Revisiting Economic Growth in Colombia – A Microeconomic Perspective

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Abstract

This paper revisits economic growth in Colombia using the growth diagnostics methodology proposed by Hausmann, Rodrik and Velasco (2005), to identify 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.

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1. Introduction

Although economic growth in Colombia has been widely diagnosed,[4] 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 incentives for investment at the microeconomic level and the distortions that result from government or market failures. Progress in these directions is crucial for adequate policy design. This paper aims at contributing to fill these gaps.

The paper revisits economic growth in Colombia using the growth diagnostics methodology proposed by Hausmann, Rodrik, and Velasco (2005) – henceforth HRV (2005). The purpose is to identify 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 anti-competitive behavior–is found to be the most important determinant of investment decisions in Colombia.

To rank public policy priorities, we complement the HRV (2005) methodological approach with an econometric analysis of micro-data. The analysis explores 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 show economic reactivation in areas with declining levels of violence. Results from analysis at the microeconomic level, however, give a particular spin to this conclusion. They show 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 in 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.

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

The paper is organized as follows. As a motivation for the growth diagnostics exercise, 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 are used to arrive at a set of hypotheses. These hypotheses are then empirically tested in Section 4 using micro-data, and conclusions and policy recommendations follow.

2.   Stylized Facts

Figure 1 summarizes the history of economic growth in Colombia since 1970. Gross domestic product (GDP) per capita grew at 3 percent per year on average in the 1970s, completely stagnated during the first half of the 1980s, grew at 2.2 percent between 1985 and 1997, and decreased at a rate of -1.3 percent per year between 1997 and 2002. The positive results in 2004 and 2005 have partially compensated for the earlier poor performance; GDP per capita has grown on average at a rate of 2.9 percent in the past three years.[5] However, this has not yet been enough to put the country back on its growth path of the 1970s. GDP per capita would have to grow at the 2005 rate of 3.6 percent for 14 years in order to reach the level it would have had, had it kept growing at the average rate of the 1970s. The rate would have to be 60 percent greater than it actually was at the beginning of 2006.

Figure 1: Economic growth, 1970-2005 (1970=1)
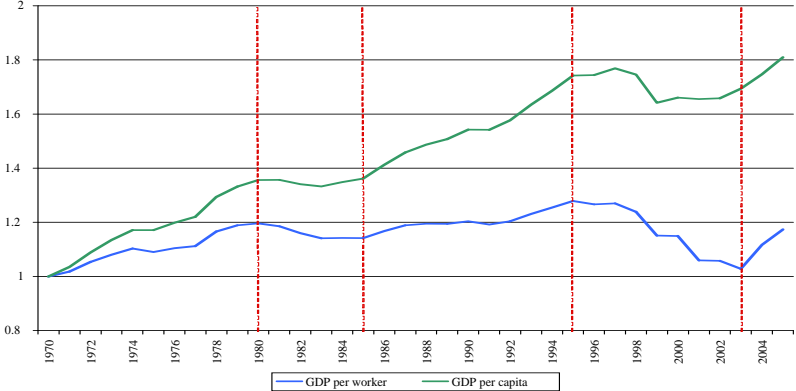
Source: DANE and GRECO (2002).

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

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The picture is even less appealing in terms of the evolution of GDP per worker, which peaked in 1995, then dropped continuously until 2003 when it reached a level close to that of 1970. Despite recovery in recent years, by 2005 this indicator had not reached its level of 1980.

Thus, although Colombia's economy has grown with few reversion episodes (see Figure 2), it has experienced periods of deceleration. 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.

Figure 2: Real GDP growth
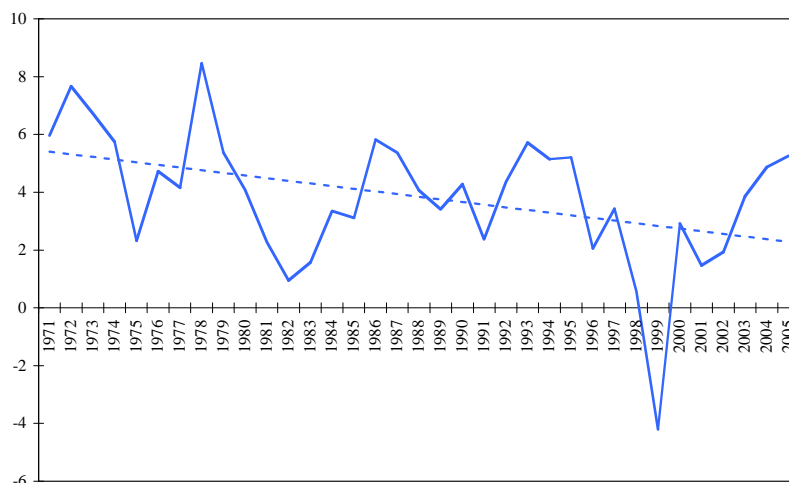
Source: DANE.

Table 1 presents an overview of economic growth by sector and by demand components. Between 1970 and 2005, the less dynamic sectors were agriculture–with very poor performance since 1990–and manufacturing, which grew at 6.8 percent per year in the 1970s and at 2.8 percent between 1985 and 1997, stagnated between 1980 and 1995, and grew at only 1.4 percent between 1997 and 2002, systematically declining in share of 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 the performance of coal, ferronickel, and oil. The same was true for the service sectors between 1985 and 1997.

Looking at 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 percent in the 1970s to 9 percent between 1985 and 1997).[6] Public investment decelerated (from positive average growth rates of 6 percent in the 1970s and 10 percent between 1985 and 1997, to negative average growth rates of -1 percent between 1997 and 2002); and private investment had a sizeable decline (from positive average growth rates of 7 percent in the 1970s and 3 percent between 1980 and 1997, to negative average growth rates of -7 percent between 1997 and 2002).

Table 1 shows that positive average growth between 2002 and 2005 was associated with the recovery of private investment.

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[6] As a result, public consumption as a share of GDP went from 11.5 percent to 21.9 percent between 1990 and 2000.

Table 1: Growth rates by sector and demand components (annual averages)

a. GDP, population and GDP per capita

GDP	1970-80	1980-90	1990-2000	2000-05
GDP	5.51	3.40	2.72	3.47
Population	2.52	2.18	1.93	1.70
GDP per capita	2.92	1.19	0.78	1.73

b. By sector

GDP	1970-80	1980-90	1990-2000	2000-05
Agriculture, Hunting, Forestry and Fishing	4.36	3.07	1.58	1.50
Mining and quarrying	-2.05	17.42	5.06	2.35
Manufacturing	5.99	2.95	0.44	3.89
Construction	5.17	1.93	-1.16	10.74
Wholesale and retail trade	5.70	2.42	0.79	6.09
Services	6.60	4.10	6.46	2.71

c. By demand components

GDP	1970-80	1980-90	1990-2000	2000-05
Private consumption	5.53	2.70	1.80	3.76
Public consumption	7.17	4.56	10.63	1.29
Private investment	26.43	29.37	-6.10	21.50
Public investment	30.26	26.14	11.07	-0.30
Exports	6.26	6.00	5.52	3.60
Imports	6.56	1.51	7.15	10.65

d. International comparisons (constant dollars)

GDP per c‡pita	1970-80	1980-90	1990-2000	2000-03
Colombia	3.09	1.27	0.76	0.73
Latin America and the Caribean	3.36	-0.80	1.66	-0.59

Source: Cárdenas (2005) and DANE (figures updated).

Figure 3: Investment as a percentage of GDP, 1960-2005
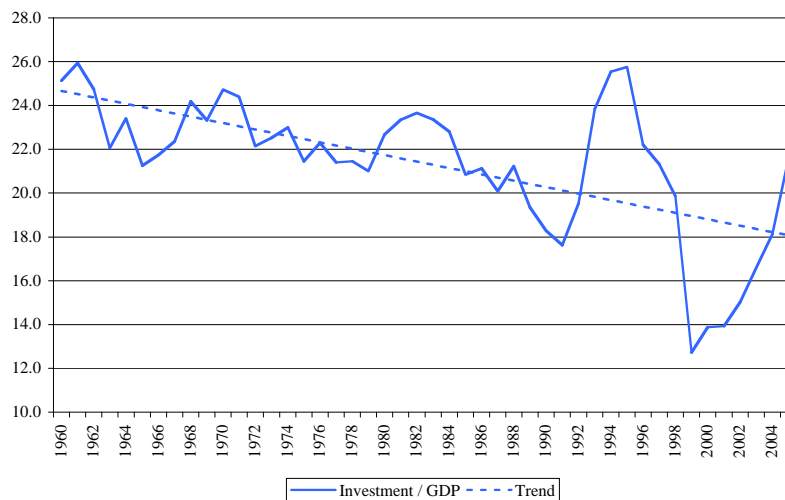
Source: DANE and Fedesarrollo.

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Figures 3 and 4 look at investment over time.

Figure 3 shows that investment as a share of GDP peaked 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 percent of GDP. Recovery since then has been continuous and has occurred at a sustained pace since 2003. Figure 4 shows investment broken down into its public and private components since 1994. Between that year and 1997, public investment was substituted by private investment. Those were years of privatization of public utilities and transport infrastructure concessions. In 1998 the drop in private investment was partially compensated by an increase in public investment, which was only an interruption of the declining path on which public investment had entered. Private investment continued to decline until 2000 and began to recover at a good pace in 2001.

Although 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 of the 1970s; it has shown growth recovery only for three years in a row in a context of favorable international conditions. So there is a question whether growth can be sustained over time at the current rates, especially if the favorable international conditions were to change. This is inherently connected to whether the increasing investment materializes in productivity growth, because ultimately it is through its impact on productivity that investment can give way to sustained growth in the medium and long run.

Figure 4: Public and private investment as a share of GDP, 1994-2005
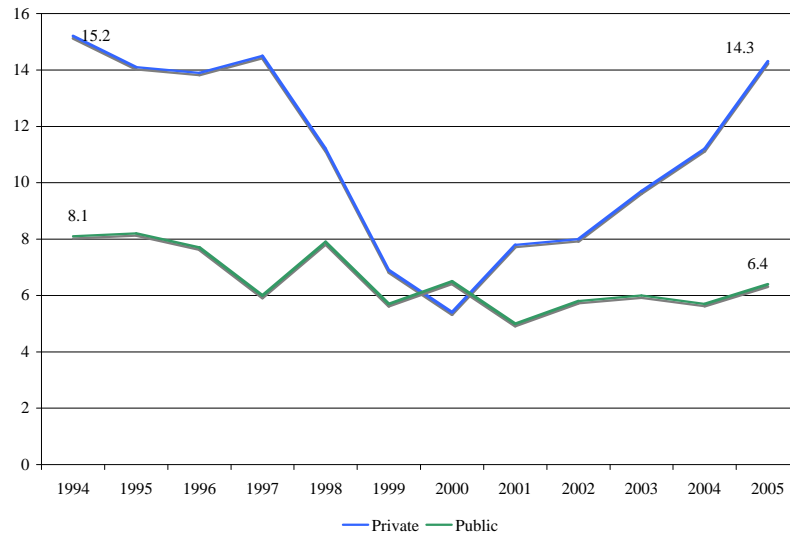
In fact, poor productivity performance has been associated with the slowdown of economic growth in Colombia. Cárdenas (2005) decomposes the growth of GDP per worker for Colombia between 1965 and 2004 into changes in physical capital accumulation, growth of human capital per worker, and productivity growth. The findings show that between 1970 and 2004, the average increase in years of education positively contributed to increased output per worker. Physical capital accumulation has also contributed positively to output growth since 1980. But in recent years this has not materialized in higher growth due to the contraction in total factor productivity (TFP). Estimations of the aggregate production function for the Colombian economy by the same author confirm the finding of a decreasing residual. Although this type of measurement is broad and may capture 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 shows TFP stagnating between 1980 and 1999 and increasing only in 1999, apparently as a result of the exit of less productive plants during the recession (Meléndez and Seim, 2006). Therefore it seems critical to investigate whether there has been a permanent change in the business environment and to provide the appropriate incentives for productivity-enhancing investment.

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Moreover, Figure 5 shows that the recovery of gross capital formation since 2002 has largely been explained by the performance of housing construction, hardly associated with productivity growth.

Figure 5: Investment by type of capital, as % of GDP

Legend:
- Agriculture, hunting, forestry and fishing
- Metal and metallic products
- Machinery (electrical and other)
- Construction - Housing and other buildings
- Services
- Furniture and equipment
- Machinery (non-electrical)
- Transportation equipment
- Construction - Transport infrastructure and other
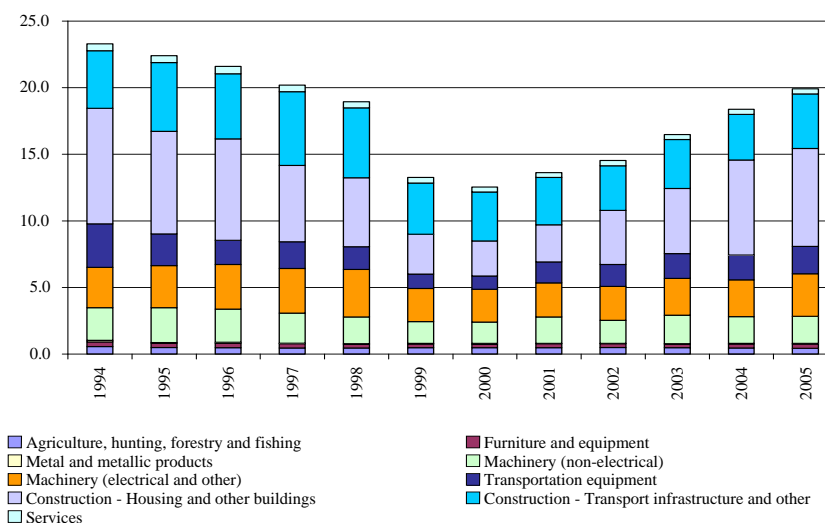
Source: DANE and calculations by the authors.

Second, growth is not yet a widespread phenomenon across the country's regions. Table 2 provides GDP per capita growth by department between 1990 and 2004,[7] showing performance during periods of positive economic growth (1990-97 and 2002-04) and decline (1997-02). Average growth rates after 2002 show in most cases recovery over the previous years; but a number of departments are still 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. The cases of recovery at average rates above 4 percent (against national average annual growth of 2.8 percent) are notable in departments in the Atlantic region (Cesar, Córdoba, Sucre, and La Guajira), and in Cauca, Chocó, Santander, Risaralda, and Vichada. Understanding the origin of these different performances is necessary to learn whether Colombia has overcome the

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[7] Figures for more recent years are not yet available.

constraints to growth that were binding in previous years, and whether the country will continue to grow in a sustainable manner or if the path to growth is still fragile.

Table 2: Regional differences - GDP per capita by department, 1990-2005

Departments	Real growth (annual averages)			
	1990-97	1997-02	2002-05	1990-05
Amazonas	-0.96	-1.21	1.15	-0.63
Antioquia	1.07	-0.63	2.89	0.86
Arauca	-3.77	-12.01	0.69	-5.75
Atlántico	2.28	-2.45	3.98	1.01
Bogotá D.C.	1.27	-2.49	2.84	0.31
Bolívar	0.30	1.59	2.79	1.22
Boyacá	1.28	-1.02	3.10	0.86
Caldas	1.94	0.64	3.33	1.78
Caquetá	2.79	-5.44	2.17	-0.15
Casanare	9.90	-0.98	-3.64	3.39
Cauca	0.93	3.00	4.69	2.36
Cesar	2.73	0.35	6.61	2.69
Chocó	1.30	-1.25	4.63	1.09
Córdoba	5.42	0.76	4.78	3.71
Cundinamarca	1.36	-0.41	1.84	0.86
Guainía	3.06	-4.06	-2.93	-0.57
Guaviare	4.73	-14.53	-17.34	-6.65
Huila	2.02	-0.91	2.91	1.21
La Guajira	3.50	-4.26	8.62	1.82
Magdalena	3.17	-2.33	2.25	1.12
Meta	4.62	-2.63	1.29	1.49
Nariño	2.20	1.53	1.61	1.86
Norte Santander	0.27	0.21	-1.22	-0.05
Putumayo	3.72	-0.76	-9.08	-0.45
Quindío	3.18	-2.95	-1.20	0.22
Risaralda	1.48	-2.67	4.57	0.68
San Andrés y Providencia	-0.52	-2.00	2.36	-0.45
Santander	3.72	0.57	6.27	3.16
Sucre	3.55	-2.71	4.29	1.57
Tolima	4.81	-1.86	0.01	1.58
Valle	2.09	-1.52	1.58	0.77
Vaupés	9.24	-2.38	-4.89	2.34
Vichada	-8.06	7.57	4.64	-0.58

Source: DANE and calculations by the authors.

The performance 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 -39.7, 2.1, and 3.4 percent, respectively, for these departments between 2002 and 2005.

As will be shown, departments that perform 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 performance), or relocated cocaine crops and/or paramilitary presence (positive performance). Thus, exploring in more detail the role of the conflict in its multiple dimensions in shaping the Colombian economy is critical for adequate policy design.

At the outset, it looks like Colombia's most binding constraints and policy priorities for economic growth are not necessarily the same across regions. In particular, policy priorities for promoting growth in rural areas may be second-order priorities in the more developed urban areas.

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 constraint 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 on 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 past 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 3). 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 3: 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
	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
Lending rate	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
	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
Deposit rate	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.

However, the recent evolution of interest rates and the fact that making a case that poor access to financing is a binding constraint for growth are not straightforward from just looking at the evolution of prices. Therefore, this section presents additional evidence to show that these factors may still be a concern. A first piece of evidence is a cross-country comparison of interest rate spreads, where Colombia falls right on the Latin American average. However, Colombia looks much worse compared with economies that have recently been growing at faster rates (see Figure 6).

Figure 6: Interest rate spreads, 2005
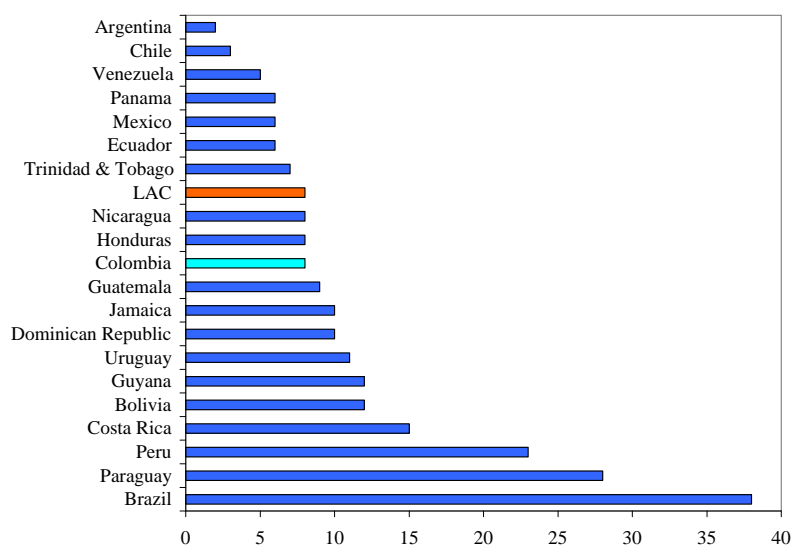
Source: World Bank, World Development Indicators.

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i.   *Local finance*

Poor intermediation. In spite of having experienced significant growth over the past 15 years, the Colombian financial sector is still small and shallow. The country's banking and non-banking financial sectors are relatively small (see Table 4). 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 in a small number of issuers and issues, and relatively illiquid.

Table 4: Bank credit, stock market capitalization, and domestic debt as a percentage of GDP, 2004

	Bank credit	Stock market capitalization	Domestic debt		
			Government	Financial	Corporate
Mature Markets					
Japan	94.4	78.5	141.0	25.6	16.3
United States	45.8	129.0	47.1	22.0	22.0
Euro Area	103.9	54.6	53.6	29.8	10.0
Emerging markets					
Asia	103.6	74.1	22.3	13.4	6.9
Europe	24.3	34.1	26.9	0.5	1.0
Latin America	20.9	40.2	28.9	5.3	2.6
Argentina	10.4	30.7	5.8	3.4	6.4
Brazil	25.2	50.0	44.7	10.8	0.6
Chile	56.8	114.8	19.6	10.2	11.3
Peru	17.6	28.3	5.6	1.3	3.1
Mˇxico	14.3	25.4	22.6	0.8	2.7
Colombia	**18.0**	**24.3**	**22.8**	**4.3**	**3.9**

Source: IMF (2005). Data for Colombia: Banco de la República de Colombia,

Superintendencia Financiera.

In Colombia, firms largely finance their activity through retained earnings or other own resources (see Table 5). Financing through the market is still limited to firms able to issue large amounts of debt (Aguilar et al., 2007), and banking credit to the private sector is also largely restricted to larger firms.

Table 5: Firm liabilities by type

	1997	1998	1999	2000	2001	2002	2003	2004
Bonds and commercial paper	2.5%	3.3%	4.6%	4.4%	4.6%	5.5%	7.1%	15.6%
Financial liabilities	45.9%	39.4%	36.1%	38.0%	37.8%	34.2%	32.7%	20.3%
Labor obligations	1.7%	1.8%	2.0%	1.8%	1.9%	1.8%	1.8%	1.4%
Accounts payable	16.6%	15.2%	18.0%	17.5%	16.5%	15.1%	15.2%	16.7%
Firm own resources	33.3%	40.2%	39.2%	38.2%	39.2%	43.4%	43.3%	45.9%

Source: Aguilar et al. (2007).

Table 6 shows the distribution of loans by firm size and loan quality between 1995 and 2002.[8] During this period, financing from the banking sector became increasingly concentrated in larger firms, both by number of loans and value. The higher share of A-quality loans among smaller firms may be a result of more stringent standards applying to firms about which the financial sector has less information after the recession.

Table 6: Banking loans by firm size

Year	% value of loans by firm size				% number of loans by firm size				% of A quality loans				% of non-performing loans			
	Micro	Small	Medium	Large	Micro	Small	Medium	Large	Micro	Small	Medium	Large	Micro	Small	Medium	Large
1995	3.9	12.2	13.0	70.8	22.5	49.5	14.4	13.5	95.5	91.8	86.5	93.3	1.6	3.6	8.7	2.7
1996	3.8	12.2	12.5	71.5	22.1	50.3	14.4	13.2	90.0	87.9	83.9	91.0	3.6	6.6	9.2	3.7
1997	4.0	11.9	12.1	72.1	21.5	50.4	14.7	13.4	91.6	88.6	86.3	89.9	4.1	5.7	8.1	3.7
1998	3.6	10.4	11.1	74.9	21.4	49.4	15.1	14.1	78.2	79.7	77.5	83.0	11.1	11.1	13.7	7.9
1999	3.1	8.2	9.5	79.2	19.6	48.5	16.1	15.8	73.3	73.9	73.4	71.7	15.7	15.7	15.1	11.3
2000	2.9	7.4	9.0	80.7	18.6	47.7	16.9	16.8	85.9	78.6	75.9	67.2	8.5	12.1	14.3	8.6
2001	3.0	8.3	9.7	79.0	18.9	47.8	16.5	16.8	91.2	84.5	81.4	72.6	5.5	9.1	8.8	6.6
2002	3.1	9.3	10.6	77.1	20.8	47.0	16.0	16.3	90.9	88.2	83.2	79.7	4.2	6.7	7.4	6.0

Source: Superintendencia Financiera and calculations by the authors.

Furthermore, a large share of the 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 in the public component of the Colombian debt market. The share of Treasury bonds rose from 13 to 57 percent as a share of total public debt over these years and from 8 to 23 percent 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 percent of their portfolios invested in Treasury bonds. Aguilar et al. (2007) find evidence of crowding-out of financial resources against private investors.

Low savings. The average savings rate was greatest between 1985 and 1997 (24 percent), dropped to 14 percent 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 (see Figure 7). This evolution of the savings rate suggests that in Colombia periods of stagnation or deceleration have

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[8] Data are publicly available only for this period. Updated records have been requested directly from the Superintendencia Financiera but have not yet been made available.

been preceded by deterioration in 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.

Note that when broken down 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.

**Figure 7: Gross national savings / GDP, 1970-2004**
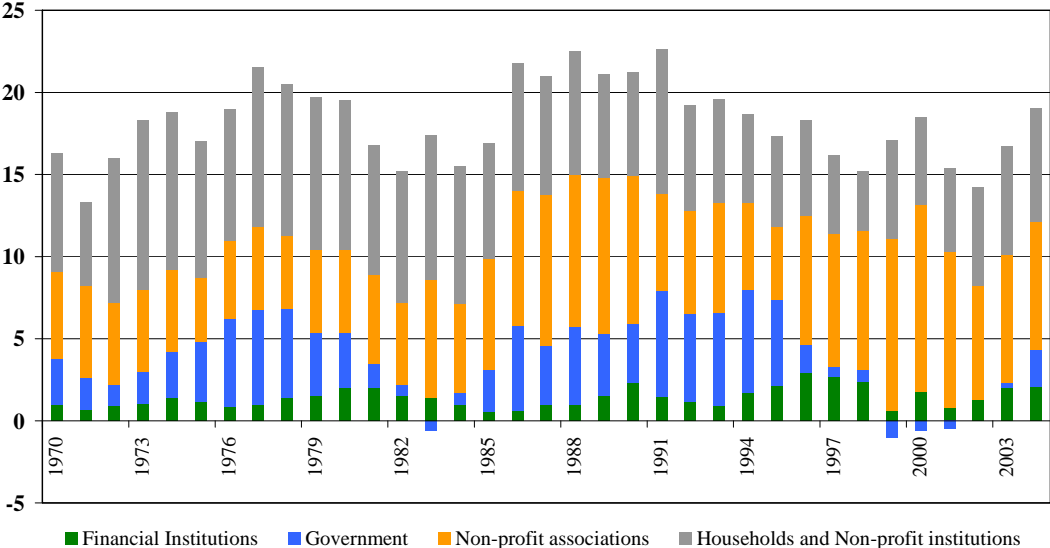
Source: DANE and calculations by the authors.

Evaluation. Poor access to financing due to poor 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, and was induced at least in part by the government through the placement of large amounts of domestic public debt in the market. The public debt was used to finance increasing public expenditures associated with new obligations from the Constitution of 1991 as well as war expenses. The lack of financing was critical due to the low availability of private savings and the fact that few firms had access to alternative sources of funding. Although in 2005 and 2006 the economy finally appeared to be on a recovery path, most of the signs that access to financing could be a constraint for sustainable growth are still present.

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ii.   International finance

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 percent in 1990 to 22.3 percent 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 rare and restricted to larger firms. The evolution of private sector external debt shows, however, that external markets have provided a financing alternative for those who have access to them (see Figure 8).

Figure 8: External debt (as % of GDP)
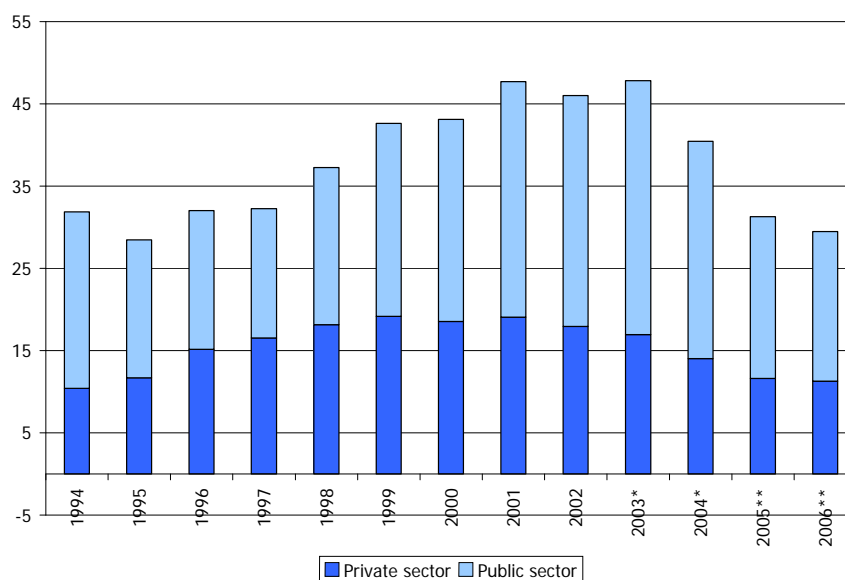
Note: External debt includes leasing and securitization. *Provisional. **Preliminary.

Source: Banco de la República de Colombia.

Colombia's ability to attract foreign direct investment has apparently been compromised by difficulty in guaranteeing property rights in the context of the conflict. Throughout the 1980s, the country experienced substantial growth in foreign direct investment (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. However, the country's FDI performance has remained below the regional average both on a per capita basis and in relation to the size of

the economy. Performance peaks are explained by privatizations of public services that occurred in the second half of the 1990s and by the sale of Bavaria to SABMiller, which accounted for $5.5 billion in 2005. Only the mining sector has shown a sustained positive trend in recent years (see Figure 9).

Finally, Colombia 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 recent years of positive growth.

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

Figure 9: Foreign direct investment, 1994-2005 (as % of GDP)
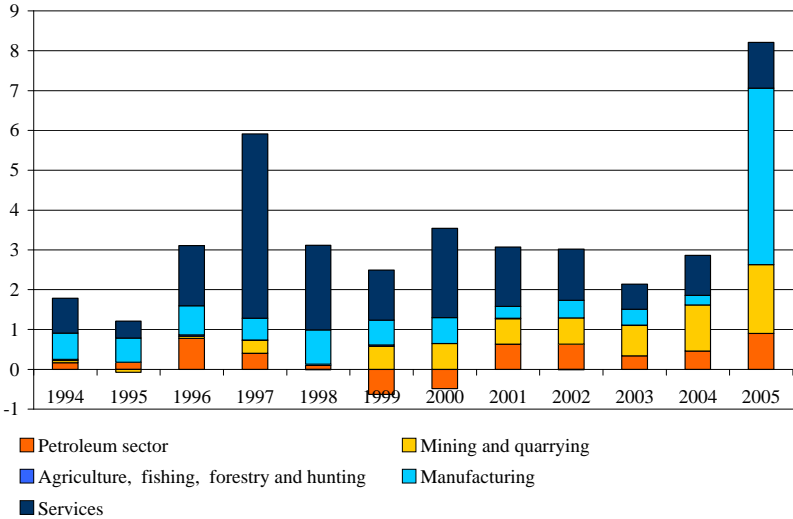
Source: Banco de la República and calculations by the authors.

b.   *Low returns to economic activity – low appropriability*

i.   *Government failures – micro-risks*

Protection of property rights. This is an area in which Colombia fares poorly. The government's inability to protect investors from the lack of security in the ongoing armed conflict is a major source of poor appropriability of returns. Although it is likely to impact economic activity in rural areas more strongly, the situation affects incentives for investment in

general. First, it deters investments that would otherwise have taken place. Second, it diverts investment toward activities that would not have been the first choice of investors during peace times but are for safety reasons more convenient due to lower potential losses (i.e., projects with lower fixed costs or shorter timeframes for investment recovery). And third, it distorts location choices to favor safer areas, and raises production costs for investors who incur non-productive expenses to guarantee the safety of their operations. These expenses may be legal (such as expenses on guards, alarm systems, etc.) or illegal (such as side-payments to the paramilitary or the guerrillas), and are likely correlated with location choices.

Figure 10 shows the evolution of violence in Colombia since 1970. In the second half of the 1980s, violence from the cocaine business started to be felt more strongly. In the 1990s, the guerrillas became more involved in cocaine, which also increased the level of violence. Recovery in recent years has been associated with 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 11 presents evidence of the recent evolution of the conflict's violence by type of event. In the figure, the indicator for kidnappings reflects only events for which the paramilitary or guerrillas have been identified as responsible. The increase in recorded armed contact events since 2002 is noteworthy and reflects the ongoing war.

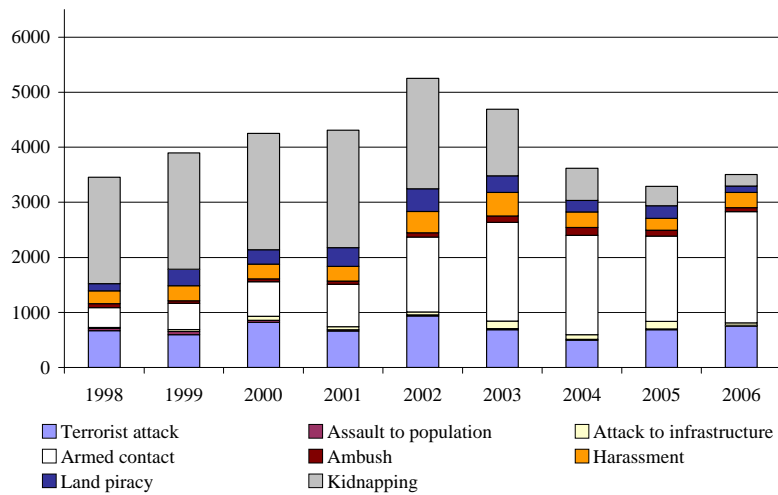At the regional level in recent years, the picture in terms of both economic performance and the evolution of conflict is mixed. This allows us to gauge the role of property rights protection as a driver of investment and its absence as a binding constraint on growth in some regions of Colombia.

Figure 10: Violence, 1970-2004 (1994=100)
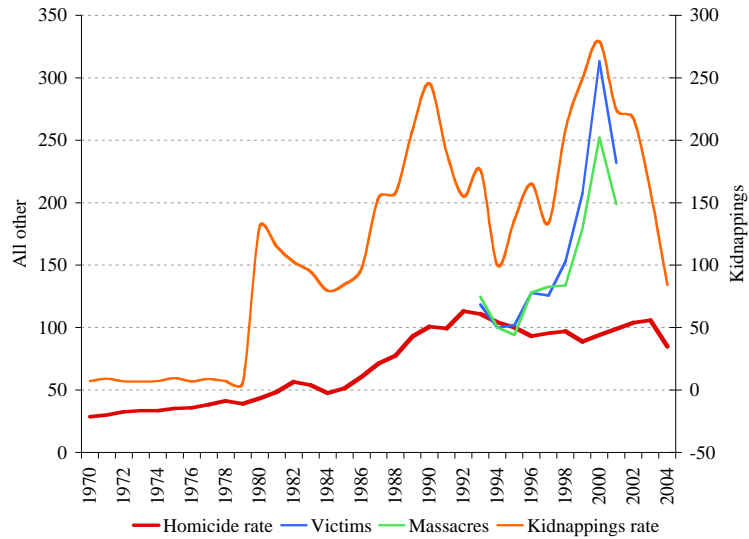
Figure 11: Violent events related to the armed conflict

Table 7 shows the distribution of violent events across regions ranked by the total number of violent events recorded between 1998 and 2006.[9] Antioquia, Santander, and Cesar stand out for their decreasing shares. It is difficult not to associate this with their recent positive economic performance (see Table 2).

Table 7: 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
NARI„O	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

* Departments ranked by number of events between 1998 and 2006. Includes kidnappings.

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

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 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 record of violence in some of the regions does not necessarily imply the reestablishment of civil order. Instead, it may result from the imposition of a new order under the rule of the paramilitary or guerrillas, which may bring about an alternative system of protection for investors' property rights.

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[9] 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) for future analysis with our firm-level data (1995-2005).

Second, the logic of the conflict's geographic distribution has two underlying forces: the geographic location of the cocaine business (moving to the south toward Cauca and Nariño in response to government action under Plan Colombia), and the geographic location 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 because armed groups tend to locate in areas where economic activity is flourishing.

Rent-seeking behavior has also materialized when illegal groups have taken control of local governments and decentralized public sector expenditures. And there have been cases of political actors at the national level involved in corruption of the policy-making processes and the 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 111 among 125 countries with respect to the security component of the political institutions quality index, 92 with respect to the ethics and corruption component, and 78 with respect to the overall public institutions quality measure. These rankings are by no means independent of the cocaine business and ongoing armed conflict.

Table 8: Plant and equipment, by department

(In millions of 2005 dollars)

Department	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Plant and equipment *% change* Number of firms											
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
		27.4	*12.1*	*3.6*	*-0.6*	*-12.2*	*7.3*	*-11.1*	*-0.7*	*3.5*	*0.0*
	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
		4.8	*0.9*	*7.0*	*4.1*	*-7.9*	*1.3*	*-62.3*	*7.8*	*13.4*	*3.5*
	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
		14.0	*3.1*	*5.2*	*3.1*	*-3.3*	*20.0*	*-25.7*	*-2.9*	*6.4*	*6.3*
	439	414	430	426	405	407	402	385	373	376	454
Atl‡ntico	547.23	726.73	739.86	779.26	770.50	709.21	717.97	577.88	604.14	608.52	674.19
		32.8	*1.8*	*5.3*	*-1.1*	*-8.0*	*1.2*	*-19.5*	*4.5*	*0.7*	*10.8*
	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
		55.2	*11.6*	*2.8*	*1.4*	*-3.3*	*-2.8*	*-6.4*	*-3.8*	*-6.3*	*0.0*
	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
		12.3	*37.2*	*4.7*	*23.5*	*11.5*	*-14.3*	*-32.0*	*39.9*	*88.4*	*61.6*
	7	6	5	5	5	6	6	6	6	7	10
Bolivar	277.12	282.37	221.08	216.27	216.27	208.39	210.14	182.12	167.23	211.01	226.77
		1.9	*-21.7*	*-2.2*	*0.0*	*-3.6*	*0.8*	*-13.3*	*-8.2*	*26.2*	*7.5*
	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
		65.1	*390.7*	*76.6*	*22.6*	*69.6*	*25.3*	*-5.6*	*0.4*	*3.3*	*3.7*
	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
		24.2	*2.0*	*29.1*	*4.6*	*-10.3*	*-81.0*	*-4.9*	*1.5*	*-34.9*	*26.7*
	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
		21.1	*15.6*	*3.2*	*6.2*	*1.5*	*312.1*	*-76.7*	*-7.5*	*-6.2*	*44.6*
	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
		23.5	*-37.9*	*0.3*	*12.5*	*74.2*	*-4.8*	*-13.5*	*-10.1*	*-2.2*	*8.6*
	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**
		20.5	*5.2*	*5.1*	*1.9*	*-5.3*	*7.1*	*-25.8*	*-0.3*	*5.5*	*4.9*
	3234	**3151**	**3221**	**3205**	**3048**	**3048**	**3044**	**2864**	**2917**	**2983**	**3643**

Note: Departments were selected to show those with higher stocks of plant and equipment.

Peso values were converted to 2005 pesos using the producer price index (IPP) from

the Central Bank of Colombia, and to US dollars at the 2005 exchange rate.

Source: Superintendencia de Sociedades and calculations by the authors.

The evolution of investment by region is probably the best measure of the conflict's impact on private incentives. Although there are no official statistics, the firm-level data available from Superintendencia de Sociedades contain records of all large and medium-size firms in Colombia, thereby providing a good approximation of the evolution of capital

expenditures.[10] Table 8 shows that the private sector was in recovery for two consecutive years, after a period of decline between 1999 and 2003 when investment in plant and equipment stagnated (falling 6.9 percent per year on average at book value). The hike in violence in 2002 coincided with large-scale disinvestment. The table also shows that Antioquia, the department that has been hit by the largest share of violence from the armed conflict, was one of the largest losers of the period, with a stagnant capital stock (falling at book value at an average annual rate of -6.2 percent) compared with a country average of 1.2 percent.
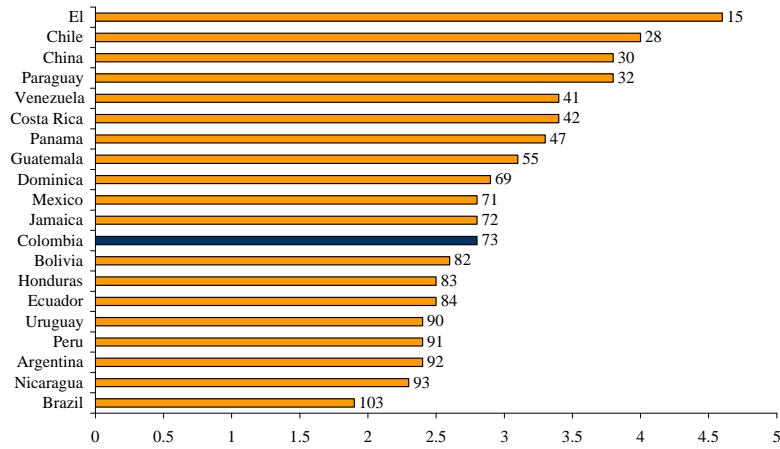
Although it seems natural to expect the ongoing war to reflect economic activity, not much has been said about the route through which this actually happens, or about the extent of the costs it imposes. This look at private investment in fixed capital suggests this to be a key transmission variable and provides a first approximation of the dimension of the problem.[11]

Taxes. The country does not fare well in either global business environment surveys with respect to the level of taxes (see Figure 12) or the efficiency of the tax system (see Figure 13). The Colombian tax system is plagued with distortions that prevent competition on a level field and are difficult to justify based on sound microeconomics (see Arbeláez et al., 2006). With respect to the tax level, nominal corporate tax rates are misleading because firms face a number of different taxes that add up.

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[10] The data systematically include all firms reporting assets or income equal to or greater 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 percent after a year of positive investment at a rate greater than 50 percent were dropped from the sample.

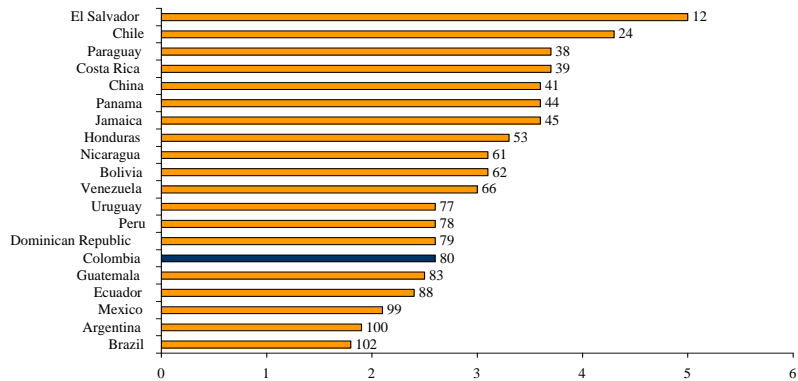[11] The data are used in the econometric analysis in Section 4.

Figure 12: Extent and effect of taxation*

El | 15
Chile | 28
China | 30
Paraguay | 32
Venezuela | 41
Costa Rica | 42
Panama | 47
Guatemala | 55
Dominica | 69
Mexico | 71
Jamaica | 72
Colombia | 73
Bolivia | 82
Honduras | 83
Ecuador | 84
Uruguay | 90
Peru | 91
Argentina | 92
Nicaragua | 93
Brazil | 103

*The level of taxes in the country (1=significantly limits incentives to work or invest, 7=has little impact on incentives to work or invest).

Source: Global Competitiveness Report 2004-2005.

Figure 13: Efficiency of the tax system*

El Salvador | 12
Chile | 24
Paraguay | 38
Costa Rica | 39
China | 41
Panama | 44
Jamaica | 45
Honduras | 53
Nicaragua | 61
Bolivia | 62
Venezuela | 66
Uruguay | 77
Peru | 78
Dominican Republic | 79
Colombia | 80
Guatemala | 83
Ecuador | 88
Mexico | 99
Argentina | 100
Brazil | 102

*The country's tax system is indexed (1=highly complex, 7=simple and transparent).

Source: Global Competitiveness Report 2004-2005.

Table 9: Tax reforms, 1990 to 2004

President in office	Year	Tax Law or Decree	Major changes
Cesar Gaviria Trujillo	1990	Law 44	Tax payers to self-calculate property values. Introduction of flexible rate system to land taxes.
Cesar Gaviria Trujillo	1990	Law 49	Tax amnesty to capital repatriation. VAT tax raised from 10% to 12%. Average tariff reduced from 16,5% to 7%.
Cesar Gaviria Trujillo	1992	Law 6	Incremental tax rate of 25% over income tax. VAT tax raised from 12% to 14%. VAT rate of 35-45% for luxury goods.
Cesar Gaviria Trujillo	1993	Law 100	Payroll taxes increased by 10%.
Ernesto Samper Pizano	1994	Law 174	Changes to taxable base calculations of. 30% tax exemption on labor costs.
Ernesto Samper Pizano	1995	Law 223	Income tax rate raised from 30% to 35%. VAT tax raised to 16%. Changes to VAT taxable set.
Andrˇs Pastrana Arango	1998	Decrees 2330 and 2331	Economic emergency. Created financial transactions 2 x 1000 tax.
Andrˇs Pastrana Arango	1998	Law 488	Removed income tax exemptions. Changed calculation of taxable base. Reduced VAT rate from 16% to 15%. New tax on gasoline.
Andrˇs Pastrana Arango	2000	Law 633	Change calculations to obtain taxable base.
Alvaro Uribe Vˇlez	2002	Decree 1838	Under "Internal Disruption" (Decree 1837, August 2002) creates War tax to "preserve democratic security", to be calculated over patrimony and paid only once.
Alvaro Uribe Vˇlez	2002	Law 788	Incremental rate of 10% on 2003 income tax. Introduced differential VAT rates.
Alvaro Uribe Vˇlez	2003	Law 863	Incremental tax rate of 10% over income tax of the following 3 years. Created 0,3% tax on patrimony owned on January 2004 to be paid on the following 3 years by everyone with patrimony over a floor of 3,000 million pesos at the time.

Source: Misión de Ingresos and Tax Code.

In addition, and most detrimental to investment decisions, tax policy in Colombia is highly volatile. The difficulty in passing a structural tax reform through Congress, which 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.

Tables 9 and 10 give an idea of the extent of rule instability.

Table 9 summarizes the recent history of tax reforms in Colombia. Table 10 presents a calculation of the mean income tax rate paid by each sector and its variation over time, after accounting for discounts and exemptions. These tax rates, which are calculated over taxable income before exemptions[12] and applicable to the taxable base using firm-level data, reflect the dispersion in tax treatments as well as the effect of the changing regulations.

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[12] Exemptions are granted to particular sectors by law and are in addition to the usual deductions that apply to the calculation of taxable income.

**Table 10: Tax rate 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**		

*Net income tax/(taxable income + exemptions to taxable base).

Source: DIAN and calculations by the authors.

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) (see Figure 14). 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 benefit from some degree of informality without being noticed by the tax authorities.

Figure 14: Informal and non-salary labor costs (%)
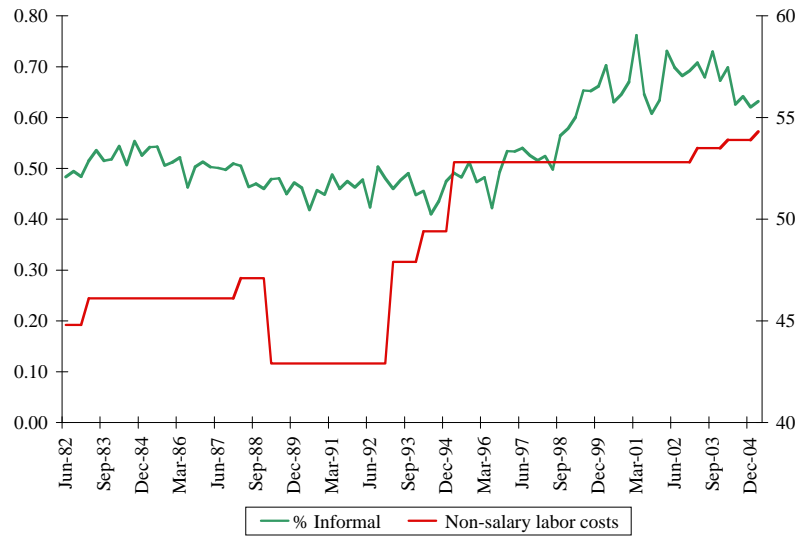
Source: Cárdenas (2006).

Competition policy. Institutional weakness in the implementation of competition policy to guarantee a level field for all investors has often resulted in expropriation of smaller investors through unfair competition and market monopolization by larger firms. This is difficult to illustrate based on objective data and would require more rigorous testing. However, the record of antitrust investigations by the competition authority in charge of overseeing the manufacturing sector SIC,[13] for the period between January 2000 and March 2007, combined with the complaint about the reduced plant capacity of its antitrust unit, provide some information about institutional weakness. Of all the demands raised during this period, 40 percent closed with no consequence to the accused due to "lack of merit" for the accusation. Another 40 percent fell in the "guarantee" category, which, as stated by the competition authorities, is a mild reprimand often incapable of inducing the desired change in behavior.

The situation is probably not worse now than it was in the 1970s, when Colombia did not have an applicable competition law.[14] And the lack of a strong competition authority cannot on its own be singled out as the most binding constraint on the country's growth. Yet, it still seems

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[13] SIC is in charge of overseeing the manufacturing sector and is also responsible for competition policy in all other sectors not explicitly assigned by law to other government authorities.

[14] See Arbeláez et al. (2006).

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.

At the outset, it is tempting to say that competition policy and changing taxation rules must not distort investment decisions as much as the poor protection of property rights connected with the armed conflict. However, it is worth establishing their relative weight as sources of low appropriability in a more rigorous way, particularly because policy makers may have more direct impact in the short run on these fronts.
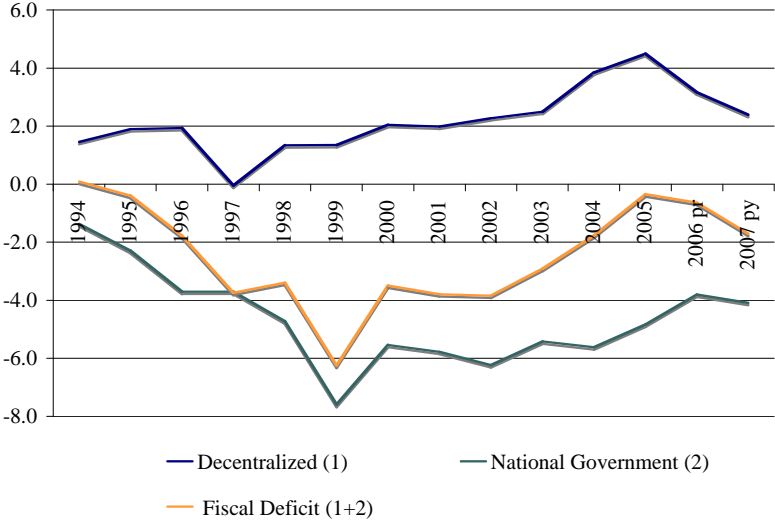
ii.   Government failures – macro risks

The fiscal deficit has improved although there are still some concerns. Reforms of pensions and transfers to local entities have addressed some of the main risks for fiscal sustainability. Pension outlays, which still represent a large 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 also gone through a process of reform, which includes privatization, resizing, and private partnership, among others. There is also speculation about 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. The fiscal situation of Colombia has not always been easy; in the 1990s, growing fiscal deficits resulted in increasing accumulation of public debt that reached levels above 50 percent of GDP between 2001 and 2005. Even so, the primary surplus required to guarantee debt sustainability–stabilization at 50 percent of GDP–is 2.38 percent of GDP, with

the economy growing at an annual rate of 5 percent and an interest rate of 10 percent (Cárdenas, 2006).

**Figure 15: The fiscal deficit as a percentage of GDP, 1994-2007***

6.0

4.0

2.0

0.0

-2.0

-4.0

-6.0

-8.0

1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 pr 2007 py

—— Decentralized (1)   —— National Government (2)

—— Fiscal Deficit (1+2)

* pr denotes preliminary; py denotes projected.

Source: Ministry of Finance, CONFIS.

The Colombian government has indeed been successful in 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 lower public debt than originally expected (Figure 16). For the medium term, the Ministry of Finance expects a net public debt path systematically declining toward levels close to 23 percent of GDP in ten years.

Figure 16: Net debt as a percentage of GDP, 2002-2018
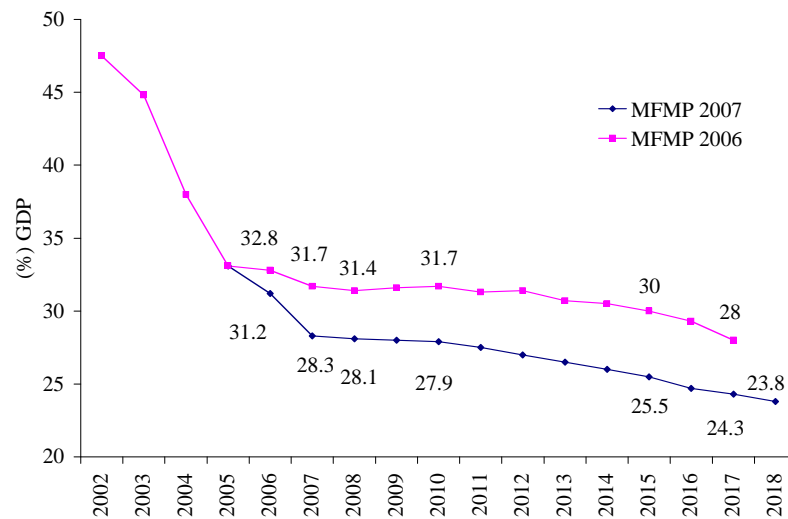
Source: Ministry of Finance.

On the external side, Table 11 shows that Colombia's vulnerabilities have followed the same trend. All indices of external sustainability have systematically improved since 2000 and are expected to continue to improve.

Table 11: External debt sustainability

	2000	2003	2006	2007	2008
External debt / GDP	46%	46%	28%	27%	27%
External debt / Net International Reserves	401%	348%	259%	222%	218%
External Debt / Current Account Income	204%	197%	119%	122%	115%
External Debt / Exports of Goods and Services	229%	242%	140%	145%	138%

Source: Central Bank of Colombia.

All this is reflected 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 for the public debt of emerging market economies.

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 (see Figure 17), there are signs of overheating pressures that have translated into higher inflation and widening of the current account deficit. To address short and medium-term issues, the government could reduce even further its expenditures.

Figure 17: Government consumption as a share of GDP
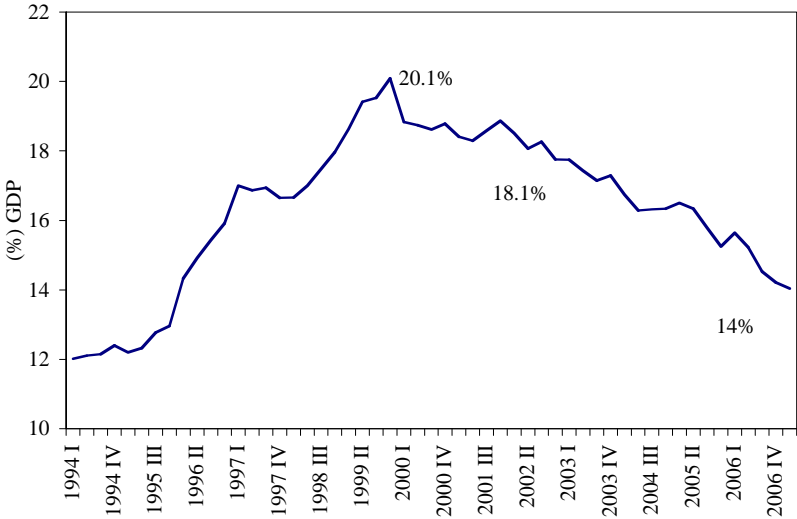
Evaluation. Macro risks are not a binding constraint for growth in Colombia.

iii.   *Market failures*

Information and coordination failures. Colombian exports have experienced sustained growth since 1970, and have been particularly dynamic since the late 1980s (see Figure 18). Based on the evolution of exports over time, it is difficult to argue that information or coordination failures have resulted in low investment due to poor entrepreneurship. Exports per capita grew at an average rate of 15.5 percent in the 1970s when the economy was growing, despite the fact that deceleration almost tripled between 1990 and 2005 (see Figure 19). 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 18: Exports, 1970-2005 (in millions of dollars)
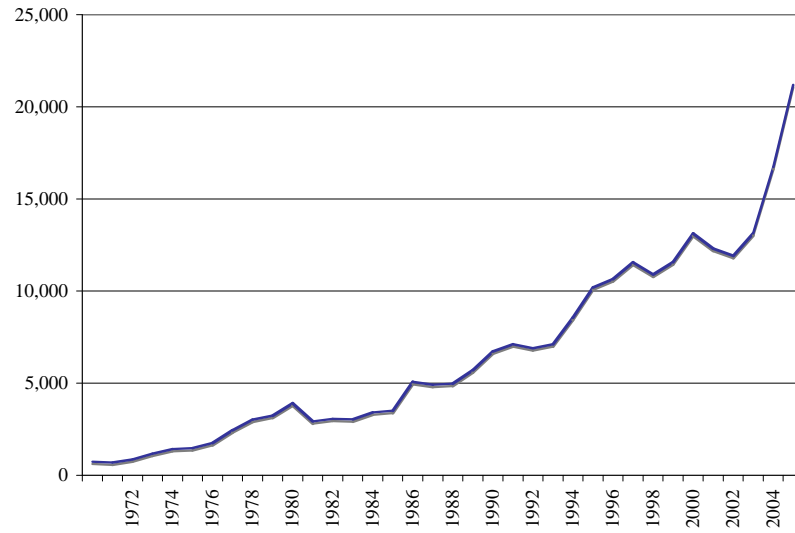
*Source*: Banco de la República de Colombia.

Figure 19: Exports per capita, 1970-2005 (in dollars)
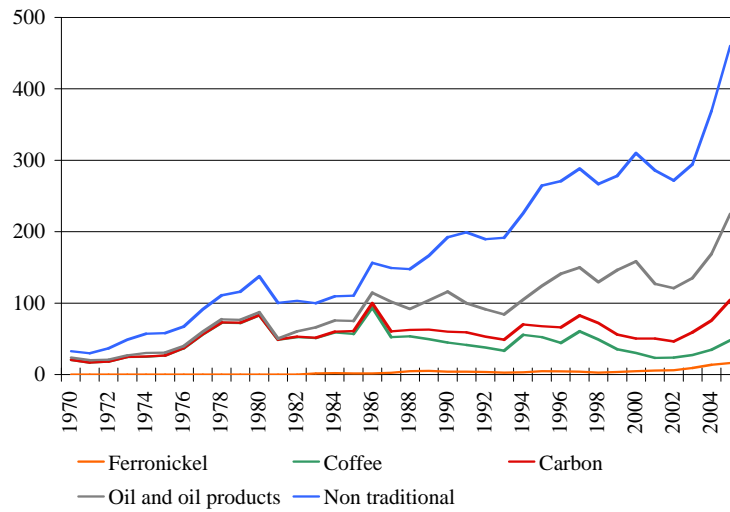
Source: DANE, Banco de la República, and calculations by the authors.

Figure 20 illustrates the re-composition of the Colombian export basket in response to the decline in coffee exports since 1986. Although overall export growth has not been enough to result in the sustained growth of exports as a share of GDP–exports as a share of GDP are currently at the 1990 level–so-called non-traditional exports[15] have grown as a ratio of traditional exports (coffee, oil and oil products, carbon, and ferronickel) from 0.4 in 1986 to 1 in 2005.

Figure 20: Composition of exports (% of GDP)
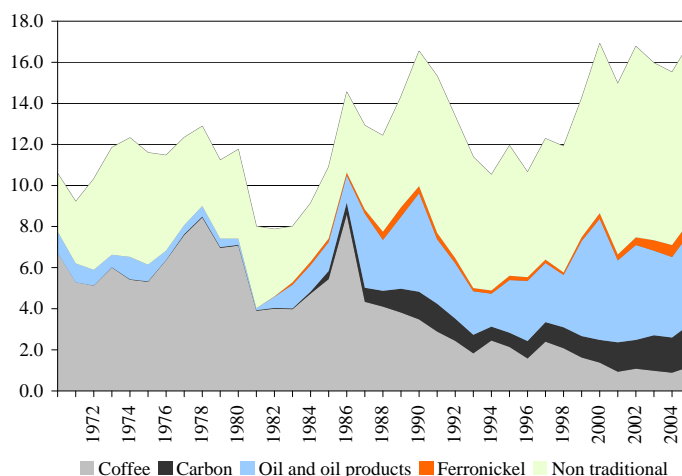
*Source*: DANE and calculations by the authors.

Average annual growth of non-traditional exports between 1970 and 2005 was 5.3 times greater than overall average annual export growth. Non-traditional exports were characterized by increasing exports of manufactures of medium and high knowledge content[16] (see

Figure 21). The share of technology-based exports increased from 20 percent of total exports to 26 percent between 1994 and 2004, driven by the dynamics of medium technology products.

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[15] Exports other than coffee, oil, or minerals.
[16] 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 toward knowledge intensive production technologies.

Figure 21: Manufacturing exports by knowledge content (% of GDP)*
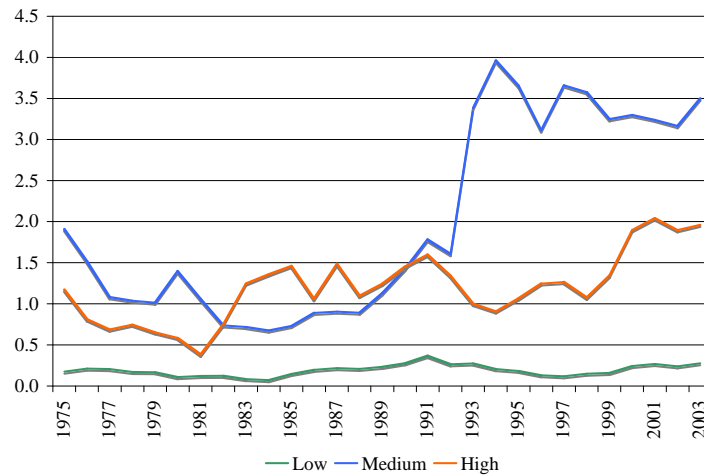
* Categories by ISIC Rev. 2. High: 351, 353, 383, 384. Medium: 311, 312, 313, 314, 341,
356. Low: 323, 331, 312.

Source: DANE.

This is confirmed by the measure of export sophistication, EXPY, proposed by Hausmann, Hwang, and Rodrik (2006),[17] according to which the level of Colombia's current export basket sophistication appears as moderate but increasing over time.

Figure 22 shows that in fact compared with other Latin American countries, Colombia's export basket looks good by this sophistication measure when considered against GDP per capita. Figure 23 confirms that progress in sophistication over time has been extremely dynamic, much more than the Latin American average and, moreover, that Colombia has been systematically closing the gap in export sophistication since 1975.

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[17] The authors develop a measure of the 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.
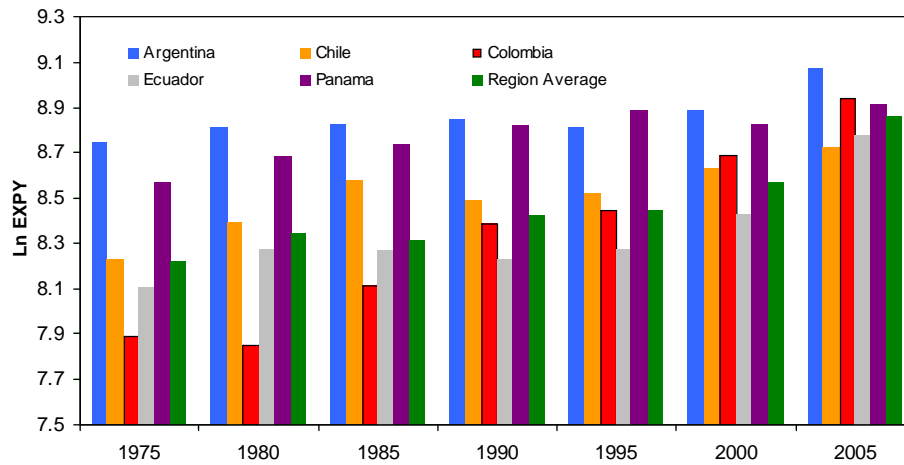
Figure 22: GDP per capita versus EXPY, 2005*
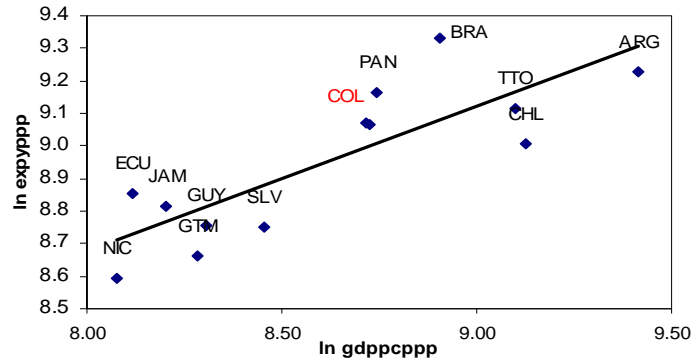
*2000 PPP dollars.

Source: Data provided by Ricardo Hausmann and calculations by the authors.

Figure 23: Colombia and other Latin American countries, EXPY*

*2000 PPP dollars.

Source: Data provided by Ricardo Hausmann and calculations by the authors.

Finally, global business environment surveys also capture the view that Colombian entrepreneurs have been relatively good at moving toward more sophisticated production (and export) baskets. With respect to business sophistication, Colombia was ranked 48 among 125 countries in the Global Competitiveness Report of 2006-07. With respect to innovation, it was ranked 57 (see Figure 24).

Figure 24: Business sophistication and innovation

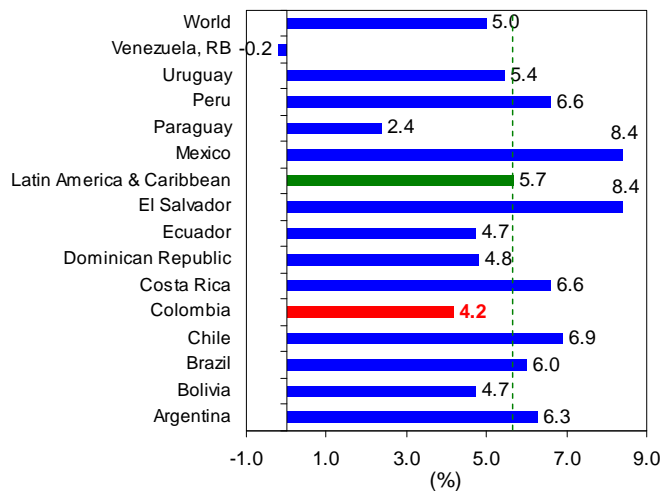|	Innovation	Business sophistication
Bolivia	2.3	3.0
Venezuela	2.8	3.5
Honduras	2.6	3.5
Ecuador	2.7	3.6
Dominican	2.7	3.7
Argentina	3.0	3.9
China	3.4	4.1
Mexico	3.3	4.3
Colombia	3.3	4.3
Peru	2.9	4.4
Brazil	3.6	4.6
Costa Rica	3.7	4.7
Chile	3.6	4.9
India	4.1	5.1
Malaysia	4.5	5.3

■ Business sophistication ■ Innovation
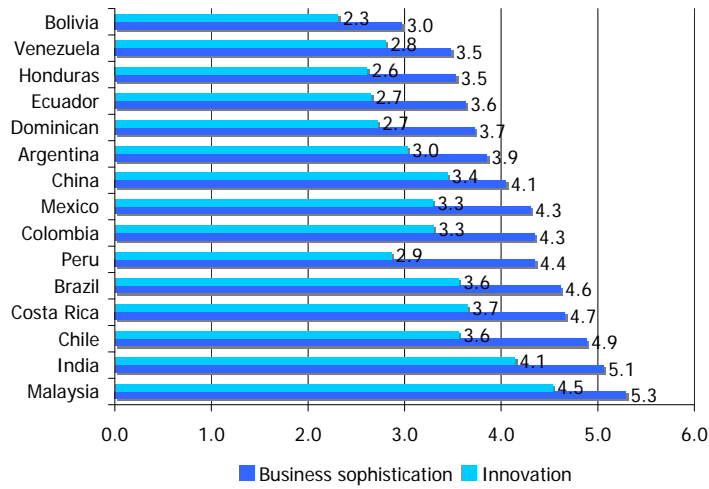
Source: Global Competitiveness Report, 2006-07.

Despite all of the above, it is also true that Colombian exports lag both in dynamism (see Figure 25) and size compared with other Latin American countries. And Colombia's exports are small relative to the size of its economy (see Hausmann and Klinger, 2007). Thus, self-discovery cannot be singled out as a binding constraint for growth. But there is still the question of whether export growth and increasing export sophistication could be critical for moving the economy to a higher growth path in the future.

Figure 25: Real exports per capita, average growth (1990–2005)

	(%)
World	5.0
Venezuela, RB	-0.2
Uruguay	5.4
Peru	6.6
Paraguay	2.4
Mexico	8.4
Latin America & Caribbean	5.7
El Salvador	8.4
Ecuador	4.7
Dominican Republic	4.8
Costa Rica	6.6
Colombia	4.2
Chile	6.9
Brazil	6.0
Bolivia	4.7
Argentina	6.3

Source: WDI, World Bank, and calculations by the authors.

Table 12 shows that Colombia's shift toward manufacturing exports has been slower than the Latin American average. Furthermore, the fact that fuels still represent a significant share of all exports implies that the Colombian economy is significantly exposed to volatility in world prices.

Table 12: Composition of exports (% of total)

	Colombia				Latin America
	Agricultural and raw materials exports	Food exports	Fuel Exports	Manufacturing exports	Manufacturing Exports
1960s	4.1	73.8	14.8	6.6	11.8
1970s	5.7	67.9	6.5	19.3	23.2
1980s	5.0	57.0	16.1	20.4	26.3
1990s	5.4	31.7	30.1	32.1	50.3
2000s	5.5	18.5	38.7	36.5	56.3

Source: Arbeláez and Meléndez (2006), calculations from WDI data.

Colombia is nonetheless in a potentially good position for improvement according to Hausmann and Klinger's (2006) *open forest* measure.[18] Although 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." Figure 26 shows Colombia's standing in 2005 relative to other Latin American countries by this measure.

Figure 26: Open forest, 2005
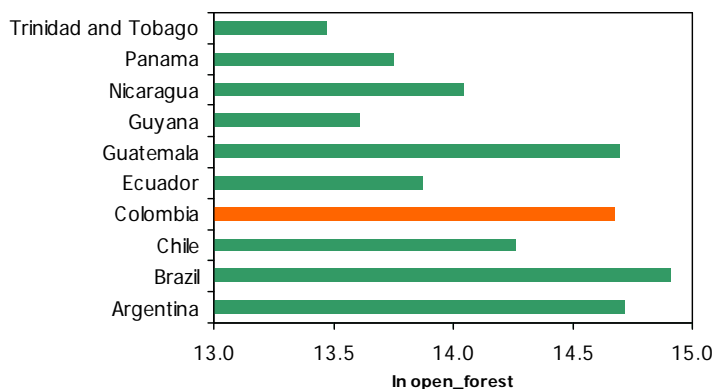
Source: Data provided by Ricardo Hausmann and calculations by the authors.

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[18] 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. The authors find it highly significant in determining the future growth of export sophistication of a country.

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

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

c.   *Low returns to economic activity - low social returns*

i.   *Poor geography / inadequate infrastructure*

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

Table 13 presents an overview of the evolution of road and railroad transport infrastructure since 1991. Progress in terms of kilometers covered between 1991 and 2005 was 19 and 35 percent, respectively. In the case of railways, the increase reflects exclusively the repair of the existent railroad network, which had been abandoned.

**Table 13: 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.

Figure 27 and Figure 28 place Colombia's land infrastructure development in the context of Latin America in terms of kilometers per capita. Numbers are not available for the same year for all countries but serve for the purpose of comparison: Colombia does not fare well by this measure.

Kilometers, however, may not be the best measure to evaluate Colombia's transport infrastructure. 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 that connects the interior with the ports and the large productive centers with each other. The network 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.

Figure 27: Road infrastructure
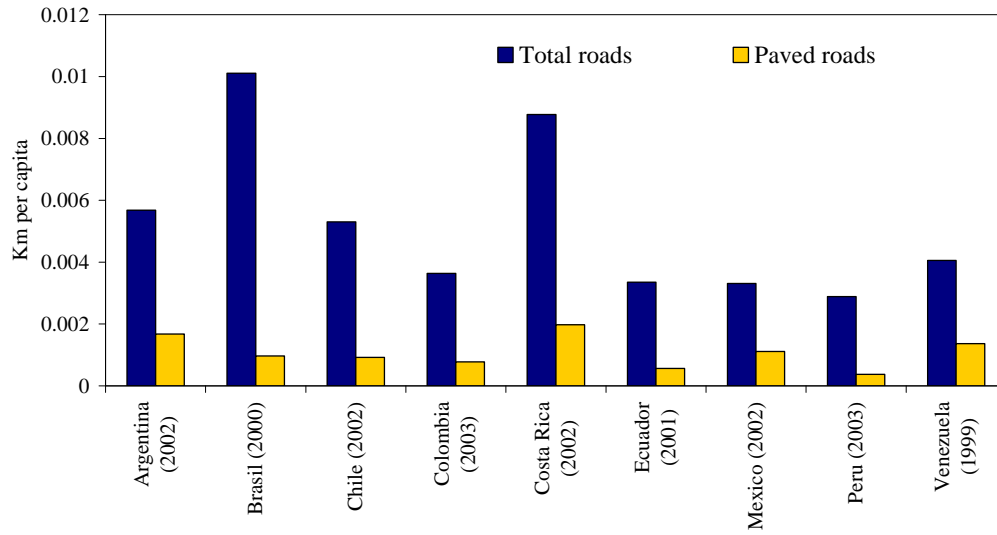
Source: CEPAL (2003).

Figure 28: Railroad infrastructure
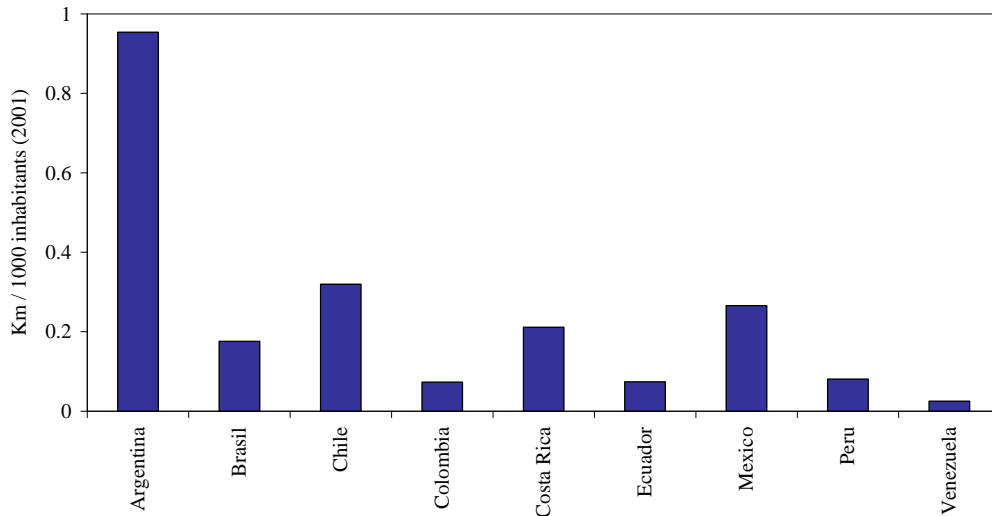
Source: CEPAL (2003).

Perhaps a better measure of overall road infrastructure development is the proportion of paved roads. Figure 27 presents the most recent measure available for the whole road network – classified as primary, secondary, and tertiary depending on the level of government that maintains it (national, departamental, or municipal).

Table 14 presents more detailed road quality information available for the national road network. It shows road expansion proportionately more concentrated in unpaved roads and

negligible progress in paved road quality since 1998. Both factors contribute to bottlenecks that translate into transport costs.

Table 14: 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 15 gives a rough idea of the dispersion of transport costs across regions that in turn reflect road infrastructure quality and/or geographic complexity.[19]

Table 15: Costs per ton, per kilometer, 2004 (2004 pesos)

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.

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[19] The history of transport costs since 1997 is being reconstructed based on information from the Ministry of Transportation of Colombia.

Transport infrastructure is much better nowadays than it was before 1990, and quality improvements under concession contracts are noteworthy. Thus, on the grounds of comparison with the situation in the 1970s alone, it is difficult to sustain that transport infrastructure development is a binding constraint on growth. But the present context of globalization is very different from that of the 1970s. 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 is whether it makes sense to stand back and reconsider the geographic development pattern of the Colombian economy. The purpose would be 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 further 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, although 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 competition has translated into immense progress in service penetration and in many cases lower prices.

Evaluation. Although geography is not a growth constraint that can be dealt with directly, exploring alternative policy routes to deal with the challenges it poses to economic growth in Colombia in a context of increasing globalization is critical. 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, as a consequence, a binding constraint to growth in Colombia. It is worthwhile to consider whether investment priorities for the improvement of transport infrastructure can be rationalized by pairing the government's

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 human capital supply constraint.

According to their cross-country data survey, Colombia stands well above the mean for Latin America in terms of schooling attainment (see Table 16). First, in Colombia the average years of schooling of male wage earners between 25 and 65 years old was 10.5, and 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 percent) with respect to the Latin American average (13.3 percent). Colombia also fares well in average years of schooling compared with 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.

Table 16: Schooling attainment and returns, by country (male wage earners, 25-65 years old)

Country	Year of Survey Data	Schooling Attainment by Country		Returns to Schooling by Country	
		Mean years of schooling	% with tertiary education	Average return (%) (OLS)	Difference between 90th and 10th quantile
Cambodia	2003-5	7.4	1.7	38.3	-44.6
China	2000	11.3	22.9	12.1	-4.7
Indonesia	2003	10.2	16.1	11.4	-0.9
Mongolia	2002	9.2	38.7	8.5	-4.5
Philippines	1999	10.1	31.3	11.6	-3.3
Singapore	1998	10.1	28.0*	11.9	4.3
Thailand	2002	9.0	17.4	15.2	-5.3
Vietnam	2001-2	10.9	27.6	7.2	-4.4
East Asia Mean		**9.8**	**23.0**	**14.5**	**-7.9**
Argentina	2003	10.0	16.4	11.0	4.2
Bolivia	2002	9.8	16.2	10.3	6.2
Brazil	2002	7.6	12.5	15.7	6.4
Chile	2003	9.3	9.5	12.0	7.0
Colombia	2003	10.5	20.3	10.4	5.5
Guatemala	2000	7.4	11.2	12.6	5.3
Mexico	2002	8.6	8.5	11.3	2.4
Venezuela	2002	8.5	11.7	9.9	3.3
Latin America Mean		**9.0**	**13.3**	**11.6**	**5.0**

Source: Patrinos et al. (2006).

With respect to returns to schooling, in the aggregate, estimates place Colombia just below the Latin American average of 11.6 percent. However, 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 with other Latin American countries (see Table 17).

Table 17: Returns by education level (%) (males, 25-65 years old)

Country	Primary	Secondary /1	Higher technical (vs. secondary)	University (vs. secondary) /2
Argentina	8.3	7.6	11.6	19.5
Bolivia	14.2	4.3	25.0	22.0
Brazil	12.4	6.9	-	28.0
Chile	13.0	11.6	-	24.4
Colombia	13.2	7.5	8.1	16.1
Guatemala	-	11.3	-	21.2
Mexico	12.4	12.0	-	17.5
Venezuela	18.6	6.6	13.5	14.7
Latin America Mean	**13.2**	**8.5**	**14.6**	**20.4**

/1 Upper Secondary (vs. primary) for Mexico and Brazil
/2 University (vs. upper secondary) for Mexico and Brazil

Source: Patrinos et al. (2006).

Returns to schooling estimations by Prada (2006) for four cross-sections of the Colombian National Household Survey yield results comparable to those of Patrinos et al. (2006). Prada shows 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 (see Table 18). Both Patrinos et al. (2006) and Prada (2006) find no shortage of qualified labor supply in Colombia.

As a complement to the evidence presented, Figure 29 presents the results of the more recent Global Competitiveness Report, in which Colombia is rated well compared with other Latin American countries with regard to the quality of higher education and training. Colombia 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. The survey shows that foreign companies rate Colombia well for labor force skills, both at the executive and technical levels.

**Table 18: Colombia: Returns by education level (%)**

Year	Average	Secondary	University
1985	9.5	6.9	16.4
1990	9.2	5.5	15.2
1995	9.6	5.2	18.5
2000	11.3	6.8	17.0
2003	10.4	7.5	16.1

1985-2000: Prada (2006), OLS regression, dependent variable "log weekly earnings". Encuesta Nacional de Hogares, males, 12-65 years.

2003: Patrinos et al. (2006), OLS regression, dependent variable "log monthly earnings". Encuesta de Calidad de Vida, males, 25-65 years.

Source: Prada (2006) and Patrinos et al. (2006).

Figure 29: Higher education and training
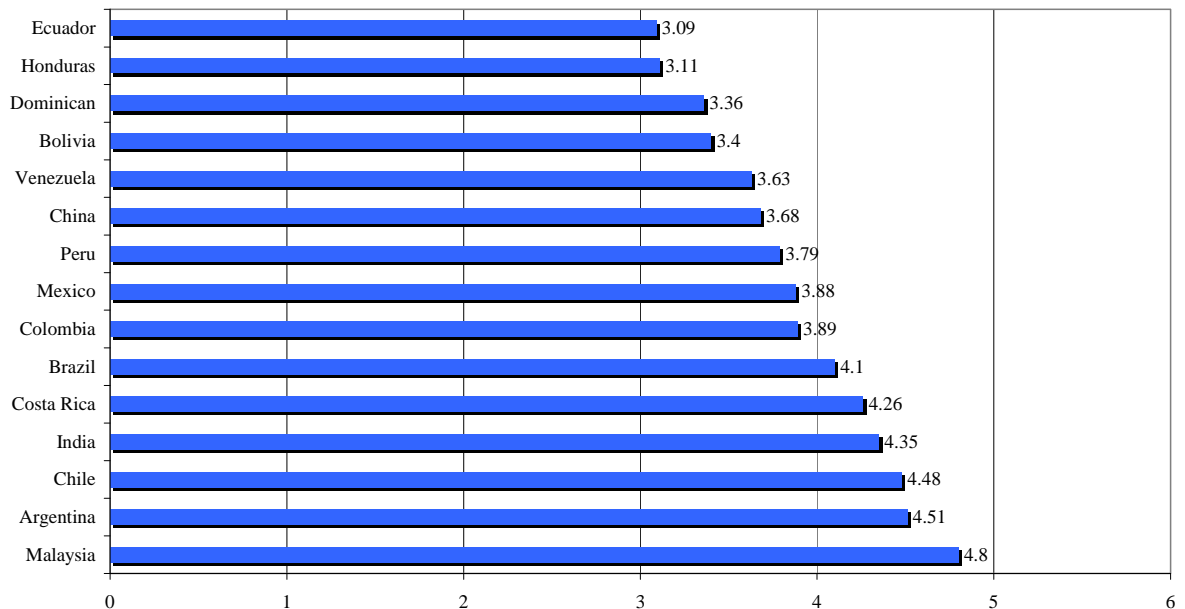
Source: Global Competitiveness Report, 2006-2007.

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 us to discard some of the potential sources of constraints to private investment in a straightforward manner. But it is inconclusive on 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 lack of transport infrastructure, and poor access to financing due to inadequate local finance. This section goes further in exploring how these variables affect investor decisions and weighting the determinants of investment and growth.

Using firm-level capital expenditure 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 dataset containing the financial statements of all firms with income or assets at or above 20,000 times the minimum wage each year in Colombia. The data, from 1995 to 2005, are from Superintendencia de Sociedades, which granted access to annexes of financial statements containing additional firm characteristics that are not publicly available, among them detailed data about 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 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, 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 pndex from the Central Bank of Colombia.

The tax administration of the Ministry of Finance, DIAN, provided firm-level tax data that were used to calculate effectively paid income tax rates. Because firm-level tax data fall under a statistical reserve regulation that prevents them 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 10).

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

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Regulated transport costs for 16 municipalities that include the larger urban centers, for 1998 to 2005, were obtained from the Ministry of Transportation. Costs per ton per kilometer traveled were calculated from each municipality to each of the four large Colombian ports– Cartagena, Buenaventura, Santa Marta, and Barranquilla–and each municipality was assigned the cost corresponding to the least expensive route connecting it to the international markets. Regretfully there is no systematic information available about transport costs between the main cities.

Finally, data on exports and imports by ISIC 4-digit sector as well as department-level GDP data are from the National Statistics Department, DANE, and interest rates are from the International Monetary Fund's *International Financial Statistics*.

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 1 at time *t* if the firm reports a positive change in plant and equipment with respect to the previous period, and zero otherwise.

The 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 the estimation. Uncertainty caused by the violent conflict is captured through two municipality-level variables: the number of violent events at time *t* and a proxy for 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 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. Reduced paramilitary violence may reflect this kind of situation. Alternatively, it may reflect the

effectiveness of government intervention in containing the conflict. Since insurance availability–which 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 caused by 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 because 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 about 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 the absence of a strong competition authority. If this is the case, the coefficient on this variable should be negative. However, if 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 dominates.[20]

To assess whether high financing costs are indeed a constraint on investment in Colombia, a one-period lag of the lending interest rate multiplied by a measure of firm 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 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 greater in locations in the interior of the country where economic activity and investment tend to concentrate, this variable is treated as endogenous to investment decisions. It is instrumented in the estimation by measures of agglomeration, such as the number of firms and the aggregate

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[20] Alternatively, an ISIC 4-digit sector dummy equal to 1 if the sector was ever questioned by the competition authority with regard 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 the Superintendencia de Industria y Comercio.

operational income of firms in the municipality. The investment decisions of firms that import or export more are likely to be affected by greater transport costs to the ports than firms whose activity is restricted to the local market. Therefore, this variable enters the estimation multiplied by an ISIC 4-digit measure of international exposure equal to imports plus exports divided by 2. It enters the estimation in logarithmic form.

Finally, because firm-level investment decisions are likely to vary across firm size and are expected to be positively correlated with 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 a macroeconomic control in exchange for time dummies. But time dummies reduce 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 poor transport infrastructure vary across groups of firms (in the same municipality or the same department) but are not firm or sector specific. There is particular interest in learning how these variables affect firm investment choices; therefore, the model specification using time dummies as controls is not used in the analysis.[21] Standard errors are robust and clustered by ISIC 4-digit sector.

ii.   *Investment level decision*

Although both decisions occur simultaneously in practice, deciding whether to make an investment at a given time is different from 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 with the timing of investment than with its magnitude (see Dixit and Pyndick, 1994).

A second econometric model explores the decision of how much to invest. Since the purpose of this exercise is still to explore the impact of the growth constraints identified in Section 3 on investment, the set of explanatory variables is largely the same. To explore positive investment decisions, negative entries resulting from actual disinvestment or accounting practices are set equal to zero. Estimation is done using two alternative Tobit models: a fixed-

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[21] Results for model specifications including time dummies are available from the authors on request.

effects Tobit regression and an instrumental variables Tobit regression. Through inclusion of firm fixed-effects, the former prevents biases and potential endogeneities arising from unobserved firm variables without variation over time. It recognizes the fact that investment projects are firm-specific and that although 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 the 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 the estimation. The second regression includes transport costs.

c. *Estimation*

i. *Investment decision*

Estimation results for the investment decision probit model are presented in Table 19. To check the robustness of the results 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 percent, and only for investment rates in excess of 20 percent.

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, which are not significant. Judging from these results, they apparently do not affect investment decisions in Colombia. The 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.

The marginal effects of all the variables become smaller as the investment definition is made more stringent and some variables lose significance. In the cases of the 10 percent and 20 percent 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 greater probability of investing than do others. This result is robust for the first two investment definitions. The marginal effects of firm size are comparable in size across models.

Table 19: 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	0.004	-0.001	0.000	0.004	0.001
	(0.023)		(0.016)		(0.019)	
Size(t-1)	0.049	0.018	0.063	0.019	0.037	0.009
	(0.029)*		(0.022)***		(0.025)	
ISIC 4-digit Herfindahl-Hirshman Index	0.075	0.028	0.053	0.016	-0.009	-0.002
	(0.092)		(0.089)		(0.089)	
ISIC 4-digit sector effective income tax rate standard deviation	-0.010	-0.004	-0.007	-0.002	-0.007	-0.002
	(0.006)*		(0.008)		(0.008)	
Violent Events	-0.051	-0.019	-0.049	-0.015	-0.041	-0.010
	(0.02)**		(0.019)**		(0.021)**	
Dummy public order restored	0.179	0.069	0.063	0.020	0.021	0.005
	(0.062)***		(0.072)		(0.069)	
Department-level real GDP growth (t-1)	0.021	0.008	0.014	0.004	0.011	0.003
	(0.003)***		(0.003)***		(0.004)***	
Lending rate (t-1) * Financial debt (t-1)	-0.008	-0.003	-0.009	-0.003	-0.007	-0.002
	(0.003)***		(0.003)***		(0.003)**	
Constant	-1.130		-1.650		-1.487	
	(0.329)***		(0.284)***		(0.298)	
Number of observations	13,160		13,160		13,163	
Log seudolikelihood	-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 20 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 show 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 roles 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 20 – Extent of investment decision

	Tobit Regressions	
Dependent variable: Log (change in capital expenditures). Made = 0 if entry < 0.	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	0.847
	(0.078)***	(0.354)**
ISIC 4-digit Herfindahl-Hirshman Index	1.372	1.249
	(0.624)**	(1.188)
ISIC 4-digit sector effective income tax rate standard deviation		-0.123
		(0.076)
Violent Events	-0.694	-0.682
	(0.14)***	(0.248)***
Dummy public order restored	1.398	2.012
	(0.428)***	(0.727)***
Department-level real GDP growth (t-1)	0.255	0.270
	(0.025)***	(0.04)***
Lending rate (t-1) * Financial debt (t-1)	-0.109	-0.090
	(0.017)***	(0.037)**
Constant	-17.187	-17.097
	(1.308)***	(4.122)***
Number of observations	18,412	13,160
Log seudolikelihood		-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 with locations in which distress from paramilitary violence is no longer present. Recall that 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 with operation under scale economies.

Tax uncertainty and transport costs are unaccounted for in this version of the model. However, they are included in the instrumental variables Tobit regression and both are 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 difficult 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 with 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 the 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 with the cessation of paramilitary violence, and not only by the reduction of

violence per se. This could reflect the critical role played by insurance markets, because insurance availability depends on the insurance sector's perceptions of public order.

Although the 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 the risk of monopolizing behaviors. It turned out that, if anything, investment decisions are facilitated by market concentration, possibly because firms that are able 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 smaller investors.

Among the sources of poor appropriability caused by micro-risks due to government failures identified in the growth diagnostics exercise, only the variables associated with 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 toward ending violence and reestablishing public order will see a reward in economic reactivation. A note of caution is in order, however, because restoration of public order that occurs under the rule of paramilitary groups may provide the security conditions to facilitate investment. The country should decide whether this is a desirable or necessary arrangement in the process of putting an end to the conflict and entering on 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. Although efforts toward 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. The

empirical results, robust across model specifications, single out the provision of access to financing at fair prices as a policy priority for economic growth. This result is relevant across country regions and independent of whether uncertainties about appropriability issues are resolved.

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