

Revisiting economic growth in Colombia

A microeconomic perspective

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**IADB Project:
Competitiveness and Growth in Latin America**

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Abstract

This paper revisits economic growth in Colombia using the growth diagnostics methodology proposed by Hausmann, Rodrik and Velasco (2005), with the purpose of identifying the most binding constraints for economic growth and the policies that, if implemented, can have the largest positive impact. To rank public policy priorities the HRV (2005) methodological approach is complemented with an econometric analysis of micro-data, aimed at exploring the impact that the various potential constraints to growth have had on firm-level investment decisions. The data shows economic reactivation in areas with falling violence. Results from analysis at the microeconomic level, however, give a particular spin to this conclusion by showing that investment decisions at the firm level are also explained by the restoration of some form of public order connected to the cessation of paramilitary violence and not only by the reduction of violence. From a public policy perspective, perhaps the most relevant result is the confirmation that in Colombia investment decisions are negatively affected by the cost of financing. Empirical results, robust across model specifications, single out the provision of access to financing at fair prices as a policy priority for economic growth, relevant across country regions and independent of whether uncertainties from poor protection to property rights are resolved.

January 2008

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Acknowledgements

We are grateful to comments from Fidel Jaramillo, Ben Clements, Eduardo Lora, Mauricio Cárdenas, Manuel Agosín, Francesca Castellani, Alfie Ulloa, Daniel Gómez and participants in the Competitiveness and Growth IADB Research Project Workshops. Conversations with Juan Ricardo Ortega and María Inés Agudelo contributed valuable insight. Daniel Monsalve provided excellent research assistance.

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1. Introduction

While economic growth in Colombia has been widely diagnosed³, there are two areas in which there is still space for contribution. One is the ranking of policy priorities for economic growth. The other is the analysis of the incentives for investment at the microeconomic level and of the distortions that result from government or market failures. Progress in these directions is crucial for adequate policy design and is not independent. This paper contributes to fill these gaps

In the framework given by the IADB, this paper revisits economic growth in Colombia using the growth diagnostics methodology proposed by Hausmann, Rodrik and Velasco (2005) – henceforth HRV (2005) – with the purpose of identifying the most binding constraints for economic growth and the policies that, if implemented, can have the largest positive impact. In the context of the growth diagnostics decision tree proposed by these authors, the branch that is left uncrossed is that of poor appropriability due to micro risks from government failures: uncertainty from three sources of poor property rights –public order, changing taxes and anticompetitive behaviors– is found to be the most important determinant of investment decisions in Colombia.

To rank public policy priorities the HRV (2005) methodological approach is complemented with an econometric analysis of micro-data, aimed at exploring the impact that the various potential constraints to growth have had on firm-level investment decisions. Most findings are confirmed.

To no surprise, the data shows economic reactivation in areas with falling violence. Results from analysis at the microeconomic level, however, give a particular spin to this conclusion by showing that investment decisions at the firm level are also explained by the restoration of some form of public order connected to the cessation of paramilitary violence and not exclusively by the reduction of violence per se.

From a public policy perspective, perhaps the most relevant result is the confirmation that in Colombia investment decisions are negatively affected by the costs of financing. Empirical results, robust across model specifications, single out the provision of access to financing at fair prices as a policy priority for economic growth, relevant across country regions and independent of whether uncertainties from poor protection to property rights are resolved.

The paper is organized as follows. As a motivation for a growth diagnostics exercise, following this introduction, Section 2 presents an overview of the stylized facts of economic growth in Colombia. Section 3 contains a growth diagnostics analysis strictly based on the HRV (2005) strategy for identifying the policy priorities that is used to arrive at a set of hypotheses. These hypotheses are then empirically tested in the following section using micro-data, and conclusions and policy recommendation follow.

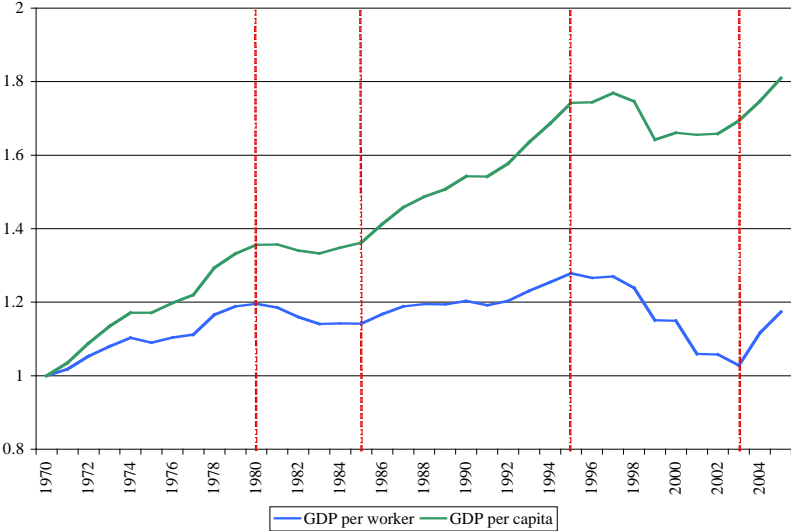
2. Stylized facts

Figure 1 summarizes well the history of economic growth in Colombia since 1970. GDP per capita grew at 3% per year on average in the 1970s and then at 2.2% between 1985 and 1997, but

³ The most recent research on this topic is found in GRECO (2002) and Cárdenas (2005).

completely stagnated during the first half of the 1980s and decreased at a rate of -1.3% per year between 1997 and 2002. The positive results of 2004 and 2005 have partially compensated this poor performance and GDP per capita has grown on average at a rate of 2.9% in the last three years⁴. This is, however, not yet enough to put the country back on the growth path on which it was in the 1970s. GDP per capita would have to grow at the 3.6% rate of 2005 during fourteen years in order to reach the level it would have had, had it kept growing at the average rate of the 1970s, which is 60% higher than it actually was at the beginning of 2006.

Figure 1: Economic growth, 1970-2005 (1970=1)



Source: DANE and GRECO (2002).

The picture is even less appealing if you look at the evolution of GDP per worker that had its peak in 1995, then dropped continuously until 2003 when it reached a level close to that of 1970, and despite recovery in the recent years had not reached by the end of 2005 its level of 1980.

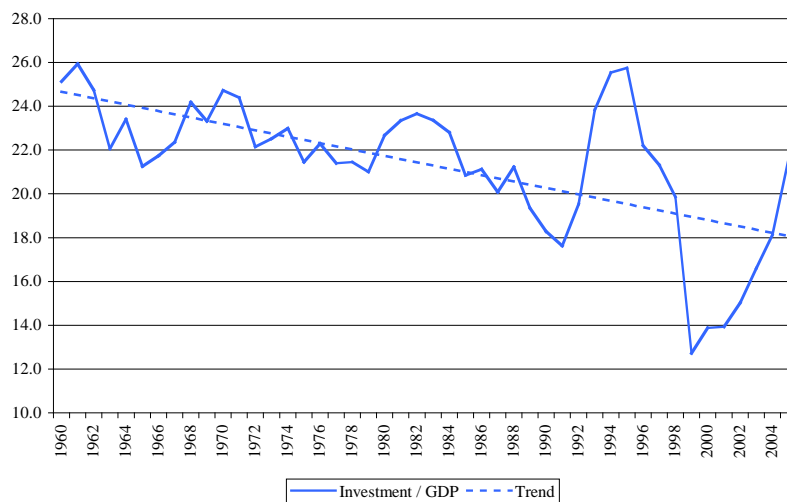
So while Colombia’s economy has grown with few reversion episodes it has experienced periods of deceleration and the recession of the end of the century was strong enough to erode the gains of the previous years, causing the decade between 1994 and 2004 to be lost in terms of economic growth.

Between 1970 and 2005 the less dynamic sectors were Agriculture –with very poor performance since 1990– and Manufacturing that grew at 6.8% per year in the 1970s and at 2.8% between 1985 and 1997 but stagnated between 1980 and 1995 and grew at only 1.4% between 1997 and 2002, systematically losing participation over total GDP. Manufacturing growth recovery between 2002 and 2005 basically reflects this sector’s good performance in 2005. In contrast, Mining and quarrying experienced substantial expansion during the 1980s and 1990s, largely driven by performance of coal, ferronickel and oil. The same is true for the Services sectors between 1985 and 1997.

⁴ Official GDP figures for 2006 are not yet available but will add to the positive trend.

Breaking GDP growth by demand components shows that the recession of the end of the century was preceded by substantial acceleration of public consumption (from average growth rates of 6% in the 1970s to average growth rates of 9% between 1985 and 1997)⁵, and accompanied by deceleration of public investment (from positive average growth rates of 6% in the 1970s and of 10% between 1985 and 1997, to negative average growth rates of -1% between 1997 and 2002) and by a sizeable decline of private investment (from positive average growth rates of 7% in the 1970s, and 3% between 1980 and 1997, to negative average growth rates of -7% between 1997 and 2002). Positive average growth between 2002 and 2005 is associated with the recovery of private investment.

Figure 2: Investment as percent of GDP, 1960-2005



Source: DANE and Fedesarrollo.

Figure 2 shows that investment as a share of GDP had a peak in 1961 and then entered a declining path. This tendency reverted between 1993 and 1995, when it recovered to levels similar to those of the early 1960s, but the performance of those years was not sustained and investment fell again experiencing the largest drop between 1998 and 1999, when it dipped to less than 13% of GDP. Recovery since then has been continuous and has occurred at a sustained pace since 2003.

Between 1994 and 1997, public investment was substituted by private investment. These are years of privatization of public utilities and transport infrastructure concessions. In 1998 the drop of private investment was partially compensated by an increase in public investment, which was only an interruption of the declining path in which public investment had entered. Private investment continued to decline until 2000 and started to recover at a good pace since 2001.

While the recent performance of private investment and economic growth justifies optimism, there are at least two issues that call for a more cautious assessment. First, the economy is not yet on the growth path on which it was in the 1970s, and has shown growth recovery only for three

⁵ As a result of which public consumption as a share of GDP went from 11.5% to 21.9% between 1990 and 2000.

years in a row in a context of favorable international conditions. So there is the question of whether growth can be sustained overtime at the current rates even if the favorable international conditions were to change. This is inherently connected to whether the increasing investment materializes in productivity growth or not, because ultimately it is through its impact on productivity that investment can give way to sustained growth in the medium and long run.

In fact, poor performance of productivity has been associated with the slowdown of economic growth in Colombia. Cárdenas (2005) decomposes the growth of GDP per worker for Colombia between 1965 and 2004 into changes in physical capital accumulation, growth of human capital per worker and productivity growth, and finds that while between 1970 and 2004 the average increase in years of education positively contributed to raising output per worker, and physical capital accumulation also contributed positively to output growth since 1980, in the recent years this did not materialize in higher growth due to the contraction of total factor productivity. Estimations of the aggregate production function for the Colombian economy by the same author confirm the finding of a decreasing residual. While this type of measurement is broad and may be capturing the evolution of productivity along with other things, the concern it raises about productivity performance in Colombia is justified. Evidence from the evolution of manufacturing productivity estimated at the firm level show TFP stagnating between 1980 and 1999 and increasing only in 1999 apparently as a result of the exit of the less productive plants during the recession (Meléndez et al., 2006). Investigating if there has been a permanent change in the business environment to provide the appropriate incentives for productivity-enhancing investments seems critical.

Gross capital formation recovery since 2002 is largely explained by the performance of housing construction, hardly associated with productivity growth.

Second, growth is not yet a widespread phenomenon across the country's regions. While average growth rates after 2002 show in most cases recovery from the previous years, there are still a number of departments experiencing negative growth or stagnation. The cases of Norte de Santander, Quindío, Putumayo, Guainía, Guaviare, Vaupés and Casanare are noteworthy because in these departments GDP per capita continued to decline after 2002 at significant rates. Also notable are the cases of recovery at average rates above 4% (against a national average annual growth of 2.8%) for departments in the Atlantic region (Cesar, Córdoba, Sucre, La Guajira), Cauca, Chocó, Santander, Risaralda and Vichada. Understanding the origin of these different performances is necessary to learn if Colombia has overcome the constraints to growth that were binding in previous years and will continue to grow in a sustainable manner, or if the path to growth is still fragile.

Performances of La Guajira, Cesar, and Chocó, for instance, can be explained to varying degrees by the positive performance of the mining sector. Recalculation of GDP per capita growth without mining, results in average rates of, respectively, -39.7%, 2.1% and 3.4% for these departments between 2002 and 2005.

As will be shown, departments with performances at the extremes of the distribution have also been at the center of attention regarding the violent conflict in which Colombia is immersed because of either the presence of cocaine crops under fumigation (negative performances), or

relocated cocaine crops and/or paramilitary presence (positive performances). So exploring in more detail the role of the conflict in its multiple expressions in the shaping of the Colombian economy seems critical for adequate policy design.

At the outset, it seems justified to believe that in Colombia the most binding constraints and policy priorities for economic growth are not necessarily the same across regions, and particularly that policy priorities for promoting growth in the rural areas may be second order priorities in the more developed urban Colombia.

3. Growth diagnostics exercise

HRV (2005) propose a methodology to identify the most binding constraints for economic growth that rests on the consideration of possible explanations for insufficient investment. Their framework suggests reviewing the factors that can affect investment decisions, to identify and rank the areas that are problematic in order to bring them to the attention of policy makers. Potential areas of constrain are organized under two broad categories: factors that result in high costs of finance, and factors that result in low returns to investment. This section explores each of the branches of the HRV (2005) growth diagnostics tree in the case of Colombia and investigates which constraints are more binding according to the available evidence.

The analysis largely focuses on understanding what has been different in the periods of positive economic growth and the periods of growth stagnation or deceleration, whether the constraints to growth that were binding during the growth reversal of the late 1990s have in fact been removed, and what are the constraints that policy makers will have to tackle next in order to ensure sustained growth at the rates of the last three years.

a. High cost of finance

Recent growth in Colombia has been paired with falling interest rates and a steady interest rate spread (see Table 1). For high cost of finance to qualify as a binding constraint for growth according to the HRV (2005) methodology, however, it should be true that higher interest rates in Colombia have been associated with periods of lower growth and higher spreads. But interest rates were higher during the years of positive growth between 1986 and 1997, when the economy was also growing, and the spread was also higher.

Table 1: Interest rates, 1986-2004

		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Lending rate	Nominal	40.8	41.1	42.7	43.0	45.2	47.1	37.3	35.8	40.5	42.7	42.0	34.2	42.2	25.8	18.8	20.7	16.3	15.2	15.1	14.6	12.9
	Real	16.4	13.8	11.4	13.4	9.7	16.0	9.7	10.8	14.6	19.5	16.7	14.1	21.9	15.1	9.2	12.1	8.7	8.2	9.1	9.3	8.4
Deposit rate	Nominal	31.4	30.8	33.5	33.7	36.4	37.2	26.7	25.8	29.4	32.3	31.2	24.1	32.6	21.3	12.1	12.4	8.9	7.8	7.8	7.0	6.3
	Real	8.6	5.5	4.2	6.0	3.1	8.2	1.2	2.6	5.6	10.8	7.8	5.5	13.6	11.1	3.1	4.5	1.8	1.2	2.2	2.1	1.8

Source: IFS and calculations by the authors.

Because despite the recent evolution of interest rates, and despite the fact that making a case that poor access to financing is a binding constraint for growth is not straightforward from just looking at the evolution of prices, this section presents other evidence to show that it may still be a concern. A first piece of evidence is the cross-country comparison of interest rate spreads,

where Colombia falls right on the Latin American average, but looks much worse against economies that have been recently growing at faster rates.

i. Bad local finance

Poor intermediation: In spite of having experienced significant growth over the last 15 years, the Colombian financial sector is still small and shallow. Both the Colombian banking and non-banking financial sectors are relatively small. The picture is slightly different for the corporate debt market, in which Colombia appears as a medium size player; but this is a market still concentrated on a small number of issuers and issues, and relatively illiquid.

In Colombia firms largely finance their activity through retained earnings or other own resources financing through the market is still limited to firms able to issue large amounts of debt, and banking credit to the private sector is also largely restricted to larger firms. Financing from the banking sector is also concentrated in the larger firms, both by number of loans and value (Aguilar et al. 2006).

Also, a large share of market liquidity has been -and continues to be- absorbed by the public sector. The increasing financing needs of the government between 1990 and 2004 resulted in impressive growth of the public component of the Colombian debt market -the share of Treasury bonds rose from 13% to 57% as a share of total public debt over these years and from 8% to 23% of GDP between 1997 and 2004. Treasury bonds placed in the market at interest rates higher than competing investments, have resulted in large shares of financial institutions' portfolios invested in public debt. In 2004, banks had on average 64% of their portfolios invested in Treasury bonds. Aguilar et al (2006) find evidence of crowding-out of financial resources against private investors.

Low savings: The average savings rate was highest between 1985 and 1997 (24%), dropped to 14% between 1998 and 2002, and despite recovery in recent years is still below its average level during the years of stagnation between 1980 and 1985. This evolution of the savings rate suggests that in Colombia periods of stagnation or deceleration have been preceded by deterioration of the savings rate, while periods of good performance have been preceded by increases in savings. There still remains the question of whether savings measured as gross income minus consumption is a good measure of true savings in a context of under reported capital outflows.

When broken by origin, the contribution of the government to the savings rate is systematically lower than that of the private sector and extremely low or negative between 1997 and 2002.

Evaluation: poor access to financing due to bad local finance has been a constraint for growth in Colombia in the past. The crisis of 1999 was largely driven by a shortage of market liquidity for the private sector induced at least in part by the government through the placement of large amounts of domestic public debt in the market, required to finance increasing public expenditures associated with new obligations from the Constitution of 1991 as well as with war expenses. The lack of financing was critical due to the low availability of private savings and the fact that only few had access to alternative sources of funding. While in 2005 and 2006 the economy appears to finally be on a recovery path, most of the signs that access to financing can be a constraint for sustainable growth are still present.

ii. Bad international finance

With respect to external financing, the Colombian government has uninterruptedly had access to foreign financing. Moreover, despite having lost the investment grade after 1999, the evolution of foreign public debt shows an increasing reliance on market-based instruments. Foreign debt bonds increased from 2,2% in 1990 to 22,3% in 2004 as a share of total debt, gaining participation against loans from agencies, governments, multilateral organizations and commercial banks. Firm access to foreign financing has been more rare and restricted to larger firms. The evolution of private sector external debt shows, however, that external markets have been a financing alternative for those who have access to them.

Colombia's ability to attract foreign direct investment has been, however, apparently compromised by the difficulty to guarantee property rights in the context of the conflict. While throughout the 1980s the country experienced substantial growth of FDI inflows, and liberalization of its FDI regime in 1991 paired with privatization and fiscal and foreign exchange reforms resulted in positive growth rates in the 1990s, Colombia's FDI performance has remained below the regional average both on a per capita basis and in relation to the size of the economy. Peaks of performance are explained by privatizations of public services that occurred in the second half of the 1990s and by the sale of Bavaria to SABMiller that accounted for \$5.5 billion in 2005. Only the mining sector shows a sustained positive trend in recent years.

Finally, Colombia's imports more than it exports. The foreign trade balance was not a source of savings during the 1990s, and it has not been a source of savings in the recent years of positive growth either.

Evaluation: poor access to financing due to bad international finance is not a binding constraint for growth in the case of Colombia.

b. Low returns to economic activity – low appropriability

i. Government failures – micro risks

Protection to property rights: This is an area in which Colombia fares poorly. The government's inability to protect investors from the lack of security from the on-going armed conflict is a major source of poor appropriability of returns, and while it is likely to impact economic activity in rural areas more strongly, it affects incentives for investment in general. It deters investments that would otherwise have taken place, it diverts investment towards activities that would not have been investors' first choices during peace times but are for safety reasons more convenient due to lower potential losses (i.e. projects with lower fixed costs or shorter time-frames for investment recovery), it distorts location choices to favor the safer areas, and it raises production costs for investors who incur in non-productive expenses to guarantee their safety to operate. These expenses may be legal (such as expenses on guards, alarm systems, etc.) or illegal (such as side-payments to the paramilitary or the guerrilla), and are likely correlated with location choices.

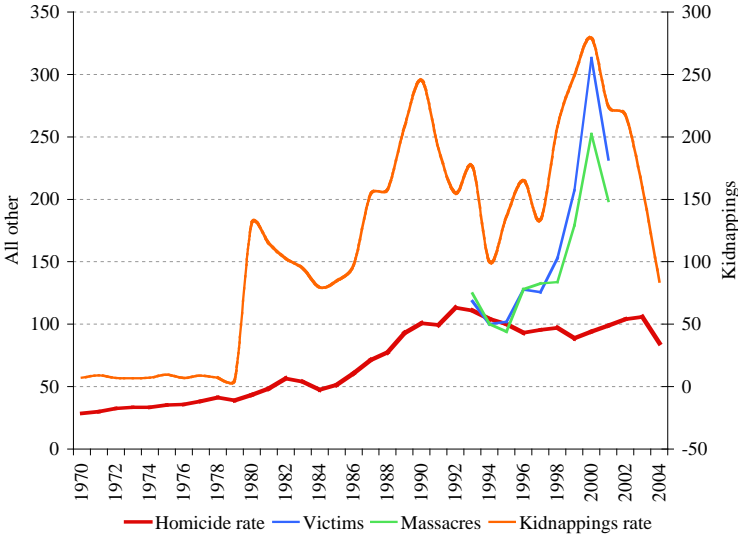
Figure 3 shows the evolution of violence in Colombia since 1970. It was in the second half of the 1980s that violence from the cocaine business started to be felt more strongly, and in the 1990s, when the guerrilla became more involved in cocaine, that violence hiked. Recovery in recent

years is associated to a decrease in kidnappings and massacres that chronologically coincides with the enactment of the Law of Security and Order under Alvaro Uribe’s presidency.

Figure 4 presents evidence of the recent evolution of the conflict’s violence by types of event - the kidnappings series cleaned to reflect only events for which the paramilitary or guerrilla have been identified as responsible. The increase in recorded armed contact events since 2002 is noteworthy and reflects the on-going war.

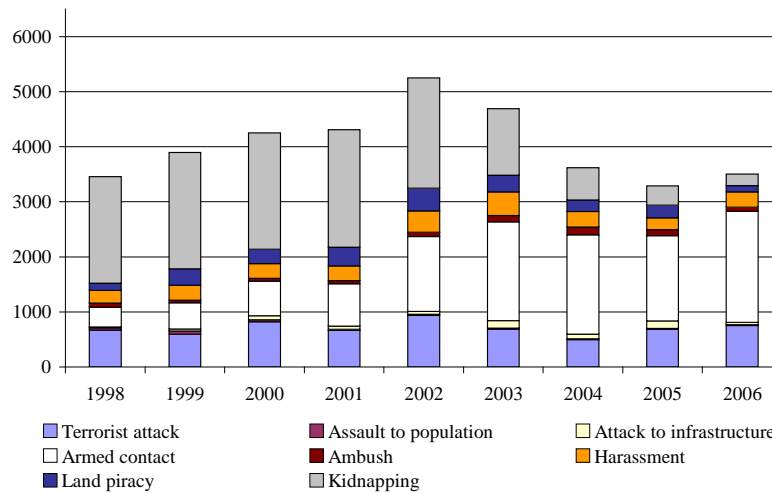
The fact that at the regional level in recent years the picture in terms of both economic performance and conflict evolution is mixed, allows us to gauge the role of property rights protection as driver of investment and of its absence as a binding constraint for growth in some of the regions of Colombia.

Figure 3: Violence, 1970-2004 (1994=100)



Source: National Police.

Figure 4: Violent events related to the armed conflict



Source: Observatory of Human Rights, Vice-Presidency of Colombia and calculations by the authors.

Table 2 shows the distribution of violent events across regions ranked by the total number of violent events recorded between 1998 and 2006⁶. Antioquia, Santander and Cesar stand out for their decreasing shares. It is difficult not to associate this to their recent positive economic performances.

Table 2: Regional distribution of violence (%)*

DEPARTMENT	1998	1999	2000	2001	2002	2003	2004	2005	2006
ANTIOQUIA	22.1	19.1	18.4	17.8	16.8	16.7	17.6	13.5	14.0
CESAR	6.5	6.7	8.6	5.8	5.7	7.9	6.8	5.4	3.2
META	3.5	3.9	4.3	4.8	5.3	6.3	5.8	6.6	8.8
VALLE	5.8	4.9	5.8	7.3	4.9	4.0	4.8	4.6	6.9
SANTANDER	8.9	8.5	6.9	6.2	5.8	3.4	3.4	2.6	2.5
NORTE SANTANDER	5.6	7.2	6.1	6.8	4.2	4.2	2.4	3.6	4.6
ARAUCA	4.7	5.0	4.9	4.8	3.5	5.0	3.8	5.0	3.0
CAUCA	3.5	4.2	3.6	3.1	3.5	4.2	4.1	6.2	5.8
CUNDINAMARCA	2.5	2.6	3.8	4.1	6.5	6.7	4.3	2.9	0.9
TOLIMA	3.6	3.3	3.0	3.2	3.8	4.8	4.8	4.5	5.5
BOLIVAR	3.1	5.5	3.7	3.1	4.6	3.6	3.2	2.5	3.5
CAQUETA	2.0	1.7	2.5	2.6	3.7	3.8	4.1	3.7	4.2
MAGDALENA	3.2	2.4	3.7	3.6	3.4	2.4	4.3	3.3	2.4
NARIÑO	1.6	2.8	2.2	1.5	3.4	2.7	3.1	4.8	5.1
OTHER	23.5	22.1	22.5	25.1	25.0	24.2	27.5	30.7	29.5

Source: Observatory of Human Rights, Vice-Presidency of Colombia and calculations by the authors. * Departments ranked by number of events between 1998 and 2006. Includes kidnappings.

Empirically, however, the analysis is complicated. First, the impact of the conflict in all of its expressions is not necessarily well captured by the statistics of violence. Violence is highest in

⁶ The database made available for this study by the Observatory of Human Rights of the Vice-presidency of Colombia, contains a record of all violent events registered by municipality, by actor. We are processing the data for years previous to 1996 (all events except kidnappings) and 1998 (kidnappings) to be able to exploit it together with our firm-level data (1995-2005).

regions in dispute, but when the dispute is resolved because one of the parties takes over, violence is no longer a good proxy of guerrilla or paramilitary presence. As a consequence the falling records of violence in some of the regions of Colombia do not necessarily imply the reestablishment of civil order, but rather result from the imposition of a new order under the rule of the paramilitary or guerrilla, that may as well bring about an alternative system of protection for investors' property rights.

Second, the logic of the conflict's geographic distribution has two underlying forces: the geographic allocation of the cocaine business (reallocating to the south towards Cauca and Nariño in response to government action under Plan Colombia) and the geographic allocation of other sources of rent, such as national government transfers to local governments, or *regalías* from mining in the mining regions. When considering the relationship between armed conflict and economic growth, this can result in potential endogeneity since armed groups tend to locate in areas where economic activity is flourishing.

Rent-seeking behavior has also materialized in capture of local governments and public sector decentralized expenditures by illegal groups, as well as of political actors at the national level, in many cases resulting in corruption of the policy-making processes and emergence of low quality policies aimed at the protection of individual interests. Not surprisingly, in the Global Competitiveness Report of 2006-07 Colombia is ranked in place 111 among 125 countries with respect to the security component of the Political Institutions quality index, in place 92 with respect to the ethics and corruption component, and in place 78 with respect to the overall public institutions quality measure, which are by no means independent of the cocaine business and the ongoing armed conflict.

The evolution of investment by region is probably the best measure of the conflict's impact on private incentives. While there are no official statistics, the firm-level data available from Superintendencia de Sociedades, containing records of all large and medium size firms in Colombia provides a good approximation to the evolution of capital expenditures⁷. Table 3 shows a private sector in recovery for two consecutive years, after a period of decline between 1999 and 2003 during which investment in plant and equipment stagnated (falling 6.9% per year on average at book value), the hike in violence of 2002 coinciding with large-scale disinvestment. It also shows Antioquia, the department that has been hit by the largest share of violence from the armed conflict, as one of the biggest losers of the period, with a stagnant capital stock (falling at book value at an average annual rate of -6.2%) compared to a country average of 1.2%.

While it seems natural to expect the ongoing war to reflect on economic activity, not much has been said about the route through which this actually happens, or about the extent of the costs it imposes. This look at private investment in fixed capital suggests this to be a key transmission variable and provides a first approximation to the dimension of the problem⁸.

⁷ The data systematically includes all firms reporting assets or income equal to or higher than 20,000 minimum wages. Exit may reflect falling under this threshold and not necessarily closing down operations. Firms reporting decreases of plant and equipment at rates greater than -10% after a year of positive investment at a rate greater than 50% were dropped from the sample.

⁸ These are the data used in the econometric analyses of Section 4.

Table 3: Plant and equipment, by department
In 2005 million dollars

Plant and equipment											
% change											
Number of firms											
Department	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Bogota D.C.	5,122.10	6,523.01	7,311.03	7,573.70	7,529.92	6,610.57	7,092.14	6,304.12	6,260.34	6,479.24	6,479.24
	1730	1699	1702	1643	1564	1531	1523	1427	1450	1458	1729
Antioquia	2,709.90	2,841.23	2,867.50	3,068.88	3,195.84	2,941.92	2,981.32	1,125.11	1,212.67	1,374.65	1,422.81
	491	454	476	479	461	470	474	435	456	484	611
Valle del Cauca	1,348.38	1,536.63	1,584.79	1,667.97	1,720.50	1,663.59	1,996.31	1,484.10	1,440.32	1,532.25	1,628.56
	439	414	430	426	405	407	402	385	373	376	454
Atlántico	547.23	726.73	739.86	779.26	770.50	709.21	717.97	577.88	604.14	608.52	674.19
	145	157	164	163	139	142	139	129	140	146	186
Cundinamarca	363.80	564.74	630.41	647.92	656.68	634.79	617.28	577.88	555.99	520.97	520.97
	85	92	94	97	98	94	94	91	96	99	114
Cesar	114.26	128.27	175.99	184.31	227.65	253.92	217.58	147.97	207.07	390.07	630.41
	7	6	5	5	5	6	6	6	6	7	10
Bolívar	277.12	282.37	221.08	216.27	216.27	208.39	210.14	182.12	167.23	211.01	226.77
	72	66	63	69	60	60	63	60	58	64	78
Cauca	8.54	14.10	69.17	122.14	149.72	253.92	318.27	300.32	301.63	311.70	323.09
	7	7	17	26	29	40	43	43	44	45	52
Tolima	213.64	265.30	270.55	349.35	365.55	327.90	62.17	59.10	59.98	39.05	49.47
	31	29	28	30	29	29	28	25	25	22	30
Santander	97.63	118.20	136.59	140.97	149.72	151.91	626.03	145.78	134.84	126.52	182.99
	59	63	60	75	73	71	75	71	67	70	107
Other	618.88	764.14	474.27	475.55	535.04	931.82	887.06	767.48	689.82	674.47	732.55
	168	164	182	192	185	198	197	192	202	212	272
TOTAL	11,421.48	13,764.73	14,481.24	15,226.32	15,517.40	14,687.94	15,726.26	11,671.86	11,634.04	12,268.45	12,871.05
	3234	3151	3221	3205	3048	3048	3044	2864	2917	2983	3643

Source: Superintendencia de Sociedades and calculations by the authors. Departments selected to show those with higher stocks of plant and equipment. Peso values converted to 2005 pesos using the Producer Price Index (IPP) from the Central Bank of Colombia, and to USD at the 2005 exchange rate.

Taxes: Colombia doesn't fare well either in global business environment surveys with respect to the level of taxes or the efficiency of the tax system. The Colombian tax system is plagued with distortions that prevent competition on a level field and are hard to justify based on sound microeconomics (see Arbeláez et al, 2006), and with respect to the tax level, nominal corporate tax rates are misleading because firms face a number of different taxes that add up.

In addition, and most detrimental to investment decisions, tax policy in Colombia is highly volatile. The difficulty to pass a structural tax reform through Congress, that is critical and pending, has resulted in the passing of subsequent tax bills introducing partial adjustments and new distortions to the tax system and repeatedly changing the rules of the game for private investors. To give an idea of the extent of rule instability

Table 4 presents a calculation of the mean income tax rate paid by each sector and of its variation

over time, after accounting for discounts and exemptions. These tax rates calculated over taxable income before exemptions⁹ applicable to the taxable base using firm-level data, reflect the dispersion in tax treatments as well as the effect of the changing regulations.

Table 4: Tax rates dispersion, 1997-2004*

ISIC 2-DIGIT SECTOR	1997	1998	1999	2000	2001	2002	2003	2004	Mean	Standard Deviation
Agriculture, hunting and forestry	29.4	30.4	30.6	31.2	29.5	29.3	29.4	30.3	30.0	0.7
Fishing	27.5	28.5	25.7	26.3	25.8	26.9	26.2	27.8	26.8	1.0
Mining and quarrying	31.7	33.1	33.6	34.1	33.8	33.1	34.2	33.9	33.4	0.8
Manufacturing	29.7	30.5	31.3	32.2	32.2	32.6	32.6	33.0	31.8	1.2
Electricity, gas and water supply	18.8	14.3	16.8	19.9	21.6	22.6	29.7	30.5	21.8	5.8
Construction	31.5	32.6	32.5	32.4	32.8	33.0	32.5	32.6	32.5	0.4
Wholesale and retail trade	32.3	32.3	32.6	32.6	33.1	32.9	33.0	33.3	32.8	0.4
Hotels and restaurants	32.5	33.4	33.9	33.1	34.1	34.1	33.8	33.7	33.6	0.5
Transport, storage and communications	28.4	29.1	30.2	30.9	31.1	31.0	30.7	30.7	30.3	1.0
Financial intermediation	27.4	28.2	28.2	27.6	27.1	27.5	27.1	26.8	27.5	0.5
Real estate, renting and business activities	31.6	32.3	32.4	32.1	32.4	32.1	31.9	32.2	32.1	0.3
Public administration and defence; compulsory social security	11.8	20.4	21.2	21.3	13.6	14.3	12.6	16.2	16.4	4.0
Education	19.8	22.3	22.3	20.6	19.7	19.0	18.8	19.5	20.3	1.4
Health and social work	24.1	24.5	25.2	24.2	24.7	24.1	23.0	23.7	24.2	0.7
Other community, social and personal service activities	21.9	20.7	20.4	20.8	19.3	18.9	19.2	19.2	20.0	1.0
Private households with employed persons			20.0	0.0	23.9	29.9	34.9	28.4	22.9	12.3
Mean	29.4	29.7	30.1	30.2	30.2	30.1	30.1	30.4		
Standard Deviation	6.1	5.8	5.7	8.7	6.2	6.1	6.5	5.7		
Nominal income tax rate	35.0	35.0	35.0	35.0	35.0	38.5	38.5	38.5		

Source: DIAN and calculations by the authors. *Net income tax/(Taxable income + Exemptions to taxable base).

Another channel through which taxation may compromise investor returns in Colombia is through its effect on informality, which seems to have increased in the 1990s along with non-salary labor costs (i.e. taxes on labor). Because competition with informal firms occurs at lower prices, rising informality implies competition at lower prices. This may drive investors to invest less than they would in its absence, because investments become less profitable or because, by remaining smaller, firms are able to also benefit from some degree of informality without being noticed by the tax authorities.

Competition policy: Institutional weakness in the implementation of a competition policy to guarantee a level field for all investors has often resulted in expropriation of the smaller investors through the unfair competition and market monopolization by larger firms.

While this is hard to illustrate based on objective data and would require more rigorous testing, the record of antitrust investigations by the competition authority in charge of overseeing the manufacturing sector¹⁰, SIC, for the period between January 2000 and March 2007, combined with the complaint about the reduced plant capacity of its antitrust unit, makes at least wonder about this weakness. 40% of all demands attended over this period closed with no consequence to the accused due to 'lack of merit' for the accusation, and another 40% fell in the 'guarantee'

⁹ Exemptions are granted to particular sectors by Law and are in addition to the usual deductions that apply to the calculation of taxable income.

¹⁰ SIC is in charge of overseeing the manufacturing sector and is also responsible of competition policy in all other sectors not explicitly assigned by law to other governmental authorities.

category, that as stated by the competition authorities themselves, is a mild way of reprimand often incapable of inducing a desired change of behavior

While the situation is probably not worse now than it was in the 1970s, when Colombia did not have an applicable competition law¹¹, and the lack of a strong competition authority cannot on its own be singled out as the most binding constraint for growth in Colombia, it still seems worth exploring further the extent to which the lack of this fundamental guarantee for market participation and the consequent increasing concentration of some markets in Colombia is a limitation for investment.

Evaluation: uncertainty about the private appropriability of investment returns is one of the most binding constraints for economic growth in Colombia. Identification of the shape of the distortions to private investment from uncertainty about appropriability of returns is key for adequate policy design in the context of an on-going war, as well as for the assessment of the relative importance of this branch of the HRV (2005) decision tree in limiting economic growth in Colombia.

While at the outset there is a temptation to say that competition policy, and changing taxation rules must not distort investment decisions as much as the poor protection of property rights connected to the armed conflict, it is still worth establishing their relative weight as sources of low appropriability in a more rigorous way. Particularly because these may be fronts over which policy makers can have a more direct impact in the short-run.

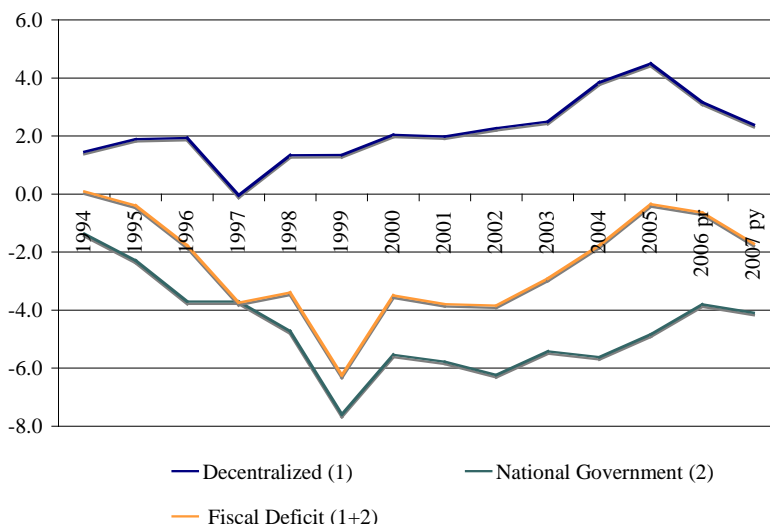
iii. Government failures – macro risks

Fiscal deficit has improved although there are still some concerns. Pension reforms and transfers to local entities reform have addressed some of the main risks for fiscal sustainability. Pension outlays, which still represent a big part of the expenditure budget each year, have been fully dimensioned and accounted for and are no longer a source of fiscal uncertainty. Publicly owned enterprises have as well gone through a process of reform, which includes privatization, resizing, and private partnership, among others. There is also a bet placed on the future performance of Ecopetrol, the national oil company that experts consider reasonable.

Figure 15 shows the Ministry of Finance's accounting of the fiscal deficit and its projection for 2007. While the fiscal situation of Colombia has not always been easy and in the 1990s growing fiscal deficits accumulated resulting in an increasing accumulation of public debt that reached levels above 50% of GDP between 2001 and 2005, calculations of the primary surplus required to guarantee debt sustainability –stabilization at 50% of GDP– are of 2.38% of GDP, with the economy growing at an annual rate of 5% and an interest rate of 10% (Cárdenas, 2006).

¹¹ See Arbeláez et al (2006).

Figure 5: Fiscal deficit as % of GDP, 1994-2007*



Source: Ministry of Finance, CONFIS. (pr): preliminary; (py): projected.

The Colombian government has indeed been successful at lowering its debt burden over the past few years. Recent performance of the primary surplus has been above the government's targets and resulted in a lower public debt than originally expected. For the medium term, the Ministry of Finance expects a net public debt path systematically declining towards levels close to 23% of GDP in ten years.

On the external side, Colombia's vulnerabilities have followed the same trend. All indices of external sustainability have been systematically improving since 2000 and are expected to continue to improve.

All this reflects in the way markets are reading Colombian macroeconomic performance

However, there are still concerns. One of them, for the medium term, is that Colombia's public debt is still above investment grade emerging market economies public debt.

For the short term, although government consumption as a share of GDP has been declining, and is currently about 5 points below the peak it reached during 1999-2000, there are signs of overheating pressures that have translated into a higher inflation and a widening of the current account deficit. To address short and medium term issues the government could reduce even further its expenditures.

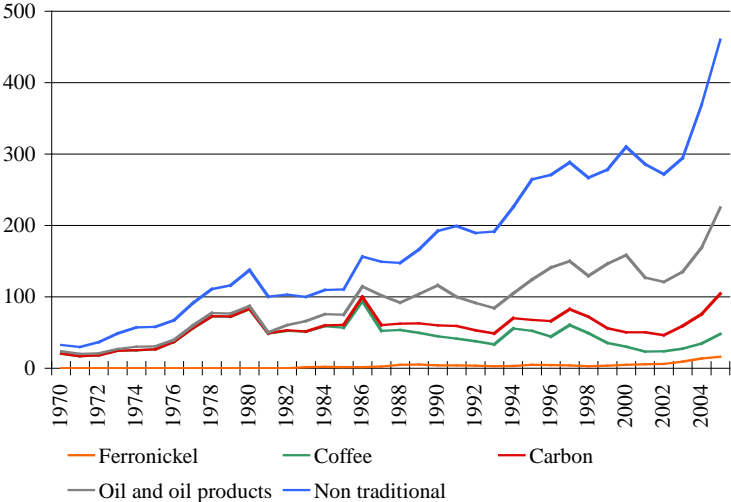
Evaluation: macro risks are not a binding constraint for growth in Colombia.

iv. Market failures

Information and coordination failures: Colombian exports have experienced sustained growth since 1970, and have been particularly dynamic since the late 1980s. So based on the evolution of exports over time it is hard to argue that information or coordination failures have resulted in low investment due to poor entrepreneurship in Colombia. Exports per capita grew at an average rate of 15.5% in the 1970s when the economy was growing and despite periods of deceleration

almost tripled between 1990 and 2005 (see Figure 6). Also, and most importantly, for analyzing whether lack of self-discovery is the most binding constraint for growth in Colombia, export dynamism has been accompanied by substantial diversification.

Figure 6: Exports per capita, 1970-2005 (in dollars)*

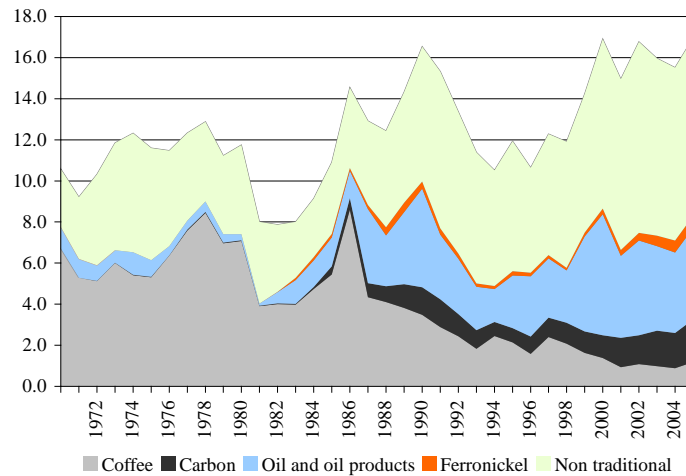


Source: DANE, Banco de la República and calculations by the authors.

Figure 7 illustrates the re-composition of the Colombian export basket in response to the decline in coffee exports since 1986. While overall export growth was not enough to result in sustained growth of exports as a share of GDP -exports as a share of GDP are currently at the 1990 level- the so called non-traditional exports¹² grew as a ratio of traditional exports (coffee, oil and oil products, carbon and ferronickel) from 0.4 in 1986 to 1 in 2005.

¹² Local jargon for export products different to coffee, oil and minerals.

Figure 7: Exports composition 1 (as % of GDP)



Source: DANE and calculations by the authors.

Average annual growth of non-traditional exports between 1970 and 2005 not only was 5.3 times higher than overall average annual export growth, but also was characterized by increasing exports of manufactures of medium and high knowledge content¹³. The share of technology-based exports increased from 20% of total exports to 26%, between 1994 and 2004, driven by the dynamics of medium technology products..

This is confirmed by the measure of export sophistication, EXPY, proposed by Hausmann, Hwang and Rodrik (2006)¹⁴, according to which the level of Colombia's current export basket sophistication appears as moderate but increasing overtime. In fact compared to other Latin American countries Colombia's exports basket looks well by this sophistication measure when considered against GDP per capita. Export sophistication progress overtime has been extremely dynamic, much more than the Latin American average and, moreover, that Colombia has been closing the gap in export sophistication systematically since 1975.

Finally, global business environment surveys also capture the view that Colombian entrepreneurs have been relatively good at moving towards more sophisticated production (and export) baskets. With respect to business sophistication Colombia was ranked in place 48 among 125 countries in the Global Competitiveness Report of 2006-07. With respect to innovation, it was ranked in place 57.

Despite all of the above, it is also true that Colombian exports lag both in dynamism and size when compared to other Latin American countries and are small also relative to Colombia's economy size (see Hausmann and Klinger, 2007). So while self-discovery cannot be singled out as a binding constraint for growth there is still the question of whether export growth and

¹³ Sector categorization by knowledge content is based on a set of research and development and human capital sector-level indices developed by DANE as a guide to determine the evolution of Colombian manufacturing towards knowledge intensive production technologies.

¹⁴ The authors develop a measure of revealed sophistication of each product, PRODY, as the revealed comparative advantage weighted GDP per capita of each country that exports the good. This is a measure of the GDP per capita of the typical country that exports good *i*. It is a measure of sophistication inferred from the types of countries exporting a good. This product-level measure can then be used to measure the sophistication of a country's entire export basket, EXPY, the income level associated with a country's export package.

increasing export sophistication could be critical to move the economy onto a higher growth path in the future.

Colombia's shift towards manufacturing exports has been slower than the Latin American average and the fact that fuels still represent a significant share of all exports implies that the Colombian economy is significantly exposed to world prices volatility.

Colombia is nonetheless in a potentially good position for improvement according to Hausmann and Klinger (2006)'s open forest measure¹⁵. While it is not in a particularly dense or sparse part of the product space, its open forest has been steadily increasing in value over time. Hausmann and Klinger (2007) show that since 1985 Colombia has "caught up with Argentina, closed the gap with Brazil and kept the pace with Mexico"

This continuously improving open forest tells that Colombia has persistently succeeded in choosing to produce and export goods with good strategic value. So despite its relatively poor export performance, the country is now facing an expanding option set that places it in a good position to achieve an export-led structural transformation.

Evaluation: Market failures resulting in low self-discovery are not the most binding constraint for growth in Colombia.

c. Low return to economic activity - low social returns

i. Poor geography / Bad infrastructure

Despite having wide coasts, both on the Atlantic and the Pacific oceans, Colombia's geography is challenging for economic growth and development. In particular, most productive activities have been historically concentrated in the country's interior on top of the Andean mountain range to a large extent land-locked due to bottlenecks in the transport infrastructure connecting the main production and consumption centers between each other and to the ports. Transport costs are, in consequence, a key issue affecting competitiveness of the Colombian products in the foreign markets. They are also one of the reasons why expansion across both the local markets and abroad has only been possible for the larger producers.

Table 5 presents an overview of the evolution of road and railroad transport infrastructure since 1991. Progress in terms of kilometers covered is of 19% and 35% between 1991 and 2005 respectively. In the case of railways increase reflects exclusively the repair of the existent railroad network that had been abandoned.

¹⁵ This is a measure of the degree to which the country's current export basket is connected with valuable new productive possibilities representing opportunities for structural transformation. It is found by these authors to be highly significant in determining the future growth of export sophistication of a country.

Table 5: Colombia: Land transport Infrastructure, 1991-2005

Year	Roads		Railroads		Airways
	Km	Km / 1000 inhabitants	Km	Km / 1000 inhabitants	
1991	161,249	4.52	1,578	0.044	-
1992	161,274	4.43	1,578	0.043	508
1993	161,185	4.34	1,578	0.043	-
1994	161,205	4.26	2,097	0.055	434
1995	161,334	4.19	2,100	0.054	426
1996	161,574	4.11	1,920	0.049	419
1997	161,574	4.03	2,060	0.051	-
1998	161,532	3.96	2,027	0.050	-
1999	162,574	3.91	1,983	0.048	-
2000	163,537	3.86	1,973	0.047	489
2001	163,541	3.80	2,228	0.052	520
2002	163,546	3.73	2,212	0.050	564
2003	163,635	3.67	2,231	0.050	580
2004	164,184	3.62	2,137	0.047	614
2005	164,257	3.57	2,137	0.046	598

Source: Ministry of Transportation of Colombia.

When compared against other Latin American countries in terms of kilometers per capita, Colombia does not fare well. This, however, may not be the best measure to evaluate Colombia's transport infrastructure, because given the country's geography there is little space for more expansion and the concern is more about quality. This is true particularly regarding the National road network connecting the interior with the ports and the large productive centers between each other that nowadays connects all regions with a minimum population density, stopping where expansion becomes cost-ineffective due to a combination of complex geography – there is not only the Andean Mountain range, but also the tropical forests in Urabá and Amazonia – and low population.

Perhaps a better measure of overall road infrastructure development is the proportion of paved roads.

Table 6 presents road quality information available for the National road network. It shows road expansion proportionately more concentrated on unpaved roads and negligible progress in paved road quality since 1998. Both things contribute to bottlenecks that translate into transport costs.

Table 6: National road network

Year	Paved	Unpaved	Total	Paved						Unpaved					
				Good		Medium		Bad		Good		Medium		Bad	
				Km	%	Km	%	Km	%	Km	%	Km	%	Km	%
1998	10,388	2,931	13,319	8,103	78	1,766	17	519	5	1,348	46	938	32	645	22
1999	11,010	3,549	14,559	7,597	69	2,312	21	1,101	10	674	19	1,597	45	1,278	36
2000	11,732	4,790	16,522	7,978	68	2,816	24	939	8	2,156	45	1,868	39	766	16
2001	11,744	4,791	16,535	8,221	70	2,701	23	822	7	1,629	34	2,012	42	1,150	24
2002	11,921	4,607	16,528	8,225	69	2,623	22	1,073	9	1,889	41	1,520	33	1,198	26
2003	12,154	4,493	16,647	8,022	66	3,160	26	972	8	1,887	42	1,573	35	1,033	23
2004	12,170	4,471	16,641	8,276	68	3,043	25	852	7	1,967	44	1,654	37	849	19

Source: INVIAS

Table 7 gives a rough idea of the dispersion of transport costs across regions that in turn reflect road infrastructure quality and/or geographic complexity¹⁶.

Table 7: Costs per ton, per kilometer, 2004 (pesos 2004)

Port Orgin	Barranquilla	Buenaventura	Cartagena	Santa Marta
Armenia	86	169	98	81
Barranquilla		90	273	263
Bogotá	64	114	57	67
Bucaramanga	103	110	96	108
Buenaventura	93		102	87
Cali	82	213	91	81
Cartagena	232	108		154
Manizales	92	145	98	84
Medellín	74	108	91	70
Pereira	87	162	97	83
Santa Marta	298	83	154	
Average	121	130	116	108

Source: Ministry of Transportation of Colombia and calculations by the authors.

Transport infrastructure is much better nowadays however than it was before 1990, and quality improvements under concession contracts are noteworthy. So on the grounds of comparison with the situation in the 1970s alone, it is hard to sustain that transport infrastructure development is a binding constraint to growth. But the truth is that the context of globalization is very different to that of the 1970s, and if Colombia is to take advantage of the growth opportunities from increasing international trade, dealing with the challenges posed by the country's geography with solutions that translate into lower transport costs will be crucial for future investment and growth.

An issue that should be raised under this literal is whether it makes sense to stand back and reconsider the geographic development pattern of the Colombian economy to better understand what has driven businesses to locate far away from ports in areas landlocked by the mountain range and dependent on the development of costly infrastructure for access to external markets. Inducing more efficient location patterns may be in the hands of policy makers through the provision of the appropriate incentives and may be more cost-effective in the long run. This policy route will be furthered considered.

Other infrastructure sectors are less problematic. They experienced substantial improvements during the 1990s, after the Constitution of 1991 gave way to the participation of the private sector in their provision. In the case of electric energy, while prices increased in the 1990s due to rebalancing to more appropriately reflect costs, service quality improvement was also considerable relative to previous decades. In the case of communications, opening the sector to

¹⁶ The history of transport costs in this shape is being reconstructed since 1997 from information available through the Ministry of Transport of Colombia.

competition has translated into immense progress in service penetration and in many cases lower prices.

Evaluation: While geography in itself is not a growth constraint that can be dealt with directly, exploring the alternative policy routes to deal with the challenges it poses to economic growth in Colombia in a context of increasing globalization is critical. Remaining bottlenecks in the road network translate into high transport costs by international standards and affect the ability of Colombian producers to compete in international markets. Transport costs are, in consequence, a binding constraint to growth in Colombia.

It is worthwhile to consider if investment priorities for the improvement of transport infrastructure can be rationalized by pairing the governments' efforts in this direction with alternative policies connected to rethinking the country's spatial development pattern.

ii. Low human capital

Patrinos et al. (2006) estimate the benefits of education and their distribution across education levels and income distribution for a set of East Asian and Latin American countries, including Colombia. Their empirical evidence suggests that Colombia has both a relatively high educational attainment level and a relatively low constraint of human capital supply.

According to their cross-country data survey, Colombia stands well above the Latin-American mean in terms of schooling attainment. First, while in Colombia the average years of schooling of male wage earners between 25 and 65 years old was 10.5, the average for Latin-America was 9. Second, the fraction of this population (wage earners 25 to 65 years old) with tertiary education is high in Colombia (20.3%) with respect to the Latin-American average (13.3%). Colombia also fares well by average years of schooling compared to the mean of the East Asian countries considered in the analysis (9.8 years) and is below but close to the average by the second measure.

With respect to returns to schooling, while in the aggregate estimates place Colombia just below the Latin-American average of 11.6%, estimating returns to schooling by education level Patrinos et al (2006) find that returns to higher technical and university education in Colombia are quite low compared to other Latin-American countries.

Returns to schooling estimations by Prada (2006) for four cross-sections of the Colombian National Household Survey yield results comparable to Patrinos et al (2006) and show that returns to education in Colombia have increased for additional years of secondary education, but display a decreasing tendency when it comes to higher education levels. Both Patrinos et al (2006) and Prada (2006) find no shortage of qualified labor supply in Colombia.

As a complement to the evidence from these papers, in the more recent Global Competitiveness Report, in Colombia is rated well compared to other Latin American countries with regards to the quality of its higher education and training, and ranked 69 among 125 countries by this measure. This rating is also consistent with the findings of a survey of 61 foreign investors established in Colombia undertaken on behalf of UNCTAD by Fedesarrollo in 2003 in which foreign companies rate well the Colombian labor force skills, both at the executive and technical levels.

Evaluation: Low human capital is not the most binding constraint for economic growth in Colombia.

4. Microeconomic assessment

The growth diagnostics exercise of the previous section permits to discard some of the potential sources of constraints to private investment in a straightforward manner, but is inconclusive with regards to the relative weight of the branches that are left standing: micro-risks due to government failures resulting in poor appropriability of investment returns, low returns from poor geography and lacking transport infrastructure, and poor access to financing due to bad local finance. This section goes further in exploring how these variables affect investor decisions and weight relative to each other as determinants of investment and growth.

Using firm-level capital expenditures data, the relative importance of these variables is tested in an econometric setting. Analysis rests on the estimation of two types of models: a probit model to explain the investment decision, and two Tobit regressions to explain the level of capital expenditures in the case of firms that choose to invest.

a. Data

The primary database used in estimation is a firm-level panel shaped dataset containing financial statements of all firms with income or assets at or above 20,000 minimum wages each year in Colombia, available from Superintendencia de Sociedades from 1995 to 2005. Superintendencia de Sociedades granted access to annexes to these financial statements containing additional firm characteristics that are not publicly available, among them detailed data about firm fixed assets. A significant amount of time was devoted to link each observation to the municipality where the firm actually operates, since firms are often registered in the major urban centers and not necessarily where they are located. Accomplishing this task required crossing the database with a firm directory made available by the National Statistics Department (DANE) and with other sources of information available and eventually, in the case of multi-plant firms, directly contacting firm headquarters.

Capital expenditures were defined as positive changes in the values of plant and equipment, converted to 2005 pesos using the Producer Price Index from the Central Bank of Colombia.

The Ministry of Finance tax administration, DIAN, provided firm level tax data that was used to calculate effectively paid income tax rates. Because firm-level tax data fall under a statistical reserve regulation that prevents it from being made public, firm identification numbers were coded and effective tax rates had to be constructed as ISIC 4-digit sector averages (a summary of this information is presented in Table 4).

The Observatory of Human Rights from the Vice-Presidency of Colombia provided municipality-level violence data by actor for the period 1998-2005.

Regulated transport costs for 16 municipalities that include the larger urban centers, for 1998 to 2005, were recovered from Ministry of Transport's resolutions. Costs per ton per kilometer traveled were calculated from each municipality to each of the four larger Colombian ports - Cartagena, Buenaventura, Santa Marta and Barranquilla- and each municipality was assigned the

cost corresponding to the cheaper route connecting it to the international markets. Regretfully there is no systematic information available about transport costs between the main cities.

Finally, exports and imports data by ISIC 4-digit sector as well as department-level GDP data were available from the National Statistics Department, DANE, and interest rates were available from the IFS.

Most of these data were used in the previous section to provide support for the analyses presented.

b. Econometric exercises

i. Investment decision

Investment decisions at the microeconomic level are examined using a Probit model to estimate the probability of observing positive capital expenditures. The dependent variable is a dummy variable equal to one at time t if the firm reports a positive change in plant and equipment with respect to the previous period, and zero otherwise.

Explanatory variables are proxies of the potential constraints to growth identified in Section 3. Three sources of poor appropriability due to weak property rights are examined in estimation. Uncertainty from the violent conflict is captured through two municipality-level variables: the number of violent events at time t and a proxy of public order restored defined as a dummy equal to 1 at time t if at time $(t-1)$ there was paramilitary violence reported in the municipality and at time t there is none. The first of these measures is straightforward and the expected coefficient on it is negative. The second one requires a more careful explanation. It is known that paramilitary presence has often contributed to restoration of public order in regions where it had been previously challenged by guerrilla violence and that violence is typically a concern in regions under dispute but moderates when one of the sides in conflict gains a dominant position. So reduced paramilitary violence may be reflecting this kind of situation. Alternatively it may be reflecting the effectiveness of governmental intervention to contain the conflict. Since insurance availability that can be key to the viability of large-scale investments is importantly determined by public order conditions, a positive correlation is expected between firm-level investment decisions and restoration of some form of public order.

Uncertainty from changing tax rules is captured by the standard deviation over time of the effectively paid ISIC 4-digit sector tax rate. The expected coefficient on this variable is negative, since larger variability in tax rules should induce increased uncertainty about investment returns.

The ISIC 4-digit Herfindahl-Hirshman Index (HHI) of market concentration was used to capture uncertainty from expropriation by exposure to abuse of dominant position by other market players or predatory pricing. Presumably in more concentrated markets exercise of market power is more pervasive and can result in monopolizing behaviors that deter investments through the threat of expropriation, in absence of a strong competition authority. If this is the case, the coefficient on this variable should be negative. If, however, investors in relatively concentrated markets are at an advantage, and concentration results from economies of scale or puts investors

in a position to extract larger monopoly rents, the coefficient on this variable should be positive. The sign depends on which effect dominates¹⁷.

To assess if high financing costs are indeed a constraint to investment in Colombia, the one period lag of the lending interest rate multiplied by a firm measure of financial indebtedness (financial liabilities over total liabilities) is included among the explanatory variables. A negative coefficient on this variable will signal that access to financing is a problem.

The impact of low profitability due to high transport costs is examined through the inclusion of a proxy of the transport costs to the closest major port faced by the firm, constructed as described in the previous section. Because transport costs per ton per kilometer tend to be higher from locations in the countries interior where economic activity and investment tend to concentrate, this variable is treated as endogenous to investment decisions and is instrumented in estimation using measures of agglomeration such as number of firms and aggregate operational income of firms in the municipality as instruments. Since investment decisions of firms that import or export more are likely to be affected by higher transport costs to the ports than firms whose activity is restricted to the local markets, this variable enters estimation multiplied by an ISIC 4-digit measure of international exposure equal to imports plus exports divided by 2. It enters estimation in logarithmic form.

Finally, since firm-level investment decisions are likely to vary across firms sizes and are expected to be positively correlated to macroeconomic performance, firm size in the previous period (the log of firm operational income at time (t-1) deflated using the Producer Price Index) and previous period GDP growth of the Department where the firm is located are included as controls. This variable is chosen as macroeconomic control in exchange of time dummies. Since time dummies take away the significance of explanatory variables that vary more over time than across firms, and by construction the measures used to assess the impact of the armed conflict and of poor transport infrastructure vary across groups of firms (in the same municipality or the same department) but are not firm or sector specific, and there is a particular interest in learning how these variables affect firm investment choices, the model specification using time dummies as controls is not used in the analysis¹⁸.

Standard errors are robust and clustered by ISIC 4-digit sector.

ii. Investment level decision

While both decisions occur simultaneously in practice, deciding whether or not to make an investment at a given time is different than deciding on what to invest and how much. The drivers behind both decisions are not necessarily the same. For instance, factors that cause uncertainty are, at least conceptually, more associated to the timing of investment than to its magnitude (see Dixit and Pyndick, 1994).

¹⁷ Alternatively, an ISIC 4-digit sector dummy equal to 1 if the sector was ever questioned by the competition authority with regards to the occurrence of monopolizing behaviors and equal to 0 otherwise was used to capture this type of uncertainty. It turned out to be not significant under standard errors adjusted for sector clusters. This variable was constructed thanks to access to the Competition Policy Unit files at Superintendencia de Industria y Comercio.

¹⁸ Results for model specifications including time dummies are available from the authors on request.

A second econometric model explores the decision of how much to invest. Since the purpose of this exercise still is to explore the impact of the growth constraints identified in Section 3 on investment, the set of explanatory variables is largely the same as before. To explore positive investment decisions, negative entries resulting from actual disinvestment or from accounting practices are set equal to zero. Estimation is done using two alternative Tobit models: a fixed effects Tobit regression and an instrumental variables Tobit regression. Through inclusion of firm fixed-effects, the former of these regressions prevents biases and potential endogeneities arising from unobserved firm variables without variation over time, and also recognizes the fact that investment projects are firm-specific and that while investment decisions may be facilitated or hindered by the environment in which a firm operates, the magnitude of the investment to undertake will largely depend on specificities of each investment project. Conceptually this model seems the more adequate for the purpose of this study. It does not, however, control for biases due to the endogeneity of variables that change over time. For this reason, the transport costs proxy is excluded from estimation. The second regression includes transport costs.

c. Estimation

i. Investment decision

Estimation results for the investment decision probit model are presented in Table 8. To check the results' robustness to more stringent definitions of positive investment, the dependent variable is redefined to take the value of 1 only for investment rates in excess of 10%, and only for investment rates in excess of 20%.

In the first model, where any positive capital expenditure is taken to be a decision to invest, most variables are significant and have the expected signs on their coefficients. The exceptions are the market concentration measure and the transport costs proxy that are not significant and judging from these results apparently do not affect investment decisions in Colombia. Marginal effects (dy/dx) reported are for y equal to the probability of a positive outcome. When the explanatory variable is a dummy variable, dy/dx is for a discrete change from 0 to 1.

Marginal effects of all variables become smaller as the investment definition is made more stringent and some variables lose significance. In the cases of the 10% and 20% investment rate thresholds, the tax rate variation measure becomes insignificant and so does the measure of public order restored. These results leave two sources of constraints to investment standing: poor appropriability of investment returns due to the ongoing armed conflict and poor access to financing.

As expected, size matters. Larger firms have a higher probability to invest than others. This result is robust for the first two investment definitions. Marginal effects of firm size are comparable in size across models.

Table 8: Investment decision

Dependent variable: Dummy = 1 if firm reports positive capital expenditures	IV Probit Regressions					
	Investment rate > 0		Investment rate > 10%		Investment rate > 20%	
	Coefficient	dy/dx	Coefficient	dy/dx	Coefficient	dy/dx
Transport Costs * ISIC 4-digit sector international exposure ¹	0.010 (0.023)	0.004	-0.001 (0.016)	0.000	0.004 (0.019)	0.001
Size(t-1)	0.049 (0.029)*	0.018	0.063 (0.022)***	0.019	0.037 (0.025)	0.009
ISIC 4-digit Herfindahl-Hirshman Index	0.075 (0.092)	0.028	0.053 (0.089)	0.016	-0.009 (0.089)	-0.002
ISIC 4-digit sector effective income tax rate standard deviation	-0.010 (0.006)*	-0.004	-0.007 (0.008)	-0.002	-0.007 (0.008)	-0.002
Violent Events	-0.051 (0.02)**	-0.019	-0.049 (0.019)**	-0.015	-0.041 (0.021)**	-0.010
Dummy public order restored	0.179 (0.062)***	0.069	0.063 (0.072)	0.020	0.021 (0.069)	0.005
Department-level real GDP growth (t-1)	0.021 (0.003)***	0.008	0.014 (0.003)***	0.004	0.011 (0.004)***	0.003
Lending rate (t-1) * Financial debt (t-1)	-0.008 (0.003)***	-0.003	-0.009 (0.003)***	-0.003	-0.007 (0.003)**	-0.002
Constant	-1.130 (0.329)***		-1.650 (0.284)***		-1.487 (0.298)	
Number of observations	13,160		13,160		13,163	
Log pseudolikelihood	-57,878		-56,408		-55,304	
Wald chi ² (8)	130.26		90.60		45.94	

Note: Standard errors in parentheses, * significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors adjusted for ISIC 4-digit sector clusters.

¹ Instrumented. Instruments: Firm size(t-1), ISIC 4-digit sector HHI, ISIC 4-digit sector effective tax rate standard deviation, Violent events, Dummy public order restored, Lending rate(t-1)*Financial debt(t-1), Real Department GDP growth, Number of firms in municipality, Income of firms in municipality, Exchange rate

Source: calculations by the authors.

ii. Investment level decision

Table 9 presents the results of the Tobit regressions exploring the extent to which the growth constraints identified in Section 3 determine the size of the investments firms undertake, when they decide to invest.

Results from the fixed-effects Tobit regression say that, after controlling for firm specific characteristics, size remains a significant variable in explaining investment levels: larger firms incur larger investments, as is to be expected. It also says that violence results in lower investment levels and so do financial constraints. These results are in agreement with those obtained in the models intended to explain investment choice and underscore the role of both

uncertainty about property rights arising from the ongoing armed-conflict and poor access to financing as constraints for private investment in Colombia.

Table 9 – Extent of investment decision

Dependent variable: Log (change in capital expenditures). Made = 0 if entry < 0.	Tobit Regressions	
	Firm fixed effects	Instrumental variables regression
	Coefficient	Coefficient
Transport Costs * ISIC 4-digit sector international exposure		0.118 (0.284)
Size(t-1)	0.957 (0.078)***	0.847 (0.354)**
ISIC 4-digit Herfindahl-Hirshman Index	1.372 (0.624)**	1.249 (1.188)
ISIC 4-digit sector effective income tax rate standard deviation		-0.123 (0.076)
Violent Events	-0.694 (0.14)***	-0.682 (0.248)***
Dummy public order restored	1.398 (0.428)***	2.012 (0.727)***
Department-level real GDP growth (t-1)	0.255 (0.025)***	0.270 (0.04)***
Lending rate (t-1) * Financial debt (t-1)	-0.109 (0.017)***	-0.090 (0.037)**
Constant	-17.187 (1.308)***	-17.097 (4.122)***
Number of observations	18,412	13,160
Log pseudolikelihood		-73,866
Number of groups	3,828	
Log likelihood	-34,971	
Wald chi ² (6)	401	
Wald chi ² (8)		123.68

Note: Standard errors in parentheses, * significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors adjusted for ISIC 4-digit sector clusters.

¹ Instrumented. Instruments: Firm size(t-1), ISIC 4-digit sector HHI, ISIC 4-digit sector effective tax rate standard deviation, Violent events, Dummy public order restored, Lending rate(t-1)*Financial debt(t-1), Real Department GDP growth, Number of firms in municipality, Income of firms in municipality, Exchange rate

Source: calculations by the authors.

Estimation including firm fixed-effects also yields a significant positive coefficient on the dummy variable indicating restoration of public order. According to this result, higher investments are also associated to locations in which distress from paramilitary violence is no longer present. Recall recent economic growth in Colombia coincides in time with peace agreements between the government and the paramilitary.

Finally, there is a positive and significant coefficient on the market concentration measure indicating that firms in more concentrated sectors tend to incur larger investments. Both, market concentration and larger scale investments are probably associated to operation under scale economies.

Tax uncertainty and transport costs are unaccounted for in this version of the model. They are however included in the instrumental variables Tobit regression and both rendered not significant. With the exception of the result on the market concentration measure, all other findings of the fixed-effects panel regression are confirmed by this model specification.

5. Concluding remarks and policy recommendations

Colombia is growing and appears to finally be on a path of recovery from the slowdown of the end of the century. In this context it is hard to talk about binding constraints to growth, because no constraint has apparently been binding in recent years. There is, however, a structural change in the way the armed conflict has evolved that can partially explain the economy's positive performance since 2003. This research adds little new insight in recognizing the critical role of the conflict in connection to economic activity. It advances, however, in identifying the channels through which this effect materializes and in giving an order of magnitude to the costs it represents through its negative impact on private investment.

Issues about geographically widespread growth and sustainability were raised. Examination of regional growth considering the conflict's geographical distribution showed economic reactivation in areas with falling violence. This is not surprising. Nonetheless, results from analysis at a microeconomic level give this conclusion a particular spin by showing that investment decisions at the firm level are also affected by the restoration of some form of public order connected to the cessation of paramilitary violence and not only by the reduction of violence per se. This could be reflecting the critical role played by insurance markets, since insurance availability depends on the insurance sector perceptions of public order.

While measures used to assess the impact of tax rule instability on investment decisions are imperfect, there is empirical evidence that changing tax rules apparently affect the probability of investment through their impact on firm expectations and the uncertainty they bring about future returns.

Measures of market concentration were used to capture the potential effects of uncertainty on investment returns from risk of monopolizing behaviors. It turned out that, if anything, investment decisions are facilitated by market concentration, possibly because firms enabled to exploit scale economies or to extract rents through the exercise of some degree of market power face less uncertainty about their ability to recover their investments and are therefore more likely to invest. In practice, this should be balanced by the intervention of the competition authority to make sure it does not occur at the expense of consumers and/or of smaller investors.

Among the sources of poor appropriability from micro-risks due to government failures identified in the growth diagnostics exercise, only the variables associated to the conflict survive across all model specifications when their impact on investment decisions at the firm level is tested. The data confirm that this is unquestionably one of the most binding constraints for investment and that any effort directed towards ending violence and reestablishing public order

will see a reward in economic reactivation. A note of caution is in order, however, since as discussed above, restoration of public order that occurs under the rule of paramilitary groups may as well provide the security conditions to facilitate investment. The country should decide if this is a desirable or necessary arrangement in the process of putting an end to the conflict and entering into a sustainable growth path.

There is no evidence that transport costs affect firm investment decisions negatively. This result may be due to the lack of firm specific data. The impact estimated is, however, not significant and while efforts towards lowering transport costs can only have positive impacts on economic activity, high transport costs cannot be singled out as the most important constraint affecting investment decisions in Colombia.

Finally, from a public policy perspective, the most relevant result is the confirmation that in Colombia investment decisions are negatively affected by the costs of financing. Empirical results, robust across model specifications, single out the provision of access to financing at fair prices as a policy priority for economic growth, relevant across country regions and independent of whether uncertainties about appropriability issues are resolved.

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