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ECONOMIC GROWTH IN COLOMBIA: A REVERSAL OF 'FORTUNE'?

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ABSTRACT

Colombia's annual GDP growth fell to an average of 3% between 1980 and 2000 from 5% between 1950 and 1980. The sources-of-growth decomposition shows that this reversal can be accounted entirely by changes in productivity. Indeed, between 1960 and 1980 productivity gains increased output per capita by nearly 1% per year. Since 1980, productivity losses have reduced output per capita at about the same rate. The time series analysis suggests that the implosion of productivity is related to the increase in criminality which has diverted capital and labor to unproductive activities. In turn, the rise in crime has been the result of rapid expansion in drug-trafficking activities, which erupted around 1980. This explanation is supported by cross-country evidence that shows that Colombia is clear outlier in terms of conflict and fragmentation, and suggests that high crime is associated with low productivity.

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1. INTRODUCTION

Colombia has traditionally been regarded as a success story in terms of economic growth and stability. According to Figure 1a, this reputation is based on the macroeconomic performance between the 1930s and 1970s, which was characterized by increasing GDP growth rates combined with a reduction in volatility (measured by the standard deviation in growth rates). In fact, GDP growth rose to an annual average of 5.78% during the 1970s from 3.76% during the 1930s. The standard deviation in the growth rate fell from around 3% during the 1930s and 1940s to 1% during the 1960s (and then rose to 1.7% during the 1970s in spite of much sharper external shocks relative to previous decades).

These trends are corroborated when the per-capita data is used. As shown in Figure 1b, the acceleration in growth was particularly significant during the 1960s and 1970s when high GDP growth rates were coupled with lower population growth figures. The economics profession, both nationally and internationally, impressed with this performance, considered Colombia as a paradigm of macroeconomic management, praising the combination of able technocrats and sound institutions as the key driving elements of this success story.

As in every other Latin American country, growth decelerated significantly during the 1980s. Figures 1a and 1b show that very clearly: average GDP growth fell to 3.4% per year, while the annual per-capita GDP growth was 1.24%. Even tough both figures corresponded to historical lows, macroeconomic performance was perceived as an accomplishment at a time when GDP contractions were the norm in Latin America. However, relative to its own track record, Colombia's economic performance during the 1980s was unimpressive.

Dissatisfaction with the results of the 1980s led to a package of structural reforms during the early 1990s. A series of constitutional and legal changes drastically modified the regimes related to central banking, trade, foreign exchange, foreign investment, labor, social security, and health. The strength of trade reform was impressive: Quantitative restrictions were fully dismantled, average import tariffs were lowered to 11.7% in 1992 from 43.7% in 1989.

Some of these reforms of the early 1990s, especially in relation to fiscal decentralization, resulted in an increase in government expenditures. This trend was reinforced by a deliberately expansionary fiscal management throughout must of the decade. In fact, the central government's deficit rose to more than 8% of GDP in 1999 from nearly zero in 1991. This trend was reversed in 2000 when an IMF-endorsed stabilization program was implemented.

Unsurprisingly, economic growth during the 1990s was not encouraging, especially during the second half of the decade. Average annual GDP growth fell to 2.8% during the 1990s from 3.4% during the 1980s. In per-capita terms, average annual growth fell to 0.85% during the 1990s from 1.24% in the 1980s. Growth rates became even more

volatile: The standard deviation in annual growth was 3% during the 1990s, the highest in the postwar period. In fact, volatility during the 1990s was twice its value during the 1980s and 1970s, and three times that of the 1960s.

What explains this reversal of fortune? There are two types of answers in the Colombian economic literature. First, a standard macro explanation highlights the role of the debt crisis and the reduction in foreign capital during the 1980s and the effects of fiscal management during the 1990s (which resulted in high interest rates and an appreciated exchange rate). Second, a more structural interpretation that attributes poor economic performance to either the effects the implementation of the 'Washington Consensus' package (especially trade liberalization and central bank independence), or, alternatively, to the lack of additional reforms that are necessary for the package to deliver better results[2].

This paper searches for an alternative explanation framed in the context of the recent growth literature and the cross-national evidence. After analyzing the underlying factors that explain economic growth in Colombia it concludes that the growth reversal began around 1980, almost a decade before the implementation of the reform package. The main conclusion is that low growth since 1980 is the consequence of an implosion in productivity explained by the exponential increase in drug-trafficking, violent crime, and insurgent activities. The evidence does not support the view that trade liberalization, or the lack of additional reforms in areas such as labor market regulation or social security (the two more frequently mentioned) can explain such a large reversal of fortune. Rather, it is the effect of the 'fortunes' generated by drug-trafficking –which have exacerbated crime and violence- that explain the change in economic performance in Colombia since 1980.

In other words, the paper identifies some country-specific and external factors that interact with the initial conditions and are able to alter the growth trajectories. As we will see, these shocks can induce further changes in the institutions and policies, leading to vicious cycles that reinforce the negative effects of the initial shocks. More concretely, I favor an interpretation where the increase in drug-trafficking set in motion a chain reaction which not only exacerbated crime and conflict (with a consequent negative impact on productivity) but possibly also had an adverse effect on the ability to conduct more prudent macroeconomic policies. This paper deals only with the direct relationship between drug-trafficking, crime, and productivity. The relationship between these factors and fiscal policy is an area for future research[3].

The analytical narrative is carried out at three different levels. First, using the standard sources-of-growth accounting, the paper presents new evidence on the 'proximate'

[2] The statements of the labor unions and the insurgent groups are good examples of the structural-reform-as-culprit approach. At the other end, some (including the multilateral banks) underscore the lack of comprehensiveness in Colombia's reform package (see Edwards and Steiner, 2000).

[3] Some have argued, however, that fiscal decentralization (i.e., more transfers to the regions), as well as greater expenditures in order to preserve the rule of law, were endogenous to the destabilizing effects of drug-trafficking.

determinants of growth: (a) physical capital deepening; (b) human capital accumulation; and (c) productivity growth. As is well known, this decomposition has limitations because accumulation and productivity are endogenous factors. As mentioned, most of the 'explanation' of the reversal of growth in Colombia can be attributed to total factor productivity. However, this does not provide a structural interpretation of what caused the growth deceleration in Colombia.

Second, the paper analyzes the 'deep' or 'fundamental' determinants of growth. Recent growth studies have focused on the role of physical geography, institutions, and trade in determining the long–run performance of individual economies. The main message of this literature is that it is extremely likely for a country that is landlocked and close to the equator to experience low growth. Things get even worse if it does not have 'good' institutions, and does not trade much with the rest of the world.

This paper does not engage in the 'controversy' of which of these three factors (trade, geography, and institutions) is the most relevant for growth. Rather, the paper compares Colombia's record in these three areas with a broad sample of countries. In particular, it identifies a series of variables where Colombia is an outlier in the international context (e.g., crime, distribution, etc.) and assesses the role that these variables play in determining growth in a cross-section of countries. Not surprisingly, the variables in which Colombia is an outlier not only are highly relevant for growth but also explain the reversal during the 1980s.

The paper is divided in five sections. Section 2 uses a wide range of economic, social, and political variables that describe the development process in order to compare Colombia with the rest of the world. This section provides some interesting stylized facts that characterize Colombia as a country with high levels of crime and income concentration, but relatively standard otherwise. Section 3 deals with the time series evidence and applies a simple procedure in order to establish the fact that growth in Colombia has been lower since 1979. Section 4 presents the standard sources-of-growth decomposition in order to quantify the role of physical and human capital accumulation, as well as technological change in per-capital GDP growth. The evidence indicates that productivity is the key driving force behind the reduction in growth since 1979. Section 5 relates the high levels of crime and violence, typical of the 1980s and 1990s, with the productivity implosion. Section 6 looks into this issue using some cross-country regressions. Section 7 concludes.

2. COLOMBIA AND THE CROSS-COUNTRY EVIDENCE: SOME FACTS

This section looks at a large number of variables that have been used in the empirical growth literature, with the purpose of extracting information on Colombia's relative position vis-à-vis the rest of the world. The information covers a variety of areas, grouped into seven categories: Size, Macroeconomic Performance, Trade and Indebtedness, Geography and Health, Distribution and Fragmentation, Political Institutions, and

Conflict and Violence. This exercise is useful in order to understand the peculiarities of growth and development in Colombia.

For nearly 60 variables that describe the overall process of development, and that have been used extensively in the cross-country literature, I compare the value reported for Colombia with the mean and standard deviation of a large sample of countries where the same information is available. The comparison also includes information on the number of observations (in absolute terms and as a percentage of the sample size) with values greater than the ones reported for Colombia. This exercise is presented in Table 1.

Size

Colombia is a relatively large country, both in terms of population and area. In fact, it is in the top quintile of the world's distribution on these two accounts. The rate of population growth between 1960 and 1989 was 2.36 on average per year, higher than the world's average (2.01%).

Macroeconomic Performance

According to World Development Indicators (1997), per capita GDP was US$6,130 in 1995 (in PPP terms), very close to the world's average. There were 44 countries (out of 150) with higher per-capita incomes. Annual per capita growth was 3% between 1960 and 1975, equal to the world's average (60 countries –out of 117- had higher growth). Between 1975 and 1989 per-capita growth decelerated to 2% per year. Gross investment has been on average around 17-18% of GDP for the period 1960-1990, very similar to the world's sample mean and median.

Colombia's average annual inflation rate was 13.7% between 1960 and 1975. Only 9 countries (out of 105) had higher inflation rates during that period. Inflation rose to an average of 23.9% between 1975 and 1990. However, 17% of the countries in the sample showed higher inflation rates during that period. Indeed, the acceleration in inflation after 1975 was less intense than in the average country.

In sum, Colombia has had a relatively average macroeconomic performance. Growth and investment are in line with the sample mean and median. Inflation rates have been relatively high (top quintile), but the index of macroeconomic mismanagement (as calculated by Rodrik, 1998) is quite standard[4].

Trade and Indebtedness

Colombia stands as a relatively closed country on all measures of trade intensity. The total trade/GDP ratios, regardless of the source and time period, are below the sample mean. More than 80% of the total number of countries has had higher trade ratios than Colombia. The Sachs-Warner (1995) openness indicator -which is a dummy variable-, assigns Colombia a value of zero, indicating that the country is not very open according

[4] This is a linear combination of the increase in the rates of inflation and the black market premia for foreign currency.

to any one of five criteria[5]. However, it is interesting to note that the estimated trade share for Colombia, constructed by Frankel and Romer (1999) using a gravity model, is only 7.5% of GDP, suggesting that structural, and especially geographical factors are the cause for the lack of openness.

I also include a measure of external shocks during the 1960s and 1970s obtained from Rodrik (1998) who multiplies the standard deviation of the first log-differences of the terms of trade with the average share of total trade in GDP. Given the low trade to output ratio, the external volatility of the Colombian economy has been modest, compared with other countries. In fact, 70 countries (out of 119) experienced greater external shocks than Colombia during the 1970s.

Finally, external indebtedness in 1985 was relatively low in terms of GDP (72% of the countries with this information had higher debt-to-GDP ratios) and about average in terms of exports. This means that Colombia has not been overburdened with foreign debt, which has been kept under control.

Geography and Health

These are two intertwined areas that have shown to be powerful determinants of economic growth. The evidence for Colombia indicates that 25% of the population is at risk of malaria transmission (29% is the world's average); life expectancy of the population 70 years (64 years is the world's average); and, infant mortality rate is well below the mean and in the bottom half of the world's distribution. Thus, the data underscores relatively favorable health indicators in Colombia in spite of the tropical conditions that are described below.

Colombia's average temperature is 22.5° (Celsius). The absolute degree of latitude is 0.04°, indicating that most of the territory is tropical in an ecological sense. Only 16% of the land is within 100 km from the seacoast, making Colombia one of the most landlocked countries of the world (139 out of 150 countries have a higher proportion of the territory close to the seacoast). Moreover, climate conditions along the coast have induced the population to live in the inland mountains, explaining why international trade has been low, but also why health conditions are better than in many other tropical countries. In a sense, Colombia is a good example of the trade-offs involved between latitude and altitude: Tropical conditions can be overcome by living in the mountains. The cost, however, is an increase in distance between the population centers and the coast.

Distribution and Fragmentation

This is an area where the relative position of Colombia is not very encouraging. The standard measures of distribution of income and land, as well as fragmentation between groups of the population place Colombia in the highest levels of income and land concentration (regardless of the time period) in the world. In fact, the Gini coefficient for

[5] The five criteria are: if it had average tariff rates higher than 40%; if nontariff trade barriers covered more than 40% of imports on average; if it had a socialist economic regime; if it had a state monopoly over major exports; if the black market premium exceeded 20% during the 1970s or 1980s.

income is 0.51, substantially higher than the world average. The Gini for land concentration is 0.86, reflecting the fact that the distribution of assets is highly unequal (only 6 countries have a higher coefficient). However, the fragmentation of the population is not the result of ethno-linguistic factors. Rather, according to Knack and Keefer (1995), it is the result of racial tensions which in their scale have the maximum possible value.

Political Institutions

This subsection looks at the quality of the institutions that reflect the prevalence of the rule of law, coupled with democratic values. The risk of confiscation and forced nationalization of property (obtained from Political Risk Services) has been frequently used as a summary variable for institutional quality. The average value for Colombia over the period 1985-1995 (obtained from Sachs and McArthur, 2001) measured on a 1 to 10 scale (higher values imply that expropriation is a less likely event) is 7.39, compared to a sample mean of 7.02. Only 46 countries (out of 118) have a lower risk of confiscation than Colombia. It has been argued that participatory political regimes deliver higher quality growth because democracies yield more predictable and stable growth rates, handle adverse shocks much better, and deliver better distributional outcomes (see Rodrik, 2000). For these reasons it is useful to measure democracy using the Freedom House index of political rights and civil liberties (on a scale of 0 to 1). Here the information is again reassuring for Colombia. In the four decades between the 1960s and 1990s, the value of this index has been over 0.7, higher than the sample mean and in the top 40% of the distribution.

However, on other accounts the quality of political institutions in Colombia seems less impressive. In fact, the ICRG index (ranging from 0 to 10) based on numerical evaluations relating to the rule of law, bureaucratic quality, corruption, expropriation risk, and government repudiation of contracts, assigns Colombia a value of 5.30, compared to a sample mean of 5.69 (higher values indicate superior institutions)[6]. According to this index, 49% of the countries have better quality government institutions than Colombia. This is probably related to the quality of bureaucratic efficiency and the lack of corruption index. These two measures, taken from Mauro (1995), place Colombia in the lowest-quality quintile of the distribution.

It is useful to compare three other aspects of the political regime, obtained from Rodrik (2000): (a) the degree of institutional (*de jure*) independence of the executive; (b) the degree of operational (*de facto*) independence of the executive; and (c) the degree to which non-elites can access political institutions. These data come originally from the Polity III data (see Jaggers and Gurr, 1995), are scaled 0 to 1, and are for the 1970s. The conclusion is that there is a high *de jure* independence of the executive (which is characteristic of less democratic societies), but low *de facto* independence in Colombia. Finally, Colombia is in the top quintile in terms of non-elite political participation, a positive feature of the democratic system.

[6] This index is available in Knack and Keefer, 1995. The raw data comes from the International Country Risk Guide assembled by Political Risk Services. I use the average for the period 1980-89, taken from Easterly and Levine (1996)

In sum, Colombia is a legalistic society, with a long democratic tradition which has avoided authoritarian forms of government. However, the bureaucratic efficiency is relatively low.

Conflict and Violence

The last group of variables deals with the measurement of conflict and violence. The war variable reflects the well-known existence of an internal armed conflict since the 1960s. The homicide rate comes from the U.N. Demographic Yearbooks and shows that Colombia had the highest homicide rate (80 per 100,000 inhabitants) among a group of 84 countries in 1995. In 1985 the rate was much lower (37.4 per 100,000 pop.), but even then there was only one country (out of 66) with a higher rate.

Summing up

Given its geographical location, large areas of the Colombia territory have relatively higher incidence of tropical diseases. Precisely because of that, the population is concentrated in the mountains, far from the coast. According to the cross-country empirical literature, these two factors should have a negative effect on growth. In spite of the recent trade liberalization, Colombia has been relatively closed to foreign trade, making economy less vulnerable to external shocks than many other countries during the postwar period. Economic performance has been relatively standard. Growth and investment are very similar to the world average.

The discussion of Colombia's institutions is much more complex. While some political institutions (specially the ones related to the legal system and democratic principles) do relatively well in international comparisons, others such as bureaucratic efficiency and the lack of corruption are not well ranked. However, the two areas where Colombia is a striking outlier are income and land concentration, on the one hand, and conflict and violence, on the other. In these areas, Colombia is one of the worst performers in the world.

3. GROWTH REVERSAL: TIME SERIES FACTS

As mentioned in the introduction, Figure 1 suggests a growth deceleration in Colombia since 1980. However, the average growth rates per decade do not constitute a proof of the existence of a structural break in the growth process. For that purpose I apply a simple time series methodology presented in Ben-David and Papell (1997) and use GDP and per-capita GDP data for the period 1950-2000, ignoring the lower quality data available for the period 1925-1949. As many studies have already demonstrated profusely, it is easy to reject the existence of a unit root in both series. Consequently, I test for structural change in growth rates by estimating an equation of the form:

$$\Delta y_t = \mu + \theta D_t + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t$$

Where y is the log of GDP (or, alternatively, per-capita GDP), μ is a constant, D_t is a dummy variable that takes a unitary value if $t > T_B$, where T_B is an arbitrary break in the

sample. The coefficient θ captures the effect of structural changes in economic growth. I estimate equation 1 using 30 possible definitions of the variable D_t, corresponding to values of T_B between 1960 and 1990. For each one of the regressions we test the null hypothesis of no structural change in growth (θ = 0) and compare the t-statistic of all the estimated values of θ. The more robust structural change corresponds to the value of T_B with the maximum t-statistic. I perform the test for GDP growth and per-capita GDP growth. In all cases we use 4 autoregressive terms ($k=4$) based on the Akaike information criterion.

According to the results, which are shown in Appendix 1, the more robust and significant structural break occurs in 1979, for both GDP and per-capita GDP. During the period 1980-2000, annual GDP growth has been, on average, 2% below the 1950-1979 average. In per-capita terms the reduction of growth has been, on average, 0.9% per year[7]. Figure 2 looks at this issue from a different angle by plotting the difference between growth in the period 1950-T_B and growth in the period T_B-2000. T_B is measured in the horizontal axis, while the differences in growth are measured in the vertical axis. It is interesting to note that 1979 is not only the sample break with the highest statistical significance, but also the one resulting in the largest reduction in economic growth.

The conclusion of this section is that, unambiguously, economic growth decelerated in Colombia after 1979. On average, annual GDP growth fell to 3% after 1979, from 5% before that date. This is a significant alteration in growth path: while it took 14 years to double output before 1979, it now takes 23. How is that change explained? What caused such a large reduction in growth? These are the questions to which we now turn.

4. Proximate Causes of Growth: Accumulation and Productivity

This section closely follows the framework developed in Hall and Jones (1998) in order to estimate the contribution to growth of changes in the capital-output ratio, changes in the educational attainment of the population, and changes in productivity. Using the simplest Cobb-Douglas approach, assume that output Y_t in period *t* is produced according to:

$$Y_t = K_t^{\alpha}\left(A_t H_t\right)^{1-\alpha},$$

where K_t denotes the stock of physical capital, H_t is the amount of human capital-augmented labor used in production, and A_t is the labor-augmenting measure of productivity. Assume that each unit of labor (L_t) has been trained with E_t years of schooling. Human capital-augmented labor is given by:

$$H_t = e^{\phi(E_t)} L_t.$$

According to this specification, the function ϕ(E) reflects the efficiency of a unit of labor with E years of schooling relative to one with no schooling (ϕ(0) = 0). The derivative ϕ'(E) measures the effect on efficiency of an additional year of schooling, which corresponds to the return to schooling estimated in a Mincerian wage regression.

[7] The results do not change significantly when the 1925-2000 data is used. In this case the break occurs in 1981 for both series. There is evidence of a 1.6 percentage points reduction in GDP growth (0.95 percentage points in per capita GDP growth) after that year.

Rewriting the production function in terms of output per-worker, $y \equiv Y/L$, we obtain:

$$y_t = \left(\frac{K_t}{Y_t} \right)^{\alpha/(1-\alpha)} h_t A_t,$$

where h_t is human capital per worker. Taking logs and first-differences:

$$\Delta \ln y_t = \frac{\alpha}{1-\alpha} \Delta \ln \left(\frac{K_t}{Y_t} \right) + \Delta \phi(E_t) + \Delta \ln A_t.$$

This equation allows us to decompose growth in output per worker into changes in physical capital intensity, growth in human capital per worker (educational attainment), and growth in productivity. Note that writing the decomposition in terms of the capital-output ratio rather than the capital-labor ratio facilitates the interpretation because the former is proportional to the investment rate (along a balanced growth path).

To proceed with the decomposition we need data on output (GDP), labor input (employment), average educational attainment, and physical capital for the 1950-2000 period. Figure 3 shows the average years of schooling of the urban and rural population based on the population censuses and the household surveys[8]. It is interesting to note that the educational attainment has been increasing at a stable rate since the early 1970s. Even though faster progress on this front was made between 1965 and 1973, this is not a likely factor in explaining the origin of the growth reversal.

In order to construct the function $\phi(E)$ I need the returns to schooling estimated in a Mincer equation. Fortunately, Núñez and Sánchez (2000) provide this information, based on the quarterly household surveys for the period 1976-1998. According to their results, shown in Table 2, the rates of return to education in Colombia do not have the standard concavity that has been obtained for other countries. In fact, their returns to education for complete secondary schooling (11 years of schooling) are 0.10 for men and 0.16 for women. These levels are about the same as the ones observed for five years of schooling, corresponding to primary education. Workers with completed higher education have the highest returns to education (0.215). Based on this information, I constructed the function $\phi(E)$, which is depicted in Figure 4. For comparison, I include in Figure 4 a measure of $\phi(E)$ based on the more standard (i.e. concave) returns to education derived from the international evidence surveyed in Psacharopoulos (1994)[9].

[8] The source is (*Estadísticas Históricas de Colombia*, Cuadro 7.3 (1954-1996) and calculations from DNP-DDS for the period 1997-2000.

[9] Specifically, the rate of return for the first four years of education is 13.4%, for the next four years falls to 10.1%, and to 6.8% for education beyond the 8th year.

TABLE 2 Returns to Education

Years of schooling	Total	Men	Women
0-4	0.0853	0.0763	0.0830
5	0.1214	0.1029	0.1576
6-10	0.0761	0.0618	0.1021
11	0.1369	0.1018	0.1595
12-15	0.1201	0.1238	0.1127
16+	0.2158	0.2320	0.2026
Average	0.1020	0.0923	0.1152

Source: Núñez and Sánchez (2000)

The capital stock was constructed using the perpetual inventory model and disaggregated investment data since 1925. For the year 2000, the stock of capital corresponds to the sum of all investment since 1925, net of depreciation[10]. Although the methodology underestimates the stock of capital for earlier dates, the capital stock is only used for the 1955-2000 period (due to the limitations with data on years of schooling prior to 1955). Thus, in practice at least 30 years of investment data are considered for each observation of the stock of capital. Finally, a value of 0.3 is used for the parameter α, which is the share of capital in output in the production function.

Before showing the results of the decomposition it is useful to take a cursory look at the raw data. Figure 5 plots output per worker against capital per worker for the period 1955-2000. Interestingly, the pre-1979 period is characterized by a much faster increase in output per worker, than in capital per worker, while the opposite is true after 1979. This suggests that capital accumulation is not likely to be the cause of the deceleration in growth since 1980. Interestingly, Figure 5 also implies that the output per worker contraction observed between 1997 and 1999 was not caused by a reduction in capital per worker. The fact that with the same amount of capital (per worker) less output (per worker) is produced suggests that productivity may be playing a role in explaining these changes. This is the issue to which we now turn.

Table 3 shows the results of the decomposition exercise using the two measures of the returns to schooling mentioned above. Panel A compares the decomposition results for the periods before and after 1979. Annual growth in output per worker fell to 0.66% between 1980 and 2000, from 1.55% between 1955 and 1979. The decomposition indicates that the reduction in output growth cannot be explained by changes in physical and human capital intensity. In fact, changes in physical capital intensity (i.e. in the capital-output ratio) have been a positive source of growth during the post-1979 period (adding on average 0.64 percentage points to the growth rate per year). The same is true for human capital per worker, which has been a steady source of growth given the continued progress in average years of schooling. Indeed, during the post-1979 this factor

[10] The following depreciation rates were used: 8% for machinery and furniture, 20% for transportation equipment, and 2% for housing and construction. The weighted average rate of depreciation was 4.92%.

alone would have accounted for an annual growth in output per worker of 0.96%. This means that, other things equal, the educational advancement of the population would have resulted in an annual growth in output per worker of nearly 1%. Looking at the role of physical and human capital one would have expected higher output growth in the post-1979 period. This conclusion does not depend on the measurement of the returns to education.

Productivity is the key variable driving the results. Clearly, the reversal of growth is also a reversal in productivity growth. Before 1979 productivity added 1 percentage point in output growth per year. After 1979 it has subtracted about the same amount per year.

The information per decades is also shown in Table 3. The decomposition suggests that the contribution of human capital accumulation to economic growth has been relatively stable, adding –since the 1960s- around 1 percentage point in per capita output growth per year. Again, the main difference between decades is productivity growth, although there is an interesting difference between the 1980s and the 1990s. The 1980s were characterized by negative productivity growth and low physical capital deepening (the two arguments that justified the structural reforms of the early 1990s). In contrast, capital intensity increased during the 1990s, in line with the investment boom that resulted from trade liberalization, capital inflows, and currency appreciation. However, productivity growth collapsed during this period. This result is stronger when Psacharopoulos' returns to education are used.

What explains the productivity implosion since 1979? Is there any relationship between the growth reversal and the fact that Colombia has exceptionally high levels of income concentration and violence? These are the questions that I try to answer in the next sections.

5. Explaining the Productivity Implosion: The role of the social conflict

It is extremely difficult to point towards changes in the political system or in economic policies in order to explain the deceleration in economic growth since 1980. On the one hand, most legal and constitutional reforms, as well as changes in the institutions that are decisive for economic policies, occurred in the early 1990s, almost ten years after the decline in growth. Although the economy experienced a negative external shock during the early 1980s, mainly due to the end of the coffee boom of the late 1970s and the beginning of the debt crisis, it is hard to argue that this sole factor could explain such a permanent reversal in growth. Export diversification has made world coffee prices less relevant for Colombia, at least from a macroeconomic viewpoint. Also, it is a well-established fact that the debt crisis was not as severe for Colombia as for other highly-indebted nations. Therefore, it is necessary to look into other areas in order to find the explanation for the productivity implosion.

The emergence as a major illicit drug producer is perhaps the most prominent aspect of Colombia's recent economic and political history. The production of cocaine rose from less than 100 tons around 1980, to more than 500 tons in 1999. The area under cultivation

of illicit crops increased to nearly 140,000 hectares in 2000, from less than 20,000 in 1980, reflecting the substitution of imports of coca paste (the raw material) from Bolivia and Peru. A five-fold increase in production and a seven-fold increase in area explain why Colombia became in two decades the dominant supplier of cocaine for the world market.

The expansion in drug-trafficking activities can be linked to the collapse of productivity, mainly through the effect of drug-trafficking on crime and violence. The homicide rate (homicides per 100,000 population) increased to 62 on average during the 1990s, from 41 during the 1980s, 23 during the 1970s, and 19 during the 1960s. The increase in the homicide rate, in turn, is related to the increase in the activities of insurgent and paramilitary groups.

Figure 6 plots cocaine production (in tons), the homicide rate, and the number of fronts of the insurgent groups[11]. The strong relationship between these variables has been the subject of a number of studies that argue that the extraction of rents from primary goods (such as oil and coca) has strengthened the military capacity of the insurgent groups. One example is Collier (2000), who points that:

> "… economic characteristics – dependence on primary commodity exports, low average incomes, slow growth, and large diasporas – are all significant and powerful predictors of civil war. Rebellions either have the objective of natural resource predation, or are critically dependent upon natural resource predation in order to pursue other objectives.."

In the Colombian context, the predatory behavior of the insurgent groups in their regions of influence has been documented Rangel (2000). Virtually no one, including the rebels, questions the fact that the expansion of the insurgent groups during the 1980s and 1990s –both in terms of their ability to recruit and the sophistication of their arms- was based on the extraction of rents from the growing coca trade[12].

The relationship between drug-trafficking and overall criminality has been analyzed by Gaviria (2000). He argues that expansion of drug-trafficking activities not only had a direct impact on crime but also indirectly through the effect on the congestion of the judicial system and the consequent reduction in the probability of punishment. Also, the change in moral values and the diffusion of crime technologies had a negative effect on overall delinquency.

Social capital or social infrastructure is, arguably, the main channel linking crime and violence, on the one hand, and productivity on the other[13]. Recently, Lederman, Loayza,

[11] Although there are differences in size between different insurgent groups, each front is formed of about 120 rebels.

[12] FARC-EP, the largest rebel organization (with approximately 16,500 members), rationalizes the extraction of rents as a tax levied on the small coca growers in exchange for protection.

[13] The term social infrastructure is more precise because it refers to elements that are not really factors of production.

and Menéndez (2001) have provided empirical evidence showing a strong negative relationship between violent crime and social capital which they define as "...The set of rules, norms, obligations, reciprocity, and trust embedded in social relations, social structures, and society's institutional arrangements which enables its members to achieve their individual and community objectives..." As they point out, the relationship between social capital and crime may run in both directions. The incidence of violent crime may diminish social capital, such as trust, or may increase it, through the formation of community organizations to fight crime[14]. However, the evidence suggests that the erosion of social capital is the dominant factor.

The relationship between productivity and social capital or social infrastructure has been a recurrent theme in the recent growth literature. In an influential paper, Hall and Jones (1999) argue that the lack of social infrastructure encourages predatory behavior. Under these circumstances a fraction of the population is employed in unproductive activities, either by engaging in crime-related activities or by protecting their human and physical assets, making no contribution to output. In addition, some of the physical capital can diverted to unproductive activities, such as public and private defense-related equipment. This form of diversion is captured in the productivity component of the sources-of-growth accounting. Similarly, the productivity term captures the contribution of other factors of production (e.g., land) that may become unusable when it's too costly to protect them.

From a different angle, social capital, or 'trust', decreases the costs of social transactions, such as the costs of negotiations, enforcement, etc. In the words of Robison and Siles, as quoted by Loayza et al. (2001) "…transaction costs are reduced by increases in social capital because each party to the trade has his well-being linked to the well-being of his or her trading partner" (1997, 5).

Figure 7 plots total factor productivity (as derived in the previous section) and the homicide rate, used as a proxy of criminality[15]. Clearly, productivity rose until 1979 when the homicide rate was relatively low. After 1979, the increase in homicides has been matched by a reduction in productivity.

Adding income concentration

The reduction in income concentration which was observed during the 1960s and 1970s began to reverse during the early 1980s. As shown in Figure 8, in what can be characterized as a typical Kuznets Curve, the Gini coefficient increased during the earlier

[14] Rosenfeld, Messner, and Baumer (1999) examine the relationship between social capital and homicide in the U.S., while Moser and Holland (1997) and Moser and Shrader (1998) analyze this issue with data for Latin America and conclude that "[t]here are often higher levels of participation in community action groups in less violent areas".

[15] Other components of crime show a similar trend. Kidnapping, a pervasive form of criminal behavior, have increased to 3,706 in 2000 from only 44 in 1980.

stages of growth (1930-1960), and the fell between 1960 and 1970. The 1980s saw the beginning of a new phase with lower growth and higher inequality.

Was greater income concentration also a consequence of the increase in crime and violence propelled by drug-trafficking? It is plausible that the interaction of a negative shock to crime (associated with drug trafficking) and high initial levels of income concentration set in motion a vicious circle of high crime, negative productivity growth, low GDP growth, increasing concentration, with additional negative feedback on crime. In contrast, the 1960s and 1970s could be characterized by a virtuous circle of low crime, high productivity growth, and decreasing income concentration. However, a full test of these hypotheses is beyond the scope of this paper.

For the purposes of this paper it is sufficient to say that, regardless of its own determinants, the increasing degree of income inequality since 1980 may have had a negative impact social infrastructure and productivity.

To check for the effects of crime on productivity I run a basic OLS regression of the log of TFP on the log of the homicide rate, controlling for income concentration (using the Gini coefficient) as well as for the average GDP growth in Latin America for the period 1960-1999 (which controls the exogenous shocks common to the region that could explain the deceleration in growth). The regression has an Adjusted-R-squared of 0.34 (t-statistics in parenthesis):

$$\underset{}{\text{Ln TFP}_t} \underset{(36.12)}{= 5.24} \underset{(-3.22)}{- 0.04\ \text{Ln Homicide Rate}_t} \underset{(-4.42)}{- 0.99\ \text{Gini}_t} \underset{(2.54)}{+ 0.004\ \text{GDP growth in LAC}_t} + e_t;$$

Clearly, this regression gives a partial indication of the negative relationship between the homicide rate and total factor productivity. Income concentration also has a negative impact on productivity. The next section investigates whether this relationship is supported by the international evidence, using data for a large cross-section of countries.

6. Social conflict and Growth: Cross-country Evidence

Recent growth studies have emphasized the role of physical geography, institutions, and trade in determining the long–run performance of individual economies. This section presents some evidence on the determinants of per-capita GDP and total factor productivity for a large sample of countries, highlighting the role of crime and income distribution, the two variables that I consider decisive in explaining the reversal of luck in Colombia.

According to the geography-driven models of growth, latitude, and more specifically prevalence of tropical conditions, act as a constraint to growth. The main reason is that technologies are ecologically-specific and that the technologies developed for the temperate zones are more productive. Also, technological innovation is an increasing returns activity, so the technological gap between tropical and temperate zones has widened (see Sachs, 2001).

Institutions are receiving increasing attention in the growth literature. A number of papers show that property rights, appropriate regulatory structures, quality and independence of the judiciary, and bureaucratic capacity are essential pre-conditions and determinants of growth. For instance, Acemoglu, Johnson and Robinson (2000) argue that weak institutions, but not physical geography, explain variations in economic development across former colonies.

Integration with the world economy is a third dimension of the development process that has been intensively emphasized in the literature as a factor leading to higher levels of income. For instance, Frankel and Romer (2000) have shown that countries that trade more tend to have higher incomes, even after controlling for the effect of income on trade. There is some criticism of this relationship, because the joint endogeneity (or reverse-causation) between trade and income (see Rodriguez and Rodrik, 2000) but the evidence is strongly in favor of the idea that geography plays a major role in determining trade (using the 'gravity' model) and that trade and income are highly correlated.

The starting point of this section the estimation of 'benchmark' regression of the cross-country determinants of economic development of the following form[16]:

$$\text{Ln GDP}_t = a + b\ \text{Institutional Quality}_t + c\ \text{Trade}_t + d\ \text{Geography}_t + e_t.$$

The dependent variable is the natural log of real GNP per capita at purchasing parity in 1995 US dollars, LGNP95, as taken from the World Bank's 1997 *World Development Indicators*. Alternatively, I also use the productivity level in 1987 (as a fraction of the U.S. productivity) measured by Hall and Jones (1998). In either case, I will focus on levels rather than growth rates in the cross-country regressions[17].

The proxy for institutions is the risk of confiscation and forced nationalization of property, EXPROP, as defined in Section 2. I also use the two variables in which Colombia is an outlier, Homicide Rate in 1995 and the Gini coefficient (at different points in time), as alternative measures of institutional quality. Regarding the geographically-related variables I include the Infant Mortality Rate in 1995, IMR95, as reported in Table 1. Of course, joint endogeneity between health indicators and income seems plausible. McArthur and Sachs (2001) have shown that cross-country differences in health are affected by physical geography (mainly because of disease incidence in tropical ecozones). Therefore, IMR95 can be instrumented using the mean annual

[16] A new vintage of papers is focusing on the interrelations between these dimensions (and their relative strength). Geography, which is the only truly exogenous factor, influences the way in which a country is integrated with world markets, regardless of its own policies. Geography also affects institutions. Tropical countries have relied on extractive activities that have resulted in rent-distributive institutions (in Colonial times and now), rather than institutions that promote local industry (see Engerman and Sokoloff, 1997). Trade and institutions also interact: Better institutions foster trade (see Anderson and Mercuiller, 1999) and more openness to trade begets higher-quality institutions (Wei, 2000).

[17] The argument is that differences in growth rates across countries are transitory, mainly because of idea and technology flows. When the regressions focus on growth, the main purpose is to explain transitory differences in growth across countries.

temperature in Celsius, MEANTEMP; the portion of land area within 100 km of the sea coast, LT100KM; and the absolute value of latitude, LATABS; all as defined in Table 1.

Acemoglu, Johnson, and Robinson (2000) have noted that EXPROP is likely to be endogenous because high-income countries may be better able to protect property rights than poor countries. They use a measure of mortality rates from the early 19th century in logs, LMORT, as an instrument for EXPROP. Although, the sample of countries is severely reduced when LMORT is used, I also report the regressions that use this variable as an instrument.

Table 4 shows the regression results omitting the trade-related variables. Equations 1 and 2 replicate McArthur and Sachs (2001) and reiterate the point that EXPROP and IMR95 are powerful explanatory variables. The coefficients are highly significant and the R-squared is high (0.8). In the specific case of Colombia, the regressions predict a value for per capita GNP in 1995 which is between 1% and 4% below the observed level. This implies that the level of GNP in Colombia is quite in line with the value that corresponds to a country with that level of political institutions (as measured by EXPROP), health, and geography.

Equations 3 and 4 add the homicide rate to the list of explanatory variables. In Equation 3, the coefficient on HOMICIDES95 comes out with a negative sign but insignificantly different from zero. In Equation 4, which excludes EXPROP, the effect of HOMICIDES95 is negative and significant. Figure 9 shows the partial correlation between the log of per capita GDP in 1995 and the homicide rate (controlling or the effect of infant mortality). Clearly, there is a negative correlation between income and crime.

This Equation does poorly in predicting Colombia's GDP because its level of income is higher than what corresponds to a country with such a high level of criminality. In other words, high criminality is a relatively recent phenomenon that has affected growth during the last couple of decades. In fact, based on this simplified model, the current levels of criminality and infant mortality would predict, in the steady state, a level of income that could between 41% and 57% below the level observed in 1995. This means that if crime is not reduced, the level of income will fall in the long run to a level consistent with the predictions of the model.

Equation 5 adds the Gini coefficient for the 1960s and 1970s. The results do not support the view that income concentration has an impact on the level of income once the regression controls for infant mortality and its geographical determinants. Equations 6 and 7 use total factor productivity in 1987 as the dependent variable. In this case, the homicides rate does not come out significant, but the Gini coefficient is significant and has the expected negative sign. Although productivity in Colombia is also under-predicted by this model, the error is much lower than in the case of income. Finally, Equation 8 uses as dependent variable the change in the growth rate between two periods (1975-1990) minus (1960-1975). The results indicate that, regardless of the factors that

explain the change in growth in each country, the higher the initial level of concentration the lower the subsequent rate of growth.

Interestingly, inequality and crime are positively correlated (Figure 10). A regression of homicides on a constant and the Gini coefficient for 45 countries with data on both variables has an R-squared of 0.2 and the coefficient on the Gini is significant and positive. This means that there is some interaction between these two variables, which creates problems in including them in the same regression.

The next step is to look at the role of trade and geography in a regression that combines these two variables following closely Frankel and Romer (1999). They analyze the relationship between trade and income by estimating cross-country regression of log income per person in 1985 (LY85) on the trade-GDP ratio (TRADE SHARE) and two measures of country size (POPULATION and land AREA). The joint endogeneity between trade and income is handled by estimating a gravity equation, where bilateral trade is regressed on geographical variables (countries' size, their distance from each other, whether they share a common border, and whether they are landlocked). The fitted trade values are aggregated across trade partners to construct a measure of trade that then is used as an instrument in the regressions.

Equations 1 and 2 in Table 5 replicate Frankel and Romer's original regressions. The conclusion is that the effect of trade on income is positive and significant. In fact, this effect is higher when the trade share is adequately instrumented. However, these regressions severely under-predict the level of income in Colombia reflecting the fact that the trade shares (actual and constructed) were very low in 1985. Again, the implication is that the predicted level of income in Colombia, based on trade openness, was below its observed value. This suggests that other factors compensated the negative effect on income of the lack of trade.

In equations 3 and 4, the original regressions are updated using information for 1995. Interestingly, the results become much weaker in the OLS regression, and even vanish in the instrumental variables (IV) equation, indicating that the relationship between trade and income (at least in this specification) is not robust. From the point of view of Colombia, what this tells is that the changes in income cannot be attributed to changes in trade policy.

8. CONCLUSIONS

Colombia's GDP has been growing at an average rate of 3% per year since 1980. In contrast, between 1950 and 1980 growth rates were substantially higher and, also, more stable. In fact, a 5% growth rate seemed almost natural prior to 1980. This paper analyzes the possible causes of such a prolonged change in growth, which has had devastating consequences on welfare.

There are various possible explanations. Some, argue that the growth reversal is the result of trade liberalization (which took place in the early 1990s). Others consider that more reforms –e.g., labor deregulation- should be adopted in order to allow trade liberalization to deliver high growth.

This paper takes a different approach. It looks at this issue in two steps. First, it deals with the proximate causes of growth –the standard sources-of-growth-decomposition- and concludes that the reversal of growth is the result of an implosion of productivity. This is interesting because it implies that both physical and human capital accumulation are not responsible for the reduction in growth. Indeed, this reduction is explained entirely by changes in productivity growth. Prior to 1980, productivity gains added 1 percentage point to the per-capita GDP growth on average per year. Since 1980, productivity losses have been subtracting a similar amount.

In the second step, the paper deals with the determinants of productivity, using Colombian time series information and international cross-sectional data. The conclusion is that the implosion of productivity is directly related to the four-fold increase in criminality. The existing literature has already shown that the explosion of crime was the result of the rapid expansion of drug-trafficking activities and the intensification of the internal armed conflict (fueled by the rents from the drug trade). Thus, the paper argues that it is not a coincidence that the implosion of productivity, the increase in crime, the expansion of drug-trafficking, and the strengthening of the insurgent movements, occurred at the same time, starting around 1980.

The paper also shows that income concentration has tended to increase since 1980, partially reversing the impressive reduction in concentration of the 1960s and 1970s. This means that growth and equity have moved in the same direction. In fact, the period between 1980 and 2000 can be characterized by a vicious circle of high crime, negative productivity gains, low growth, and increasing concentration. This contrasts sharply with the 1960-1980 period, which can be called the golden age of economic development in Colombia, described by the virtuous circle of low crime, high productivity gains, high growth, and decreasing concentration.

This paper shows that the reversal of fortune is a direct consequence of the ‘fortunes’ associated with the sudden eruption of drug trafficking. Implicit in this analysis is that the direct (and positive) effects of drug trafficking on income (on the order of 3% of GDP) are of second order when compared to the economy-wide indirect (and negative) effects on productivity.

Finally, the international evidence supports the view that high crime and high concentration are two interrelated phenomena. Countries with high levels of crime tend to show also high levels of income concentration. In turn, high crime and greater inequality are associated with low productivity. This may turn out to be more important in explaining differences in long term performance than differences in trade orientation.

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Table 1.

Variable	Source	Number of observations
Size		
Total population 1985 (Millions)	Penn World Table, Mark 5.6	151
Economically active population 1985 (Millions)	Penn World Table, Mark 5.6	150
Average population growth 1960-1989	Penn World Table, Mark 5.6	121
Area (Thousands of Sq. Miles)	McNally (1993)	150
Macroeconomic Performance		
Income per worker 1985 (International Prices-Dollars)	Penn World Table, Mark 5.6	150
Per capita GDP 1995 (PPP)	1997 World Development Indicators	150
Per capita GDP growth rate 1960 - 1975	Rodrik (1998)	117
Per capita GDP growth rate 1975 - 1989	Rodrik (1998)	116
Changes in the per capita GDP growth: (1975-1989) - (1960-1975).	Rodrik (1998)	110
Inflation rate 1960 - 1975	1997 World Development Indicators	105
Inflation rate 1975 - 1990	1997 World Development Indicators	131
Change in the inflation rate: (1975-1990) - (1960-1975)	1997 World Development Indicators	105
Investment Rate (%GDP) 1960 - 1975	Penn World Table, Mark 5.6	118
Investment Rate (%GDP) 1975 - 1989	Penn World Table, Mark 5.6	125
Index of macroeconomic mismanagement (inlfation and black market premia)	Rodrik (1998)	89
Trade-related variables and Indebtedness		
Total Trade / GDP 1960s	1995 World Development Indicators	120
Total Trade / GDP 1970s	1995 World Development Indicators	125
Actual trade share 1985, (Imports+Exports)/GDP	Penn World Table, Mark 5.6	150
Actual trade share 1992, (Imports+Exports)/GDP	Penn World Table, Mark 5.6	91
Constructed trade share 1985	Frankel and Romer (1999)	150
Sachs-Warner dummy variable for openness (0=closed, 1=open)	Sachs and Warner (1995)	83
External Volatility Index 1960s	Rodrik (1998)	97
External Volatility Index 1970s	Rodrik (1998)	119
Debt-Exports ratio in 1985	Rodrik (1998)	93
Debt-GNP ratio in 1985	Rodrik (1998)	95
Geography and Health		
Proportion of a country's population at risk of falciparium malaria transmission in 1994	Gallup, Sachs, and Mellinger (1999)	149
Life expectancy at birth in 1995	United Nations (1996)	148
Infant mortality rate (deaths per 1000 live births) in 1995	United Nations (1996)	148
Mean annual temperature in degrees Celsius	Gallup, Sachs, and Mellinger (1999)	123
Proportion of land area within 100 Km of the sea coast	Gallup, Sachs, and Mellinger (1999)	150
Absolute value of latitude	La Porta et al. (1999)	150
Distribution and Fragmentation		
Gini coefficient 1960 - 1970	Deininger and Squire (1996)	58
Gini coefficient 1970	Deininger and Squire (1996)	56
Gini coefficient 1980	Deininger and Squire (1996)	81
Gini Coefficient for Land	Alesina and Rodrik (1994)	51
Proportion of the population that does not speak the country's official language at home	Easterly and Levine (1996)	127
Index of ethno-linguistic fragmentation (ELF60)	Mauro (1995)	109
Racial Tension (1-6, 6 = high tension)	Knack and Keefer (1995)	99
Political Institutions		
Risk of confiscation and forced nationalization of property (1-10, 10= no risk) 1985-1995	Political Risk Services. Taken from McArthur and Sachs (2001)	118
Democracy Index (from Freedom House Index of political rights and civil liberties) 1960s (0-1, 1=full democracy)	Rodrik (2000)	98
Democracy Index (from Freedom House Index of political rights and civil liberties) 1970s (0-1, 1=full democracy)	Rodrik (2000)	137
Democracy Index (from Freedom House Index of political rights and civil liberties) 1980s (0-1, 1=full democracy)	Rodrik (2000)	137
Democracy Index (from Freedom House Index of political rights and civil liberties) 1990s (0-1, 1=full democracy)	Rodrik (2000)	138
International Country Risk Guide Index (Average 1980 - 1989) (0-10, 10=high quality)	Easterly and Levine (1996)	107
Index of bureaucratic efficiency (1-10, 10 = high quality)	Mauro (1995)	68
Lack of corruption index (1-10, 10 = no corruption)	Mauro (1995)	68
De Jure Independence of the Excecutive (0-1, 1 =full independence) 1970s	Jaggers and Gurr (1995) Polity III data	116
De Facto Independence of the Excecutive (0-1, 1 = full independence) 1970s	Jaggers and Gurr (1995) Polity III data	116
Degree to which non-elites can access political institutions 1970-79 (0-1, 1=full access) 1970s	Jaggers and Gurr (1995) Polity III data	116
Public expenditure on Social Security / GDP in 1985	Rodrik (1998)	87
Conflict and Violence		
War during the 1960s (dummy)	Rodrik (1998)	131
War during the 1970s (dummy)	Rodrik (1998)	131
War during the 1980s (dummy)	Rodrik (1998)	131
Homicides per 100.000, 1985	Demographic Yearbook, UN, 1988	66
Homicides per 100.000, 1995	Demographic Yearbook, UN, 1997	84

* Number of countries for which the dummy variable takes the value 1

Table 1 (Cont.)

Variable	Number and % of observations above Colombia in the sample		Value for Colombia	Sample Mean	Value for Colombia as st. deviations from the mean
Size					
Total population 1985 (Millions)	28	19%	29.48	31.00	-0.01
Economically active population 1985 (Millions)	32	21%	9.43	14.03	-0.08
Average population growth 1960-1989	50	41%	2.36%	2.01%	0.34
Area (Thousands of Sq. Miles)	23	15%	439.74	332.47	0.11
Macroeconomic Performance					
Income per worker 1985 (International Prices-Dollars)	62	41%	9276.00	10658.31	-0.14
Per capita GDP 1995 (PPP)	44	29%	6130.00	6168.39	-0.01
Per capita GDP growth rate 1960 - 1975	60	51%	0.03	0.03	-0.05
Per capita GDP growth rate 1975 - 1989	45	39%	0.02	0.01	0.26
Changes in the per capita GDP growth: (1975-1989) - (1960-1975).	43	39%	-0.01	-0.02	0.31
Inflation rate 1960 - 1975	9	9%	13.71%	10.15%	0.20
Inflation rate 1975 - 1990	22	17%	23.90%	48.55%	-0.14
Change in the inflation rate: (1975-1990) - (1960-1975)	26	25%	10.20%	40.09%	-0.16
Investment Rate (%GDP) 1960 - 1975	55	47%	0.18	0.18	0.00
Investment Rate (%GDP) 1975 - 1989	70	56%	0.17	0.18	-0.12
Index of macroeconomic mismanagement (inlfation and black market premia)	44	49%	0.01	0.01	-0.34
Trade-related variables and Indebtedness					
Total Trade / GDP 1960s	94	78%	26.26	53.61	-0.72
Total Trade / GDP 1970s	103	82%	29.53	59.94	-0.84
Actual trade share 1985, (Imports+Exports)/GDP	129	86%	26.33	73.38	-1.02
Actual trade share 1992, (Imports+Exports)/GDP	78	86%	35.36	70.01	-0.70
Constructed trade share 1985	136	91%	7.54	27.20	-0.69
Sachs-Warner dummy variable for openness (0=closed, 1=open)	74	89%	0.00	0.35	-0.73
External Volatility Index 1960s	43	44%	2.90	3.36	-0.16
External Volatility Index 1970s	70	59%	5.12	8.91	-0.45
Debt-Exports ratio in 1985	32	34%	287.50	296.86	-0.03
Debt-GNP ratio in 1985	68	72%	42.85	79.77	-0.60
Geography and Health					
Proportion of a country's population at risk of falciparium malaria transmission in 1994	49	33%	0.25	0.29	-0.10
Life expectancy at birth in 1995	56	38%	70.43	64.44	0.52
Infant mortality rate (deaths per 1000 live births) in 1995	82	55%	30.00	48.17	-0.46
Mean annual temperature in degrees Celsius	66	54%	22.50	20.23	0.31
Proportion of land area within 100 Km of the sea coast	86	57%	0.16	0.35	-0.55
Absolute value of latitude	139	93%	0.04	0.30	-1.36
Distribution and Fragmentation					
Gini coefficient 1960 - 1970	6	10%	51.61	40.54	1.18
Gini coefficient 1970	5	9%	51.61	40.21	1.25
Gini coefficient 1980	14	17%	51.26	40.55	1.15
Gini Coefficient for Land	5	10%	86.40	67.01	1.25
Proportion of the population that does not speak the country's official language at home	95	75%	5.00	39.35	-0.87
Index of ethno-linguistic fragmentation (ELF60)	90	83%	0.06	0.42	-1.20
Racial Tension (1-6, 6 = high tension)	12	12%	6.00	3.67	1.40
Political Institutions					
Risk of confiscation and forced nationalization of property (1-10, 10= no risk) 1985-1995	46	39%	7.39	7.02	0.20
Democracy Index (from Freedom House Index of political rights and civil liberties) 1960s (0-1, 1=full democracy)	37	38%	0.70	0.43	0.64
Democracy Index (from Freedom House Index of political rights and civil liberties) 1970s (0-1, 1=full democracy)	31	23%	0.79	0.48	0.97
Democracy Index (from Freedom House Index of political rights and civil liberties) 1980s (0-1, 1=full democracy)	43	31%	0.73	0.50	0.68
Democracy Index (from Freedom House Index of political rights and civil liberties) 1990s (0-1, 1=full democracy)	52	38%	0.77	0.57	0.57
International Country Risk Guide Index (Average 1980 - 1989) (0-10, 10=high quality)	52	49%	5.30	5.69	-0.17
Index of bureaucratic efficiency (1-10, 10 = high quality)	49	72%	5.42	6.63	-0.55
Lack of corruption index (1-10, 10 = no corruption)	53	78%	4.50	6.79	-0.90
De Jure Independence of the Excecutive (0-1, 1 =full independence) 1970s	63	54%	0.75	0.76	-0.05
De Facto Independence of the Excecutive (0-1, 1 = full independence) 1970s	82	71%	0.17	0.58	-1.02
Degree to which non-elites can access political institutions 1970-79 (0-1, 1=full access) 1970s	26	22%	0.75	0.36	0.99
Public expenditure on Social Security / GDP in 1985	39	45%	0.03	0.05	-0.40
Conflict and Violence					
War during the 1960s (dummy)	21 *	16%	1	0.16	2.28
War during the 1970s (dummy)	26 *	20%	0	0.20	-0.50
War during the 1980s (dummy)	34 *	26%	1	0.26	1.68
Homicides per 100.000, 1985	1	2%	37.4	6.00	3.55
Homicides per 100.000, 1995	0	0%	80	8.00	6.68

* Number of countries for which the dummy variable takes the value 1

Table 3.

Sources of Growth Decomposition

Growth in:	(1)=(2)+(3)+(4) per-capita GDP	(2) Capital-Output Ratio Ratio	(3) Human Capital per capita	(4) Productivity
Using Returns to Education from Núñez and Sánchez (2000)				
1955-1979	1.55%	-0.21%	0.74%	1.01%
1980-2000	0.66%	0.64%	0.96%	-0.95%
1955-1959	1.31%	0.27%	0.26%	0.77%
1960-1969	1.31%	-0.32%	0.72%	0.91%
1970-1979	1.91%	-0.33%	1.02%	1.22%
1980-1989	0.63%	0.39%	1.08%	-0.84%
1990-1999	1.12%	1.02%	0.80%	-0.71%
Using Returns to Education from Psacharopoulos (1994)				
1955-1979	1.55%	-0.21%	1.11%	0.64%
1980-2000	0.66%	0.65%	1.03%	-1.03%
1955-1959	1.31%	0.27%	0.40%	0.63%
1960-1969	1.31%	-0.32%	1.12%	0.50%
1970-1979	1.91%	-0.33%	1.46%	0.77%
1980-1989	0.63%	0.39%	0.92%	-0.68%
1990-1999	1.12%	1.02%	1.06%	-0.97%

Source: Author's calculations.

Table 4. Regression Results.

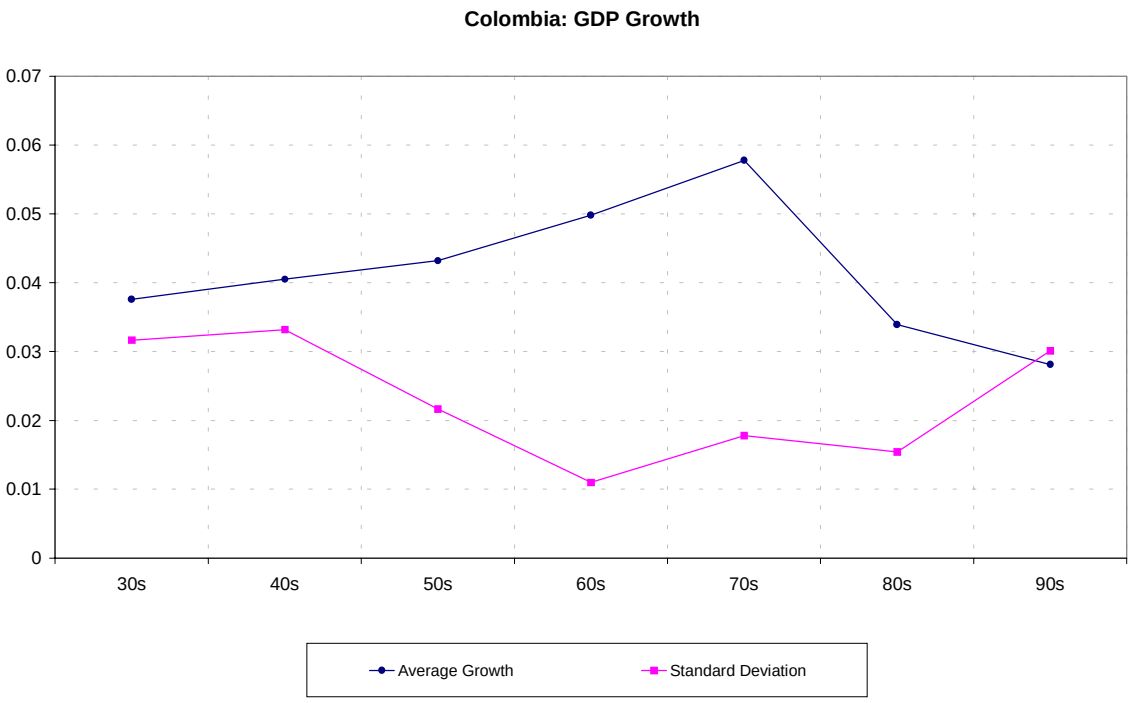
REGRESSION	1	2	3	4	5	6	7	8
Dependent Variable	LGNP95	LGNP95	LGNP95	LGNP95	LGNP95	LTFP87	LTFP87	DIF
Estimation	IV	IV	IV	IV	IV	IV	IV	OLS
CONSTANT	7.67	5.24	7.74	9.99	6.64	0.91	1.48	0.04
t - stat	10.54	4.14	10.22	103.08	10.05	10.33	5.30	2.61
EXPROP	0.22	0.52	0.23		0.29			
t - stat	2.95	3.45	3.09		4.56			
IMR95	-0.02	-0.012	-0.03	-0.04	-0.02	-0.01	0.00	
t - stat	-4.06	-2.11	-3.32	-8.75	-3.99	-2.28	-2.65	
HOMICIDES95			-0.004	-0.01		-0.01		
t - stat			-1.05	-2.13		-0.56		
GINI60-70					0.014		-0.02	0.00
t - stat					1.67		-2.36	-3.96
N	118	63	49	50	52	47	72	51
Ad R - sq	0.76	0.79	0.85	0.80	0.83	0.19	0.32	0.23
Residual for Colombia	0.0439	0.011	0.41	0.57	-0.10	0.11	0.18	0.03
Instruments:								
MEANTEMP	✓	✓	✓	✓	✓	✓	✓	
LT100KM	✓	✓	✓	✓	✓	✓	✓	
LATABS	✓	✓	✓	✓	✓	✓	✓	
LMORT		✓						

Table 5. Regression Results.

REGRESSION	1	2	3	4
DEPENDENT VARIABLE	LY85*	LY85*	LGNP95**	LGNP95**
Estimation	OLS	IV	OLS	IV
CONSTANT	8.14	6.88	6.59	-5.63
t - stat	24.50	6.56	5.18	-0.42
TRADE SHARE	0.85	1.97	0.01	0.05
t - stat	3.48	2.16	2.14	1.06
Ln POPULATION	0.12	0.20	0.15	0.35
t - stat	1.89	2.18	1.51	1.23
Ln AREA	-0.013	0.09	-0.01	0.59
t - stat	(-0,24)	0.88	-0.06	0.89
N	150	150	83	83
Ad R-sq	0.08	-	0.04	-
Residual for Colombia	0.58	0.78	0.38	0.8
Instruments:				
Ln AREA		✓		✓
Ln POP.		✓		✓
Constructed Trade Share***		✓		✓

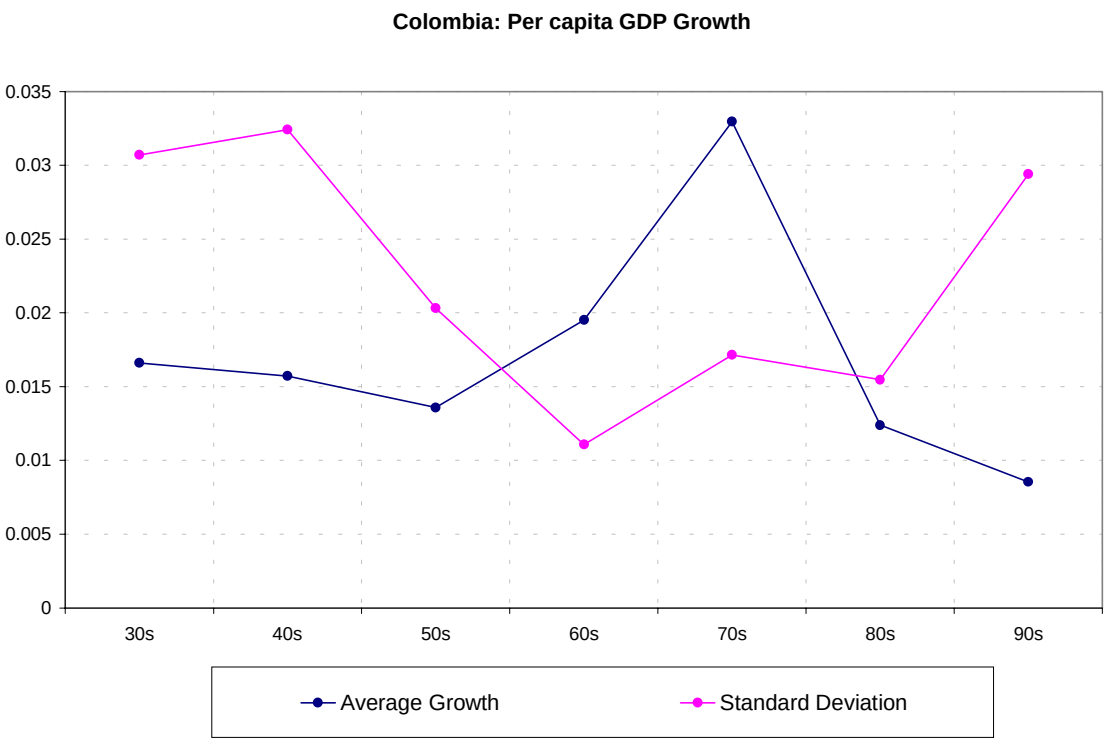
* Actual Trade Share, Population, and Area are for 1985.
** Actual Trade Share, Population, and Area are for 1995 and come from the World Penn Tables Mark 5.6.
*** Constructed trade share comes from Frankel and Romer (1999) for 1985, and from Andrew Rose's Website for 1995.

Figure 1a.



Source: Author's calculations based on National Accounts data from DANE.

Figure 1b.

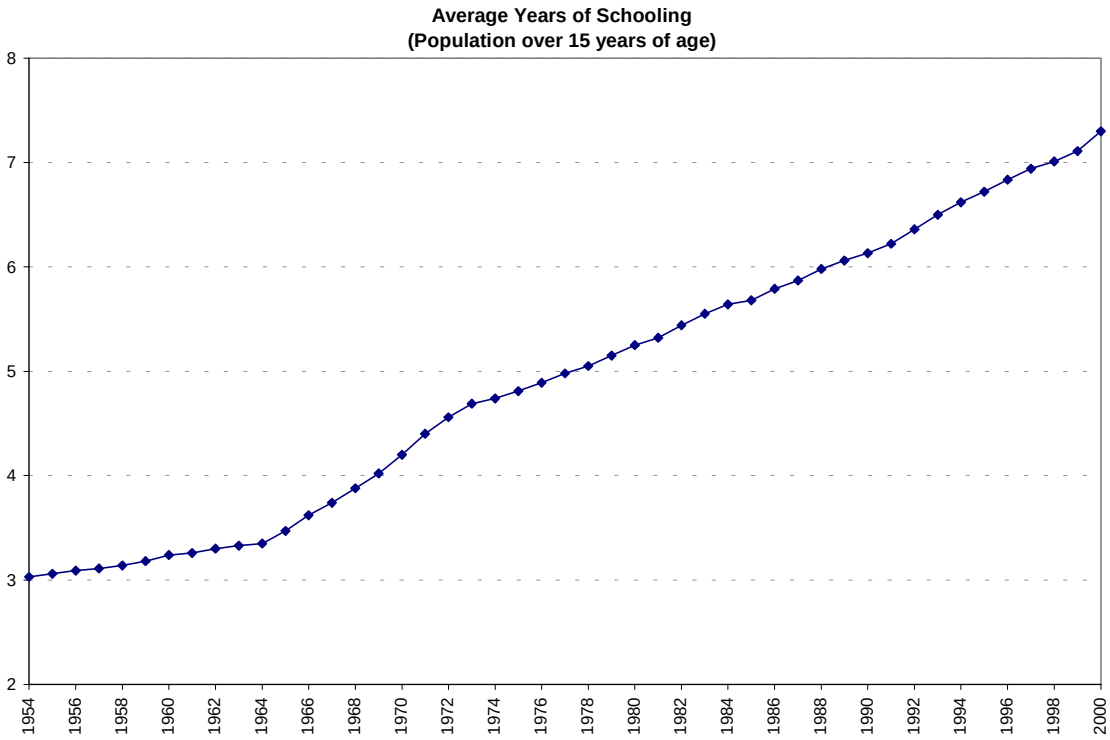


Source: Author's calculations based on National Accounts data from DANE.

Figure 2.

Source: Author's calculations based on National Accounts data from DANE.

Figure 3.



Source: Estadísticas Históricas de Colombia, Cuadro 7.3 (1954-1996) and calculations from DNP-DDS for the period 1997-2000.

Figure 4.

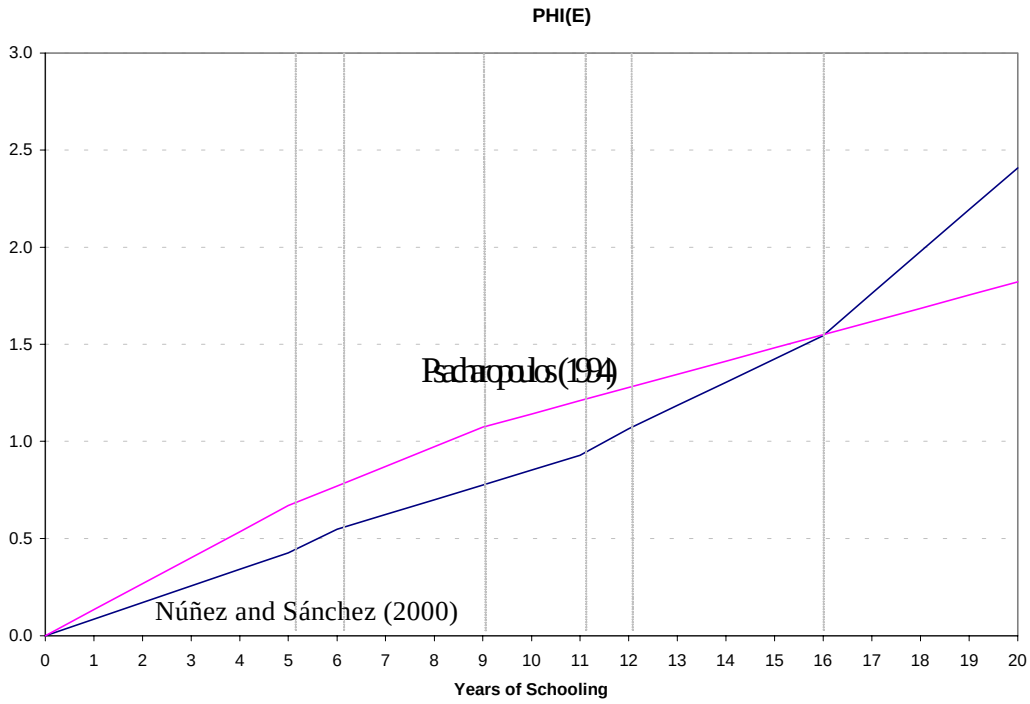
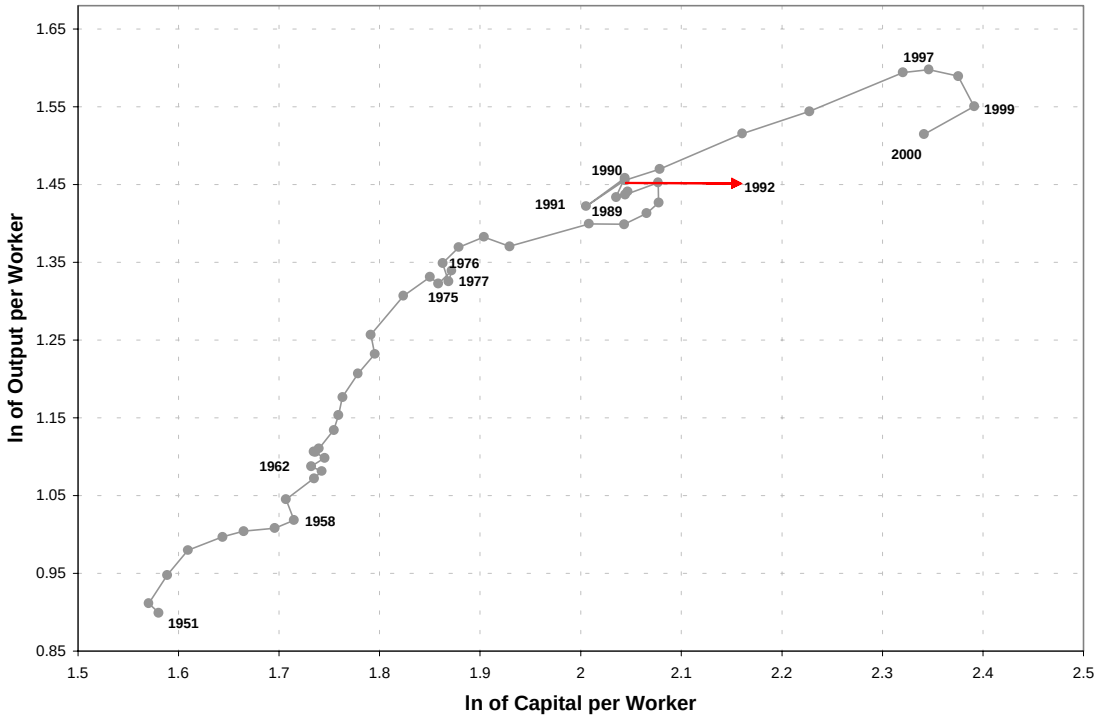
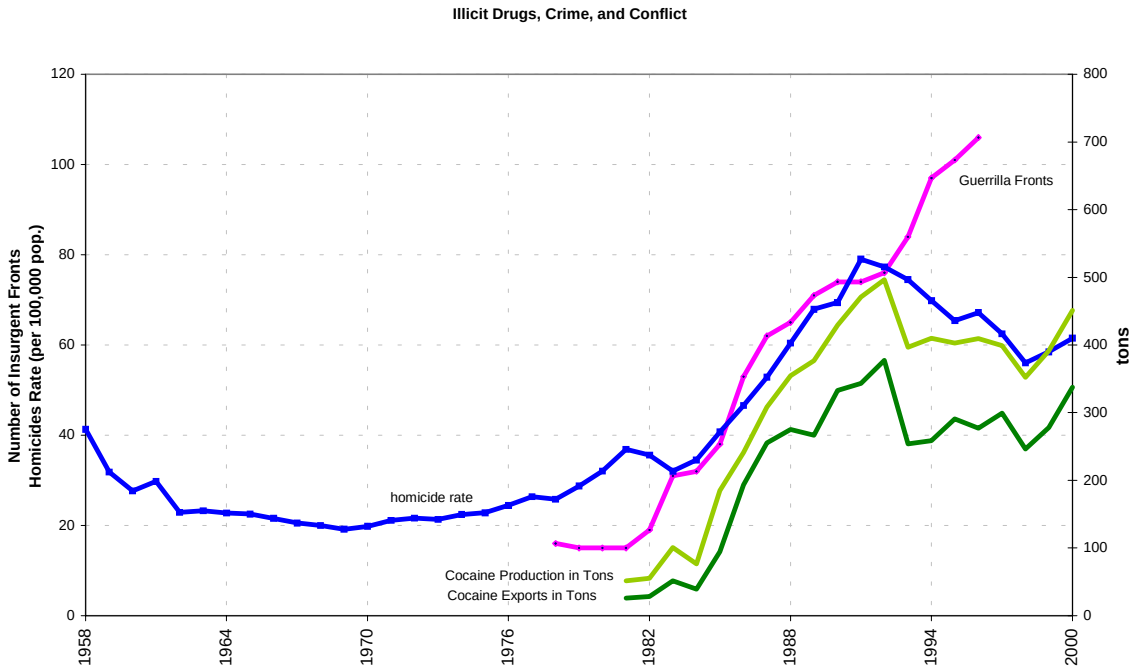

PHI(E)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Years of Schooling
Psacharopoulos (1994)
Núñez and Sánchez (2000)

Figure 5.



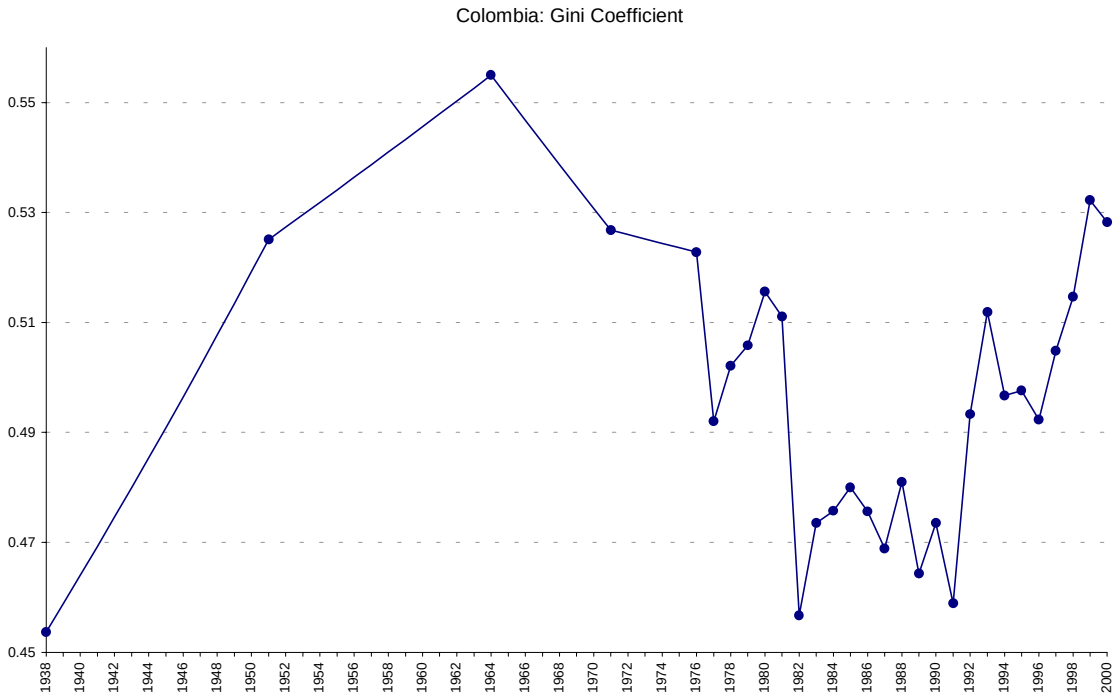
Source: Author's calculations.

Figure 6.



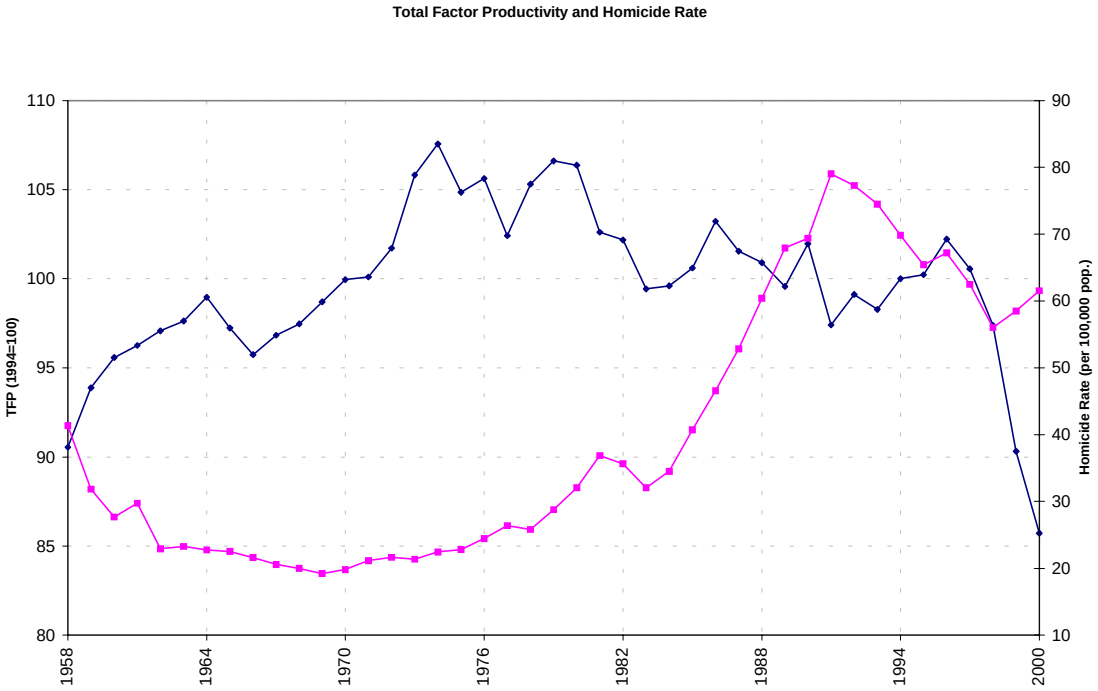
Source: Homicide Rate comes from Informes de Criminalidad (Policia Nacional) various years. Cocaine production and exports from Rocha (2000)

Figure 7.



Source: 1938, 1951, 1964 and 1971, "Distribución del Ingreso y Desarrollo Económico", Juan Luis Londoño.
1976-2000, Dane, Encuesta Nacional de Hogares. Cálculos DNP-Umacro.

Figure 8.



Source: Author's calculation (TFP) and Informes de Criminalidad, Policia Nacional

Figure 9.

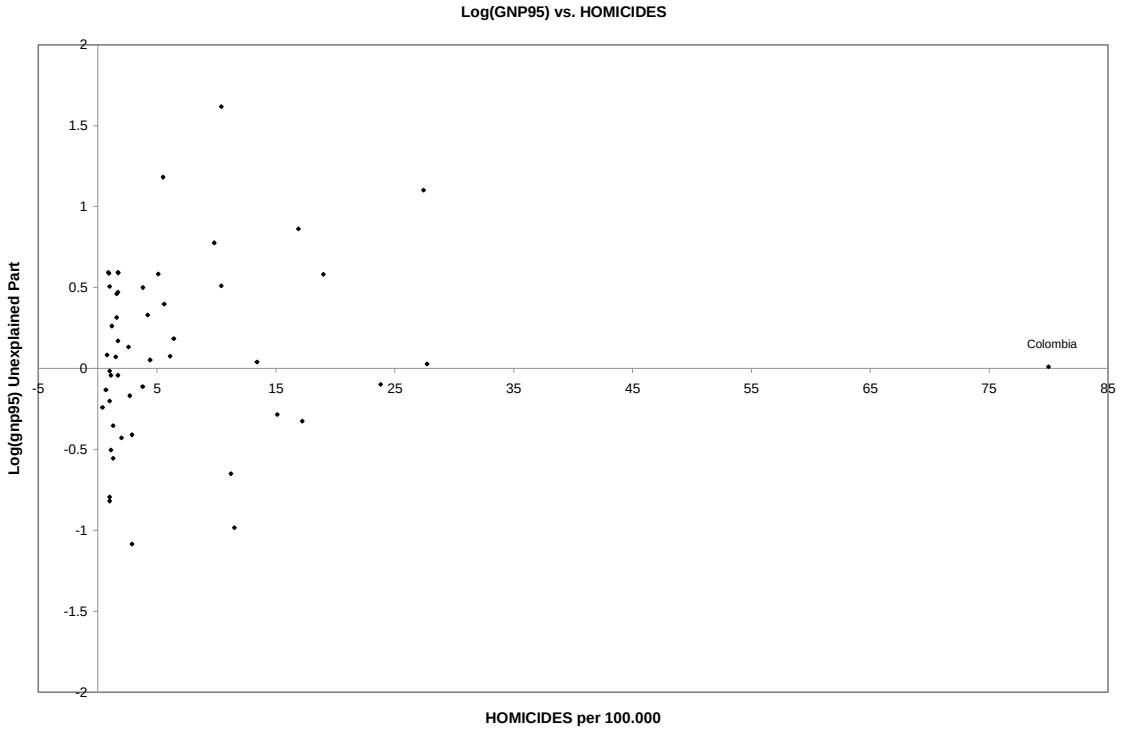
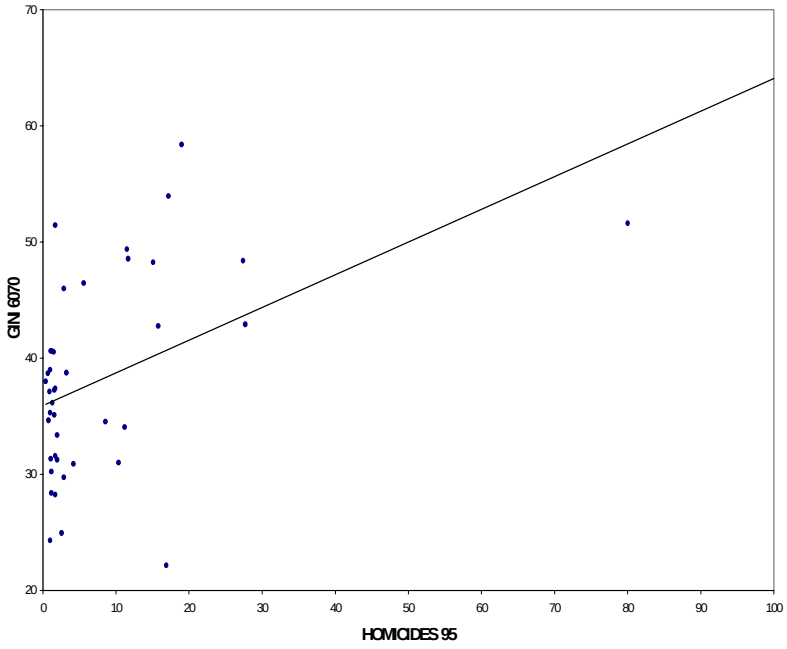
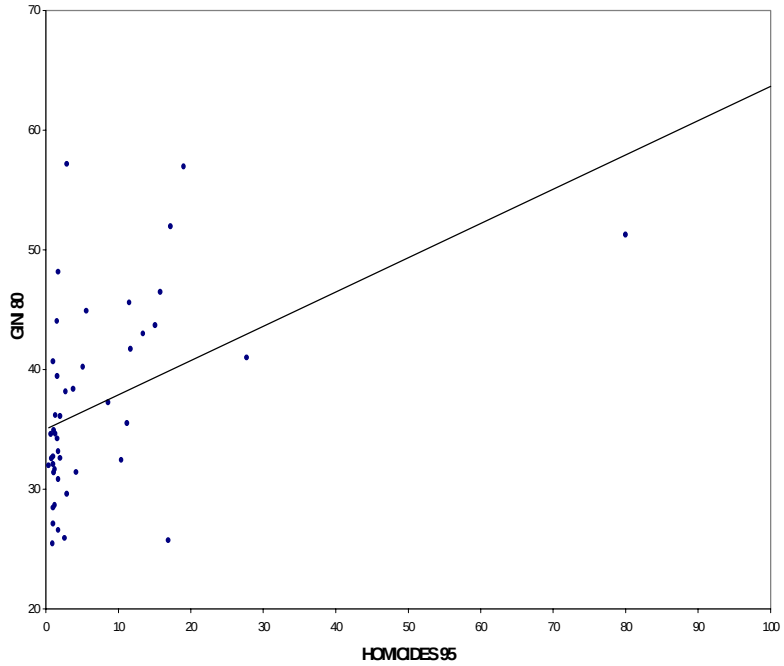

Log(GNP95) vs. HOMICIDES
Log(gnp95) Unexplained Part
HOMICIDES per 100.000
Colombia
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-5
5
15
25
35
45
55
65
75
85

Figure 10.


GIN 6070
HOMICIDES 95
70
60
50
40
30
20
0
10
20
30
40
50
60
70
80
90
100

(a)


GIN 80
HOMICIDES 95
70
60
50
40
30
20
0
10
20
30
40
50
60
70
80
90
100

(b)

Appendix 1.

GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Year	Akaike IC
D60	-0.00233	0.00737	-0.31612	0.75340	**1960**	-4.81929
D61	-0.00112	0.00713	-0.15721	0.87580	**1961**	-4.81762
D62	-0.00068	0.00687	-0.09866	0.92190	**1962**	-4.81729
D63	-0.00077	0.00665	-0.11561	0.90850	**1963**	-4.81737
D64	0.00015	0.00652	0.02219	0.98240	**1964**	-4.81708
D65	-0.00178	0.00635	-0.27980	0.78090	**1965**	-4.81881
D66	-0.00142	0.00626	-0.22729	0.82120	**1966**	-4.81822
D67	-0.00200	0.00616	-0.32371	0.74770	**1967**	-4.81940
D68	-0.00136	0.00607	-0.22410	0.82370	**1968**	-4.81819
D69	-0.00318	0.00599	-0.53067	0.59830	**1969**	-4.82331
D70	-0.00417	0.00594	-0.70322	0.48550	**1970**	-4.82800
D71	-0.00591	0.00589	-1.00408	0.32070	**1971**	-4.83923
D72	-0.00646	0.00589	-1.09793	0.27810	**1972**	-4.84351
D73	-0.00934	0.00584	-1.59977	0.11660	**1973**	-4.87239
D74	-0.01137	0.00588	-1.93482	0.05930	**1974**	-4.89698
D75	-0.01306	0.00599	-2.18029	0.03450	**1975**	-4.91749
D76	-0.01134	0.00628	-1.80462	0.07780	**1976**	-4.88694
D77	-0.01416	0.00629	-2.25255	0.02920	**1977**	-4.92391
D78	-0.01539	0.00633	-2.43078	0.01910	**1978**	-4.94044
D79	-0.01992	0.00608	-3.27670	0.00200	**1979**	-5.03105
D80	-0.01964	0.00624	-3.14915	0.00290	**1980**	-5.01624
D81	-0.02008	0.00650	-3.08821	0.00340	**1981**	-5.00929
D82	-0.01864	0.00685	-2.72110	0.00920	**1982**	-4.96940
D83	-0.01759	0.00710	-2.47669	0.01710	**1983**	-4.94486
D84	-0.01614	0.00703	-2.29403	0.02650	**1984**	-4.92767
D85	-0.01504	0.00686	-2.19283	0.03350	**1985**	-4.91860
D86	-0.01286	0.00676	-1.90271	0.06350	**1986**	-4.89445
D87	-0.01415	0.00661	-2.14054	0.03780	**1987**	-4.91404
D88	-0.01447	0.00674	-2.14665	0.03720	**1988**	-4.91457
D89	-0.01400	0.00701	-1.99718	0.05190	**1989**	-4.90200
D90	-0.01296	0.00732	-1.76927	0.08360	**1990**	-4.88432

Source: Author's calculations.

Appendix 1.

Per capita GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Year	Akaike IC
D60	0.00181	0.00676	0.26812	0.78980	**1960**	-4.97766
D61	0.00381	0.00657	0.57990	0.56490	**1961**	-4.98351
D62	0.00459	0.00636	0.72262	0.47370	**1962**	-4.98760
D63	0.00475	0.00615	0.77271	0.44370	**1963**	-4.98925
D64	0.00573	0.00599	0.95627	0.34400	**1964**	-4.99618
D65	0.00401	0.00589	0.68102	0.49930	**1965**	-4.98632
D66	0.00471	0.00579	0.81355	0.42020	**1966**	-4.99067
D67	0.00434	0.00572	0.75879	0.45190	**1967**	-4.98878
D68	0.00530	0.00563	0.94144	0.35150	**1968**	-4.99557
D69	0.00363	0.00559	0.64849	0.52000	**1969**	-4.98537
D70	0.00295	0.00556	0.53027	0.59850	**1970**	-4.98229
D71	0.00138	0.00554	0.24912	0.80440	**1971**	-4.97744
D72	0.00102	0.00550	0.18581	0.85340	**1972**	-4.97683
D73	-0.00168	0.00543	-0.30866	0.75900	**1973**	-4.97818
D74	-0.00320	0.00540	-0.59161	0.55710	**1974**	-4.98381
D75	-0.00422	0.00539	-0.78132	0.43870	**1975**	-4.98954
D76	-0.00300	0.00543	-0.55322	0.58290	**1976**	-4.98284
D77	-0.00462	0.00540	-0.85519	0.39700	**1977**	-4.99219
D78	-0.00564	0.00540	-1.04452	0.30180	**1978**	-5.00002
D79	-0.00939	0.00532	-1.76376	0.08460	**1979**	-5.04291
D80	-0.00932	0.00545	-1.71108	0.09400	**1980**	-5.03910
D81	-0.00946	0.00557	-1.69789	0.09640	**1981**	-5.03816
D82	-0.00854	0.00572	-1.49356	0.14230	**1982**	-5.02445
D83	-0.00813	0.00584	-1.39200	0.17080	**1983**	-5.01822
D84	-0.00679	0.00589	-1.15348	0.25480	**1984**	-5.00520
D85	-0.00689	0.00587	-1.17466	0.24630	**1985**	-5.00627
D86	-0.00575	0.00591	-0.97286	0.33580	**1986**	-4.99688
D87	-0.00723	0.00595	-1.21474	0.23080	**1987**	-5.00833
D88	-0.00734	0.00614	-1.19584	0.23800	**1988**	-5.00735
D89	-0.00719	0.00637	-1.12808	0.26530	**1989**	-5.00395
D90	-0.00655	0.00660	-0.99206	0.32650	**1990**	-4.99770

Source: Author's calculations.