three times as many as in the next most violent regions of the world (see, e.g., Guerrero, 1998; and, especially, Londoño, 1998, p. 72). Within Latin America, 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 30,000 per year in the early 1990s.

During the last years however, this tendency has changed. Now murder declines from 28,781 in 2002 (around 66 murders per 100,000 people) to 22,973 in 2003 (52 murders per capita), and 20,133 in 2004 (44.4 per capita – figure 1). A further reduction emerges when analyzing cyclical terrorist murder per capita figures¹ of -4.06 , -6.8 and -14.4^2 for those years respectively (figure 1A) suggesting both that terrorist murder is being eradicated and that Colombia's civil conflict is dying. I claim that after 14 years of research I have found a way to construct a theoretically and statistically good model for cyclical terrorist murder than can be applied to other countries infected by terrorism.

The research reported here do not use the original per capita series of murder in Colombia since there is no way to construct such a model, so I take advantage of the fact

¹ The estimation of the cyclical terrorist murder per 100,000 people is presented in the section for data and methods.

that the per capita murder series have a unit root and split it in its cyclical (*terrorist murder*) and *permanent components*³.



Colombia's murderous violence is related to three salient features: political violence, guerrilla activity and drug trade, while the first two have marred the country for decades, the latter one appeared in the seventies. But less well known and appreciated is that these two factors account only for a small portion of all murders in the country (Guerrero,

² There are no negative murders. Negative murders in this case represent homicides falling below the trend line as a consequence of an agonizing civil conflict.

³ In general terms the original series of per capita murder per 100,000 is identical to the new cyclical terrorist murder per capita estimated according to *Beveridge and Nelson*, a inspection of figures 1 and 1A

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 Fridays, Saturdays and Sundays, 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). Others, such as Uprimny(2001, p.47), through the comparison between Colombia and Bolivia conclude the lack of collective action as an explanation of the persistence of violence in Colombia.

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 income from crimes have been variously estimated 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, conviction rates had

confirms so; basically the main difference is that the cyclical component enlarges the cycles and peaks allowing the construction an estimation of a theoretically satisfying model for cyclical terrorist murder.

dropped to below four percent (Rubio, 1998a,p.606), and sentences rarely exceeded six months of jail time (Rubio, 1998b, p.91). In a recent paper (Levitt and Rubio, 2000) find as explanations for Colombia's high crime rate: the drug trade, lack of punishment of criminals, guerrillas, poverty and income inequality and a probable propensity to violence from Colombians.

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 some evidence that major perpetrators of violence – the military and paramilitary forces, the drug traders, and the various guerrilla groups – might be acting in a 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 (2004A) 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, economic booms and guerrilla activity and, when matching their estimated cyclical terrorist murder series with the political and economic events as well as terrorist activity in the country, they appear to generate a good overlap between the political and guerrilla violence the history suggests and the economic booms at least for the time period 1946-2004. In the next section I re-estimate the cyclical component for 1946-2004 and start the construction of a model that would capture the causal reasons why cyclical terrorist murder would move in the way it does.

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 linear multiple regression.

Decomposition of Colombian murder into permanent and transitory components⁴

I use The *Beveridge and Nelson* (BN for short) decomposition of economic time series to obtain the cyclical and permanent components of murder. This method has been applied in Colombia to decompose macro indicators as gross domestic product (GDP) by authors as Cárdenas (1991). It is applied in this paper for social variables, related with crimes, specifically Colombian homicides recorded annually from 1946 to 2004⁵. The purpose of this decomposition is twofold, to construct a model explaining cyclical terrorist murder and in a future research a model for permanent murder.

According to BN (1981) after verifying that the series of the logarithm of murder 1946-2004 do not reject the existence of a unit root, I proceed to perform the decomposition, which begins by adjusting the per capita murder series (PCM) to an ARIMA model with k autoregressive and h moving average components as follows:

⁴ The technical reason for decomposing murder to create and estimate a model for cyclical terrorist murder stems in the fact that the series has a unit root; additionally I realized multiples attempts to model the original per capita series for murder using the independent theoretical variables shown ahead, it was not possible to come across with a theoretically attractive model keeping reasonable econometric fitting.

⁵ The Colombian National Police distinguish 15 comprehensive categories of crime. Category #13, called crimes against life and personal integrity includes: abortion, common body lesions, culpable lesions (lesions in job related accidents), culpable homicide (job related homicides), *homicide*, *aggravated homicide* (assassination), *death associated with the exercise of official police duties* and since 1993 *murder with terrorist intent*. For this analysis I use the last for subcategories collapsed in a single series.

$$\Delta LPCM = \mu + \sum_{i=1}^k \gamma_i \Delta LPCM_{t-i} + \sum_{i=1}^h \psi_i \varepsilon_{t-i} + \varepsilon_t \quad [1]$$

The model estimated for the Colombian case includes moving average components of order 1, 5 and 13, (t statistics shown in parenthesis):

$$\begin{aligned} \Delta LPCM = 0.025 + 0.2789\varepsilon_{t-1} - 0.2898\varepsilon_{t-5} - 0.2994\varepsilon_{t-13} \\ (1.73) \quad (2.27) \quad (-2.24) \quad (-2.27) \quad [2] \\ R^2 = 0.91 \quad DW = 2.09 \end{aligned}$$

After replacing its parameters and adding the estimated residuals from the last regression, the permanent component of murder is calculated according to equation [3]:

$$M_t^{PC} = V_0 + \frac{\mu \cdot t}{1 - \gamma_1 - \dots - \gamma_k} + \frac{1 + \Psi_1 + \dots + \Psi_h}{1 - \gamma_1 - \dots - \gamma_k} \sum_{i=1}^t \varepsilon_i \quad [3]$$

Finally the transitory component is found by means of the difference between the original series and the permanent per capita component (M_t^{PC}) and is shown in figure 1A. It coincides with the political events experienced by the country since 1946 and narrated by Colombian historians. I use the chronology and political description of events taken from Bushnell (1993) and Valencia (1997), finding that the re-estimated cyclical component 1946-2004 coincides with them.

Historical adjustment of the estimated cyclical component of murder with major socio political events in Colombia.

The Liberal party was in power for 16 consecutive years from 1930 to 1946, and this period was called the *Liberal Republic*. Although the country historically has had one of the longest electoral traditions in the continent and the world (Uribe Vélez, 2005, p. 16)⁶

⁶ This paper is a presidential address to the Colombians in regards to the social and economic improvements that the country must reach by year 2019.

and in spite that at that time the Colombian two party system, was superficially taken as evidence of the country's political stability, it was a handy way of keeping alive old grudges and passing them from father to son to grandson. This caused a rising cycle of violence just in time for the presidential elections of 1946 (figure 1A), this year begins a struggle for bureaucratic positions, the winners in elections wish to dominate all the positions, while the losers fight hard not to lose them; in the middle of this cycle in 1948 *Gaitán*, a charismatic liberal leader is assassinated starting what was called *The Bogotazo*, defined as an outburst of mass rioting in Bogotá and all over the country. *Gaitán* was disliked by most of the party establishment. His assassination caused that the army became tainted by politics and so, in a battle in 1952 at the peak of the cyclical component (figure 1A) they left an estimated of 1,500 people dead in El Líbano, State of Tolima.

In 1953 the country had a second military government. General Gustavo Rojas Pinilla becomes president (the cyclical component shows a decrease in the pace of murder). During his regime thousands of guerrillas surrendered their weapons from 1953 to 1954 and that led to a declining cycle⁷. Then from 1958 to 1974 the country had the system of presidential alternation in power called the *National Front*, this was a new era of political reconciliation and domestic peace the institutionalization of a bipartisan rule put an end to the electoral competition (decreasing cycle, figure 1A). It is in this period, (specifically years 1963-1965-1967 and 1970) that guerrilla groups appeared: in 1963 the *Revolutionary armed Forces of Colombia* (FARC) is born, in 1965 the *National Liberation*

⁷ The time period 1947-60 is generally referred to as *La Violencia*, defined as a period of intense power clashes between the Liberal and Conservative parties mingled with a Roja's military intervention 1953-57. A paradoxical phenomenon of these years was a surge of economic growth, homicides were going up but so was

Army (ELN), the *Popular Liberation Army* (EPL) in 1967 and, the *M-19 Group* in 1970. The M-19 Group's life was ephemeral. In 1979 they stole 5,000 weapons from an army canton in the north of Bogotá. Later in 1980 they used them for taking over the Dominican Republic's embassy in Bogotá in the midst of a diplomatic reception and holding hostage 14 ambassadors including the U.S envoy.

From 1982 to 1986 the country experienced a *first peace process*. There were intensive efforts by the government to reach cease fire agreements with guerrilla groups, except for the ELN, resulting in a decreasing cycle as shown in Figure 1A. However, in these agreements substantial items were not clearly resolved, particularly regarding demobilization and surrendering of weapons. The agreements generated positive advantages for the groups, by paralyzing military operations and leaving large empty geographical gaps that were occupied by new guerrilla cells.

In 1984 the Justice Minister increased pressure on the drug industry causing the destruction of the largest clandestine laboratory but was later assassinated by the Medellín Cartel. Later in 1985 and, during peace talks the M-19 Group seized the Justice Palace, seat of the Supreme Court, holding as hostage magistrates that by the end of the night were assassinated⁸. The assault to the Justice Palace was the final blow to the frustrated peace process and so, from 1986 to 1991 cyclical murder takes the form of a general conflict, made up of the confrontation between the government, drug traffickers and guerrillas, which caused hundreds of deaths in the Communist Party (Unión Patriótica), and the assassination

the GDP, at a rate of five percent annually between 1945-1955. Industrial output showed even sharper growth at a yearly rate of nine percent.

⁸ There was intensive fire between the groups and the military who used tanks to get into the Palace. At the end of the night The Palace was completely destroyed and burned out.

of the Attorney General and three presidential candidates (Bernardo Jaramillo, Luis Carlos Galán and Carlos Pizarro).

In 1990, Liberal César Gaviria is elected president starting a process of constitutional reform. He changed the Constitution and the policy toward drugs traffickers, he rejected extradition as a mean of countering the drug traffic and unveiled a program for dealing with the drug problem that produced concrete results: any trafficker that voluntarily surrender to Colombian authorities and plead guilty to one or more charges would not be extradited to the U.S. but instead tried in Colombia. The Medellín Cartel organization declared a truce, and Pablo Escobar gave himself up in 1992, figure 1A captures this declining cycle.

In 1993, as the U.S. press for his extradition Escobar, escaped prison launching another terrorist campaign, but was killed by Los Pepes a group belonging to the Cali Cartel. In 1994, Liberal Ernesto Samper is elected president and Colombia is *decertified* by Washington for the alleged involvement of drug money in the electoral campaign. A new actor in the conflict appeared this year, a federation of paramilitary groups led by Carlos Castaño and called *Self Defense Units of Colombia (AUC)*. As a consequence of this, murder and displacement of civilians in the countryside increases sharply.

In 1998, Conservative Andrés Pastrana is elected president starting a second *Peace Process* and an ambitious plan to establish a negotiated peace without a cease fire agreement. Pastrana's government gave a demilitarized zone (DMZ) the size of Switzerland to the FARC and restricted the presence of the army and the police within such zones. Cyclical murder is on the rise (figure 1A).

In 2002, independent Liberal Alvaro Uribe is elected president, enacting a strong policy to confront guerrillas and paramilitary, his *Democratic Security Policy* proves effective at diminishing the intensity of the conflict; the country lowers total and transitory murder per capita.

As the estimated component coincides with the historical political narrative I have called it *Cyclical Terrorist Murder* and begin the construction of a model explaining the causal reasons for its movement across time.

Initial model

Political variables

Cyclical terrorist murder might be thought of as a “combined mixture” of politically motivated violence and guerrilla activity. 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, over 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. Intense struggles and 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 coca 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.⁹¹⁰

A model explaining cyclical terrorist murder then should contain variables for the *La Violencia* (a time period characterized by intense clashes between traditional political parties) and *National Front* years (the time period where the peasant self-defense movements or communist guerrilla appears). This is done in the simplest and most effective way with the use of dummy variables. Following Brauer & Gómez-Sorzano (2004B), I code *La Violencia* equal to 1 for 1947 to 1960, and call the variable “B” (for *Bogotazo*, which refers to the violent, murderous rioting in Bogotá and the whole country on April 9 1948). The National Front years (“CL” – conservative/liberal) are coded equal to 1 to 1958 to 1978.

Effective variables – armed forces

Whereas I do have numbers on the strength of the police and armed (i.e., military) forces, I am not in possession of large series for para-military, guerrillas, and drug-gangs.¹¹ It might be argued, however, that the police and military personnel numbers reflect

⁹ . On the role and links between and among police, army, and para-military troops in the Colombian conflict see, e.g., Giraldo (1996).

¹⁰ . The information in this paragraph is uncontroversial. For a history of Colombia see, e.g., Bushnell (1993).

¹¹ . Following reports in The Wall Street Journal and The Economist, numbers for 2002 run 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 about 150,000 (including 50,000 salaried, professional troops) and the police force at 100,000.

information about the strength and intensity of the various opposing forces so that, from a modeling perspective, the police and military forces could stand as a proxy for all armed groups in the country.

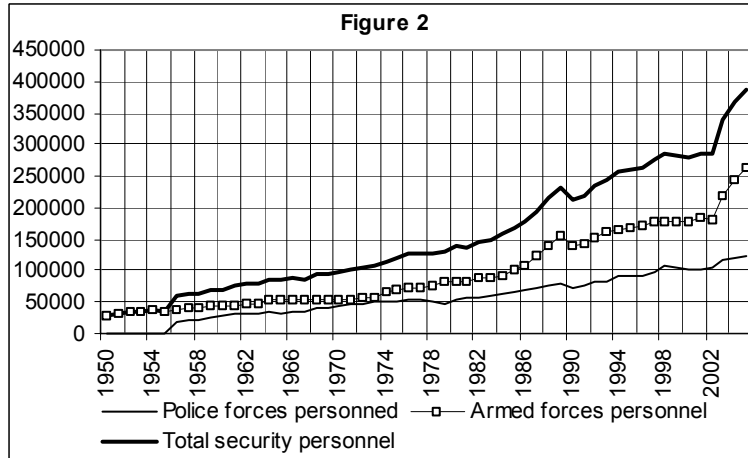


Figure 2 does show a constant level of armed forces during the National Front years, 1958 to 1978 and an ascending one for police forces. Thereafter, I note a drastic force increase, lasting, especially from 1983 to 1990. This was the time when cocaine became so profitable as to spur competition for 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, and landowners and paramilitary participated, lasted, roughly, from 1978 to 1989 with a minor stop in the pace of violence from 1990 to 1991, when respectively the M-19 guerrilla movement agreed to a cease-fire in order to create the political party Democratic Alliance M-19 and when Colombia adopted a new Constitution. The post-1991 period was politically calm but shows a growing level of security forces because of the continued conflict among the drug cartels and later on during president Pastrana's

government (1998-2002), between the paramilitaries and drug traffickers¹². Bushnell (1993) is explicit in referring to the post-1991 era as the “end of war” period (and we will return to this point).

Although after examining figure 2, it does appear as if police and armed forces strength respond to different underlying motivations. In particular, note that during the National Front years, the armed force variables remains relatively stable, picking up in 1979 (7.6%) a year later after the National Front consensus broke apart, and increases drastically during the 1980s. The police force variable moves quite differently, decreasing in 1979 (-4.8%)¹³. Since both variables respond to different motives, a priori, the movement of the total security personnel (police + army = Taf1) is more closely associated with the historical cyclical terrorist homicide observed in Colombia during 1950–2004 because it also responds to different motives (political, economical and social motives) and it is this variable therefore what I will use in my model. It also has the advantage of reaching back to 1950, giving me 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, increasing under the military General Rojas Pinilla (1953-1957). 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

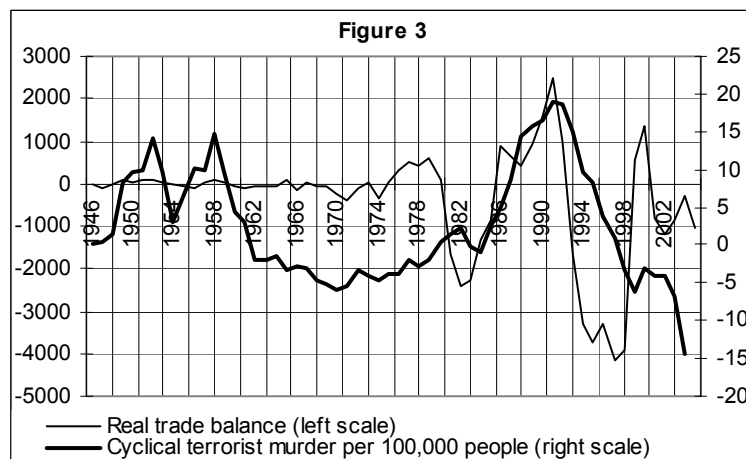
¹². E.g., In 1993 Pablo Escobar escapes from prison launching a terrorist campaign as a the debate over extradition is pressed in Colombia by the U.S; also a new group, “Los Pepes,” (victims of Pablo Escobar), emerges, connected to the Cali Cartel, Los Pepes carried out acts of terrorism against Escobar’s organization and collaborated with the security forces in the search of Escobar up to his death by December this year. (NACLA, Report on the Americas Vol 35, No.1 pp 24-27)

¹³. The different movement of both series would be suggesting that in times of political clashes police forces increase while armed forces diminish; in similar way in times of guerrilla – drug traffickers and paramilitaries activities the armed forces increase while the police forces diminishes.

the use of a continuous, relevant variable such as $Tafl$ that stretches across almost the entire time-period (1950-2004) is statistically preferred.

Economic variables

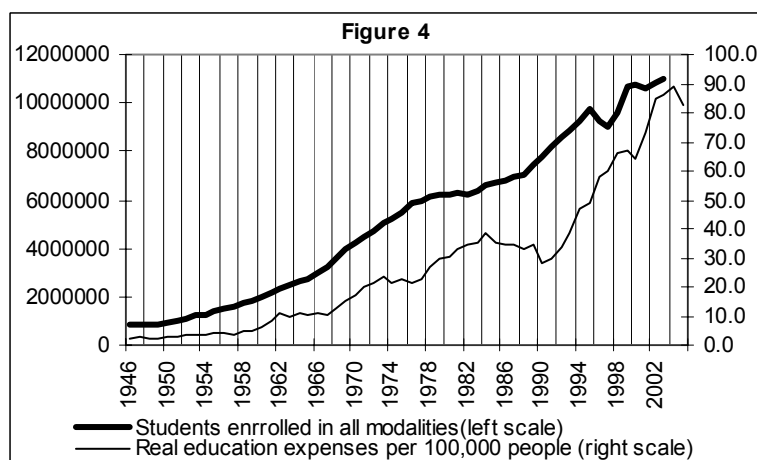
The Colombian literature has noted a seemingly curious link between commodity-export booms and political violence, i.e., between economic well-being and increases in murder. Recent evidence finds for the seven biggest cities and their MSA's a strong relation between criminality and narco-traffic income (Sánchez, F and J. Núñez, 2000). One hypothesis is that commodity booms increase the pot-of-gold over which it is “worth fighting”¹⁴. One might therefore speculate and test the hypothesis that, for Colombia, movements in the inflation-adjusted trade balance ($Rtb6$) is an explanatory variable for cyclically motivated terrorist murder. An inspection of the descriptive graph (in figure 3) is suggestive. There are four four time-periods of pronounced improvements in the balance of trade: 1955-1959; 1971-1975; 1982-1991; and 1994-2001 – figure3. Levels of cyclical violence in all of them are strongly directly associated with trade balance improvements and for this reason I am including this variable in my final model.



¹⁴. 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).

Social variables

As Jimeno (2001) cites there is a growing line of thought in Colombia that views violence as a non-specific, all-pervasive, non-historical phenomenon – the very essence of evil in Colombian society. This tendency runs parallel to the reasoning of those who view violence as an endemic disease of the Colombian social structure, the product of its social inequalities. General Alvaro Valencia Tovar (1997) considers violence as a continuous chain of violences, possibly having remote origin in the acts of the Spaniard conquest, during those times inequality was essentially the product of clashes between the Spaniards invaders and the native rebellious Comuneros captains. I therefore include in this model a historical social inequality variable using as a proxy for it *education* measured by the number of students matriculated in all modalities in Colombia (pre-elementary, elementary and high school)¹⁵. My expected coefficient between enrollment and cyclical terrorist murder is negative.



¹⁵ . The National Demography and Health Care Survey (Profamilia, 1995) examined domestic violence in relation to the level of schooling and the number of children, both for spouse and child abuse, and found that the lower the level of education and the greater the number of children in the family, the greater the likelihood of domestic violence. (See Violence and Social Life in Colombia in Critique of Anthropology Vol. 21, No. 3 (2001) pp. 221-246)

Figure 4 presents the historical movement of selected indicators for education in Colombia: students enrolled in all modalities and education expenses by the Ministry of Education.

Forced Displaced people and the unemployment rate.

The problem of internal displaced people in Colombia is one of the greatest facing the country today¹⁶. Nowadays, there are more than a million people affected by it and, this number is increasing daily as a consequence of the internal war. In general terms these people lose everything, abandoning their homes and possessions, keeping themselves in permanent danger because of retaliation or the possibility that a new surge of cyclical terrorist murder force them to move again. The Law 387 of 1997 defines *displaced people* as, “any person that has been forced to migrate inside the national territory, abandoning its quality shelter and its permanent economic activities because, his life, physical integrity, security and personal freedom have been wounded, or because they are directly threatened as a consequence of the internal war, disturbances and internal tensions, massive violations of the human rights and transgressions to the international humanitarian law”.

The Colombian Police has identified a total of five main causes generating displaced people: clashes between illegal armed groups disputing the possession of the territory in certain areas of the country. Normally these confrontations occur in strategic drug producing areas of the country or close to the international frontiers between Colombia and the neighboring countries since these borders favor the international drug trafficking; second, selective homicides accompanied by threatens and pressure forcing people to

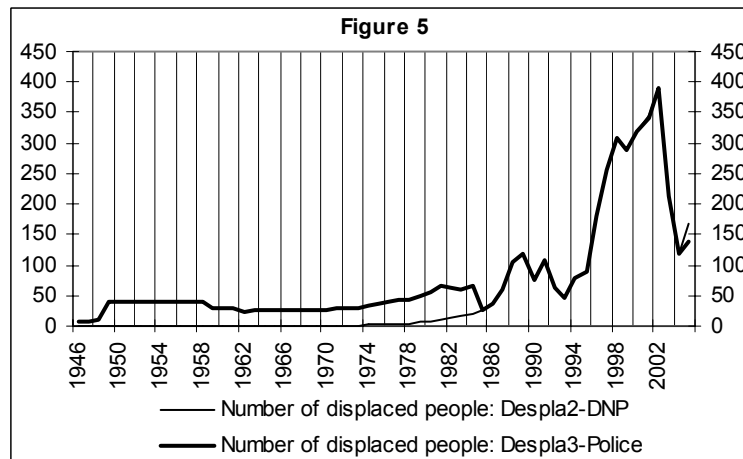
leave, splitting their families; third, massacres in which the delinquents deliberately killed peasants accusing them of being informants to guerrillas groups, to self defense groups or to the army; fourth, fumigations to coca crops affecting also basic plantations for human consumption and, fifth, the breaking of peace talks between the government or the guerrillas and paramilitary organizations (figure 5 shows the two statistical sources of data for displaced people: The Colombian National Police (1985-2001) and The National Planning Department, DNP (1985-2004). Both sources are reliable from 1985 forth. However for running the model across the entire sample a reconstruction for these data is necessary and was done in the following way: from 1984 to 1962 the data for the *National police* was backcasted using its average growth rate of 24.2% between 1985 and 2001 and creating a new data series called *despla* while the data for *DNP* was backcasted using its average growth rate of 19.8% between 1985 and 2004 creating the data series *Despla2*. The backcasting method turned both series in zeros from 1962 to 1946).^{17 18}

¹⁶ . Revista Criminalidad, Policía Nacional de Colombia, 2002.

¹⁷ The two sources are nearly identical. At the time of writing this analysis I was in possession of data for The DNP up to 2004 but for the National Police just up to 2002. The data for The DNP shows a strong deceleration in displaced people by 212,000 and 117,000 respectively for 2003 and 2004 a fact that causes a jump in the forecasted component of terrorist murder for 2004 creating a new cycle in terrorist murder.

¹⁸ One reader suggested that an alternative reconstruction for displaced people should be done using the narrative by Colombian historians, I present these calculations now: A) Reconstructing displaced people Source the Colombian National Police – *despla3* (original) or *despla5*(expressed in thousands) (1985-2001). The reliable data for displaced people for the National Police starts in 1985 going up to year 2001. I reconstructed the missing data from 1946 to 1986 using the narrative by historians. Bergquist, 1992, p.105 mentions that in Tolima for example from 1949 to 1957 (a period of 9 years), 361,800 persons emigrated and, that these figure were greater in the state of Valle del Cauca. Using these data for Tolima results in an average of 40,200 persons per year, and I also use 40,200 per year for Valle del Cauca in spite of Bergquist's warning that these figures could have been bigger for the latter one. Accordingly I filled out the data for displacement from 1949 to 1957, with 80,400 per year, and also realized a correction to the data in the following way: I calculated the standard deviation (110 displaced people) for the annual data reported by the National Police from 1985 to 2001 and used this standard deviation, adding it year by year to the constant value of 80,400 from 1949 to 1957. According to this, the first data, for 1949 starts in 80,400 and the last one for 1957 turns out to be 81,200. Now for filling out the holes from 1946 to 1948 and from 1958 to 1984, I first calculated year by year for the historical data 1985-2001 the proportion between displaced people and the number of homicides, and using these independent proportions, I found an annual average of 0.60% among them. This annual average was used for estimating the number of displaced people for the sub-periods 1946-1948 and 1958-1984. The first data for 1946 is 7 displaced

Figure 5 shows both series, the backcasted, Despla2 (DNP) and the reconstructed (Despla3) for the National Police following the account of historical facts according to Colombian historians.



In regard to the consequences of displaced people, the Colombian Police also mentions, family splitting; political, social and cultural ruptures of the population, migration and most importantly the increase in the unemployment rate. It is for this reason that I have included the number of displaced people along with the unemployment rate in the four main cities of the country as predictors for cyclical terrorist violence. The logic is that displaced people coming to the four main cities is the result of innovations in cyclical terrorist murder in the countryside (so I expect a positive correlation between cyclical terrorist murder and forced displaced people); these new migrants to the cities in turn boost the unemployment rate¹⁹ reducing the social pressure and killing in the countryside (so I expect to find a negative relation between unemployment rate and cyclical terrorist murder in the countryside).

people (obtained as 1,184 homicides times 0.006), for 1947 10 (1,715 homicides times 0.006); and for 1984 is 64 displaced people (10,694 homicides times 0.006).

¹⁹ The unemployment rate for 2003 is assumed to be 23.2% + 2.1%= 25.4%. The 2.1% is the total growth in informal employment (April to June) from 2002 to 2003.

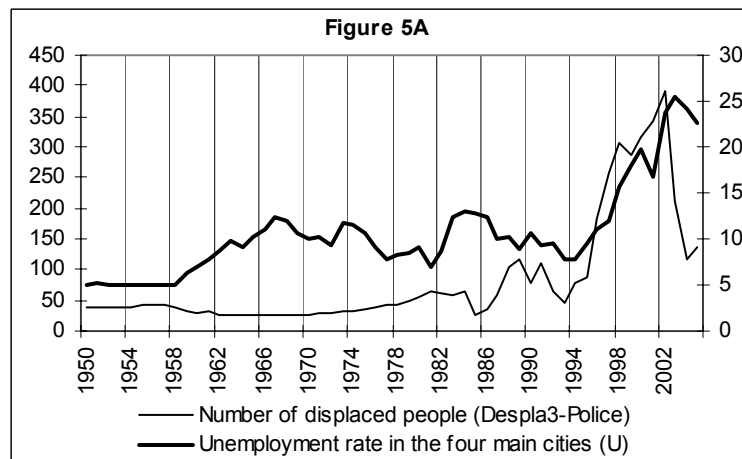


Figure 5A shows the direct relationship particularly in the 1990's between displaced families for innovations in cyclical terrorist murder in the countryside and its output or consequence, the increase in the unemployment rate²⁰. For these reasons both variables are selected for inclusion.

Results and interpretation

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

$$[4] \text{Cvpc } 1_t = F (+ B_t, - CL_t, + Rtb \ 3_t, + Taf \ 1_t, - U_t, - Students \ _t, - Despla \ 3_t, - Rcpr \ _t, - Rgaso \ _t, - Rde \ _t)$$

Where

Cvpc1	estimated cyclical terrorist murder per capita
B	years of <i>La Violencia</i> (1947-1960, following Bushnell's dating)
CL	years of <i>National Front</i> (1958-1978)
CL1	years of <i>National Front</i> (1958-1978) and (1994 to 2006) ²¹
Rtb6	real trade balance
Taf1	total number of armed forces (police + army), also Taf1 1
U	Unemployment rate (four main cities)
Students	number of students matriculated in all modalities, also students 1
Despla2	number of displaced persons (source DNP)

²⁰ . The theoretical reasons for this relationship are explained in *Revista Criminalidad, Policía Nacional de Colombia* #45, 2002 pp 86-91. It contains a description of the phenomenon of displaced people, generalities, legal background, causes generating displaced people, consequences of having these people displaced, and forms of displacement.

²¹ As a curious remark Colombia has had alternation in power again from 1994 to 2006 (From 1994 to 1998 Liberal Samper was in power, from 1998 to 2002, Conservative Pastrana, and from 2002 to 2006, independent liberal Uribe)

Despla3 number of displaced persons – reconstructed series according to Bergquist (source Nat.Police).

The monetary variable *real trade balance* is measured in millions of pesos. Since the data for the total armed forces is available only as from 1950, the model is run for 1950-2003.

Table 1: estimation results – using despla2

Dependent Variable CVPC1A - Estimation by Least Squares
Annual Data From 1950:01 To 2003:01
Usable Observations 54 Degrees of Freedom 47
Centered R**2 0.833494 R Bar **2 0.812238
Uncentered R**2 0.855403 T x R**2 46.192
Mean of Dependent Variable 2.8798697883
Std Error of Dependent Variable 7.4678033423
Standard Error of Estimate 3.2359155837
Sum of Squared Residuals 492.14403426
Durbin-Watson Statistic 1.800841
Q(13-0) 9.194643
Significance Level of Q 0.75808920

Variable	Coeff	Std Error	T-Stat	Signif
B	9.485082	1.12	8.44	0.00
CL1	-3.226489	1.02	-3.15	0.00
RTB6	0.001503	0.00	4.09	0.00
TAF11	0.000195	0.00	7.26	0.00
U	-1.002479	0.16	-6.34	0.00
STUDENTS1	-0.000002	0.00	-3.39	0.00
DESPLA2	-0.033890	0.01	-5.16	0.00

Table 2: estimation results – using despla3

Dependent Variable CVPC1A - Estimation by Least Squares
Annual Data From 1950:01 To 2003:01
Usable Observations 54 Degrees of Freedom 47
Centered R**2 0.831370 R Bar **2 0.809842
Uncentered R**2 0.853559 T x R**2 46.092
Mean of Dependent Variable 2.8798697883
Std Error of Dependent Variable 7.4678033423
Standard Error of Estimate 3.2564895423
Sum of Squared Residuals 498.42203455
Durbin-Watson Statistic 1.784386
Q(13-0) 7.918340
Significance Level of Q 0.84887924

Variable	Coeff	Std Error	T-Stat	Signif
B	10.699296	1.09	9.78	0.00
CL1	-3.142554	1.03	-3.05	0.00
RTB6	0.001395	0.00	3.75	0.00
TAF11	0.000176	0.00	6.89	0.00
U	-0.916351	0.16	-5.68	0.00
STUDENTS1	-0.000002	0.00	-2.81	0.01
DESPLA3	-0.037792	0.01	-5.07	0.00

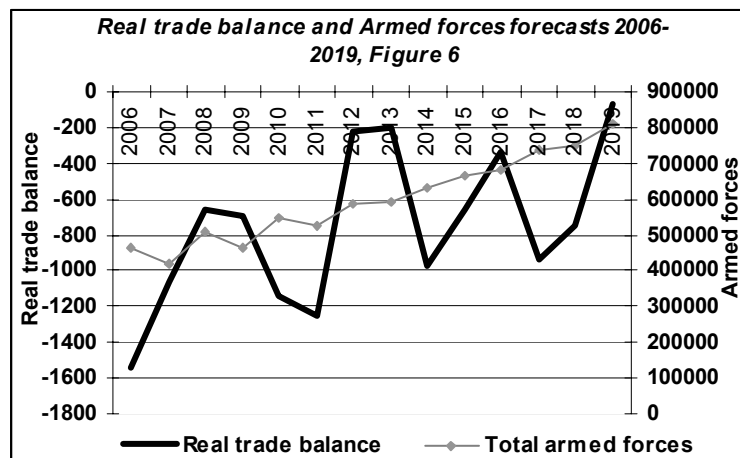
All coefficient estimates conform to my prior expectations. The *La violencia* dummy is positive and statistically significant; the National Front dummy is negative and

statistically significant, proving the reason to regard the inherited partisan rivalry of Liberals and Conservatives as one of the most important causes of cyclical terrorist murder. As to the monetary variables, the trade balance effect is positive, as predicted, and is also statistically significant. The total number of armed forces variable is statistically significant and carries as, expected, a positive sign. The unemployment variable shows the expected negative sign indicating the trade-off between the deceleration in cyclical terrorist murder in the countryside and the increase in unemployment in the four main cities. The number of students matriculated carries the expected sign being statistically significant; in regard to displacement of people in table 1 I used *Despla2* and in table 2 *Despla3*, its coefficients carry the expected negative sign indicating that people coming to the cities diminish pressure in the countryside reducing terrorist murder. Both models display a good adjusted R^2 of 0.83 and optimal Durbin-Watson indexes of 1.80 and 1.78.

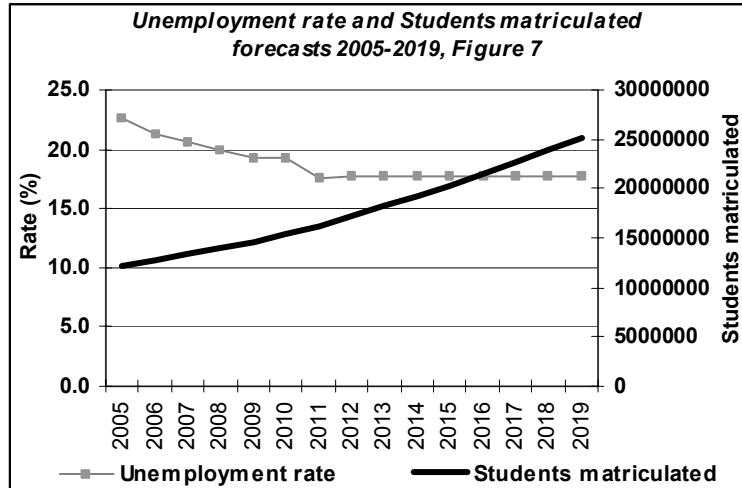
Preparing the model for forecasting purposes: Forecasting the explanatory variables using ARIMA models (the Box-Jenkins approach)

For forecasting the future path of cyclical terrorist violence in Colombia I estimate in this section the political, economic and social explanatory variables feeding up the model for cyclical terrorist murder. All variables are forecasted excepting the years of *La Violencia* and the *National Front*, for which I fill out the spreadsheet containing these dummies with zeros and ones for National Front to account for the recent historical alternation in power. The methodology used is the *Box-Jenkins* approach.

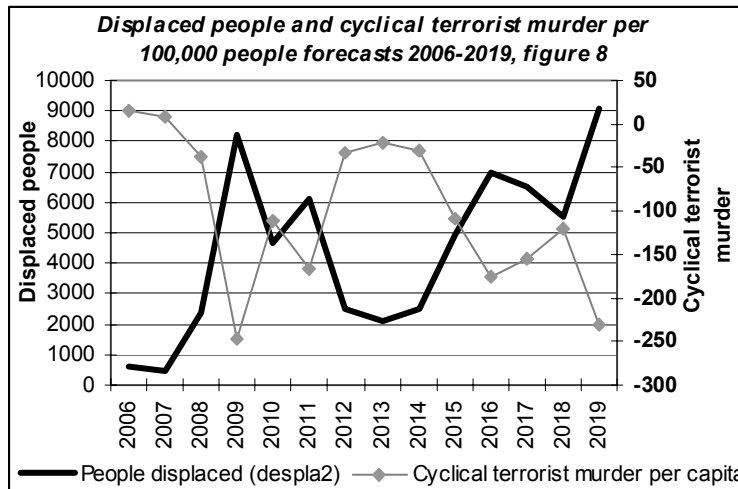
Forecasting the Colombian real trade balance and total armed forces. Figure 6 shows the forecasts up to year 2019. The real trade balance is forecasted using ARIMA model (1,1,18) no constant term included but moving average components of order 2,13,7,18. Armed forces use ARIMA (2,1,2) with constant term, and autoregressive and moving average components of order 1 and 2.



Forecasting the unemployment rate in the four main cities and students matriculated(figure 7). The unemployment rate uses ARIMA(0,1,9)(1,0,0), no constant term included but moving average components of order 1,7,9; students matriculated is fitted with ARIMA (2,1,3), with constant term included and autoregressive components of order 1,2 and moving average components of order 1,3.

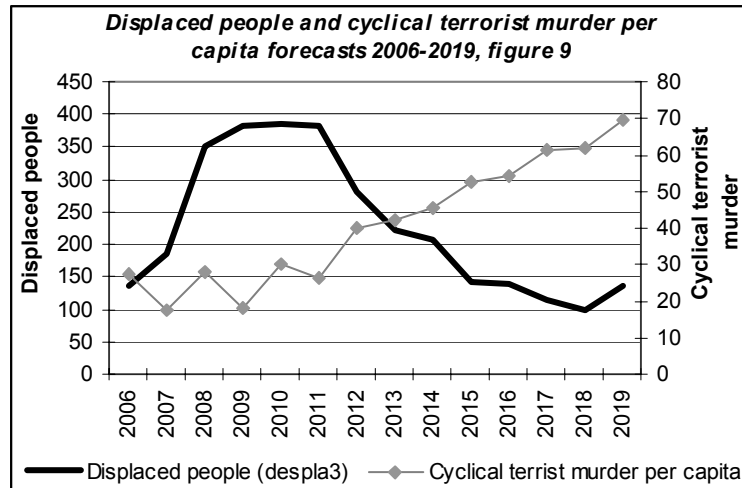


Forecasting the number of displaced people- *despla2* and cyclical terrorist murder (figure 8). Displacement of people (*despla2*) is forecasted with ARIMA (0,1,16) with constant term. The scenario presented here for didactical purposes is an extreme situation where 9 million of displaced people around year 2019 will reduce terrorist murder in the countryside by -231 terrorist murders per 100,000 people.



Forecasting the number of displaced people- *despla3* and cyclical terrorist murder (figure 9). Displacement of people (*despla3*) is forecasted with ARIMA (1,1,18) with constant term and moving average components of order 1,4,5,16,18. The scenario presented here for didactical

purposes is implying 137,000 displaced people around year 2019 placing terrorist murder at a rate of 70 terrorist murders per 100,000 people.



Conclusion

Provided with a data series of cyclical terrorist murder in Colombia 1946-2004, I created a model to explain the movements in that terrorist murder data. I confirm that obvious variables, such as coding for the *La Violencia* and the *National Front* years, are indeed statistically significant (and of the expected sign). I also find that, as the narrative literature and Brauer & Gómez-Sorzano (2004B) suggest, an increase in the real trade balance leads to higher levels of cyclical terrorist murder; and, that an increase in armed forces or armed actors increase the cyclical terrorist murder; finally as the Colombian National Police and several historians suggest I also find statistically that the increase in displaced people (families coming to main cities of the country) decreases the cyclical terrorist murder through the reduction of pressure in the countryside and causes in turn a increase in the unemployment rate in the main cities of the country. In regard to the trade balance the underlying theoretical point is that trade balance improvements derive from

commodity booms (coffee, banana, cocaine, gold, coal, emeralds, petroleum, gas) that make land more valuable and therefore the competition for it more severe, historically this phenomenon has occurred from 1945 to 1955 via a coffee boom and most recently 1985-1990 via the war for cocaine and petroleum among the government, drug traffickers and guerrillas. Finally, I find that increases in the number of students enrolled in all modalities (pre-elementary, elementary, high school, university) reduce the cyclical terrorist murder.

In regard to the recent overall results in the behavior of murder and cyclical terrorist murder per capita for Colombia, figures 1 and 1A show the results between the past and current administrations. During President Pastrana's government (1998-2002), both graphs show an upwards tendency in both indicators, while for 2003-2004 they present a sharp decrease, implying that Alvaro Uribe's *Democratic Security Policy* is highly effective at annihilating terrorist guerrilla clashes in the countryside and strongly suggesting that a continuation of this policy would be destroying the roots of the Colombian civil conflict.²² However, the analyses presented in this paper show the big dilemma currently facing Colombian authorities: the forecasts shown in figures 8 and 9 show the trade-off or inverse relationship between displaced people and cyclical terrorist murder. The forecasts presented *when varying the number of future displaced people*

²². These findings coincide with the analyses done by Jorge Restrepo and Michael Spagat (2004) in regards to Uribe's first 17 months in the presidency, quoting them in their abstract to the paper "The Colombian Conflict: Uribe's first 17 Months: Analysis of our new, 16-year dataset on the Colombian civil war finds under Uribe: guerrilla and paramilitary attacks dropping sharply to long-run averages since 1988, lower for April-December 2003; government-guerrilla clashes at all-time highs, exceeding guerrilla attacks; civilian killings dropping sharply and continuously to all-time lows, mainly from decreased paramilitary attacks; combatants killings rising sharply to all-time highs; guerrilla tactics shifting toward indiscriminate attacking, forcing civilians injuries to long-run highs; government-to-guerrilla casualty ratios in clashes falling; government-paramilitary clashes increasing but still uncommon; paramilitary performance in clashes poor and worsening; guerrilla-paramilitary clashes dropping sharply; the ELN (National Liberation Army) seriously weakened, mounting few attacks.

using two different sources show a dramatic picture in which the reduction of forced displacement (*desplazamiento*- figure 8) from 212,000 people in 2003 to 117,000 in 2004 is having a impact on the intensity of the conflict, creating a new cycle boosting the terrorist murder concentrated in the countryside from -6.93 murders per capita in 2003 to 12 in 2004 and 14 in 2005. Although this upsurge in murder appears to be erasing the initial results obtained in 2003 by The Uribe's administration, terrorist murder is expected to decrease again by 2006 and 2007 (figure 8) and peace will be attained around year 2008 (-38 terrorist murders, figure8)²³. As to *sustainable peace*, figures 8 and 9 show two scenarios on which the natural tendency of the predictors captured by the ARIMA modeling must be stopped in order to prevent having extreme opposite figures of -231 or 70 murders according to both graphs respectively by year 2019; and so an equilibrium around zero for terrorist murder must be found through active leadership and presidential policy manipulation. Previously designed scenarios not presented has shown that the only way to get such a permanent lasting peace at this point, is through general disarmament of all armed actors, starting by guerrilla, paramilitary groups followed by the Army which was oversized and modernized by the *Democratic Security Policy*. The remaining required conditions will include a combination of political variables and the returning of a modern *alternation in power* followed by investment in education increasing enrollment in conflict and non-conflict areas; these pre-conditions will restore the economy reducing the unemployment rate since displacement disappears once disarmament is achieved, the trade balance will restore equilibrium by itself once the war

²³ This figure is expected as a result of the natural up trending Box Jenkins forecasts assumed by the predictors feeding up the model.

in the countryside is over. The scenarios for Permanent Peace show that the continuation of the Democratic Security Policy will grant *sustainable peace* before year 2019.

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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) consist of health expenditures and education expenditures. For 1946-1970, taken from “Estado y Hacienda Pública 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), Macroeconomics 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 members of the armed forces both come up to year 1989 from the National Planning Department, Justice and Security Unit; from 1999 and projections to 2006 come from the National Ministry of Defense.

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 cyclical intent (*homicidio con fin cíclica*), 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 (2004).

The unemployment rate for the period 1950-54 comes from the monthly bulletins of statistics (DANE), for the period 1955-1976 it was taken from Londoño (1990) and, since 1977 it corresponds to the unemployment rate in the four largest Colombian cities (Bogotá, Cali, Medellín and Barranquilla) the source is DANE.

The number of students enrolled in all modalities (pre-elementary, elementary, high school, university) are taken from 1946-1990 from Londoño (1990), for 1987-2002 from the Ministry of National Education and the ICFES (Colombian Institute for the Promotion of Higher Education).

The data for displaced families are taken from *Revista Criminalidad* #45, 2002 p.p. 86-92; and Justice and Security Unit National Planning Department (DNP).

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