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Private Saving in Colombia

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Abstract

This paper studies the main determinants of the sharp decline in Colombia's private saving rate which accompanied the steep deterioration of the country's external current account deficit in the 1990s. The paper rejects current arguments pointing to a consumption boom and corporate behavior as the main causes of the decline. It concludes that: private consumption, explained mainly by permanent income, has only increased moderately in the 1990s; household behavior—not corporate behavior—determines private saving; and tax increases do not entirely explain the fall of private saving. Thus, reliance on external saving could be reduced by increasing public saving.

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SUMMARY

After almost twenty years of stability, Colombia's private saving rate fell sharply during the 1990s. The main hypotheses explaining the decline have focused on three factors: a consumption boom, corporate behavior, and tax increases.

This paper examines the National Accounts data and carries out an econometric test to assess the validity of these hypotheses. It arrives at three conclusions: (1) The recent decline in the private saving rate was not associated with significant increases in the share of private consumption in GNP. The econometric evidence indicates that permanent income is the only variable capturing the "euphoria" factor attributed to the structural reforms of the 1990s. This rejects the hypothesis that some structural reforms would have to be reversed to foster growth, and suggests that concerns regarding the sustainability of the balance of payments should not be associated with the behavior of private consumption. (2) Although corporate saving in Colombia declined sharply in the 1990s, total private saving is not determined by corporate behavior. Empirical evidence shows that if firms retain less earnings, households will save more by a corresponding amount. This has several implications for fiscal policy. First, a system of corporate income tax, which induces corporations to retain or distribute earnings, would have little effect on the aggregate level of capital formation. Second, reducing corporate tax rates would not stimulate total private saving and investment. Third, a more effective approach would be to introduce a "fully integrated" system of corporate and personal income tax. (3) Econometric tests show that tax increases cannot entirely explain the recent collapse of the private saving rate either. This implies that reliance on external saving could be reduced by increasing public saving. In particular, evidence suggests that cuts in public consumption should be an important element in any program of fiscal consolidation.

I. INTRODUCTION

Prior to 1990, the Colombian economy was characterized by prudent macroeconomic management reflected in moderate budget deficits, inflation in the 20–30 percent range, and in stable investment and national saving rates (Table 1). But microeconomic distortions, kept growth rates low (see, for example, World Bank, 1991; Urrutia, 1994).

Table 1. Colombia: Main Macroeconomic Data

	GNP Growth	Inflation	Public Deficit	Real Interest Rate	Real Exchange Rate	Investment Rate	National Saving Rate	External Saving Rate
1966–70	3.2	8.4	0.8	7.0	81.0	20.5	17.4	3.1
1971–75	2.7	19.0	-1.6	1.3	84.4	19.2	17.0	2.2
1976–80	4.3	25.5	0.1	4.2	74.8	18.5	20.3	-1.7
1981–85	-0.4	21.6	-4.7	11.8	73.6	20.2	16.2	4.0
1986–90	2.7	26.3	-0.3	6.2	103.9	20.2	22.1	-1.9
1991–95	1.7	24.8	2.1	7.5	99.4	20.2	19.6	0.6

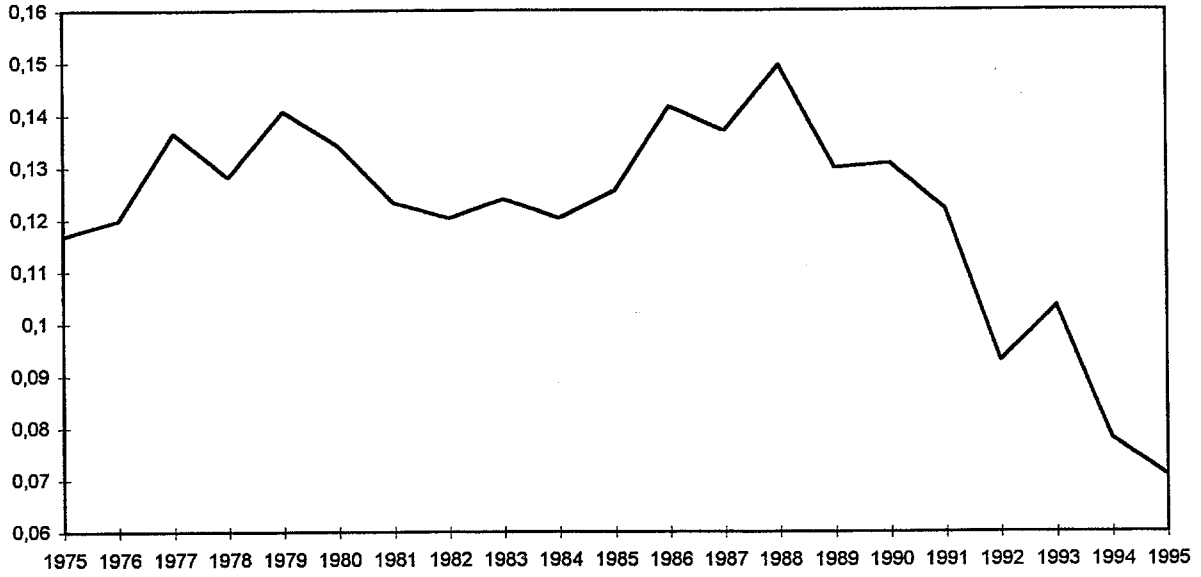
Source: National Accounts data are taken for growth, public deficit, investment, and saving. Inflation and the real exchange rate index (1986=100) are taken from Banco de la República.

In the early 1990s Colombia undertook several reforms to foster growth. These included liberalization of trade and financial systems, measures to increase labor market flexibility, and a program modernizing and privatizing public entities. Social security was reformed to increase the rate of contributions and initiate a gradual transition to a mixed system comprising privately managed pension funds and a scaled back but fully funded public pension scheme. In addition, fiscal decentralization was strengthened and measures put in place to increase tax revenues to finance higher public spending in infrastructure, security, and the social sectors.

During this period of reforms, the private saving rate fell sharply. After almost 20 years of stability, the Colombian private saving rate fell from 12.9 percent of GNP in 1989 to 7.1 percent of GNP in 1995 (Figure 1).¹ Consequently, national saving declined almost 3.5 percentage points of GNP and—together with sharp increases in gross domestic investment—was reflected in a deterioration of the current account of the balance of

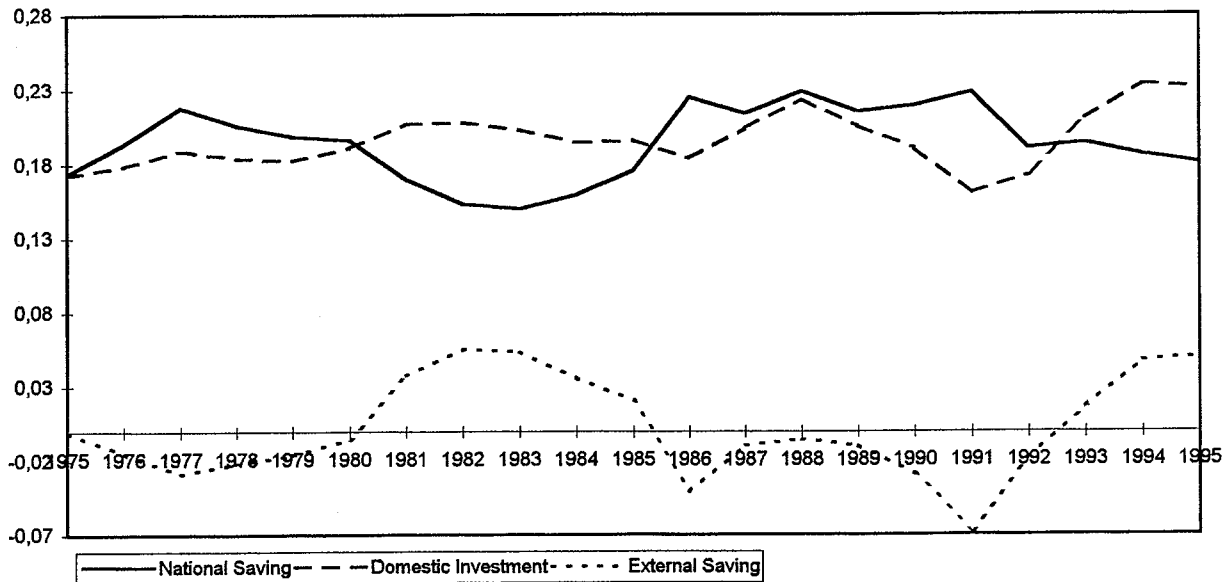
¹Preliminary evidence suggests that the decline in the private saving rate continued in 1996 and 1997. Still, since data from the National Accounts are revised frequently, this paper studies the behavior of saving only until 1995.

Figure 1. Private Saving Rate
Percentage of GNP



Source: National Accounts

Figure 2. Macroeconomic Balance
Percentage of GNP



Source: National Accounts

payments, which shifted from a surplus in 1990–92 to a deficit of about 5 of GNP in 1998 (Figure 2).²

Explaining the deterioration in private saving became a central point of debate in Colombia for three main reasons. First, if the deterioration in private saving was caused by reforms undertaken during the early 1990s—and growth was caused by saving—some reforms would have to be reversed to foster growth. Second, as private saving declined, it was argued that reliance on external saving to finance investment would introduce an element of volatility making macroeconomic management more difficult and the economy more vulnerable. Third, understanding the causes behind the drop in private saving was important to determine the sustainability of the current account deficit of the balance of payments. If the underlying cause of the drop in saving was a consumption boom caused by financial liberalization and a rise in asset prices, the sustainability of the current account deficit would be a matter of concern.

This paper seeks to understand the determinants of private saving in Colombia and the causes of the decline in the private saving rate in the 1990s and its macroeconomic implications. Section II examines whether the decline in private saving in Colombia can be attributed to a consumption boom and studies the main determinants of private consumption. Section III reviews arguments that associate the decline in the private saving rate with the behavior of corporate saving and analyzes the validity of those arguments by carrying out an econometric test. Section IV derives a model to test one of the main hypothesis of the decline of private saving in Colombia—the empirical validity of Ricardian equivalence. Section V concludes.

II. PRIVATE SAVING AND THE BEHAVIOR OF PRIVATE CONSUMPTION

A. Is a Consumption Boom Responsible for the Decline in the Private Saving Rate in Colombia?

Most economists attribute the recent fall in private saving in Colombia to a consumption boom. The literature cites in support of this argument four main factors. First, Urrutia and López (1994, 1995) attribute the consumption boom to the relaxation of liquidity constraints brought on by capital inflows and financial liberalization. Casual evidence also

²However, the National Accounts use a current account measure of saving. This is inconsistent with consumption theory, which is based on a capital account measure of saving obtained as the change in net wealth. Lopez (1997) shows that reliance on external saving to finance investment becomes less crucial in the 1990s if saving is adjusted by net capital gains from revaluations of assets and liabilities due to inflation and changes in the real exchange rate.

suggests that capital inflows and financial liberalization triggered a boom in asset prices in Colombia, producing a positive wealth effect and a decline in saving. Second, Steiner (1995) argues that the monetary policy pursued at the beginning of the 1990s was responsible for the consumption boom. He argues that in 1992, when the monetary stance was modified because of the costs and limits of a two-year sterilization policy, interest rates were drastically reduced, international reserves began to be intermediated by the financial system, and credit to the private sector increased, leading to the consumption boom. Third, Echeverry (1996) argues that the consumption boom was caused by trade liberalization, which, combined with the appreciation of the peso experienced in the first half of the 1990s, reduced the relative price of durable goods. Fourth, Cárdenas and Escobar (1997), among others, explain that the increase in consumption was a reassessment of permanent income created by the oil bonanza and the expectations associated with the structural reforms.

However, attributing the recent fall in private saving mostly to a consumption boom is inconsistent with the facts presented by the National Accounts. Although in the 1990s private consumption increased, the increase had a relatively minor effect on private saving. This can be seen in Table 2, which shows five –year averages of the adjusted private saving rate, quantifies the changes in the saving rate as a percentage of GNP, and identifies the causes behind the changes. The data shows that in the first half of the 1990s, the private saving rate deteriorated 4.3 percent of GNP and private consumption increased 0.6 percent of GNP. Thus, the increase in private consumption only explains 14 percent of the decline in the private saving rate.

This is an important result. Since the recent fall of the private saving rate is not associated with significant increases in the share of private consumption in GNP, the changes in the private saving rate during the 1990s have had little effect on the level and composition of aggregate demand.³ Still, the increase in private consumption certainly played a role in the decline of private saving. It is thus important to understand the determinants of consumption in Colombia.

³ Montiel (1997) presents a thorough review of consumption booms.

Table 2. Accounting for the Change in Private Saving

Period	Adjusted Saving Rate as Percentage of GNP	Change	Movements in Private Saving (Percentage of GNP)						
			Consumption	Capital Gains	Disposable Income				
					Tot.	GOS	TAX	Salaries	Other
1956-60	14.0	4.3	-3.3	0.6	0.4	0.7	0.1	-0.1	-0.3
1961-65	12.0	-2.0	2.3	-1.1	1.4	-2.7	0.6	3.6	-0.1
1966-70	13.0	1.0	-1.5	3.0	-3.5	-1.2	-3.1	0.7	0.1
1971-75	13.4	0.4	-1.9	-0.6	-0.9	3.7	-0.6	1.0	-5.0
1976-80	14.5	1.1	-2.4	0.5	-1.8	-3.8	-1.7	0.7	3.0
1981-85	13.6	-0.9	2.0	-0.8	1.9	-4.8	2.0	3.8	0.9
1986-90	16.7	3.1	-5.2	0.2	-2.3	-0.3	-2.5	-4.8	5.3
1991-95	12.4	-4.3	0.6	1.6	-5.4	-4.5	-1.9	1.2	-0.2

Source: National Accounts and authors calculations. In the National Accounts saving is a current account measure. To have a capital account measure of saving consistent with consumption theory, the table adjusts the current account measure by net capital gains from revaluation of assets and liabilities because of inflation and changes in the real exchange rate. For a detailed derivation of the adjusted measures, see Arrau and Oks (1992) and Schmidt-Hebbel and Servén (1996). For the case of Colombia, see López (1997).

B. Understanding the Determinants of Private Consumption in Colombia

The regressions reported in table 3 include as explanatory variables permanent income, wealth, taxes, permanent government consumption,⁴ a proxy of financial liberalization (M2/GNP), the real interest rate (r), and a dummy variable (D). The dummy variable is 1 in

⁴ Permanent income is calculated as an arithmetic average of actual and future income, two periods into the future. Permanent government consumption is constructed using an identical procedure.

Table 3. Nondurables consumption: 1966-94 ^{1/}

Variables	Eq.1	Eq.2	Eq.3	Eq.4	Eq.5	Eq. 6
Constant	1,871 [0.517]	1,8 [0.563]	2,299 [0.59]**	2,064 [0.618]	3,825 [0.457]**	3,687 [0.446]**
Log(ylp)	0,623 [0.069]**	0,588 [0.078]**				
Log(ypp)			0,708 [0.099]**	0,736 [0.115]**		
Log(ypap)					0,586 [0.065]**	0,593 [0.074]**
Log(gp)	-0,124 [0.043]**	-0,11 [0.049]**	0,11 [0.037]**	0,1 [0.038]**	0,182 [0.031]**	0,178 [0.031]**
Log(tx)	0,0359 [0.028]	0,043 [0.029]	-0,03 [0.036]	-0,033 [0.038]	-0,014 [0.029]	-0,014 [0.03]
Log(w)	0,245 [0.062]**	0,266 [0.064]**	-0,032 [0.087]	-0,027 [0.086]	-0,138 [0.079]	-0,123 [0.079]
m2/gnp	0,024 [0.095]	0,015 [0.10]	0,23 [0.10]	0,197 [0.103]	0,391 [0.081]**	0,369 [0.079]**
r-1	-0,07 [0.071]	-0,086 [0.074]	0,038 [0.085]	0,034 [0.085]	0,169 [0.076]*	0,166 [0.077]*
D1990	0,019 [0.011]		0,017 [0.013]		0,014 [0.011]	
D 1991		0,008 [0.012]		0,019 [0.015]		0,013 [0.011]
R ²	0,99	0,99	0,99	0,99	0,99	0,99
F[7,22]=	581.3**	520.77**	417.69**	414.57**	580.4**	569.85**
DW	1,17	1,12	1,4	1,39	1,87	1,86
RSS	0,004	0,0045	0,006	0,006	0,004	0,004

^{1/} All variables are in logs and in real terms except m2/gnp.

The variables are defined as follows: ylp is permanent labor income; ypp is permanent private income; ypap is permanent private income adjusted by capital gains; gp is permanent public consumption; r is the real interest rate; D are step dummies that are 1 in the 1990s.

The standard deviations are in parenthesis.

** The coefficient is significant at the 1 percent level.

* The coefficient is significant at the 5 percent level.

the 1990s and 0 in previous years.⁵ This variable should capture the effects on consumption of the reforms of the early 1990s, if they are not fully captured in the measure of future income and in the proxy of financial liberalization. Appendix I provides relevant information on the data (i.e., descriptive statistics and the correlation matrix of the regression variables).

Nondurable consumption in Colombia is mainly explained by permanent income. The coefficient on permanent income varies from 0.588 to 0.736, depending on the regression analyzed (Table 3). In the 1990s, permanent income seems to be the only variable capturing the "euphoria" factor attributed to the structural reforms undertaken during the decade. In all the regressions, the dummy variable is insignificant. Consequently, until 1995, concerns regarding the sustainability of the balance of payments could not be attributed to private consumption. Rather, the balance of payments deficit that could be attributed to private consumption was mostly reflecting private sector's borrowing against future output and/or the decumulation of previously accumulated assets (See Herrera, 1996, for a similar result).

As expected, wealth is important in explaining consumption behavior. And, when significant, the coefficient on wealth is positive and varies between 0.245 and 0.266. With regard to financial liberalization, some regressions show that relaxing liquidity constraints has a positive and significant effect on consumption. Still, this effect is not present only in the 1990s. Considerable evidence suggests that financial liberalization has been a slow and halting process in Colombia (see, among others, Ortega, 1982; Herrera, 1988).

The results also suggest that during the 1990s fiscal policy has had a negative impact on private saving in two ways.⁶ First, when significant, real interest rates have a positive effect on private consumption. And the high real interest rates of the 1990s (Table 1) could be associated with public consumption, which increased from 10 percent of GNP in 1990 to 15 percent of GNP in 1995. Second, evidence shows that private and public saving rise or fall together. In four out of six regressions, the coefficient of permanent public consumption is positive and significant, varying between 0.10 and 0.185. In this regard, the fall in the private saving rate could be explained by the rise in public consumption if it could be shown that public consumption complements private consumption.

⁵ Depending on the regression, the dummy variable is 1 starting in 1990 or 1991. If the dummy variable is introduced in 1990, it is assumed that agents formed their expectations when the government announced the structural reforms. If the dummy variable is introduced in 1991, the assumption is that agents only changed their expectations when the reforms started to take place.

⁶ Taxes do not affect consumption in the regressions presented in table 3. This result is inconsistent with the test developed in section IV which finds that the timing of taxes matter, rejecting the Ricardian equivalence proposition.

III. CORPORATE BEHAVIOR AND PRIVATE SAVING

Corporate behavior has been given as an important explanation for the decline of private saving in Colombia. This section analyzes the consistency of this argument against the stylized facts. It discusses the policy implications of rejecting corporate behavior as an explanation of private saving, and uses an econometric test to assess the importance of corporate behavior as a determinant of private saving in Colombia.

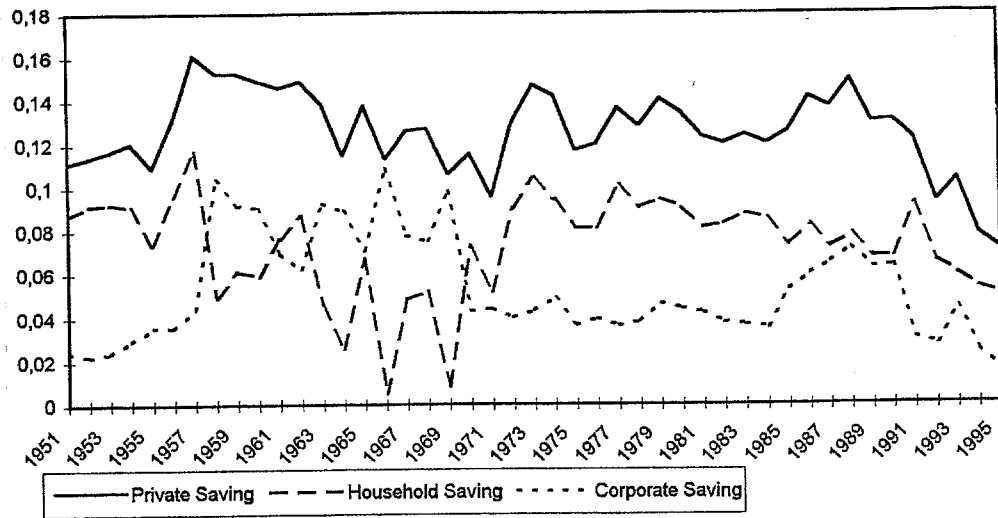
A. Corporate Behavior: Stylized Facts and Policy Implications

Sanchez et. al (1996) conclude that in the 1990s Colombia's corporate saving declined because of a fall in corporate profits associated with fiercer external competition brought about by trade reform. This hypothesis is appealing because it is consistent with the stylized facts presented by the National Accounts. In the early 1990s the stability of the private saving rate was disrupted when corporate saving declined sharply—from 50 percent of private saving during 1985-89, to 24 percent of private saving in 1990-95 (Figure 3). The decline was explained mainly by a deterioration of the gross operating surplus (GOS) generated by corporations. Consequently, and also as a result of tax increases and declines in the GOS generated by households,⁷ private disposable income fell 5.4 percent of GNP, explaining 126 percent of the decline in the private saving rate in the 1990s (Table 2).

Still, with the exception of the period 1993–95, declines (increases) in corporate saving have been usually compensated by increases (declines) in household saving, reflecting the fact that firms are ultimately owned by households (Figure 3). This suggests that the distinction between household saving and firm saving in Colombia is, to some extent, arbitrary: if firms retain more earnings, households will save less by a corresponding amount. In other words, households “pierce” the corporate veil, so that total private saving (the sum of household and corporate saving) is basically determined by household behavior.

⁷ The GOS generated by households includes profits of small industries that are not formal corporations (e.g. family industries, barbershops, shoe repair shops). It also includes income from home rental and from rent imputed to the home owner for living in the home (López, 1997).

Figure 3. Components of Private Saving
Percentage of GNP



Source: National Accounts

There are several implications for fiscal policy when households pierce the corporate veil. First, a system of corporate income taxation, which induces corporations to retain or distribute earnings, would have little effect on aggregate level of capital formation (Feldstein, 1973; Poterba, 1991). Second, tax incentives, such as lower corporate tax rates, would reduce household saving and thus would not stimulate total private saving and investment. Third, in place of the first two, another option could eventually be advocated: a “fully integrated” system of corporate and personal income taxation. In this arrangement, the incomes of all entities would be attributed to the individuals who are their ultimate owners, and income tax would be collected from owners at the relevant rates, depending on their total income.⁸ It is thus important to test the absence of a corporate veil.

B. Testing the Absence of a Corporate Veil

A possible way to test the absence of a corporate veil is to study household behavior when firm’s perspective earnings are unchanged but policy on dividends is modified. If firm’s expected profits are unchanged but higher dividends are paid, corporate saving fall. In this case, the corporate veil is pierced if there is an increase in household saving equal to the decline in corporate saving. This behavior occurs if dividends do not increase consumption—agents realize that their higher income is offset by a decline of the same amount in the firm’s value (i.e., their wealth).

⁸This system has a disadvantage in that it is much more difficult to administer than the classical system that taxes both individuals and legal entities (Chua, 1995; Chua and King, 1995; King, 1995).

To construct a test that indicates consumer behavior after a change in dividend policy, it is useful to start from Hall (1978). Assuming a representative agent seeking to maximize the expected discounted utility function of consumption, a CES utility function with an intertemporal elasticity of consumption σ , and a discount rate of time preferences δ , the optimal consumption path must follow the following Euler equation:

$$E \left[\left(\frac{C_t}{C_{t-1}} \right)^{1/\sigma} \left(\frac{1+\delta}{1+r} \right) \right] = 1 \quad (1)$$

where E is the expectations operator, C_t is real per capita consumption, and r is the after tax rate of return to savings.

Rewriting the expectation in stochastic form, applying logarithms to both sides of the equation, and renaming the $\log(C_t/C_{t-1})$ by Δc_t , it is possible to obtain:

$$\Delta c_t = \mu + \epsilon_t \quad (2)$$

where $\mu = -\sigma \log[1+\delta/1+r]$ and ϵ_t can be interpreted as the innovation or surprise in permanent income. This equation implies that no variable other than current consumption could be significant in predicting future consumption.

The permanent income hypothesis under rational expectations (PIREH) has been rejected several times in the literature (e.g, Flavin, 1981; Deaton, 1987). The existence of imperfect capital markets is perhaps the most common explanation for the failure of the PIREH. If some agents are liquidity constrained, consumption will be excessively sensitive to current income—anticipated changes in income have some explanatory value when modeling consumption. Using this evidence, dividing consumers between liquidity and non—liquidity constrained, and assuming that liquidity constrained consumers spend their entire income, equation 2 takes the following form (Campbell and Mankiw, 1989):

$$\Delta c_t = (1-\lambda) \mu + \lambda \Delta y_t^e + (1-\lambda) \epsilon_t \quad (3)$$

where Δy_t^e is the logarithm of expected income growth and λ is related to the percentage of private income accrued by liquidity constrained households. Consequently, if $\lambda > 0$, the PIREH is rejected—and λ should be higher in countries where capital markets are more imperfect (Jappelli and Pagano, 1989).

To test the absence of a corporate veil, expected income growth of liquidity constrained consumers should be divided between expected change in dividends and expected change in income net of dividends (Auerbach and Hassett, 1990). In other words, the test is:

$$\Delta c_t = (1 - \lambda) \mu + \lambda \Delta ynd_t^e + \eta \Delta d_t^e + (1 - \lambda) \epsilon_t \quad (4)$$

where Δd_t^e and Δynd_t^e are expected changes in dividends and income net of dividends of liquidity constrained consumers, respectively. The coefficient η is related to the percentage of dividends accrued by liquidity constrained consumers. If the corporate veil is pierced, $\eta = 0$. Changes in expected dividends should not affect consumption—agents realize that their higher (lower) income is offset by a decline (increase) of the same amount in the firm's value (i.e., their wealth).

Two points should be highlighted about this test. First, the test is biased toward rejecting $\eta = 0$. Indeed, absent liquidity constraints, η would be zero unless the corporate veil exists. However, if liquidity constraints are binding, expected dividends would affect the consumption of liquidity constrained households: households could relax their constraints by selling their stock. Consequently, the coefficient η would be different from zero even if agents pierce the corporate veil. Second, the test indicates the degree of capital concentration. If there is high capital concentration, most stocks should be held by non—liquidity constrained agents, implying that η should be small when capital concentration is high.

C. Is the Corporate Veil Pierced in Colombia?

It is likely that Colombian households have pierced the corporate veil. The evidence is shown in Table 4. Each column in the table presents the results of the test in equation 4 using four definitions of income. The coefficient λ , which measures the response of consumption to changes in income, varies between 0.51 and 0.79, depending on the definition of income used, and is always significantly different from zero. Moreover, capital concentration seems to be very high in Colombia. Indeed, η varies between 0.03 and 0.05 when positive, although the coefficient is not significantly different from zero. This implies that changes in dividends have not affected consumption, indicating that households have pierced the corporate veil in Colombia.

Why is η not different from zero if there are liquidity constraints? There are two explanations. First, η could still be different from zero, but the test may not have been able to capture it because the regression was carried out using a small sample size.⁹ This possibility would be increased if there were signs of misspecification, but this is not the case. As the last

⁹ The corporate veil test was performed for the period 1974—95 since the dividend series in Colombia have only been available since 1971.

Table 4. Testing the Corporate Veil ^{1/}

Coefficients and Statistics ^{3/}	Income ^{2/}			
	YPA	YP	YD	YL
λ	0.507 (1.604)	0.647 (2.278)	0.794 (2.053)	0.576 (3.245)
η	0.050	0.036	-0.091	0.030
Constant	0.007 (1.425)	0.009 (1.417)	0.005 (0.534)	0.005 (0.832)
σ	0.018	0.016	0.016	0.015
Residual Sum of Squares	0.005	0.004	0.004	0.004
Sargan Specification Test $\chi^2(2)$	6.443	5.291	6.340	1.049
Testing B=0 $\chi^2(2)$	4.218	7.171	6.179	12.863
ARE(1) χ^1	0.114	0.114	0.547	0.033
Heteroscedasticity F (4.12)	0.609	1.0621	2.123	0.487
Normality $\chi^2(2)$	0.520	0.468	0.196	0.846

^{1/} The test was carried out using instrumental variables for the period 1974–95. The instruments used were second and third lags of adjusted private income (YPA), and third lags of dividends and real interest rates. T statistics are shown in parenthesis.

^{2/} YPA is adjusted private disposable income; YP is private disposable income as measured in the National Accounts; YD is households disposable income; YL is labor income net of taxes. In this test, these four variables are net of dividends. Appendix II has a detailed definition of the variables.

^{3/} λ is the coefficient measuring the response of consumption to changes in income; η is a coefficient related to the percentage of dividends accrued by liquidity constrained consumers; σ is the standard error of the regression; RSS is the residual sum of squares.

three rows of Table 4 suggest, the errors in the regression are not serially correlated, are homoscedastic, and appear to be normal.¹⁰ Second, if η is zero and there are liquidity constraints, it could be an indication that capital concentration in Colombia is so high that almost all stocks are held by non—liquidity constrained agents.

The second explanation suggests that the corporate veil can be pierced not only when agents have perfect information and rational expectations, but also when saving is carried out by the same agents who own and manage most of the capital stock (i.e., when capital concentration is high). This is likely to be the case in Colombia, where capital concentration is among the highest in the world, stock transactions represent a small percentage of GDP, and a concentration index measuring the main ten stocks as percentage of total transactions varies between 65 percent and 80 percent (*Misión del Mercado de Capitales*, 1996). Moreover, it is likely that this capital is owned by the very few households that save. Indeed, two thirds of total private saving is carried out by 5 percent of household heads, while the 77 percent less wealthy individuals save nothing at all (Ramirez, 1992).¹¹

Besides the implications for fiscal policy mentioned in section III.A, the finding that households pierce the corporate veil provides support for the tax measures undertaken during the last decade in Colombia. The finding indicates that total capital accumulation was not reduced when several distortions affecting firms financing decisions were eliminated. In particular, when the following measures were taken to reduce disincentives to issuing stocks: removal of the double taxation of dividends, gradual elimination of the deductible inflationary component of interest, removal of property tax on stocks, and a significant reduction of

¹⁰ The test was carried out using instrumental variables because the innovation in permanent income, ϵ_p , is correlated with the innovation in income—OLS would have produced inconsistent estimates. Moreover, to avoid the presence of MA (1) in the errors induced by time aggregation in variables (Working, 1960), the instruments were dated t-2 and t-3. The instruments chosen were the second and third lags of adjusted disposable income, and the third lags of dividends and real interest rates. The instruments are significant according to Sargan's test, as shown in table 4.

¹¹From Ramirez's work it would be possible to conclude that 40 percent of total income belongs to the 77 percent less wealthy individuals who presumably do not have access to credit. This result contrasts with the estimate obtained by López (1994), which suggests that between 61 percent and 75 percent of Colombian households disposable income is earned by liquidity constrained consumers. This difference has important policy implications. Financial liberalization would have significant impact on private saving if approximately 70 percent of total income is accrued by liquidity constrained consumers. But if a high number of individuals have no capital and insufficient income to save, financial liberalization would have to be very strong to have a significant effect on household savings.

capital gain taxes on stocks. Still, in Colombia only large firms have access to the stock market. It is thus possible to conclude that reducing disincentives to the issuance of stocks favored mostly large corporations and might have increased capital concentration.¹²

IV. THE INTERRELATIONS BETWEEN PRIVATE AND PUBLIC SAVING

Another hypothesis seeking to explain the recent fall in the private saving rate in Colombia focuses on the empirical validity of the Ricardian equivalence. This explanation seems counterintuitive in the case of a developing country. After all, Barro's (1974) proposition requires the presence of conditions such as strong intergenerational links, certainty about future taxes and incomes and no restrictions on borrowing. But, as argued in the previous section, some of those conditions exist in Colombia, where a large percentage of private saving is carried out by the wealthiest individuals. These agents usually bequest their savings to their heirs, are not bound by liquidity constraints, and can smooth their consumption over their lifecycle. In view of Colombia's conditions, it seems relevant to further investigate private saving response to fiscal policy.

A. Tax Policy and Private Saving: Interrelations and Stylized Facts

The recent fall in the private saving rate in Colombia has also been attributed to the increase in taxes in the 1990s. At a theoretical level, this hypothesis would be consistent with the Ricardian equivalence proposition, whereby fiscal policy would not be a matter of concern. According to this view, successive generations are closely linked through gifts and bequests, and individuals are assumed to be rational, forward looking, and not subject to liquidity constraints. If there is a fiscal deficit (surplus), Ricardian consumers will react today to future taxes (transfers) paid (received) by their descendants. Thus, changes in public saving are offset by opposite movements in private saving.

At an empirical level, most evidence for developing countries reject the pure form of Ricardian equivalence (Haque and Montiel, 1989; Corbo and Schmidt-Hebbel, 1991; Easterly, Rodríguez and Schmidt-Hebbel, 1994; Edwards, 1994, 1995). Although the evidence does not show conclusively by how much public saving is offset by private saving, the magnitude seems to be between 0.4 and 0.6 (see Schmidt-Hebbel, Servén, and Solimano, 1996, for a

¹² According to a recent report (*Misión de Mercado de Capitales*, 1996), small firms do not go to the stock market because of fear of losing control over their property. It seems more plausible, however, that it is not property that small corporations fear, but the knowledge that their capital will not be appropriately valued in a stock market where the forces of supply and demand are almost non-existent.

review of this literature). In case of Colombia, recent evidence suggests that private saving offsets approximately 0.5 of the change in public saving (Cárdenas and Escobar, 1997), but other results could not reject the validity of the Ricardian equivalence proposition (Carrasquilla and Rincón, 1990).

The stylized facts suggest that increases in public saving have been compensated to some extent by a fall in private saving since the late 1980s (Figure 4). Moreover, Table 5 shows that the increase in the public saving rate has been the result of a substantial rise in disposable income of the public sector caused, in part, by tax increments.¹³ It is thus relevant to examine the importance of tax increases in explaining the fall in private saving by using an econometric test.

B. Testing Private Saving Response to Fiscal Policy

A possible way to test private saving response to fiscal policy is to study household behavior when tax changes occur but the stream of government spending is not modified. Under these conditions, tax increases will raise public saving. In this case, Ricardian equivalence is not rejected if private saving decline by a corresponding amount. This behavior occurs if taxes do not affect consumption—agents realize that their expected permanent income gross of taxes has not changed.¹⁴ Still, the timing of taxes will affect consumption if individuals have lower discount rates than Ricardian consumers, and/or a proportion of private saving is carried out by liquidity constrained agents.

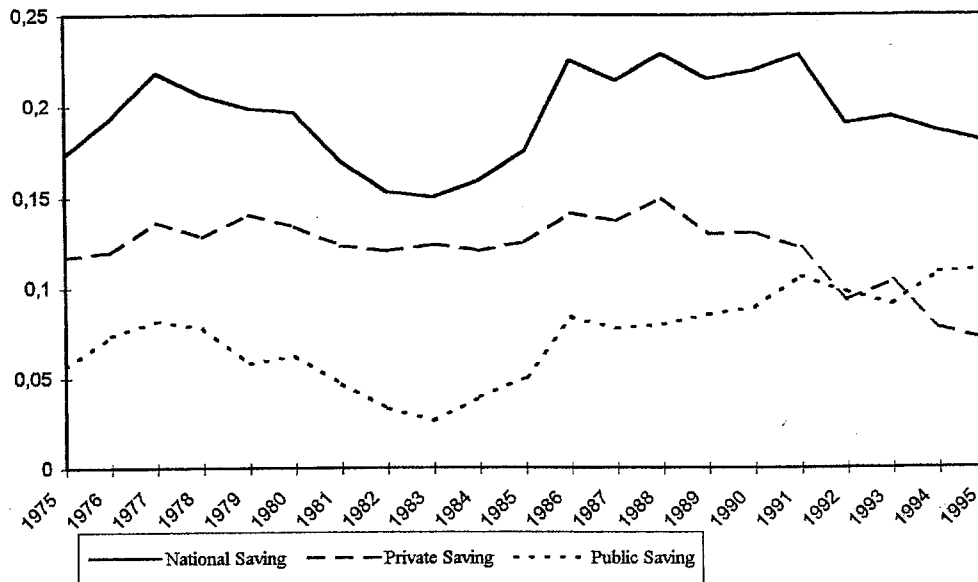
A test to study consumer behavior after a tax change can be derived assuming a representative agent with rational behavior, a CES utility function, and households that incorporate the government budget constraint when selecting their optimal consumption path. The intertemporal maximization problem is the following:

$$\underset{C_t, \forall t}{Max} \quad E_t \left[\sum_{i=0}^{\infty} u_{t+i}(c_t) \right] \quad (5)$$

¹³ This evidence contradicts the traditional belief that there was a sharp drop in public saving in the first half of the 1990s. Nonetheless, it hides the emergence of underlying balances created by the 1991 constitution. Indeed, increased revenue sharing under the process of fiscal decentralization mandated by the constitution contributed to the emergence of underlying imbalances as the central government continued to bear much of its original expenditure responsibilities.

¹⁴In other words, Ricardian consumers treat bonds redeemed as equivalent to the present value of the implied decline in future taxes.

Figure 4. National, Private and Public Saving
Percentage of GNP



Source: National Accounts

Table 5. Accounting for the Change in Public Saving

Period	Adjusted Saving Rate (Percentage of GNP)	Movements in Public Saving (Percentage of GNP)						
		Change	Explanations					Other
			Consumption	Capital	Disposable Income			
			Gains	Total	GOS	TAX		
1956-60	4.8	0.7	-0.5	0.7	-0.5	0.1	-0.1	-0.5
1961-65	2.1	-2.7	0.8	-0.5	-1.4	-0.1	-0.6	-0.7
1966-70	5.9	3.8	0.6	1.0	3.4	0.1	3.1	0.2
1971-75	4.8	-1.1	2.2	0.2	0.9	-0.5	0.6	0.8
1976-80	7.9	3.1	-0.8	0.4	1.9	-0.8	1.7	1.0
1981-85	1.0	-6.9	2.2	-3.0	-1.7	1.7	-2.0	-1.4
1986-90	3.8	2.8	-0.7	-0.1	2.2	2.5	2.5	-2.8
1991-95	11.6	7.8	2.1	3.7	6.2	1.0	1.9	3.3

Source: National Accounts and authors calculations. In the National Accounts saving is a current account measure. To have a capital account measure of saving consistent with consumption theory, this table adjusts the current account measure by net capital gains from revaluation of assets and liabilities due to inflation and changes in the real exchange rate. For a detailed derivation of the adjusted measures, see Arrau and Oks (1992) and Schmidt-Hebbel and Servén (1996). For the case of Colombia, see López (1997).

where c_t is private real consumption and E is the expectations operator. If agents are faced with perfect capital markets and the government uses taxes to finance deficits, the consumer intertemporal budget constraint is:

$$\sum_{i=0}^{\infty} \frac{c_{t+i}}{(1+r)^i} = \sum_{i=0}^{\infty} \left(\frac{y_{t+i} - tx_{t+i} + TR_{t+1}}{(1+r)^i} \right) + B_t + Wp_t \quad (6)^{15}$$

for every state of the world and every t . According to the budget constraint, discounted future consumption is equal to households permanent labor income net of taxes plus their current wealth in assets, Wp_t ,¹⁶ and government bonds, B_t . Taxes, tx , include the inflation tax (Barro, 1979) and are net of government transfers, TR .

To test the Ricardian equivalence proposition, households must incorporate the government budget constraint:

$$\sum_{i=0}^{\infty} \frac{(tx_{t+i} - TR_{t+i})}{(1+r)^i} = \sum \frac{g_{t+i}}{(1+r)^i} + B_t - Wg_t \quad (7)^{17}$$

indicating that present discounted total taxes net of transfers are equal to present discounted government consumption plus government current debt and wealth. Notice that the introduction of government's wealth, Wg , brings the government budget constraint closer to the definition of fiscal deficit (i.e., public savings minus public investment, where public investment is measured as the change in public wealth).

¹⁵The following condition must be satisfied in order to add all the intertemporal budget constraints:

$$\lim_{T \rightarrow \infty} \frac{(B_{T+1} + Wp_{T+1})}{(1+r)^T} = \lim_{T \rightarrow \infty} \sum_{i=0}^T \left(\frac{y_{t+i} - c_{t+i} - tx_{t+i} + TR_{t+1}}{(1+r)^i} \right) + B_t + Wp_t$$

with the limit on the right going to zero. Conditions for this can be found in Barro (1974) and others.

¹⁶ As shown in appendix II, the measure of wealth comprises only physical capital.

¹⁷ For this hold, the following condition has to be assumed:

$$\lim_{T \rightarrow \infty} ((B_t - Wg_t) / (1+r)^T) = 0$$

Solving for consumption under Hall's (1978) permanent income hypothesis model¹⁸ it is possible to get:

$$E_t c_{t+s} = \alpha + \left(\frac{1+r}{1+\delta} \right) E_t c_{t+s-1} \quad (8)^{19}$$

Multiplying by $(1+r)^{-s}$, substituting in and solving for c_{t+s} for every s larger than one, gives the transformed equation:

$$c_t = \gamma + \beta \sum_{i=1}^{\infty} (1+r)^{-i} E_t [y_{t+i}] - \beta \sum_{i=1}^{\infty} (1+r)^{-i} E_t [tx_{t+i} - TR_{t+i}] + \beta B_{t+1} + \beta Wp_t \quad (9)^{20}$$

Substituting in the government budget constraint the equation changes as follows:

$$c_t = \gamma + \beta \sum_{i=1}^{\infty} (1+r)^{-i} E_t [y_{t+i}] - \beta \sum_{i=1}^{\infty} (1+r)^{-i} E_t [g_{t+i}] + \beta W g_{t+1} + \beta Wp_{t+1} \quad (10)$$

Adding private and public wealth, and assuming that government consumption and household labor income gross of taxes follow a random walk with drift, the model could be simplified to:²¹

$$c_t = \beta_0 + \beta_1 y_t + \beta_2 g_t + \beta_3 W_t + \beta_4 tx_t + \varepsilon_t \quad (11)$$

¹⁸ Using a Taylor approximation that assumes small changes in marginal utility across time of the CES utility function.

¹⁹ Approximating around c and if consumption does not vary much

$$\alpha = c^{-1/\sigma} (1-1/\sigma)(r - \delta) / (1+r).$$

²⁰ $\gamma = \alpha \beta (1+r)^2 / (r^2 + 2r - \delta - 1)$ and $\beta = (1+r) / (1+\delta)$.

²¹ In other words, the following process for income and government consumption are assumed: $y_t = \zeta + \eta y_{t-1} + \varepsilon_t$ and $g_t = \mu + \rho g_{t-1} + \varepsilon_t$. Among others, similar strategies have been followed by Flavin (1981) and Muellbauer and Murphy (1989).

This equation nests several hypothesis regarding households behavior after a tax change under a very simplified process for expected government expenditures and permanent income gross of taxes. The timing of taxes affects consumption when there are liquidity constraints ($\beta_4 < 0$), and/or forward-looking consumers do not expect to bear the burden of deferred taxes ($\beta_1 < \beta_2$). In other words, Ricardian equivalence will not be rejected when liquidity constraints are absent ($\beta_4 = 0$) and strong intergenerational links are present ($\beta_1 < \beta_2$).

C. What is the Response of Private Saving to Fiscal Policy in Colombia?

The collapse of private savings during 1989–95 cannot be entirely explained by tax increases. The timing of taxes matter; consequently, private savings do not completely offset public savings. To reach this conclusion several steps were taken.

First, equation 11 was log-linearized. Second, the order of integration for the variables were determined. Table 6 lists Dickey-Fuller statistics for private consumption, household disposable income gross of taxes,²² wealth, taxes, and government consumption. Unit root tests were given for the original variables (all in logs, in real terms, and per capita), and for their changes. According to the Dickey-Fuller statistics, all variables appear to be integrated of order 1, and the estimated roots for the levels are close to unity.

Table 6. Statistics for Testing Unit Roots^{1/}

Null	Variable	Log C	Log Y	Log T	Log G	Log YD	Log W
I(1)	β	0.9813	0.9760	0.9542	0.9690	0.9603	0.9883
	t-adf(k)	(-1.0497)	(-1.1078)	(-1.1098)	(-1.1757)	(-1.2707)	(-1.0975)
	k	0	2	0	1	1	1
I(2)	β	-0.0369	-0.0187	-0.2265	0.2587	-0.4596	0.5041
	t-adf(k)	(-4.0956)**	(-5.8133)**	(-7.0759)**	(-4.6813)**	(-9.574)**	(-3.9046)**
	k	3	0	0	0	0	0

^{1/}For a variable x, the augmented Dickey-Fuller (1981) statistic ADF(k) is the ratio from the regression:

$$\Delta x_t = \pi x_{t-1} + \sum_{i=1}^k \Theta_i \Delta x_{t-i} + c + \gamma t + \varepsilon_t$$

The critical values are those calculated by Mackinnon (1991). If there is no trend and the constant is included, the critical value at 5 percent is: -2.94, 1% = -3.612. The estimation period is 1958-95.

²² Using disposable income rather than labor income induces double counting in the return on wealth (Flavin, 1981).

The third step was to test if the log-linear form of equation 11 was cointegrated. Since all the variables have a unit root, the existence of a cointegrating vector is a necessary condition for any sensible interpretation of the results (Engle and Granger, 1987). Table 7 reports Johansen's maximum likelihood statistics for a fourth-order VAR,²³ and shows that the maximal eigenvalue and trace eigenvalue statistics reject the null of no cointegration (even with a degree of freedom adjustment). The null hypothesis in favor of more than one cointegrating vector is also rejected when these statistics are adjusted by degrees of freedom. This table also reports the standardized eigenvectors (β') and adjustment coefficients (α). The first row of β' is the estimated cointegrated vector:

$$C = 0.61Y - 0.15G + 0.29W - 0.04TX \quad (12)$$

All the coefficients in the cointegrated vector have their anticipated signs. The long-run elasticity of household disposable income is similar to those found in the literature, but the elasticity of wealth is higher than traditional estimates for developed countries (for example, see Currie, Holly and Scott, 1990).²⁴ As can be seen, the timing of taxes matter in economic terms. A 10 percent increase in the growth rate of government consumption (i.e., in expected growth rate of taxes), diminishes the growth rate of private consumption by 1.5 percent. In addition, a 25 percent rise in the growth rate of current taxes lowers the growth rate of private consumption by 0.4 percent.

The rejection of Ricardian equivalence is confirmed statistically. In fact, the joint test restricting $\beta_4=0$ and $\beta_1 = -\beta_2$ is strongly rejected (penultimate row of Table 7). Moreover, the last row of Table 7 reports chi-squared statistics for testing the significance of individual variables in the cointegrating vector. Each variable is significant, although taxes are very close to a 95% critical value.

²³ To ensure a reasonable power of the Johansen procedure, the lag order of the VAR was tested. Starting with a fifth-order VAR, the F test and Shwartz information criteria only accepted to simplify to a fourth-order VAR.

²⁴ This result can not be compared with that obtained for other developing countries. Studies for these countries usually ignore the effects of total wealth upon consumption because of the presence of imperfect capital markets (Ghatak and Ghatak, 1996). Still, even if credit restrictions are binding, wealth should affect consumption since it helps wealthy individuals to smooth their consumption over their life spans. Different forms of wealth have different propensities to consume depending on their liquidity (Pisarrides, 1976).

Table 7. A Cointegration Analysis of Consumption 1957-95 ^{1/}

Eigenvalue	0.890785	0.580879	0.5548007	0.3714325	0.180129	
Null hypothesis	$r = 0$	$r \leq 1$	$r \leq 2$	$r \leq 3$	$r \leq 4$	
λ_{\max}	81.93**	32.18*	29.94*	17.18	7.349	
λ_{\max}^a	37.65*	14.78	13.76	7.893	3.376	
95% critical value	37.5	31.5	25.5	19	12.2	
λ_{trace}	168.6**	86.64**	54.57**	24.53	7.349	
λ_{trace}^a	77.46	39.81	25.03	11.2776	3.376	
95% critical value	87.3	63.0	42.4	25.3	12.2	
Standardized Eigenvectors β						
Variables	C	G	Y	T	W	
	1.000	0.15875	-0.61019	0.03868	-0.28612	
	-6.803	1.000	5.3	-0.86422	-2.345	
	3.360	-0.48530	1.000	-0.56362	-3.634	
	-0.87352	0.028169	-1.563	1.000	1.182	
	-4.11	-1.116	4.155	-0.86087	1.000	
Standardized Eigenvectors α						
C	-0.96871	0.0021633	-0.0556	0.0040491	-0.061165	
G	-0.89258	-0.27754	0.27565	0.54508	-0.017318	
Y	0.31003	-0.016834	-0.23921	0.095526	-0.10699	
T	1.469	-0.36051	-0.72964	-0.42195	-0.20427	
W	0.38947	0.018927	0.06591	0.0037514	-0.020298	
Weak Exogeneity Test Statistic						{G,T,Y,W}
$\chi^2_{(1)}$	7.0878	0.497398	0.18435	0.46345	4.8038	9.0317
p-value	(0.0078)**	(0.4806)	(0.6677)	(0.4901)	(0.0284)*	(0.06073)
Multivariate Statistic for Testing Stationarity						
$\chi^2_{(4)}$	62.205	65.558	68.934	68.109	68.734	
p-value	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**	
Null: Ricardian Equivalence $\{\beta T = 0 \ \& \ \beta Y = -\beta G\}$						
$\chi^2_{(1)}(\text{p-value})$	33.395 / (0.00)**					
Variable	C	G	Y	T	W	
β restricted by Null	1	-0.63973	-0.63973	0	0.011399	
Statistics for Testing Significance of a Given Variable						
Variable	Trend	G	Y	T	W	
$\chi^2_{(1)}$	40.233	40.874	37.294	4.0449	18.397	
p-value	(0.00)**	(0.00)**	(0.00)**	(0.0447)	(0.00)**	

^{1/}Vector Pormanteau 5 lags = 143.96; ARE 1-2 $F(2,23) = 1.2879$ (0.2725); Normality $\chi^2(10) = 42.148$ (0.00)
 The vector autoregression includes four lags on each variable (C, Y, W, T, G), an unrestricted constant term, and a trend restricted to lay in the cointegration space.

The statistics λ_{\max} and λ_{trace} are the Johansen's maximal eigenvalue and trace eigenvalue statistics for testing cointegration. The null hypothesis is in terms of the cointegration rank. The critical values are taken from Osterwald- Lenum (1992, Table 1).

**The null is rejected at a 1% significance level. * The null is rejected at a 5% significance level.

V. CONCLUSIONS

The main causes for the decline in Colombia's private saving rate in the 1990s are usually associated with a consumption boom, corporate behavior, and tax increases. However, by examining the stylized facts, this paper shows that the fall of the private saving rate had little effect on the level and composition of aggregate demand. Similarly, the recent decline in private saving appears not to have been associated with significant increases in the share of private consumption in GNP: indeed, the rise in private consumption only explained 14 percent of the fall in the private saving rate.

Moreover, the econometric evidence indicates that permanent income is the only variable capturing the euphoria factor attributed to the structural reforms undertaken during the 1990s. This finding has two important policy implications. First, it rejects the hypothesis that some structural reforms would have to be reversed to foster growth. After all, the increase in private consumption is mainly determined by expectations of higher growth in the future. Second, the significance of permanent income indicates that concerns regarding the sustainability of the balance of payments should not be associated with the behavior of private consumption. Indeed, the balance of payments deficit that could be attributed to private consumption mostly reflected private sector borrowing against future output and/or the decumulation of previously accumulated assets.

This paper further shows that total private saving is not determined by corporate behavior. Although corporate saving in Colombia declined sharply in the 1990s, evidence indicates that the fall in firms' retained earnings is expected to be eventually compensated by an increase in household saving. This result has two important policy implications. First, it suggests that the recent decline in private saving cannot be reversed through tax incentives to stimulate corporate saving. Second, it shows that total capital accumulation did not decline during the last decade, when tax measures eliminated several disincentives to the issuance of stocks. This is positive. Still, in Colombia only large firms have access to the stock market. Thus, reducing disincentives to issuing stocks has favored mostly large corporations and might have increased capital concentration.

Finally, the collapse of private saving during 1989-95 cannot be entirely explained by tax increases. The timing of taxes matter; consequently, private saving do not completely offset public saving. This implies that a stabilization program based on reducing the fiscal deficit would improve national saving and lower reliance on external saving to finance investment. In the case of Colombia, cuts in public consumption should be an important element in any program of fiscal consolidation. Public consumption in Colombia increased from 10 percent of GDP in 1990 to 15 percent of GDP in 1995, which also explains part of the rise in private consumption.

Table A.1. Descriptive Statistics of the variables included in Table 3.

Consumption Nondurables Log(cnd)		Permanent Labor Income Log (ylp)		Total Taxes Net of Transfers Log (tx)	
Mean	9,44	Mean	8,91	Mean	7,89
Standard Error	0,03	Standard Error	0,04	Standard Error	0,06
Median	9,51	Median	9,03	Median	7,91
Standard Deviation	0,17	Standard Deviation	0,24	Standard Deviation	0,33
Sample Variance	0,03	Sample Variance	0,06	Sample Variance	0,11
Kurtosis	-0,77	Kurtosis	-0,52	Kurtosis	-0,56
Skewness	-0,62	Skewness	-0,77	Skewness	-0,28
Minimum	9,10	Minimum	8,41	Minimum	7,19
Maximum	9,69	Maximum	9,23	Maximum	8,46
Sum	292,58	Sum	276,15	Sum	244,71
Permanent Private Income Log (ypp)		Adjusted Private Permanent Income Log (ypap)		Wealth Log (w)	
Mean	9,48	Mean	9,50	Mean	10,83
Standard Error	0,03	Standard Error	0,03	Standard Error	0,04
Median	9,56	Median	9,58	Median	10,85
Standard Deviation	0,15	Standard Deviation	0,15	Standard Deviation	0,21
Sample Variance	0,02	Sample Variance	0,02	Sample Variance	0,04
Kurtosis	-0,61	Kurtosis	-0,63	Kurtosis	-1,02
Skewness	-0,86	Skewness	-0,87	Skewness	-0,12
Minimum	9,20	Minimum	9,18	Minimum	10,47
Maximum	9,66	Maximum	9,67	Maximum	11,22
Sum	293,96	Sum	294,50	Sum	335,88
Real Interest Rate r-1		M3/GNP		Permanent Government Consumption Log (gp)	
Mean	0,06	Mean	0,29	Mean	7,55
Standard Error	0,01	Standard Error	0,01	Standard Error	0,07
Median	0,06	Median	0,31	Median	7,66
Standard Deviation	0,04	Standard Deviation	0,07	Standard Deviation	0,37
Sample Variance	0,00	Sample Variance	0,00	Sample Variance	0,14
Kurtosis	-0,71	Kurtosis	-0,81	Kurtosis	-0,12
Skewness	-0,20	Skewness	-0,63	Skewness	-0,37
Minimum	-0,02	Minimum	0,17	Minimum	6,77
Maximum	0,13	Maximum	0,40	Maximum	8,24
Sum	1,75	Sum	8,97	Sum	234,02

Table A.2. Correlation Matrix of the Variables Included in Table 3

	Log (cnd)	Log (y1p)	Log (tx)	Log (gp)	m2/gnp	r-1	Log (ypp)	Log (ypap)	Log (w)
Log (cnd)	100,00%								
Log (y1p)	99,33%	100,00%							
Log (tx)	95,07%	93,87%	100,00%						
Log (gp)	96,66%	96,96%	94,42%	100,00%					
m2/gnp	90,24%	89,63%	84,07%	82,88%	100,00%				
r-1	26,10%	27,91%	15,90%	25,66%	25,77%	100,00%			
Log (ypp)	98,69%	98,78%	92,20%	93,92%	90,37%	25,77%	100,00%		
Log (ypap)	96,87%	96,72%	90,24%	90,27%	86,91%	21,87%	98,91%	100,00%	
Log (w)	97,45%	96,07%	93,91%	97,01%	86,65%	30,43%	94,81%	92,46%	100,00%

The Data

For the period 1970–95 the series are taken from “Departamento Nacional de Estadística” (DANE). Before 1970 the series are taken from López (1997). López uses a procedure that allows joining the National Accounts produced by DANE with those produced by El Banco de la República for the period 1950–80. The advantage of this procedure is that it maintains the basic macroeconomic identities. However, it does not solve the problem of coverage implicit in the period 1950–69. The main variables are defined as follows:

P: National Accounts deflator for private consumption.

c: C/P, where C is nominal per capita total private consumption.

cnd: CND/P, where CND is nominal per capita private consumption of nondurables. This variable has only been available since 1965.

g: G/P, where G is nominal per capita public consumption.

yl: YL/P, where YL is nominal per capita labor income. The test of corporate veil uses this variable net of taxes using the procedure suggested by Blinder and Deaton (1985).

yd: YD/P, where YD is nominal per capita households disposable income (which includes households GOS, rents, and dividends).

yp: YP/P, where YP is nominal per capita private disposable income (YD plus corporate’s retained earnings).

ypa: YPA/P, where YPA is nominal per capita private disposable income adjusted by capital gains. This variable is taken from López (1997).

w: W/P, where W is nominal per capita wealth. The stock of wealth was calculated using Harberger’s (1969) methodology. Total wealth was calculated assuming different depreciation rates for each component of total investment. A simplifying assumption was made and total investment was divided between infrastructure-buildings and machinery-vehicles. The former was depreciated at 2.5 percent (40 years) and the latter at 7 percent (15 years). These percentages were weighted every year by the participation of the component on total nominal investment. Finally, the original stock was constructed backwards from the average investment between 1950 and 1952. It was assumed that in those years net capital accumulation was growing at 5 percent.

d: D/P, where D are nominal per capita dividends. This variable is only available since 1970. In the test of the corporate veil, real dividends per capita were subtracted from the relevant measure of real per capita income.

tx: TX/P, where TX are nominal per capita total taxes. In the test of Ricardian equivalence, this variable was added to households real per capita income.

$r: R - \pi$. R is the nominal interest rate and π is the inflation rate. For the period 1950–79 it is the so-called market rate (Carrizosa, 1985). For the period 1980–93 it is the interest rate on three-month deposits on the *certificado de deposito a término* (CDT) and is taken from El Banco de la República.

POB: Population. This variable is taken from Victor Vergara, Departamento Nacional de Planeación, Unidad de Desarrollo Social, Division de Indicadores y Orientacion del Gasto Social.

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