THE COLOMBIAN ECONOMY IN THE NINETIES: CAPITAL FLOWS AND FOREIGN EXCHANGE REGIMES

Paper presented at the Conference on "Critical Issues in Financial Reform: Latin Américan-Caribbean and Canadian Perspectives", University of Toronto, June 1-2, 2000

Leonardo Villar
Hernán Rincón[*]

I. INTRODUCTION

During several decades, Colombia was considered a very special case among Latin American countries due to its outstanding economic stability. Despite deep political problems and a long tradition of violence, economic growth was sustained. Colombia experienced moderate economic cycles and a steady GDP growth (Banco Interamericano de Desarrollo, 1995). Between 1931 and 1998, the rate of growth of GDP was always positive and inflation was kept under control, although the latter one remained at moderately high levels, between 20% and 30%, during almost three decades starting in the early seventies. Quoting Dornbusch and Fisher (1992), Colombia was, "par excellence, the country of moderate inflation".

Before the nineties, Colombian economic stability was well grounded in a relatively orthodox fiscal policy, a monetary policy that was complacent with inertial inflation but which had a high degree of aversion against inflation rates above 30%, and a foreign exchange policy that gave heavy weight to real exchange rate stability among other policy objectives.

Lately, however, things have changed sharply. In 1998 GDP growth was less than 1% and in 1999 Colombia experienced one of the deepest recessions in Latin America, with a reduction 4.5% in GDP. In real terms, per-capita income in 1999 was about 7% below its level in 1997 (Table 2.1). It is possible to identify two different processes behind this crisis:

(i) First of all, a rapid increase in public expenditure which followed the 1991 Constitutional Reform. During the first part of that process, the increase in government spending was matched by a similar increase in tax revenues, associated with the temporary boom in economic activity. Later, however, it led to levels of central-government deficit that had never been observed in the Colombian economy.

(ii) Second, a deep cycle of private sector indebtedness, which financed an unprecedented boom in consumption and investment. The levels of private expenditure rose very rapidly between 1992 and 1994. Between 1995 and 1997, due to an important increase in real interest rates, private expenditure started to decline but debt levels continued their upward trend. That trend ended only in 1998 and

[*] Leonardo Villar is Co-Director at the Board of Directors and Hernán Rincón is Researcher of the Department of Economic Research of the Banco de la República of Colombia. The views expressed are those of the authors and not of the Banco de la República or of its Board of Directors.

1999, in an abrupt and dramatic way, when both foreign and domestic lenders realized that private debt had gone much farther than the capacity to pay.

Both the rapid process of fiscal deterioration and the excess of private expenditure over disposable income were greatly facilitated by huge foreign capital inflows. They allowed the economy to keep a large and increasing current account deficit of the balance of payments between 1992 and 1997. At the same time, they implied that, during most of the nineties, the foreign exchange market was characterized by excess supply of dollars and by a pressure towards a real appreciation of the Colombian peso. A vicious circle was then created. The process of appreciation of the peso promoted a further increase in expenditure and made it apparently cheaper to increase foreign indebtedness and to bring foreign assets into the country.

Given the environment described above, the dilemmas for policy makers were extremely large in the nineties, in particular for a central bank that had become independent in 1991 and that had been assigned by the new Constitution the mandate of bringing inflation down. With monetary and foreign exchange policies as its tools, the newly independent central bank had to work in a context of a recently liberalized economy --both in terms of foreign trade and in terms of access to international capital markets—and was forced to take expansionary fiscal policy as a given.

The main purpose of this paper is to describe and analyze Colombian foreign exchange policy during the nineties. In particular, we will focus on the dilemmas faced by the monetary authorities in choosing exchange rate regimes and in setting regulations on foreign capital inflows.

The paper is organized in five chapters, including this introduction. The second one presents an overview of the behavior of the most important macroeconomic variables during the nineties. The third chapter describes the development of the foreign exchange regime, going from the crawling-peg system that characterized the Colombian economy between 1967 and the beginning of the nineties, to the free floating regime that was put in place in September 1999. We also describe the process of liberalization of foreign capital flows that took place during the nineties as well as the introduction of price-based capital account regulations that, in a similar fashion to the Chilean case, were maintained in Colombia since 1993. We defend the idea that those regulations were effective, although, of course, they were just a marginal element affecting the whole macroeconomic environment. They contributed to reduce the economic vulnerability associated with short-term foreign capital flows. Also, we will argue that they helped authorities in managing the trade off between avoiding an excessive appreciation of the domestic currency and, at the same time, keeping control on the domestic interest rates in order to discourage an excessive level of expenditure in the economy. The fourth chapter presents a simple econometric model for the joint determination of real interest rates and the real exchange rate. The model is estimated with Colombian data for the period 1993-1999 and is useful for the evaluation of the effectiveness of the price-based capital account regulations from the perspective described above. Finally, the fifth chapter presents some conclusions and draws the main lessons from the Colombian experience with exchange rate regimes and with the regulation of foreign capital flows during the nineties.

TABLE 2.1

COLOMBIA: SELECTED MACROECONOMIC INDICATORS, 1990-1999

	1990	1991	1992	1993	1994	1995	1996	1997	1998 e/	1999 e/
Population (million)	35,0	35,7	36,4	37,1	37,8	38,5	39,3	40,1	40,8	41,6
Per-capita GDP (dollars of 1999)	1.887,9	1.887,0	1.924,5	1.988,8	2.064,3	2.132,6	2.134,7	2.165,6	2.135,3	2.002,3
GDP Growth Rate (%)	4,3	2,0	4,0	5,4	5,8	5,2	2,1	3,4	0,5	-4,5
Aggregate Demand (Absorption) Growth rate (%)	2,3	0,1	10,0	12,1	12,0	5,8	1,1	4,0	-1,1	-8,3
Tradable sectors: value added growth rate (%) a/	5,1	2,1	0,7	2,0	1,3	5,8	-0,6	0,9	0,7	-6,2
CPI Inflation Rate(%)										
end of period	32,4	26,8	25,1	22,6	22,6	19,5	21,6	17,7	16,7	9,2
period average	29,1	30,5	27,1	22,5	22,9	20,9	20,8	18,5	18,7	11,0
Average Real Exchange Rate(index 1994=100) b/	127,0	128,3	118,2	112,9	100,0	99,2	92,0	87,3	94,5	104,8
Average Nominal 90-Days Deposit Interes Rate (%) c/	36,4	37,2	26,7	25,8	29,4	32,3	31,1	24,1	32,6	21,3
Average Real 90-Days Deposit Interes Rate (%) d/	5,7	5,2	-0,3	2,7	5,3	9,5	8,6	4,7	11,7	9,3

a/ Rate of growth of the value added by agriculture and coffee, mining and manufacturing.

b/ Computed on a PPP basis using CPI as deflactor and nominal exchange rate against 20 currencies, weighted by the importance of each contry in bilateral trade with Colombia.

c/ Average passive rate for 90-days deposits

d/ Deflated by average CPI inflation rate.

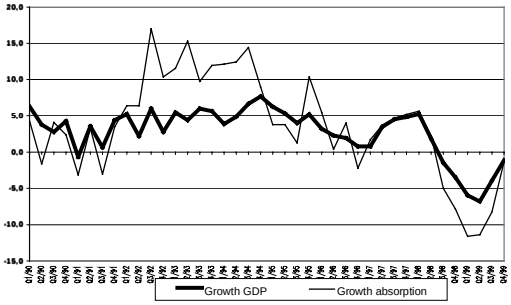
e/ Preliminary estimates

Original data from Banco de la República.

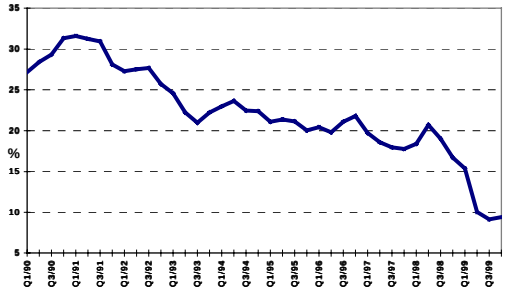
Sources: DANE and National Departament of Planning.

Graph 2.1
COLOMBIA: MACROECONOMIC INDICATORS
QUARTERLY DATA, 1990.1- 1999.4

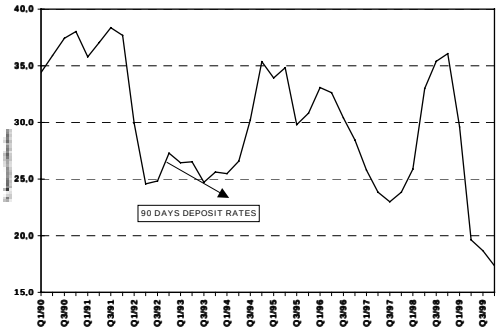
A. GDP AND ABSORPTION
(Yearly growth rates)



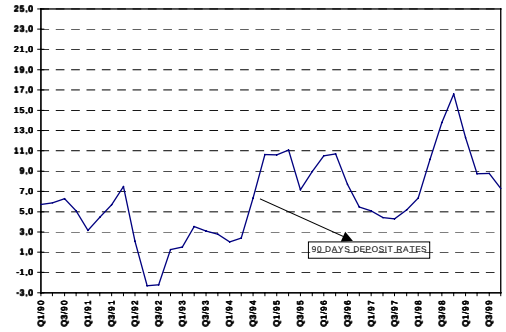
B. CPI - INFLATION RATE



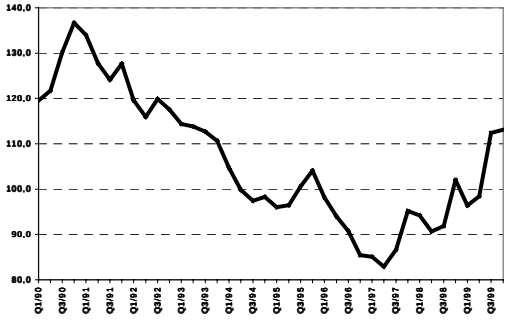
C. PASIVE AVERAGE NOMINAL INTEREST RATES



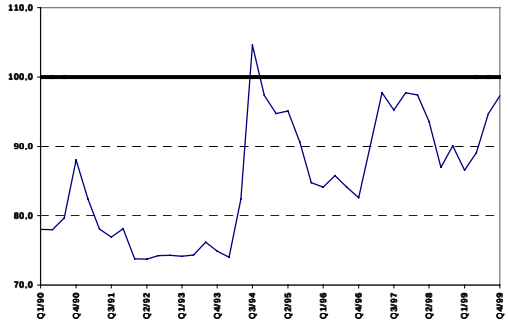
D. PASIVE AVERAGE REAL INTEREST RATES 1/



E. REAL EXCHANGE RATE INDEX 1/
(1994=100)



F. TERMS OF TRADE (PX/PM)
(Base: Average 1980-1989 =100)



1/ Deflated for CPI

Source: DANE, National Departament of Planning and Banco de la República - Subgerencia de Estudios Económicos

II. THE COLOMBIAN MACROECONOMY IN THE NINETIES: AN OVERVIEW

A. Aggregate demand: The Business Cycle and the Current Account of the Balance of Payments.

During the nineties, Colombia experienced a complete and deep economic cycle. In fact, looking at panel A of Graph 2.1, it is possible to identify three main periods during the decade:

1. First, the period between 1990 and 1991, which was characterized by a decline in economic activity. In fact, economic performance had been quite satisfactory in the second half of the eighties, with a yearly average of GDP growth of 4.7% between 1985 and 1989. In the first quarter of 1990, the annual rate of GDP growth had gone even higher and was above 6%. After that, however, dynamism of the economy slowed down. In 1991, economic growth was only 2% and in the first quarter of that year the figure was negative for the first time in any quarter since 1983.[1]

2. The second period goes from the last quarter of 1991 to the end of 1994. It is characterized by a very rapid recovery from the previous decline, with very high and increasing rates of GDP growth. By the end of this period the yearly rate of GDP growth was 7.7%.

3. The third period starts in 1995. It is characterized by a deterioration in economic activity that ends in the deep recession of 1999. It is noticeable, however, that the process of deterioration in this period was temporarily interrupted in 1997, when there was a significant although short-lived recovery.

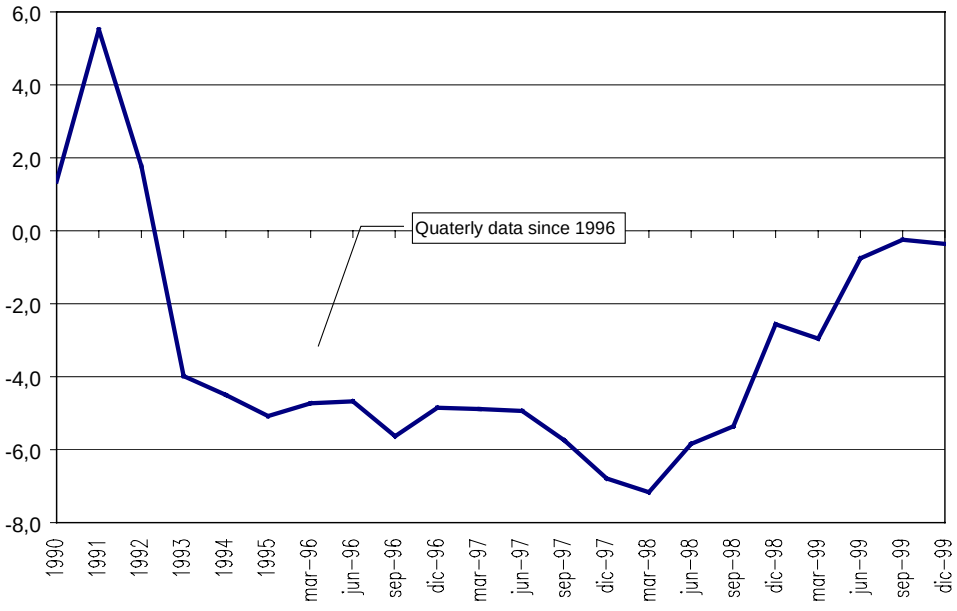
The cycle in economic activity, as measured by GDP growth, coincides thoroughly with a very similar cycle in aggregate demand by domestic residents (absorption), which is, however, much more pronounced. This can also be appreciated in panel A of Graph 2.1. In the first period, the rate of growth of absorption shows large fluctuations, but is quite low in average. This is reflected in an improvement of the current account of the balance of payments (Graph 2.2). Although it was experiencing a surplus since the beginning of the decade, the magnitude of that surplus went up sharply and reached 5.5% of GDP in 1991. Some analysts have argued that such a huge surplus may in part be explained by hidden capital inflows which, due to the foreign exchange controls that still existed in that period, came as over-invoicing of exports or under-invoicing of imports. There is no doubt, however, that total real absorption decreased and that the current account balance improved significantly in that period.

[1] It must be noticed here that official quarterly data for GDP are only available since 1994. Quarterly data presented in Graph 2.1.A for the period 1990-1994 are estimated by the National Department of Planning, on the basis of yearly GDP data produced by DANE and of quarterly data for other variables. Hence, large fluctuations in GDP and Absorption growth rates for this period may partially be explained by methodology problems.

In the second period, the annual rate of growth of aggregate demand by domestic residents recovered very rapidly, going up from a negative rate in the third quarter of 1991 to a yearly rate of 17% in the third quarter of 1992. After that, the yearly rate of growth of aggregate demand was higher than 9% for any particular quarter, until the end of 1994. In average, during these two years and a half, the yearly rate of growth of absorption reached 12.4%.

In the third period, which starts in 1995, there was a negative trend in the rate of growth of aggregate demand. However, it is possible to identify two phases in this period. Until the second quarter of 1998, the rate of growth of absorption was not too different from that of GDP. This implies that the rapid process of deterioration of the current account of the previous period did not continue at the same pace. Still, the current account deficit continued to be quite high, with yearly figures around 5% and 6% of GDP between 1995 and 1998. Only in the second phase of this period, after the second quarter of 1998, aggregate demand presented a strong downward adjustment, which coincided with the deep recession in economic activity mentioned above. The rate of growth of absorption was negative in more than 6% in the second half of 1998 and in more than 8% during 1999. As a result, there was a very rapid adjustment of the current account deficit of the balance of payments, which went down from 5.3% of GDP in 1998 to 1.4% of GDP in 1999.

Graph 2.2
Current Account of the Balance of Payments
As a Share of GDP



Source: Banco de la República - Subgerencia de Estudios Económicos - Sector

B. Interest rates in the nineties.

From the previous section, it is clear that the economic cycle in Colombia during the nineties, as measured by GDP growth, coincides with an even more pronounced cycle in absorption. Based on that fact, it might be argued that it was a demand- and not a supply-ridden cycle.

In turn, the ample cycle in aggregate demand coincides with a very similar cycle, although in the opposite direction, of interest rates.[2] This can be seen in the panels C and D of Graph 2.1. In fact, the first period identified in the previous section, characterized by a decline in economic activity, coincided with high and increasing nominal interest rates. Due to the high levels of inflation that characterize this period, real interest rates were not so high. As we will see later, however, monetary and credit policies were extremely tight in this period.

The recovery of the economy in 1992 coincides with a drastic drop in interest rates, which reached their lowest levels by the middle of that year, when they were negative in real terms. During 1993 and most of 1994, interest rates remained at historically low levels of around 2% in real terms. Since the last quarter of 1994, interest rates went up sharply and remained at very high levels, above 10% in real terms in average, until the second quarter of 1996.[3] Again, this coincides with the negative trend observed in that period in the rate of growth of both GDP and aggregate demand.

The short lived recovery of economic activity in 1997 was preceded by a significant decline in the real interest rate that took place during the second half of 1996 and coincided with the relatively low levels observed along 1997 (4.7% in real terms in average). Both nominal and real interest rates went up again very sharply since the beginning of 1998, preceding the dramatic fall in aggregate demand and the economic recession observed in 1998 and 1999. Although the nominal interest rates decreased quite rapidly during 1999, the remarkable reduction in inflation that also took place that year implied that real interest rates remained above their historical average of around 7%.

In summary, the behavior of the real interest rate during the nineties is closely associated with the profound economic cycle that characterized this decade. This is an interesting result since it is not clear that in previous decades the relationship between the real interest rate and economic activity was so close. This can be established more formally with a statistical analysis. Appendix 1 presents Granger Causality tests and depicts impulse-response functions between the real interest rate, the growth rate of aggregate demand (absorption) and the growth rate of real GDP. The exercise suggests that in the nineties real GDP growth was 'caused' by the behavior of both the real interest rate and the growth of

[2] Along this paper, we use the 90-days deposit rate (known as DTF in Colombia) as indicator of the market interest rates. Most loan contracts in Colombia use variable interest rates, which adjust quarterly with the DTF. Therefore, although it is a passive rate, its behavior also reflects, fairly well, the behavior of the active interest rates.

[3] During the third quarter of 1995 the Banco de la República imposed temporary controls on the levels of interest rates that could be charged on loans by the financial system. Those controls reduced the whole structure of interest rates but only temporarily.

real absorption. Interestingly enough, none of these results hold when data from the eighties are included.[4]

The conclusion about the importance of the real interest rate in explaining the economic cycle in the Colombian economy during the nineties does not imply that monetary policy was the main factor behind that cycle. The fundamentals behind the swings in real interest rates deserve further analysis. In the first two years of the decade, the increase in the interest rate can certainly be explained by an explicit monetary and credit policy, addressed to curb the upward trend in inflation that was observed in the last few years of the eighties and in 1990. However, during most of the period after 1991, interest rates were determined mainly by other factors, such as foreign capital flows. As we will show in chapter 4 with an econometric model estimated with data from 1993 to 1999, the behavior of the domestic (*ex-ante*) real interest rate in this period can be mostly explained by the behavior of the foreign interest rate, the Colombian country-risk (measured by the spread over the US treasury bills of the Colombian government bonds in the international market) and the non-remunerated reserve requirement that, as we will describe later, was imposed on capital inflows since 1993.

C. The Real Exchange Rate.

In 1990, the CPI inflation rate rose above 32%, reaching the highest level in Colombian recent history (Panel B of Graph 2.1). Many analysts have argued that one of the reasons behind the upward trend in inflation observed in that period was the acceleration in the rate of nominal devaluation of the peso that, under the crawling peg system, had been adopted by the administration of President Barco (Correa y Escobar, 1990). Rapid devaluation of the nominal exchange rate continued during the first months of the Gaviria administration that took office in August 1990.

Even if the increase in nominal devaluation led to higher inflation, the pass-through was not complete, so the increase in the nominal exchange rate also implied a very important real devaluation.[5] By any measure, the real exchange rate at the end of 1990 and the beginning of 1991 showed the highest levels that have been observed in Colombian history. Moreover, as mentioned above, the current account of the balance of payments was experiencing a very large surplus and the Central Bank was accumulating international reserves at a very rapid pace. In fact, foreign exchange reserves rose by more than 66% in only two years, going up from US$ 3.9 billions at the beginning of 1990 to US$ 6.4 billions at the end of 1991.

The objective of keeping a high level of the real exchange rate was so well embedded in the minds of economic authorities in 1990 and the beginning of 1991, that they took it as a given fact and tried to curb the upward trend in inflation with restrictive monetary and

[4] The fact that real interest rates appears causing GDP growth in the nineties and not in the eighties may be related with the much higher degree of financial integration in the more recent period. In any case, from the exercises, it is surprising that the real interest rate appears not 'causing' the growth of real absorption in neither period.

[5] According to econometric estimations in Rincón (1999a), the pass-through effects of the nominal devaluation into the inflation rate are relatively low in Colombia.

credit policies. As stated in the Editorial Notes of the Banco de la República of December 1991, "the initial diagnosis for the causes of the acceleration of inflation assigned a large part of the responsibility to a lack of adjustment in aggregate demand, with excessive availability of credit..." (Ortega, 1991, p. 27). Monetary and credit policies by the end of 1990 and during the first three quarters of 1991 were extremely restrictive, through open market operations at high interest rates and with a marginal reserve requirement on the banking system of 100%. This reserve requirement accounted in practice to a prohibition of any credit creation by the financial system and implied that the degree of restriction imposed by the authorities was much stricter than reflected in the level of the real interest rate. As we will see in chapter 3, these measures created several difficulties for the exchange rate regime, as they increased capital inflows.

At the end, both the nominal and the real exchange rates were forced to appreciate. This can be seen in panel E of Graph 2.1, which shows the evolution of the multilateral real exchange rate index, deflated by the CPI.[6] This index was already at its highest historical level at the beginning of 1990 and experienced an additional increase of almost 15% between the first and the last quarter of that year. After that, however, it started to fall quite rapidly until the second quarter of 1997, in a process that was only temporarily interrupted, in a mild manner, between mid-1995 and mid-1996. The real appreciation of the peso between its peak in 1991 and its trough in 1997 was of almost 40%. The recovery of the real exchange rate would start only in the third quarter of 1997. By the end of 1999, its level had gone up again quite significantly and was above the levels that had been observed in the second half of the eighties.

The deep cycle of the real exchange rate during the nineties was very much related to foreign capital flows. The real appreciation of the peso coincided with large capital inflows that entered to Colombia between 1992 and 1997 to finance both public and private imbalances. In turn, the depreciation of the peso in the following period coincided with a reduction in those capital inflows.

It is worth noticing here that the real appreciation of the peso between 1991 and 1997 cannot be explained by the behavior of the Colombian terms of trade or of traditional primary exports. The terms of trade index that we present in panel F of Graph 2.1 was 15% lower in average during the nineties than during the eighties. Only in two very short episodes, which coincide with the coffee-price "minibonanzas" of 1994 and 1997, that index went up to the levels it had had in average during the previous decade. It must be mentioned, however, that private capital inflows and the corresponding real appreciation of the Colombian peso may have responded in part to the expectations of an oil revenue boom that spread out after 1992 because of the discovery of important oil reserves (Cusiana and Cupiagua) . In any case, it was clear at the end , in 1998 and 1999, that this boom had been over-estimated.

[6] The real exchange rate index that we use in this paper is an average of the real exchange rate, deflated by the CPI, against 20 currencies, weighted by the importance of each country in Colombian trade.

D. Opening-up of the economy and economic activity of the tradable and non-tradable sectors.

The formal process of opening-up of the Colombian economy started in February 1990. During that year, the traditional system of prior-license requirements for imports was virtually dismantled. Also, although tariffs were initially raised to outweigh the potential effects of the elimination of quantitative controls, a program of gradual reduction in those tariffs was put in place and was rapidly accelerated. The average nominal tariff went down from 49.4% at the beginning of 1990 to 36.8% at the end of that year and to 11.7% by the end of 1991.[7]

It is clear, therefore, that despite the high level of the real exchange rate that was observed in Colombia by the end of 1990 and the beginning of 1991, the real effective exchange rate relevant for imports (this is, the one adjusted for import duties) had gone down since the beginning of 1990. In other words, the relative price of imports, in terms of domestic goods, decreased during 1990 and 1991 as a result of the opening-up of the economy, although the real exchange rate had gone up in that period.

Paradoxically, imports did not react as expected to the opening-up of the economy and to the reduction in their relative price that took place in 1990 and 1991. The reason for this paradox is probably associated with the uncertainty about the pace at which the reduction in import tariffs would happen. Such uncertainty was created by several decisions addressed to accelerate the original timetable for the reduction in import tariffs, as well as by several signals given by the authorities in the new Gaviria Administration on the non-desirability of a gradual approach to that process. The demand for imports remained very low in 1990 and decreased in 1991. This, together with the high real exchange rate and with a satisfactory growth of exports, contributed to explain the improvement in the trade balance in this period (Table 2.2).

During 1992 and 1993, imports reacted vigorously to the already completed reduction in tariffs, to the reduction in the real exchange rate and to the impressive increase in aggregate demand. At the same time, exports stagnated in dollar terms and fell down sharply as a percentage of GDP. As a result, the trade balance deteriorated markedly, going down from a surplus of 7% of GDP in 1991 to a deficit of 3% of GDP in 1993, which would stay close to this level until 1998.

[7] These numbers include a general surcharge on imports that existed until the end of 1991. For a description of the process of trade liberalization, see Ocampo and Villar (1992) and Hommes, Montenegro and Roda (1994).

TABLE 2.2

COLOMBIA : BALANCE OF PAYMENTS

	1990	1991	1992	1993	1994	1995	1996	1997	1998 p/	1999 p/
A. US$ BILLION										
Current Account Balance a/	0,5	2,3	0,9	-2,2	-3,7	-4,7	-4,8	-6,0	-5,3	-1,0
Trade Balance a/	2,0	3,0	1,2	-1,7	-2,2	-2,6	-2,1	-2,7	-2,6	1,7
Goods Exports	7,1	7,5	7,3	7,4	8,5	10,1	10,5	11,5	10,9	11,6
of which:										
Coffee	1,4	1,3	1,3	1,1	2,0	1,8	1,6	2,3	1,9	1,3
Oil	2,0	1,5	1,4	1,3	1,3	2,2	2,9	2,7	2,3	3,8
Other Traditional b/	1,2	1,3	1,2	1,4	1,1	1,4	1,4	1,4	1,2	1,2
Non Traditional	2,6	3,4	3,4	3,6	4,1	4,7	4,7	5,2	5,4	5,3
Goods Imports	5,1	4,5	6,0	9,1	11,1	12,9	12,8	14,4	13,7	10,0
Net- Interest payments	-1,3	-1,1	-0,9	-0,7	-1,1	-1,2	-1,4	-1,8	-1,7	-1,9
Net- Dividends and profit remittances	-0,8	-0,7	-0,9	-1,0	-0,4	-0,4	-0,7	-0,6	0,0	-0,3
International Reserves (Stock end of year)	4,5	6,4	7,7	7,9	8,1	8,4	9,9	9,9	8,7	8,1
Internacional Reserves (months of goods imports)	11,0	17,3	15,4	10,5	8,6	7,7	9,1	8,0	7,5	9,4
B. PERCENTAGE OF GDP										
Current Account Balance a/	1,3	5,5	1,8	-4,0	-4,5	-5,1	-5,0	-5,6	-5,3	-1,1
Trade Balance a/	4,9	7,0	2,5	-3,0	-2,7	-2,8	-2,2	-2,5	-2,6	2,0
Goods Exports a/	17,6	17,7	14,7	13,3	10,5	10,9	10,8	10,8	11,0	13,7
Goods Imports a/	12,7	10,7	12,2	16,3	13,6	14,0	13,2	13,5	13,8	11,8
Net- Interest payments	-3,3	-2,7	-1,9	-1,3	-1,3	-1,3	-1,5	-1,6	-1,7	-2,2
Net- dividends and profit remittences	-1,9	-1,7	-1,9	-1,7	-0,5	-0,4	-0,7	-0,6	0,0	-0,3

a/ Percents of GDP are computed at current prices

b/ Gold, coal, nickel, emeralds

Source: Banco de la República, Subgerencia de Estudios Económicos.

p: Provisional

e: Estimate

The rapid deterioration of the trade balance helps to explain the poor performance of the tradable sectors in Colombia during the nineties. Even in the period of very rapid GDP growth, between 1991 and 1994, the yearly rate of growth of the tradable sectors (measured by the value added by agriculture and cattle, mining and manufacturing industry) was only 1.3 % in average. For the whole decade, the yearly growth rate of the tradable sectors was in average 0.6%, while that for total GDP was 3% (Table 2.1). Moreover, in the particular case of the manufacturing industry, the value added in 1999 was smaller in real terms than in 1990. Tradable goods, therefore, reduced their share in GDP during the nineties, which is a paradoxical result for a period that has been characterized in Colombia by the opening-up of the economy.[8]

E. Balance of Payments Financing, Foreign Investment and Foreign Debt.

One of the most important factors behind the deterioration of the trade balance and of the poor behavior of the tradable-goods sectors was the real appreciation of the Colombian peso to which we made reference earlier.[9] That process, in turn, was explained to a large extent by huge capital inflows that entered into the Colombian economy to finance both public and private imbalances.

As we mentioned earlier, Colombia experienced a very large accumulation of international reserves in 1990 and 1991, which can be explained mostly by the current account surpluses. After 1991, despite the huge deficits of the current account of the balance of payments, the foreign exchange market continued to be characterized, until 1997, by excess supply of dollars. This is reflected, on one hand, in the pressure towards a real appreciation of the Colombian peso and, on the other hand, in the continued accumulation of international reserves by the Banco de la República. Between December 1991 and May 1997, foreign reserves of the Central Bank went up from US$ 4.6 billion to US$ 10.4 billion.[10] In this sense, foreign credit and foreign investment flows were even larger than required to finance the very large current account deficit between 1992 and 1997. The counterpart of this was that the stocks of both foreign investment and foreign debt grew rapidly in those years. This, of course, reinforced the process of deterioration of the balance of payments, as far as the current account deficit increased with the growth in interest payments and profit remittances (Table 2.2).

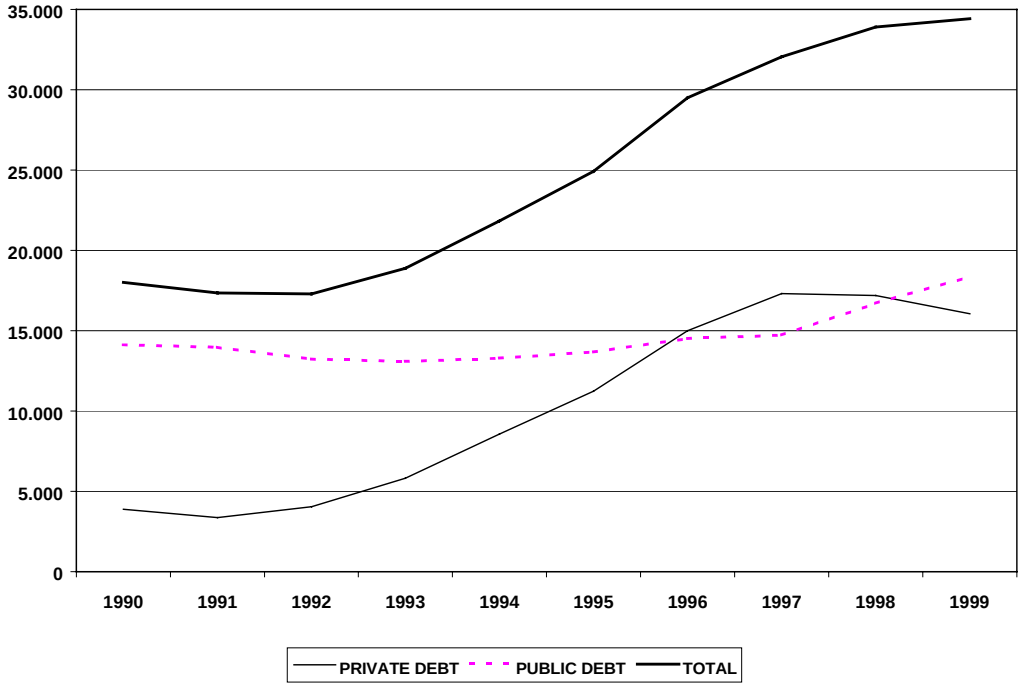
[8] If we take agriculture and cattle, mining and manufacturing industry, as a proxy for the tradable-goods sectors, the share of tradable goods in total value added, measured in constant prices of 1994, went down from 37.3% in 1990 to 31.9% in 1999. This result suggests that the share of the economy exposed to foreign competition decreased during the nineties, which contrasts with the fact that, in constant prices of 1994, total trade (exports + imports of goods and services) went up from 22.1% of GDP in 1990 to 36.9% of GDP in 1999. See Villar (2000).

[9] Using cointegration techniques, Rincón (1999b) shows that the real exchange rate does play a role in determining the short- and long-run equilibrium behavior of the Colombian trade balance and that "trade balance cannot be treated as exogenous with respect to the exchange rate".

[10] Although the coverage of international reserves in terms of months of goods imports halved in this period, going down from 17.3 months in 1991 to a level close to 8 months in 1997 (Table 2.2), they continued to be considered high enough by the monetary authorities.

Graph 2.3 presents the evolution of private and public foreign debt in the nineties.[11] The private foreign debt, which at the beginning of the nineties was only US$ 3.9 billion and had gone down to US$ 3.4 billion at the end of 1991, went up sharply in the following years, reaching a peak of US$ 17.3 billion at the end of 1997. During 1998 and 1999, coinciding with the crisis in economic activity, the process of private indebtedness ceased. It must be noticed, however, that even at the end of 1999 the private debt stock remained above US$ 16 billion. Hence, although there was an important process of private debt repayment in those two years, it was not so massive, probably reflecting the fact that the average maturity of foreign private debt was relatively high, due to the regulations imposed by the Colombian authorities to which we will refer in chapter 3.

Graph 2.3
COLOMBIA: FOREIGN DEBT
(millions of dollars)

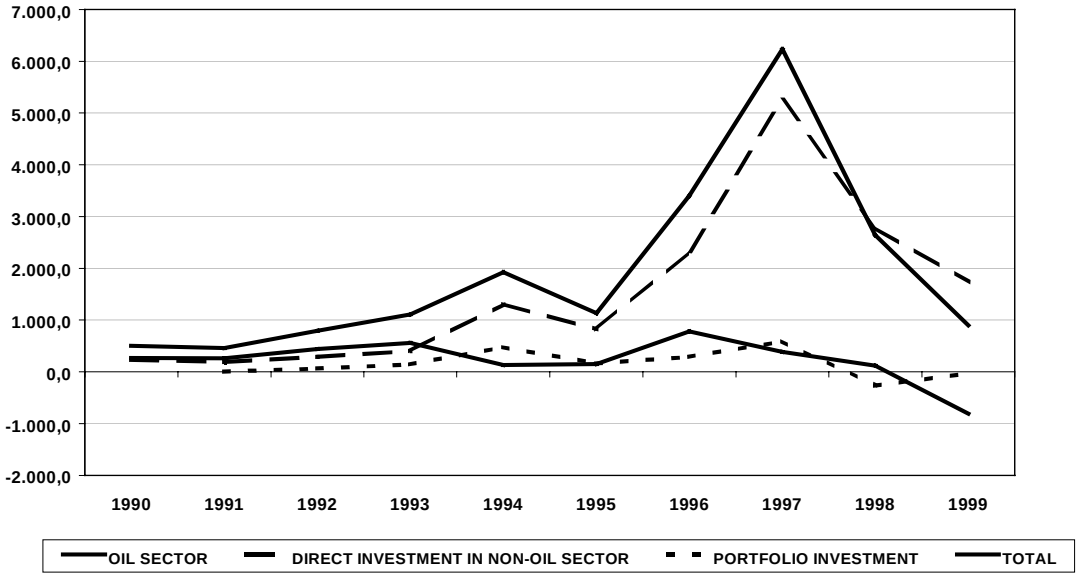


Together with the increase in private foreign debt, the current account deficit of the balance of payments that was observed during most of the nineties was financed by very large inflows of foreign investment. By the beginning of the decade, the yearly flow of net foreign investment in Colombia accounted for less than US$ 0.5 billion (Graph 2.4). That figure went up to around US$ 1.4 billion in average between 1993 and 1995 and in the following two years it experienced a noticeable increase: to US$ 3.4 billion in 1996 and more than US$ 6.2 billion in 1997. Later, during the years of the crisis, foreign investment

[11] The breakdown that we use between private and public debt in Graph 2.3 differs somewhat from the official figures, as far as we include as private debt the foreign debt of public financial intermediaries, which goes to the private sector as its ultimate beneficiary.

went back down very rapidly. Even in those years, however, it continued to be much higher than it had been at the beginning of the decade.

Graph 2.4
COLOMBIA: NET FOREIGN INVESTMENT FLOWS
(millions of dollars)



Source: Banco de la República

It is worth mentioning three characteristics of foreign investment in Colombia during the nineties:

(i) The first one is that it was mostly direct investment, as opposed to portfolio investment. The net flows of portfolio investment were significant only between 1994 and 1997, but even in those years they were less than US$ 0.4 billion in average. In 1998 and 1999, net flows of portfolio investment were negative but their negative impact was relatively small, as far as the stock had never gone too high.

(ii) The second characteristic is that foreign investment was associated to some extent with the development of the oil camps (Cusiana and Cupiagua) that started production in 1997. In some sense, therefore, the effect of this foreign investment was to anticipate part of the oil exports boom that was expected for 1998 and did not take place because of the dramatic fall in oil prices in that year.

(iii) The third characteristic is that the peaks in foreign direct investment that were observed in 1994, 1996 and, most outstanding, in 1997, were very much explained by the privatization of public banks and of public entities in the energy and telecommunication sectors. This implies that direct foreign investment in Colombia during the nineties was to a large extent associated with the financing of the public sector deficit, which, as we will see in the next section, was quite large in the second half of the decade.

The ability of the public sector to be financed mainly by the privatization of public entities and by domestic debt allowed it to keep a relatively low level of foreign debt during the nineties. The level of foreign public debt decreased during the first three years of the decade and, between 1994 and 1997 experienced only a very gradual increase. At the end of 1997, the foreign public debt was US$14.7 billion, only slightly higher in nominal dollar terms than in 1990. Only in 1998 and 1999 the level of foreign public debt rose at a relatively rapid pace, going up to almost US$ 18.5 billion.

In summary, we can say that the very large imbalances that Colombia experienced in the external current account after 1991 were financed mainly by private debt and by foreign investment until 1997. During 1998 and 1999, net foreign investment flows remained positive and the public sector received larger net flows of foreign credit than in previous years. However, the partial repayment of private debt implied that the current account deficit could not be fully financed. This led to a rapid drop in international reserves and strong pressures towards a devaluation of the Colombian peso. Before entering into a more detailed description of the foreign exchange regimes, with which this situation was managed, it is important to complete the overview of the Colombian economy with a closer look at the public and of the private sector balances during the period.

F. Government Spending and Fiscal Deficit.

As we mentioned in the introduction, one of the most remarkable characteristics of the Colombian economy in the nineties was the very large increase in government spending that followed the 1991 Constitutional Reform. In the case of the central government, total expenditure represented around 10% of GDP in 1990 and 1991, levels that are in the range in which these figures had traditionally been in previous decades. In 1999, that figure had gone up to 18.8% of GDP, almost doubling the traditional level (Table 2.3).

For the consolidated non-financial public sector, there are methodology problems with the data because of the difficulties in the identification of net transfers among public entities. Data from the National Department of Planning reproduced in Table 2.4 suggests that the increase in total public expenditure was even larger than that of the central government. According to that source, public expenditure would have increased from 20.4% of GDP in 1990 to 36.6% of GDP in 1999.

The reasons behind the increase in public spending during the nineties, both for the central government and at the decentralized level, have been extensively analyzed during the last few years.[12] Three characteristics of the process are:

(i) First, that the increase in public expenditure was partially associated with the decentralization process and with the fact that according to the new Constitution, an increasing share of the central government current revenues should be transferred to the municipalities and departments. The increase in transfers from the central government to

[12] See, in particular, Comisión de Racionalización del Gasto y de las Finanzas Públicas (1997) and Clavijo (1998).

local and regional governments accounted for almost three percentage points of GDP between 1990 and 1999 (Table 2.3). Total expenditure of departments and municipalities increased by even more than that. According to Table 2.4, it rose by more than five percentage points of GDP, going up from 8.2% of GDP in 1990 to 13.4% of GDP in 1998.

(ii) Second, that an important part of the increase in the figures of government spending in the nineties corresponds to an enhanced transparency of the fiscal accounts with respect to earlier decades. In particular, this is the case of interest payments on the central government domestic debt, which in the past had been implicitly subsidized by the central bank, and of the transfers from the central government to the social security system.[13] The increase in interest payments and in the transfers to the social security system accounted for more than 3.7 percentage points of GDP between 1990 and 1999 (Table 2.3).

(iii) Third, that the central government spending, net of transfers and interest payments, grew quite significantly between 1990 and 1992 (it went up from 5.1% to 7.1% of GDP), and stabilized around 7% during the rest of the decade. Hence, the decentralization of revenues was not reflected in a reduction of the central government spending.

In any case, the increase in public expenditures is a fundamental element in explaining the very rapid increase in domestic demand during the first half of the nineties and the fact that it remained so high with respect to GDP during the second half. In other words, the increase in public expenditures is closely associated with the large imbalances in the current account of the balance of payments and with the process of real appreciation of the peso that was experienced during most of the nineties.[14]

Paradoxically, as we have seen, net foreign debt of the public sector did not increase during the nineties, an exception made in 1998 and 1999. However, the way in which the public sector financed its increase in spending helps to explain the mechanisms through which the current account of the balance of payments was financed during the decade.

[13] Before the social security law of 1993, contributions from the government to the social security system on public employees were very low. This implied that the increase in the implicit public debt, for future retirement payments, was not properly registered in the fiscal accounts. On the implicit subsidies by the central bank to the government, see Ocampo (1997a) and the debate on his arguments in Herrera (1997b), Fainboim and Alonso (1997) and Ocampo (1997b).

[14] The econometric model in chapter 4 illustrates the close relationship between government spending and the behavior of the real exchange rate in Colombia during the nineties.

TABLE 2.3

COLOMBIA: CENTRAL GOVERMENT

Shares of GDP

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999 pr	
Total Expenditures	9,63	10,63	12,45	12,29	12,78	13,57	15,66	16,26	16,81	18,77	
Interest payments	1,11	1,20	1,04	1,14	1,16	1,23	1,87	2,04	2,89	3,32	
Transfers to departaments and municipalities	2,59	2,78	3,34	3,55	3,66	3,65	4,51	4,51	4,79	5,52	e
Transfers to the Social Security System	0,79	0,84	0,96	1,04	1,32	1,61	1,85	1,85	2,06	2,34	e
Other	5,14	5,81	7,11	6,56	6,65	7,09	7,44	7,85	7,08	7,60	e
Total Revenues	8,86	10,41	10,78	11,55	11,40	11,28	11,96	12,56	11,91	13,14	
Surplus (or Deficit)	(0,76)	(0,22)	(1,67)	(0,74)	(1,37)	(2,30)	(3,70)	(3,70)	(4,90)	(5,63)	
Privatizations	0,00	0,00	0,00	0,00	2,09	0,01	0,74	0,35	0,00	0,00	
Surplus (or Deficit) net of privatizations	(0,76)	(0,22)	(1,67)	(0,74)	0,72	(2,29)	(2,96)	(3,35)	(4,90)	(5,63)	
Debt Stock	17,04	14,19	16,06	14,48	12,67	13,51	14,41	17,86	22,03	27,82	1/
Domestic	4,13	2,95	5,49	5,62	5,12	6,06	7,19	9,30	10,97	13,18	
External	12,91	11,24	10,57	8,87	7,54	7,45	7,23	8,57	11,06	14,63	

Source: CONFIS - Contraloria General de la República and Banco de la República.

1/ Stock of goverment debt to September 1999

pr: Preliminary

e: Estimate

TABLE 2.4
Colombia: Non Financial Public Sector Indicators *
(Shares of GDP)

	1990	1991	1992	1993	1994	1995	1996	1997	1998 pr	1999 py
Total Expenditure (Net of Transfer)	20,35	21,64	23,10	24,12	26,06	28,11	32,65	34,13	33,90	36,60
Central Government	5,15	5,07	6,95	7,59	7,54	7,98	9,03	9,97	10,05	
National Social Security System	2,58	2,66	2,66	3,28	3,89	4,67	5,57	6,13	6,84	
National Descentralized Entities and Non Financial Public Enterprises	4,38	5,32	4,72	4,94	3,97	4,61	4,86	4,92	3,60	
Departments and Municipalities **	8,24	8,59	8,76	8,31	10,66	10,85	13,20	13,10	13,41	
Non Financial Public Sector Surplus (+) or Deficit (-)	-0,51	0,03	-0,19	0,22	0,11	-0,31	-1,70	-2,81	-3,64	-4,54
Central Government	-0,76	-0,22	-1,67	-0,74	-1,37	-2,30	-3,71	-3,70	-4,90	-5,78
National Social Security System	-0,12	-0,05	0,12	0,52	1,06	1,92	2,04	1,15	1,20	0,62
National Descentralized Entities and Non Financial Public Enterprises				-0,08	0,75	-0,20	0,17	-0,13	0,33	
Departments and municipalities **				0,51	-0,34	0,27	-0,20	-0,13	-0,27	
Privatizations	0,00	0,00	0,00	0,00	2,24	0,25	0,83	3,26	0,53	0,00
Non Financial Public Sector Surplus (+) or Deficit (-) Net of Privatizations	-0,51	0,03	-0,19	0,22	2,35	-0,06	-0,86	0,44	-3,11	-4,54

Source: DNP - UMACRO

* Net of Transfer

** Included: Local Government and local enterprises

Between 1992 and 1995, the public sector was able to finance its increased expenditure with higher current revenues, particularly through increased taxation. In fact, during this period, the fiscal accounts for the consolidated non-financial public sector were relatively balanced (Table 2.4). As a result, as we saw earlier, the public sector foreign debt did not increase. Increased taxation, however, may have been associated with the increase in private debt during that period at least through two different channels. On one hand, the reduction in disposable income of the private sector as a share of GDP, that was produced by the higher levels of taxes, was an important part of the explanation of the reduction in domestic private savings that we will illustrate in the following section[15]. Therefore, it may have contributed to the increase in the private foreign debt through that channel. On the other hand, increased tax revenues were associated with the boom in the private sector expenditure that was observed during this period and that was fuelled by the access of that sector to cheap foreign financing.

After 1995, current revenues of the public sector did not match the increase in expenditure. As a consequence, the consolidated non-financial public sector deficit rose from near equilibrium in 1995 to 1.7% of GDP in 1996 and 2.8% of GDP in 1997. Such a deficit, however, was financed mainly by the privatization of public entities, notably in the banking and the electricity sectors. An important part of that process of privatization was financed by foreign direct investment, which presented a very important surge in these two years. Only in 1998 and 1999, when the public sector deficit rose to 3.6% and 4.5% of GDP, respectively, and when privatization proceeds were almost null, the public sector net debt had to increase at a relatively rapid pace.

Although the consolidated public sector did not require a significant increase in net debt before 1998, the central government clearly did. In fact, the central government deficit started growing rapidly since 1993, when it was only 0.7% of GDP, until 1996, when it reached 3.7% of GDP. In 1997, the deficit remained at the same level of the previous year but in 1998 and 1999 the process of deterioration resumed, going up to 4.9% and 5.6% of GDP, respectively[16]. Moreover, privatization revenues were not so important for the central government as they were for the decentralized public sector. As a consequence, the debt stock of the central government, which had fallen quite significantly during the first half of the nineties (from 17% of GDP to 12.7% of GDP between 1990 and 1994), went up again very rapidly, reaching a level of almost 28% of GDP in 1999 (Table 2.3).

Most of the increase in the central government debt was concentrated in domestic debt rather than in foreign debt. As a share of GDP, foreign debt of the central government fell down from almost 13% in 1990 to 7.2% at the end of 1996. Afterwards, it rose again, specially in 1999, when it was 14.6% of GDP. By contrast, domestic debt of the central government experienced a continuous increase since 1991, going up from less than 3% of GDP to more than 13% of GDP in 1999. Most of this increase is represented in marketable bonds (TES) issued by the Treasury. During the nineties, therefore, there was an important

[15] See Lopez (1998) and Lopez and Ortega (1998).
[16] The arguments on the non-sustainability of the Central Government fiscal accounts are particularly clear in Hernández y Gómez (1998).

development of the domestic public debt market which at the beginning of the decade was almost non-existent.[17]

G. The Cycle in Asset Prices, Private-sector Debt and the Financial System.

The previous section made it clear that the deterioration of the current account of the balance of payments that took place during the first half of the nineties and the large deficits that where observed during the second half were closely associated with the increase in public expenditure during the decade. In the period that goes from 1992 to 1995, however, those deficits were also explained to an important extent by the imbalance between private saving and investment.

Unfortunately, the data for private saving and investment are not quite accurate and present inconsistencies depending on whether we use the old system of National Accounts, base 1975, or the new system, base 1994. Despite these inconsistencies, looking at Graph 2.5 we can draw at least two general conclusions:

(i) First, private investment experienced an important increase between 1992 and 1994 (period in which the boom was particularly noticeable in house building, rather than in manufacturing investment) and a negative trend thereafter.

(ii) Second, private savings experienced a very strong negative trend along the nineties. According to the old system of National Accounts, which provides the most widely known data, private savings dropped from about 14% of GDP in 1990 to 6% of GDP in 1998. The new system of National Accounts suggests that the level of private savings is higher than shown by the old system but, still, it confirms the strong negative trend in private savings as a share of GDP. Besides, it suggests that such a negative trend continued during 1999.[18]

---

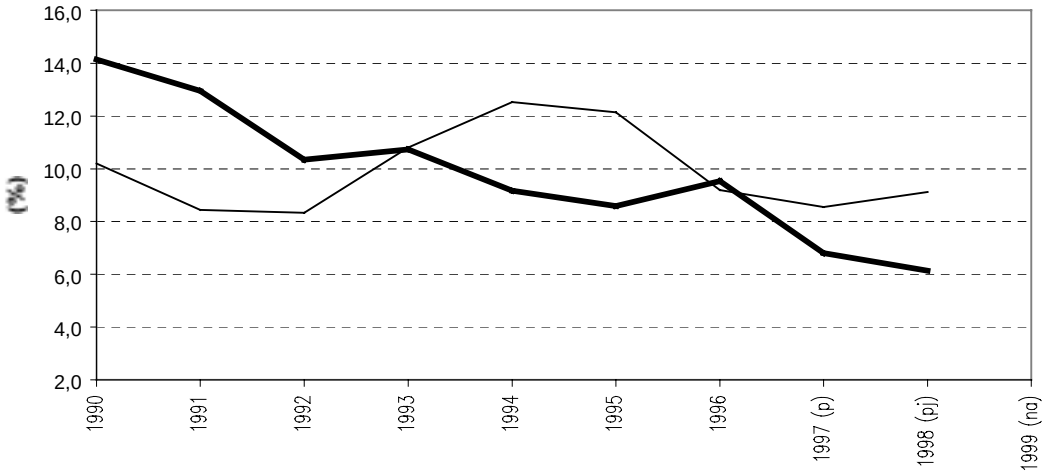
[17] A large part of the stock of Treasury Bonds is held by the decentralized public sector, notably by the Social Security Institute (ISS). However, between 1996 and the beginning of 1998 a significant part of that stock was held by foreign investors. This coincides with the surge in foreign portfolio investment that was observed in that period and entirely reversed afterwards. According to data from the Stocks and Securities Superintendency, the stock of foreign portfolio investment in Treasury bonds (TES) was null until May 1996, went up to US$ 448 million in March 1998 and back to almost zero in February 1999. A complete description of the public debt domestic market in Colombia during the nineties can be found in Correa (2000).

[18] The causes of the negative trend in private savings during the nineties have been extensively analyzed in the Colombian literature but the empirical results are not entirely conclusive. Among the reasons that have been mentioned are (i) the decline in the private disposable income as a share of GDP because of the increase in taxes, (ii) the relaxation of liquidity constraints (because of the new access to foreign financing, the financial reform, the severance payments reform and the abolition of double taxation on the distribution of corporate dividends), (iii) the reduction in relative prices and the higher availability of durable consumption goods after the opening up of the economy and (iv) the expectations of an oil boom after the discovery of the oil reserves of Cusiana and Cupiagua. In any case, the rapid decline of private savings in a period in which public spending was rising very rapidly strongly suggests that the Ricardean Equivalence hypothesis does not hold in the Colombian economy. See Cárdenas y Escobar (1997), López (1998), Lopez and Ortega (1998), Carrasquilla y Rincón (1990), Carrasquilla (1999, chapter 21), Flórez y Avella (1998), Echeverry (1999) and several papers published in Sanchez (compilador, 1998).

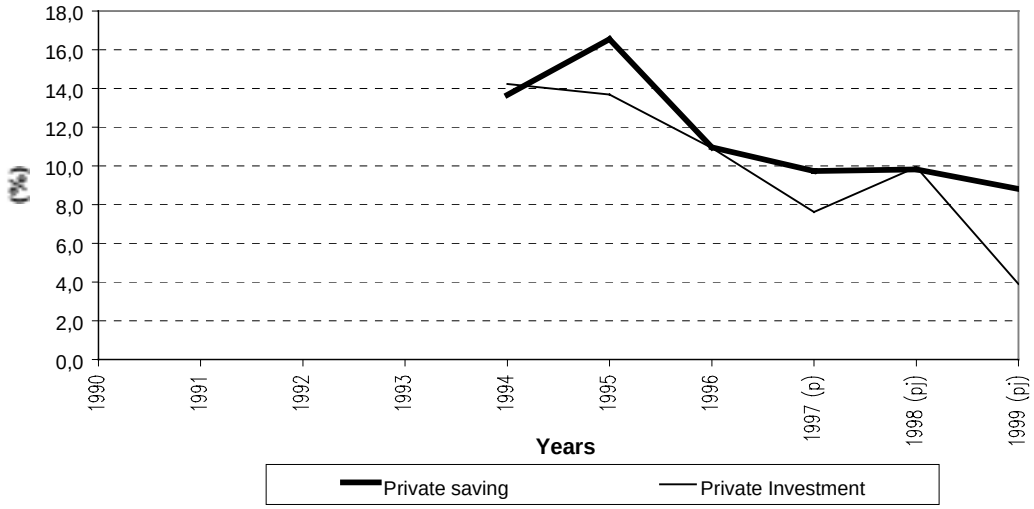
Graph 2.5

Colombia: Private Saving and Investment
(% of GDP)
1994 - 1999

A. Old System of National Accounts (Base 1975)



B. New System of National Accounts (Base 1994)



(p) Provisional.
(pj) Projection.
(na) Not available
Source: DANE and National Departament of Planning

As a consequence of the negative trend in savings during the decade and of the increase in investment during the period 1992-1994, the private sector was forced to increase its level of debt not only with foreign creditors but also with the domestic financial system. The rapid increase of the level of private indebtedness is, without doubt, one of the main reasons behind the deep crisis that the Colombian economy experienced in 1998 and 1999.

TABLE 2.5
COLOMBIA: PRIVATE DEBT

	1990	1991	1992	1993	1994	1995	1996	1997	1998 pr/	1999 pr/
A. SHARES OF GDP										
1. Domestic (Peso- denominated) debt	24,2	21,8	24,0	29,4	27,4	27,5	32,7	29,1	29,9	29,7
2. Foreign (Dollar- denominated) debt	9,6	7,9	8,2	10,4	10,5	12,1	15,4	16,2	17,3	19,0
a. Through Domestic Financial System	5,0	3,9	4,2	5,0	4,1	4,5	4,8	5,1	4,9	3,8
b. Direct Foreign Lending	4,7	4,1	4,0	5,4	6,4	7,7	10,6	11,1	12,4	15,1
3. Total Private debt (1+2)	33,8	29,7	32,2	39,8	37,9	39,6	48,1	45,4	47,2	48,6
B. MILLIONS OF US DOLLARS										
Total Foreign private debt	3.876	3.369	4.042	5.799	8.551	11.233	14.998	17.319	17.191	16.063
a. Through Domestic Financial System	1.995	1.646	2.071	2.784	3.354	4.143	4.664	5.485	4.825	3.234
b. Direct Foreign Lending	1.881	1.722	1.971	3.015	5.196	7.090	10.334	11.835	12.366	12.830

Source: Banco de la República, Subgerencia de Estudios Económicos

pr: Preliminary

The behavior of private debt during the nineties is summarized in Table 2.5.[19] As already mentioned, private foreign debt experienced a cycle with a very rapid growth between 1991 and 1997 and with a relatively important decline in the following years. It is interesting to notice that such decline was concentrated in the part that is channeled through the domestic financial system (which went down from US$ 5.5 billion at the end of 1997 to US$ 3.2 billion at the end of 1999). This component of foreign private debt is mostly short term and is strongly associated with trade financing. To an important extent, therefore, the decline in foreign private debt in 1998 and 1999 was induced by the decline in imports that took place in these years. In contrast, the net flow of direct lending from foreign creditors continued to be positive, even in the years of the crisis. It is worth noticing also that despite the decline in the total foreign debt of the private sector between 1997 and 1999, as measured in dollars, it continued rising as a share of GDP because of the real devaluation of the peso. As a consequence, while foreign private debt represented less than 8% of GDP in 1991 and 1992, it went up to 20.6% of GDP at the end of 1999.

The domestic private debt in Table 2.5 corresponds to the peso-denominated loan portfolio of the financial system. It also experienced a very important increase between 1991 and 1997, going up from less than 22% to 33% of GDP. After 1997, it stagnated around 32% of GDP.

As a whole, total private debt rose from less than 30% of GDP in 1991 to more than 48% of GDP at the end of 1997 and remained around that level until 1999. If we have in mind that during this decade, private disposable income went down as a share of GDP, it is clear that the relationship between the level of indebtedness and the disposable income of the private sector grew by much more than 70%.

The rapid increase in private indebtedness was accompanied during its initial steps by a boom in asset prices. This is illustrated by the relative price of new housing in Bogotá, which went up by about 60% between the beginning of 1992 and mid-1994 (Graph 2.6). The increase in the real interest rate that was observed after mid-1994, stopped the upward trend in real asset prices which, however, remained at very high levels until the end of 1995. Since the beginning of 1996, they started to fall very rapidly until 1999, when their real levels were similar to those of the beginning of the nineties.

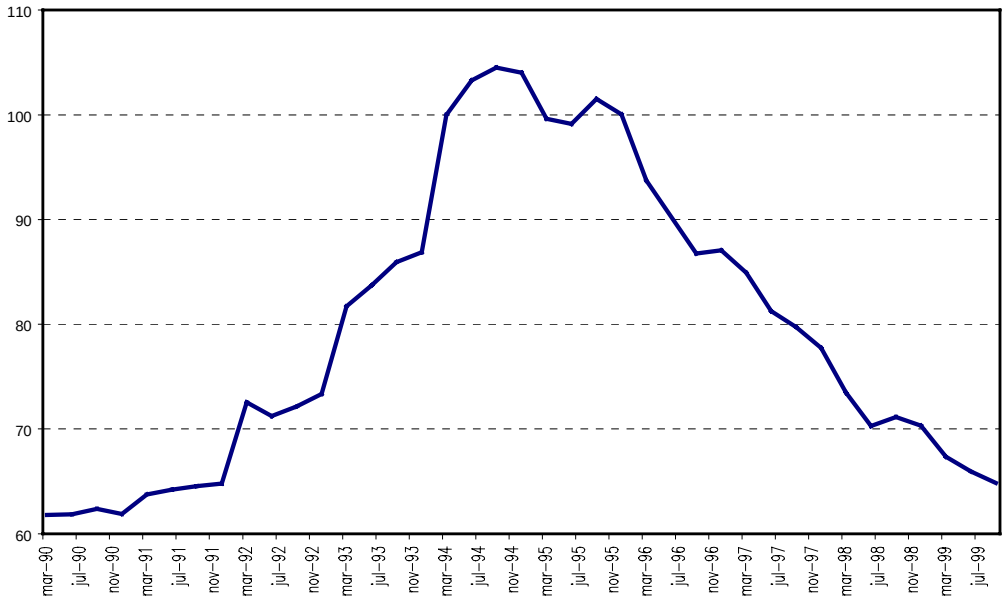
The sharp decline in asset prices during the last part of the decade, together with the very high level of the private sector debt, created the conditions for the financial crisis that exploded in 1998 and 1999.[20] As we have seen, since the beginning of 1998, following the East Asian crisis, the flows of foreign financing decreased sharply and were not anymore enough to cover for the large current account deficit that Colombia had accumulated. This situation implied a rapid increase in both the real interest rates and the real exchange rate, which was reinforced during the second half of that year, when the Russian crisis reduced even further the Colombian access to international financial resources. Under such

[19] As in Graph 2.3, the foreign debt of the public financial intermediaries that goes to the private sector as its ultimate beneficiary is classified as private foreign debt in Table 2.5.

[20] The bubble in asset prices by the middle of the decade and its relationship with the financial crisis and the recession of 1998-1999 is analyzed in Urrutia (2000).

circumstances, the Colombian private sector was facing a dramatic increase in the real burden of its outstanding liabilities, due both to higher interest payments on the domestic debt stock and to the effects of the real devaluation on the real costs of the foreign debt. This happened in a context of both scarcity of new credit flows and rapid reduction in private sector wealth, represented in real state and company shares.

Graph 2.6
Relative Price of New Housing in Bogota [1/]
March of 1994 = 100



[1/] Deflactor: CPI
Source: DNP and Banco de la República

The obvious consequence of this situation was, on one hand, a dramatic contraction of private demand. Preliminary estimates of the National Department of Planning indicate that household consumption decreased by 4.9% in real terms and private fixed capital investment fell 65% in 1999[21]. On the other hand, this implied a very rapid deterioration in the quality of the loans that had been extended by the domestic financial sector. Past due loans at the beginning of 1998 represented less than 7% of total loan portfolio. By end-1999, that figure had reached about 13%.

By the second half of 1998, it was clear that the financial sector was entering into a deep crisis and that several financial institutions had to be closed or intervened by the government. The largest Saving and Loan Corporation (Granahorrar) was taken over by the government in October and a State of Emergency was declared in November of that year. A special tax on financial transactions was introduced to finance the intervention of several

[21] Carrasquilla (2000) shows that the sharp decline in household consumption in 1999 cannot be satisfactorily explained by a traditional model of flow variables and that the explanation improves when wealth effects (with real asset prices) are included.

cooperatives and the capitalization of public banks. The process of deterioration, however, continued during the first three quarters of the following year. In May 1999, two medium size banks were closed and by the middle of the year the government specified the mechanisms through which the Deposit Insurance Fund (FOGAFÍN) would finance a re-capitalization of several other financial institutions. In the case of public banks, the deep crisis in which they were involved led the government to substitute the traditional agricultural bank (Caja Agraria) by a new and much smaller one (Banco Agrario) and to close other financial institutions (like Banco del Estado and Banco Central Hipotecario, the biggest mortgage bank). It is still too early to have a good estimate of the fiscal and quasi-fiscal costs of the financial crisis. However, it might be no less than 5% of GDP.

The financial crisis deteriorated public confidence in the financial institutions and created an environment of restriction on the supply of credit, which was particularly evident in public banks. This situation reinforced the Colombian economic recession of 1999, which implied that yearly GDP fell for the first time since 1929 and did so by 4.5%. The recession, in turn, reduced government tax revenues and aggravated the process of deterioration of the fiscal accounts. Consequently, the sustainability of the fiscal account was severely questioned by the international financial community, so access to foreign financing was further restricted, both for the private and for the public sector. Hence, despite the fact that the current account deficit of the balance of payments experienced a substantial correction, the pressure on the foreign exchange market continued. Until September 1999, the Central Bank had lost more than US$ 600 million of its international reserves. In that context, the Colombian authorities decided to enter into an agreement with the IMF in order to undertake a process of structural adjustment with particular emphasis in the reduction of the fiscal deficit and, more generally, in the correction of the very negative trend of the fiscal accounts that characterized the 1990s.

In summary, it is clear that the deep recession faced by the Colombian economy in 1999 is understandable only when we have in mind both the dramatic increase in public spending that took place along the nineties and the increase in private spending during part of the decade. This implied a dramatic deterioration of the current account of the balance of payments which could be financed for some years but that, in 1998 and 1999, could not be financed anymore. Private capital flows played a very important role in the process that led to the crisis. During a long period, they financed the external deficit and allowed the Colombian peso to experience a significant real appreciation, which reinforced the deterioration of the external accounts. The increase in private debt was however unsustainable. The increase in real asset prices and the real appreciation of the peso associated with private capital flows and with the increase in private debt were bubbles bound to explode. In fact, they exploded in a very bad international context during 1998 and 1999.

III. THE EXCHANGE RATE REGIMES AND REGULATION OF FOREIGN CAPITAL FLOWS IN THE NINETIES.

A. The Exchange Rate Regimes: From Crawling-Peg to Free Floating.

The deep recession of the Colombian economy in 1999 has led to a public debate over the responsibility of the Banco de la República and, in particular, of the exchange rate regime and interest rate policy. Some analysts argue that a more flexible exchange rate regime in 1998 and 1999 would have avoided the costs of the increase in the real interest rate that Colombia faced in those two years and, therefore, their negative impact on aggregate demand and on economic activity. Other analysts argue that monetary policy in the period 1992-1994, in which the real interest rate was extremely low, was the real cause of the increase in the private debt and, therefore, that it should be blamed for the bubble in asset prices and for the subsequent financial crisis.

A definite answer on the questions posed in this debate will perhaps never be available. The truth is that the central bank faced very serious dilemmas during the nineties which, as we mentioned in the introduction, were particularly difficult as far as it had been assigned the reduction of inflation as its primary task. A higher interest rate during the period would have implied a stronger appreciation of the Colombian peso and perhaps, through that channel, a deeper deterioration of the current account of the balance of payments in that period. In turn, lower interest rates in the crisis years would have been consistent with a more rapid devaluation of the exchange rate, with likely destabilizing effects on inflation and on the solvency of a highly indebted private sector.

These dilemmas marked the evolution of the foreign exchange regimes in Colombia during the nineties, which can be described as a process of gradual shift from a managed peg towards a free floating. We can distinguish four periods in the Colombian foreign exchange regimes during the nineties. The traditional crawling-peg regime, which lasted until June 1991. The period of the exchange rate certificates, which goes from June 1991 to February 1994. The period of currency bands, that covers since February 1994 until September 1999. And, finally, the free floating period that starts in the last quarter of 1999.

1. The Crawling-peg period: 1990- June 1991.

During 1990 and the first half of 1991, Colombia maintained the traditional crawling peg system, with a thorough control of foreign exchange transactions, that had been in place since 1967. All foreign exchange transactions had to be made through the Banco de la República. The exchange rate for those transactions was announced one day in advance and increased every day following a crawling devaluation rate.

Since 1989 the authorities had taken the decision to increase the rate of crawl in order to compensate for the decline in coffee prices after the collapse of the International Coffee Agreement and to prevent negative effects of the opening up of the economy on the trade

balance and on the domestic production of tradable goods. However, this strategy rapidly proved inconsistent with the contractionary monetary policy that the Banco de la República was trying to undertake in order to curb inflationary pressures in the economy.

In fact, as we described in chapter 2, the Banco de la República had introduced a marginal reserve requirement of 100% that accounted in practice to a prohibition of any credit creation by the domestic financial system and was undertaking huge open market operations at high and increasing interest rates. However, the contractionary effects of these measures were outweighed by the monetary effects of the very rapid accumulation of international reserves that was taking place simultaneously. A vicious circle was then created as a result of large inflows of foreign exchange induced, in part, by the large differential between the domestic and the foreign interest rate. By the middle of 1991, it was clear for the authorities that it was extremely costly and eventually impossible to continue targeting a high level of the exchange rate while keeping very high interest rates.

2. The Transition Period Towards Exchange Rate Bands: The Exchange Rate Certificates (June 1991-February 1994).

A fundamental reform in the foreign exchange regime was introduced by Congress through Law 9 of 1991 and by the Monetary Board through Resolutions 55 and 57, issued in June of that year. These regulations replaced Decree 444 of 1967, which had been the cornerstone of the foreign exchange regime for a quarter of a century.

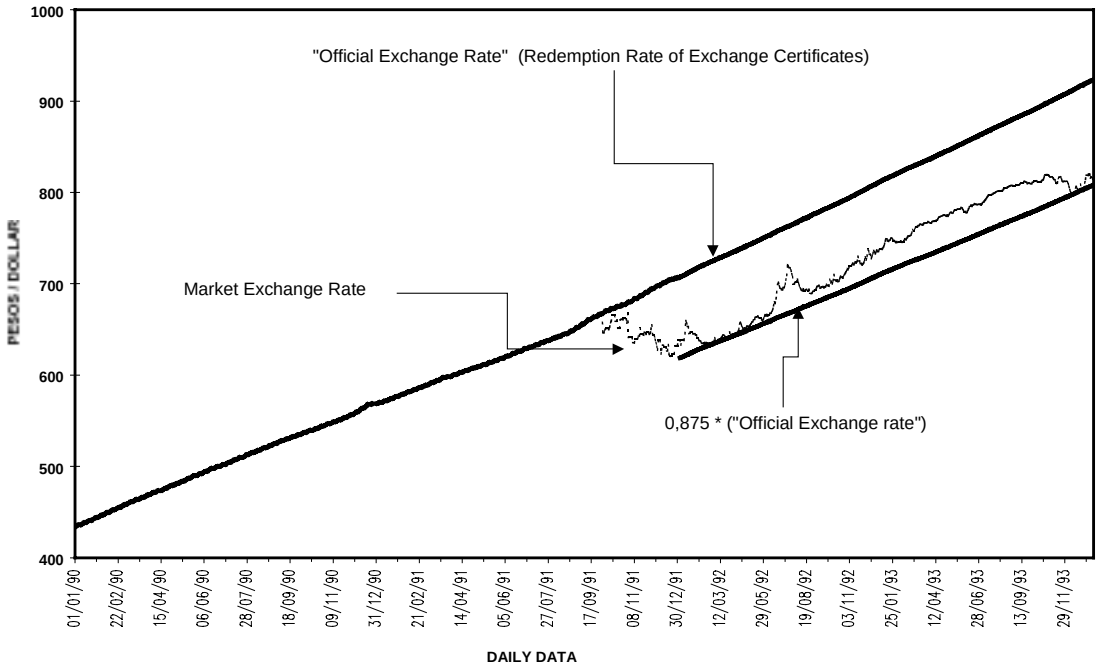
The main innovation that came out of Law 9 was a decentralization of foreign exchange transactions which were not anymore required to pass through the central bank. Still, capital transactions and most of the current account transactions continued to be highly regulated, as far as they had (and still have today) to be channeled through intermediaries legally allowed to operate in the market. [22]

By itself, the decentralization of foreign exchange transactions did not imply the abolition of the crawling-peg regime. However, through Resolutions 55 and 57 of June 1991, the Monetary Board introduced an additional important reform that created the conditions for the development of a foreign exchange market. Although the authorities would continue to daily announce an 'official exchange rate', following the crawling system, the Banco de la República would not buy foreign exchange against pesos but against dollar-denominated bonds with a given maturity: the Exchange Rate Certificates ("Certificados de Cambio"). The 'official exchange rate' was the rate at which those Certificates could be redeemed. A market for foreign exchange was then created and its exchange rate was freely determined. However, the authorities could affect that rate by changing the maturity of the Exchange Rate Certificates, the domestic interest rate or the expectation of devaluation of the 'official exchange rate'. Thus, it was a managed-floating regime. Obviously, at any time, the market

[22] See Ortega (1991) and Ocampo y Tovar (1999, chapter III). Law 9 of 1991 introduced a distinction that still exists between the free market of foreign exchange, which essentially includes transactions related with personal services, and the "mercado cambiario", which includes all foreign exchange transactions related with trade and capital flows.

exchange rate could only be lower than the 'official' one.[23] Maturity of the Exchange Rate Certificates was initially set at 90 days. This implied a nominal appreciation of the market exchange rate which marked an important shift in the policy strategy that had been in place in the previous period (Graph 3.1).

Graph 3.1
Nominal Exchange Rate and Exchange Rate Certificates
January 1990 - January 21 1994



Source: Banco de la República - Subgerencia de Estudios Económicos.

In September 1991, just after the Constitutional Reform and the central bank independence had been approved, the newly appointed board of the Banco de la República accelerated the change in the policy mix. A further appreciation of the peso was allowed through an increase in the period of maturity of the Exchange Rate Certificates to one year but, simultaneously, a drastic relaxation in monetary policy was introduced in order to reduce pressures towards further appreciation of the peso and accumulation of international reserves (Ortega, 1991). Since the last quarter of 1991, both nominal and real interest rates went down sharply and stayed at historical lows until the first half of 1994.[24]

Despite the fact that the foreign exchange transactions continued to be highly regulated, the reforms introduced in 1991 included a fairly complete liberalization of foreign direct investment. In contrast, foreign lending continued to be restricted according to the maturity of the loans and the final use of the resources. Only trade financing was allowed when the

[23] The Banco de la República also kept an open window to buy dollars against pesos at a significant discount of 12.5% over the 'official exchange rate'. This window was in practice the lower limit for an implicit band in which the market exchange rate could float.

maturity was shorter than one year and, even for a longer maturity, foreign financing could only be used for investment, exports or imports.

The process of liberalization of foreign lending started with Resolution 7 of February 1992 of the Board of Directors of the Banco de la República. The non-financial private sector was allowed to contract foreign loans for any purpose (including working capital) with foreign financial institutions, provided that they had a maturity longer than one year. Still, however, the domestic financial system could not intermediate working-capital foreign loans.

The following and most important step in the process of liberalization of foreign lending was included in Resolution 21 of September 1993, through which most administrative controls were lifted. Financial institutions were allowed to intermediate foreign loans and all restrictions on the maturity of the loans and final use of the resources disappeared for domestic residents. Even today, however, domestic financial institutions cannot have foreign liabilities except for foreign-exchange-denominated lending with equal or shorter maturity.[25]

The liberalization of foreign lending in September 1993 was accompanied by the requirement of a dollar-denominated, and non-remunerated, deposit in the Banco de la República for short term loans different from trade financing. This deposit, to which we will refer to as a reserve requirement, had the effects of a tax on short term capital inflows.[26] Hence, the measures adopted by the Colombian authorities can be interpreted as a substitution of administrative controls for price-based regulations.

Initially, in September 1993, only foreign loans with a shorter than 18-month maturity were required to make the non-remunerated deposit in the Banco de la República. The amount of the deposit was equivalent to 47% of the foreign loan dollar-value and it should be kept during 12 months, or alternatively redeemed with a discount that reflected the opportunity cost of those resources.

---

[24] An interpretation of the policy mix pursued by the new 'independent' central bank is that, in contrast with earlier crawling-peg periods, the exchange rate policy was going to be "actively used to bring down inflation" (Jaramillo, Steiner and Salazar, 1999). It is clear however that the 'independent' central bank was still worried about the dangers of a too large appreciation of the peso. Otherwise it would be difficult to understand the reasons for the sharp decline in interest rates that was promoted by the Banco de la República in the period 1992-1994, characterized by very rapid growth of aggregate demand.

[25] Besides the rules on inflows of foreign credit, the Resolution 21 of 1993 included important reforms in the foreign exchange regime. Domestic residents were allowed to extend loans to foreign residents and to buy assets abroad "in order to facilitate outflows of foreign exchange and moderate trends towards appreciation of the peso" (Urrutia, 1993, p.10). Also, the Resolution 21 set the basic rules for the development of a market of derivatives for the exchange rate and commodity prices.

[26] In Appendix 1 we derive the tax equivalent of this reserve requirement on capital inflows, following the methodology suggested by Ocampo and Tovar (1999).

3. The Exchange Rate Bands (February 1994-September 1999).

As we said before, between mid-1991 and 1994 the domestic real interest rate was at historical lows but still capital inflows were very large and the Colombian peso appreciated at a relatively rapid pace. Initially, the exchange rate certificates had the desired effect of postponing the monetary expansion created by the accumulation of international reserves. Soon, however, they started to be a problem. In fact, by the end of 1992, their stock represented almost 50% of the money base and their redemption along 1993 created difficulties from the point of view of monetary control. As the economy was booming, an increase in interest rates was urgently needed and regaining control on monetary variables became an important policy objective.

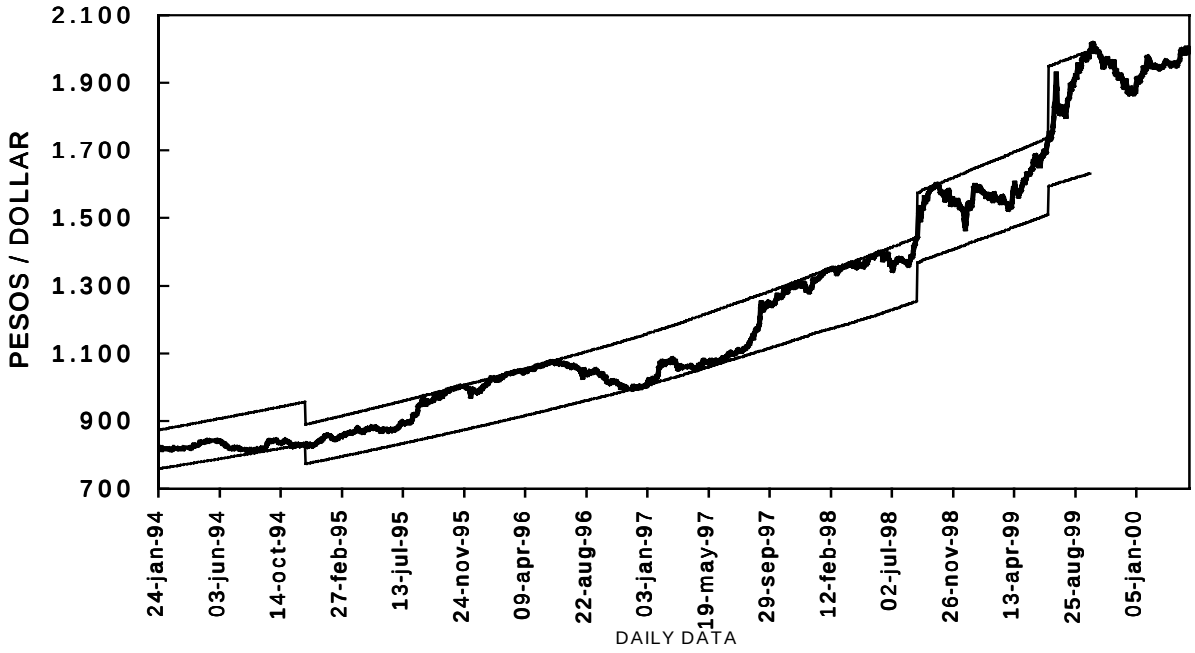
In January 1994, "with the purpose of reestablishing some degree of monetary control without issuing dollar-denominated debt", the board of directors of the Banco de la República decided to discontinue the exchange rate certificates mechanism (Urrutia, 1995, p. 12). An exchange rate band mechanism was then introduced (Graph 3.2). The center of the band was the current level of the market exchange rate the day in which the decision was taken and the upper and lower limits were set 7% above and 7% below, respectively. In contrast with other exchange rate bands, the Colombian one was never supposed to be an anchor for inflationary expectations. As stated by the Governor of the central bank, "options were essentially two: the first one was to anchor the economy to the exchange rate and to fix a trajectory for this variable; the second one was to try to regain monetary control and to set, not an exchange rate anchor, but monetary type anchors. The board choose the second way" (*Ibid*). This is the reason why the currency band was relatively wide since the beginning. Also, this explains why the limits of the band increased every day at a predetermined crawling rate that was initially set at 11% yearly.

In any case, the introduction of the exchange rate bands was a step forward towards a free floating regime. The main characteristic of the band was its remarkable flexibility. The Banco de la República only intervened inside the band with small amounts of resources in order to reduce short run volatility of the exchange rate. Moreover, the flexibility of the new regime is reflected in the fact that the limits of the band were shifted in several opportunities, when there was enough evidence that the macroeconomic fundamentals had changed and that the medium and long run equilibrium level of the exchange rate was not anymore inside the current limits. In this sense, the currency band was not supposed to create obstacles in the process of adjustment of the exchange rate but to guarantee a more orderly and gradual adjustment when such a process was grounded in fundamental macroeconomic changes (Villar, 1999).

The exchange rate band was shifted downwards in December 1994 as a consequence of the increase in long run foreign capital inflows and of the expectation of additional inflows of foreign exchange associated to the development of the recently discovered oil camps of Cusiana and Cupiagua. Later, the exchange rate band was shifted upwards in September 1998 and in June 1999, as a response to the drastic drop in foreign exchange inflows and the reduction in domestic spending that was taking place in that period. When the band was

shifted in June 1999, the distance between the center and the upper and lower limits was also widened from 7% to 10%.

Graph 3.2
Nominal Exchange Rate and Exchange Rate Bands
January 24 1994 - April 2000



Source: Banco de la República - Subgerencia de Estudios Económicos

Despite the flexibility of the band system in Colombia, the limits of the band were effective in reducing the risk of overshooting during some periods of time in which the foreign exchange market was under stress. A very illustrative example is what happened along 1996. Between February and June of that year, the political crisis of President Samper, who was being judged by Congress for allegedly illegal resources used in his presidential campaign, marked important pressures towards a devaluation of the peso. Later in the year, a strong pressure towards an appreciation of the peso took place when it became clear that President Samper would stay in office and large inflows of foreign exchange were coming into the country, in part, as a result of expectations of appreciation of the peso associated with the privatization of important public entities. The amplitude of the exchange rate band allowed the peso to depreciate during the first half of the year and to appreciate during the second half. But the limits of the band avoided the overshooting that would have probably occurred had the limits of the band not existed. The fact is that, following the rules of the

band, the international reserves of the central bank were reduced in almost US$ 400 million during the first half of the year and increased again in almost US$ 2.000 million during the second half. The mechanism proved therefore to be stabilizing.

The experience of 1998 and 1999 also showed the benefits of the stabilization properties of the exchange rate band. Since the final months of 1997, after the Asian crisis, the exchange rate had depreciated and was hitting the upper limit of the band, so the central bank was forced to sell important amounts of foreign exchange. The danger of an overshooting of the nominal exchange rate, with important inflationary and destabilizing effects, was relatively large in the absence of the limits of the band, not only because of the large imbalances that characterized the Colombian economy in the external and in the fiscal fronts but because of the noticeable political uncertainty around the presidential elections of mid-1998. The upward shift in the currency band was decided only in September 1998 when a macroeconomic program for 1999 was completed and the commitment of the new Pastrana administration with the fiscal adjustment process had gained some credibility. Meanwhile, the speculation against the upper limit of the currency band had to be managed with large sales of international reserves by the central bank and with extremely high interest rates.

After a short lived overshooting, the new currency band announced in September 1998 worked smoothly during the last quarter of that year and the first quarter of 1999. The central bank stopped losing international reserves and the domestic interest rate experienced a downward trend at a relatively rapid pace. After April 1999, however, the financial crisis, the deeper than expected recession, and the further deterioration of the fiscal accounts damaged the credibility in the macroeconomic program and new pressures towards a devaluation appeared.

In June 1999, together with the new upward shift and with the widening of the band, a new macroeconomic program was announced. It was already clear at that time, however, that the credibility of economic agents in the ability of the authorities to recover the long run viability of the fiscal accounts was greatly reduced. As a result, the central bank and the government agreed to design an IMF backed program as the only alternative to recover confidence from the international financial community.

The agreement with the IMF, on a three year macroeconomic adjustment program, was negotiated during the third quarter of 1999. By that time, however, both national and international support for the currency band system had rapidly deteriorated. At the national level, the fact that the band had been shifted twice in less than one year led to the idea that the central bank would not use important amounts of foreign exchange in order to defend the upper limit of the band. At the international level, the success of other Latin American countries (notably Brazil and Chile) with their new floating regimes created strong pressures against the band system and facilitated the appearance of speculative attacks. Even though most analysts considered that the real exchange rate in Colombia was already close to the long-run equilibrium level, the currency band continued to be under stress. It was dismantled at the end of September 1999, immediately after the agreement with the IMF was reached.

Along the period in which the exchange rate bands were operating, the essence of the non-remunerated reserve requirement on capital inflows did not change. However, the specific parameters of the system varied several times as a response to changes in the macroeconomic and international environment.[27]

In March 1994, just after the currency band system had been introduced, and coinciding with the purpose of regaining monetary control, the regime on foreign lending became more restrictive. The minimum maturity for foreign loans to be exempted from the reserve requirement was increased from 18 months to three years and the size of the requirement for lower maturity loans was increased. This happened again in August 1994, soon after the Samper administration took office. In this opportunity, the minimum maturity for the exemption was increased to five years. In February and March 1996, when the exchange rate was at the upper limit of the band and the central bank was loosing reserves, the reserve requirements were lessened and the minimum maturity for the loans to be exempted went down to four and three years, respectively.

After the huge increase in international reserves that took place in the last part of 1996, the Government issued in January 1997 an State-of-Emergency Decree which, among other measures, established an explicit Tobin tax on all capital inflows (trade financing included), in addition to the reserve requirement regulated by the central bank. The Decree was declared unconstitutional in March 1997 but the central bank rapidly increased the reserve requirement again.

In May 1997, the Banco de la República introduced several changes in the reserve requirement system, making it simpler and more similar to the one used in Chile. A flat deposit in local currency (instead of a dollar denominated deposit) was required for all loans, independently of the maturity. The minimum maturity was thus abandoned but the new mechanism implied that the tax equivalent of the deposit was lower the longer the maturity of the corresponding loan. Initially, the size of this reserve requirement in local currency was 30% of the size of the loan and had to be kept during 18 months. These numbers were reduced in January 1998 and again in September of that year as a response to the reduction in foreign exchange inflows. Between September 1998 and May 2000 the reserve requirement was equivalent to 10% of the size of the foreign loan and had to be kept during 6 months. As in the original mechanism, there was a possibility to anticipate the redemption of the deposit with a pre-established discount rate that highlights the interpretation of this reserve requirement as a tax. As shown in Appendix 3, the tax equivalent of the reserve requirement in this period was approximately 2% for an 18-month maturity loan, 0.8% for a 36-month loan and less than 0.5% for a 60-month loan. In June 2000, the reserve requirement was reduced to zero.

[27] A summary of those changes is in Ocampo and Tovar (1999), Table 1.

4. The Free Floating Experience (October 1999 onwards).

Since the currency band was dismantled and the Colombian peso entered into a floating regime, the exchange rate has behaved very quietly. There has not been significant overshooting. On the contrary, the exchange rate has gone down towards the center of the dismantled band despite the fact that the domestic interest rate has also shown a very rapid decline. The success of this experience essentially reflects two facts: (i) that the exchange rate had already adjusted to a sustainable equilibrium level and (ii) that the abolishment of the band was decided together with an agreement on a credible adjustment program with the IMF, which immediately allowed the Colombian government to get important financial resources from both the multilateral agencies (IMF and World Bank) and with foreign portfolio investors (through bond issuing).[28]

The exchange rate regime adopted in Colombia since September 1999 is close to a free floating. However, the Banco de la República has announced that it will intervene in the market through two publicly known and transparent mechanisms: (i) The first one is addressed to accumulate international reserves. For this purpose, following a system that had been previously introduced in Mexico, the central bank auctions a limited amount of foreign exchange *put options* at the end of every month.[29] (ii) The second mechanism is addressed to reduce extreme short run volatility of the exchange rate and consists of additional auctions of *put* or *call* foreign exchange options, whenever the average exchange rate of a given day is more than 5% above or below its 20-day moving average. Since December 1999, the first mechanism has been working successfully and has allowed the Banco de la República to buy more than US$ 300 million. The second mechanism has not been used as far as exchange rate volatility has been low and the trigger condition has not taken place.

B. The Rationale for the Non-Remunerated Reserve Requirement on Foreign Capital Inflows and Critical Survey of Existing Studies on their Effectiveness in Colombia.

The introduction of a tax under the form of a non-remunerated reserve requirement on foreign debt inflows since 1993 has led to an extensive debate in the Colombian literature that to some extent reproduces the international debate around the Chilean experience with the same type of instrument.

Before entering into the arguments in favor of this type of price-based regulation of capital inflows, it is important to highlight four working hypothesis that must be taken in mind in the analysis:

[28] These facts are forgotten by many analysts who argue that many problems of the last two years would have been avoided had the currency band been dismantled much sooner. See FEDESARROLLO (1999).

[29] Owners of those options have the right to sell the corresponding amount of dollars to the central bank in any day during the next month at the average market exchange rate of the previous day, provided that this average is bellow a 20-day moving average of the market exchange rate. This is a market mechanism by which the central bank guarantees that it only buys dollars when they are relatively cheap.

(i) The first one is that the rapid increase in gross capital flows during the nineties is not only a positive fact, which provides enormous advantages and new possibilities to the emerging economies, but a permanent and irreversible process. As illustrated in World Bank (1997), the rapid process of financial integration that has taken place in the recent period reflects a deep and sustainable structural change. In this context, it is clear that the benefits that emerging countries may obtain from capital inflows are much larger than they would be if they were just part of a cyclical process. Also, it is clear that administrative controls on capital flows become increasingly costly and ineffective. Price-based regulations are supposed to affect in the margin the costs and incentives to bring capital inflows into the country and not to isolate it (as a VAT tax is not addressed to eliminate retail sales or a reserve requirement on domestic deposits are not supposed to make financial intermediation impossible).

(ii) Any regulation on capital flows may have marginal positive or negative effects but is not a substitute for sound policies in other fronts, notably sound fiscal policies. The contrast in economic results between Chile and Colombia, two countries that used similar non-remunerated reserve requirements on capital inflows but with very different fiscal policies, is a good illustration of this point.

(iii) International financial integration implies that, independently of any tax on capital inflows, the economy becomes an open economy in the Mundell-Fleming sense. This implies that in the new international context, exposure to potentially huge foreign capital flows drastically reduce, on a permanent basis, the ability of the central banks to affect interest rates in a fixed or semi-fixed exchange rate regime.[30] In the Colombian case, the process of transition towards a free floating regime that we described in the previous section is closely related with the rapid loss of effectiveness of monetary policy when trying to achieve a predetermined target in either the nominal or the real exchange rate. Recovering simultaneous control on the exchange rate and the monetary policy is just impossible in the new historical context. The relevant question is whether or not a tax on capital inflows may have significant effects, in the margin, on the behavior of either the exchange rate or the interest rate.

(iv) Finally, even if the central bank is able to affect the behavior of the nominal exchange rate (with a necessary loss of monetary control), it is not clear that it would affect the real exchange rate in the long run through that mechanism. This is a long debate both theoretically and empirically in the Colombian literature. Our working hypothesis is that the nominal exchange rate might have some real effects

[30] The characterization of the Colombian economy as an open-to-capital-flows economy is particularly clear in the nineties. However, several authors have suggested that this was the proper characterization for the Colombian economy even in earlier decades, when strong administrative controls on capital flows were in place. See for example Toro (1987), Rennhack and Mondino (1989) and Gómez (1996). Also, Herrera (1997a) uses the Feldstein-Harioka methodology with Colombian data from 1952 to 1993 to conclude that capital mobility was high. With a different methodology, Posada (1999) uses data for the whole twentieth century to show that the Colombian real interest rate, in the long-run has been approximately equal to the real interest rate of the United States, plus a spread that has ranged between 2.8% and 4.8%. He concludes that excluding some short-run periods, which can be characterized as crisis periods, the behavior of the Colombian real interest rate is the behavior that can be expected for an open-to-capital-flows economy.

in the short run but that the behavior of the real exchange rate in the long run is explained by fundamentals.[31] Moreover, as the economy is more integrated to the rest of the world, the pass-through effects might become larger and the ability of the exchange rate policy to affect the real exchange rate is reduced even in the short run.

With these working hypothesis as a framework, the main arguments in favor of price-based regulation instruments on capital inflows can be classified in two groups: (i) the use of these instruments as a *liability policy* addressed to bias capital inflows against the short-run ones, and (ii) their use as a *macroeconomic policy* tool. In this section we will look at both types of arguments and at the evidence provided in the Colombian literature for each one of them. In chapter 4 we will propose an alternative way of evaluating the effectiveness of the non-remunerated reserve requirement as a macroeconomic policy tool in the Colombian case.

1. Reserve Requirements on Foreign Capital Inflows as a *Liability Policy*.

It is clear from the design of the Colombian regulations on capital inflows during the nineties that they are aimed, among other goals, to reduce the short-term component of capital inflows: First, the non-remunerated reserve requirement affected foreign debt and did not affect foreign direct investment. Second, its tax-equivalent was much higher for the short-term than for medium- and long-term loans. Third, until May 1997, the long-term debt inflows were exempted of the requirement

The benefits that may be obtained from the price-based regulation of capital inflows as they effectively create a bias against short-term debt are related to a reduction in the vulnerability of the economy to sudden external shocks (such as panics and contagion effects) that may affect even healthy economies with good macroeconomic fundamentals. A high average maturity of private debt makes the country less vulnerable to a reduction in the supply of loans from abroad which, as happened in some East Asian countries in 1997 and 1998, may force a sudden reduction in the outstanding debt.

In the Colombian case, as we argued in chapter 2, the fact that there was not any massive repayment in the final years of the 1990s suggests that the country benefited from the high average maturity of the foreign private foreign debt. Evidence presented in Cárdenas and Barrera (1996, 1997) suggests that the introduction of the reserve requirement on capital inflows had the desired effect on the term structure of the debt. Ocampo and Tovar (1999) use more formal procedures to test this hypothesis and conclude that the term structure of private capital inflows was affected both by the exemptions for loans with a minimum maturity and by the differences in the tax-equivalent of the reserve requirements on medium-term *versus* short-term borrowing.

[31] The effects of the nominal exchange rate on the real exchange rate may exist not only because the pass-through of a nominal devaluation into the inflation rate is less than unity in Colombia (Rincón, 1999c), but because the nominal exchange rate policy may affect the behavior of private capital flows, which in turn affect the fundamentals that are behind the determination of the real exchange rate.

It must be said, however, that the use of price-based regulations on foreign capital inflows as a *permanent* liability policy is not necessarily desirable, even if it is effective in increasing the average maturity of foreign private debt. The bias against short term foreign debt implies a distortion that may become costly. In particular, it implies that short-term domestic financial instruments are more protected from foreign competition than the long-term ones. This may become an obstacle for the development of the domestic capital markets as far as the domestic long-term financial instruments are discouraged in relative terms.

In addition, a high average maturity of private debt is not a safeguard against a panic or a contagion crisis. When there is a shock on the economy, "what was originally contracted to be long-term debt may become shorter-term debt by the decision of the debtors" as far as they can pre-pay their foreign currency liabilities or buy dollar-denominated assets to hedge their positions (García, 1999). To some extent, this happened in the Colombian case in 1998 and 1999, although, as we saw, the repayment of private debt was not massive in those years.

In summary, it is likely that in the long run, the costs of using price-based regulations on foreign capital inflows as a *permanent* liability policy may become larger than the benefits. A better strategy for this purpose may be to use prudential financial regulation. A possibility would be to increase capital requirements of the banking system on loans extended to clients with a high short-term debt exposure (whether in domestic or in foreign currency) or with a large currency mismatch between liabilities and assets (future earnings included). This measure could be justified as far as these clients are riskier.

2. Reserve Requirements on Foreign Capital Inflows as a *Macroeconomic Policy* Tool.

In evaluating the use of price-based regulations on capital inflows as a macroeconomic policy the Colombian literature has focused on the effects of those regulations on the volume of capital inflows. Empirical results on this topic are mixed.

Cárdenas and Barrera (1996, 1997) use regression analysis with data from 1985 to 1995 to conclude that the introduction of the price-based capital regulations in 1993 was not effective in reducing capital inflows. Their analysis is flawed, however, as far as they do not consider the existence of administrative controls until 1993. In other words, they forget the fact that the reserve requirements introduced in 1993 substituted administrative controls and were just part of a broader strategy addressed to liberalize the capital account and to use more market-oriented instruments in the regulation of capital flows.

To avoid the problem with changes in administrative controls, Ocampo and Tovar (1999) use econometric procedures with data since 1993, when most of them had been removed. They find that the reserve requirements on capital inflows "were effective in reducing the volume of capital inflows, both due to the increased costs of shorter-term borrowing and to the discrete effects of regulations, associated to the imperfect substitution of borrowing at different maturities" (p. 29). Rincón (1999) obtains similar results using short-term capital

flows as the dependent variable, confirming that the reserve requirement was effective in reducing their volume. Rocha and Mesa (1998) present similar exercises but with stocks rather than flows. They also conclude that the reserve requirements were effective in affecting the net foreign debt stock *vis-a-vis* the domestic net assets of the private sector.

The econometric results on the effectiveness of price-based regulations on the volume of capital inflows may be however subject to criticism: they do not solve the simultaneity problem that arises from the fact that those regulations affect the domestic interest rates, which in turn affect capital inflows. The papers mentioned in the previous paragraphs obtain a partial equilibrium result: given the differential between domestic and foreign interest rates, a tax on capital inflows reduces the volume of those capital inflows. The tax, however, should increase the domestic interest rate and it is likely that its total effect on the volume of capital inflows will be ambiguous when this channel is taken into account.

A tax on capital inflows can also have other indirect effects through which capital inflows may be even increased. A very interesting one has been mentioned in an IMF working paper by Tito Cordella (1998). In a formal model, he shows that if capital controls (or a tax) on short-term capital inflows are effective in reducing the vulnerability of an emerging market to financial crisis, they may increase the volume of capital inflows. The argument can be expressed as follows: when a tax on short-term capital inflows is perceived by foreign lenders as an instrument that reduces the vulnerability of an emerging market, it may reduce the relevant interest rate at which that market can have access to foreign resources. The country risk premium is reduced and foreign lending may increase. "Accordingly, the empirical findings suggesting the ineffectiveness of capital controls in reducing the total volume of capital flows in emerging markets do not refute, and may instead corroborate, the view that short-term capital controls can be effective instruments in reducing the vulnerability of such markets to financial crises" (p. 3).

The ambiguity in the total effect of price-based regulations on the volume of capital inflows is highlighted in Colombia by the fact that private capital inflows reached their historical peak after 1993, when those regulations were introduced.[32] This does not mean, however, that their effectiveness as a macroeconomic policy tool is necessarily ambiguous. In our view, their effectiveness as a macroeconomic policy tool should be evaluated from the perspective of their impact on the domestic interest rates and the real exchange rate and not on the volume of capital inflows.

As we saw in chapter 2, the Colombian economy was characterized during most of the nineties by a current account deficit in the balance of payments which reflected a large excess of aggregate demand and a simultaneous process of real appreciation of the Colombian peso. With very high capital mobility, macroeconomic policy faced a difficult trade off. If monetary policy was used to increase domestic interest rates, capital inflows

[32] The simple correlation between the introduction of the tax in 1993 and large volumes of capital inflows in the following period has led many analyst to conclude that the tax was not effective. See for example Steiner (1996). Besides the explanation provided in the text, the coexistence of the tax with large capital inflows may also be explained as a consequence of a reaction function of the economic authorities: the tax is introduced by the authorities as an endogenous response to exceptionally large capital inflows. This hypothesis is successfully tested by Cardoso and Goldfajn (1997) for the Brazilian case.

would be stimulated with a corresponding additional pressure towards nominal and real appreciation of the peso which, in turn, would weaken even further the current account of the balance of payments. What was required was a macroeconomic policy tool able to increase the domestic interest rates, in order to discourage domestic demand, without creating additional pressures towards the appreciation of the real exchange rate. Fiscal restraint would have been an optimal policy to reduce excess demand. Given the inflexibility of fiscal policy, however, the tax on capital inflows that was imposed by the Banco de la República through the non-remunerated reserve requirements aimed at this goal. Our purpose in chapter 4 is to show that it was effective from this perspective, which does not necessarily mean that the reserve requirements reduced the volume of capital inflows.

IV. A NEW PERSPECTIVE FOR THE EVALUATION OF THE MACROECONOMIC EFFECTS OF THE NON-REMUNERATED RESERVE REQUIREMENT ON CAPITAL INFLOWS.

A. The Model

This chapter introduces an alternative procedure for evaluating the effectiveness of the non-remunerated reserve requirement on capital inflows that was imposed in Colombia since 1993.

The theoretical framework is based upon a very simple model that explicitly relates the real interest rates and the real exchange rate. The model is built on three basic assumptions about the characteristics of the Colombian economy in the nineties: First, that capital mobility is very high, which implies that interest rate parity condition holds in the long run, although the interest rate may be affected in the short run by domestic monetary policy. Second, that the real exchange rate is determined in the long run by real factors such as the terms of trade, aggregate demand (mostly affected by government expenditure) and capital flows, although in the short run may also be affected by the behavior of the nominal exchange rate. Third, that capital flows are affected by the differential between domestic and foreign interest rate. The non-remunerated reserve requirement on capital inflows imposed by the central bank, to which we will refer as a tax, enters into the model as far as it affects the cost of foreign credit and, therefore, the relevant foreign interest rate.

1. Real Interest Rate Parity Condition.

Assuming high capital mobility, the first equation of our model is the standard uncovered interest parity condition, adjusted for the fact that the cost of foreign borrowing must include the tax-equivalent of the non-remunerated reserve requirement established by the Colombian central bank (*TAX*):

$$i = i^* + TAX + \Delta s^e \tag{1}$$

where i is the domestic interest rate, that for statistical purposes we will assume is the average interest rate paid by the financial system on 3 month CDs; s is the log of the nominal exchange rate, so that Δs^e is the expected value of nominal devaluation ($\Delta s^e = s_{+1} - s$); and i^* is the relevant foreign interest rate, which we compute as the LIBOR 3-month rate (i^{US}) plus the spread on Colombian government bonds (*spread*), that is assumed to reflect the Colombian country risk (hence, $i^* = i^{US} + spread$).[33]

[33] We use the spread of Colombian Bonds in the international market over US Treasury for a five year maturity since 1995. Since there were not liquid Colombian bonds in the market for the previous period, the series were completed for 1993 and 1994 by using the margin over the Libor 3-month rate of the average effective interest rate of foreign loans to the private sector.

From equation (1), we can derive the real interest rate parity condition by using the Fisher decomposition of the nominal interest rate and the definition of the real exchange rate.[34] In fact, the Fisher equation states that both for the domestic country and for the rest of the world:

(2) $$i = r + \pi^e$$

(3) $$i^* = r^* + \pi^{*e},$$

where r and r^* respectively represent the domestic and the foreign *ex-ante* real interest rates, and π^e and π^{*e} denote the domestic and foreign expected inflation rates. Substituting (2) and (3) in (1), we get:

(4) $$r = r^* + TAX + \Delta s^e - \pi^e + \pi^{*e}.$$

If we represent the log of the real exchange rate by q and we denote the log of the domestic and foreign price indexes by p and p^*, respectively, then:[35]

(5) $$q = s - p + p^*.$$

Denoting the expected rate of real devaluation by $\Delta q^e = q_{+1}^e - q$, then:

(6) $$\Delta q^e = \Delta s^e - \pi^e + \pi^{*e}.$$

Substituting (6) in (4), we obtain:

(7) $$r = r^* + TAX + \Delta q^e.$$

Equation (7) represents the real interest rate parity condition. For estimation purposes, we can derive a long run equilibrium equation as:

(8) $$r = \alpha_1 r^* + \alpha_2 TAX + \alpha_3 \Delta q^e + \varepsilon,$$

where the coefficients α_i need to be estimated and ε is an error term which allows for short run deviations of r from its long run equilibrium level. We assume that those short run deviations may depend on domestic monetary policy, which for statistical purposes will be represented by the excess supply of real money balances, *ermb*. In the short run, therefore, the dynamics of the real exchange rate can be represented by the following function:

(9) $$\Delta r = F(\Delta r^*, \Delta TAX, \Delta \Delta q^e, ermb, \varepsilon_{-1}).$$
$$(+) \quad (+) \quad (+) \quad (-) \quad (-)$$

[34] This is a standard procedure. See, e.g., Meese and Rogoff, 1988; Pauls, 1993; Clarida and Gali, 1995; MacDonald, 1997, 1998, 1999.

[35] For statistical purposes, we use the multilateral real exchange rate index deflated by CPI, published by the Banco de la República.

2. Real Exchange Rate equation

Following several studies on the real exchange rate in developing countries and in Colombia, it is assumed to be determined in the long run by real factors.[36] In particular, we include the log of the terms of trade (*tot*), the log of current real government expenditure of the central government (*ge*), the log of net total real capital inflows (*cf*) and a time-trend (*trend*) sought to capture technological and productivity changes:[37]

$$q = \beta_1 + \underset{(-)}{\beta_2\, cf} + \underset{(-)}{\beta_3\, tot} + \underset{(-)}{\beta_4\, ge} + \underset{(-)}{\beta_5\, trend} + u \qquad (10)$$

where *u* is an stochastic error term that allows for short term dynamics of the real exchange rate, which might be affected by the behavior of the nominal devaluation (Δs), as shown in the following function:

$$\Delta q = F(\underset{(-)}{\Delta\, cf}, \underset{(-)}{\Delta\, tot}, \underset{(-)}{\Delta\, ge}, \underset{(+)}{\Delta s}, \underset{(-)}{u_{-1}}) \qquad (11)$$

Assuming rational expectations, the expected rate of real devaluation (Δq^e) that appears in equations (8) and (9) should be the fitted value of Δq estimated in equation (11).[38]

3. Capital flows equation

Capital flows are assumed to depend on the interest rate differential:

$$cf = F(\underset{(+)}{r}, \underset{(-)}{r^* + TAX}) \qquad (12)$$

Thus, our model is summarized by equations (8) through (12). It can be observed that an increase in *TAX* does not necessarily reduce *cf*, as far as its effects through *r* may have the opposite effect. In our view, the effectiveness of the *TAX* should be evaluated from a different perspective: it is effective if it allows the real interest rate to increase without appreciating the real exchange rate.

B. The Econometrics and the Data

The empirical work is based in the method of instrumental variables and alternative cointegration proceedings. The model is estimated in several steps in order to avoid simultaneity problems. First, the capital flows equation (Equation 12) is estimated with a

[36] See Khan and Montiel (1987), Edwards (1989a, 1989b) and Cottani *et al*. (1990). For the Colombian case, see, among others, Herrera (1997a), Calderón (1995), Carrasquilla y Arias (1997), Ocampo y Gómez (1997) and Cárdenas (1997, chapter 2), and Arias and Misas (1998).

[37] As far as net capital inflows present negative values, the variable was re-scaled before being transformed to logs.

[38] It is clear from the model that the current and the expected real exchange rate reflect the effects coming from the regulation on capital inflows that we capture in the variable *TAX*. The theoretical justification for this is given by models of Stockman (1980), Mussa (1976, 1984), and Edwards (1989b).

simple regression of cf_t against lagged values of *cf*, domestic and foreign interest rates and *TAX*. Then, the fitted value is used as an instrument in the real exchange rate equations. As far as the real exchange rate (*q*) is a non-stationary variable, the estimation of the corresponding long run equilibrium equation (equation 10) uses a cointegration procedure. Finally, the fitted value of the dynamic error-correction equation for the real exchange rate (equation 11) is taken as our instrument for the expected real devaluation in the real interest rate equations (Equations 8 and 9).

The data set consists of monthly time-series data for the period 1993:9 through 1999:9. The series for capital inflows are taken from the foreign exchange transactions reports (*Balanza Cambiaria*) and include net cash capital flows (debt and investment) of both the public and the private sectors.

Given that r and r^* are *ex-ante* interest rates, they are not observable and have to be estimated. For that purpose we use the methodology proposed by Mishkin (1984), which is described in the Appendix 2. The estimation of r^* was carried out before adjusting it by the *spread*; that is, we estimate r^{US} and then we add the spread. Intuitively, r_t *and* $r^{US}{}_t$ are the fitted values of $r_{(ex\ post)t}$ and $r^{US}{}_{(ex\ post)t}$ in a regression against a vector that contains the available relevant information at *t-1*. The variables $r_{(ex\ post)t}$ and $r^{US}{}_{(ex\ post)t}$, in turn, are defined by the differences between the corresponding nominal interest rates (i_t and $i^{US}{}_t$) and observed inflation rates forwarded to *t+3* (that is, π_{t+3} and π^*_{t+3}). As shown in Appendix 2, there are no important differences between the real *ex-ante* interest rates and the *ex-post* rates.

The methodology to obtain *TAX* draws heavily on Ocampo and Tovar (1997) and the modifications introduced by Rincón (2000). As shown in Appendix 3, the tax-equivalent of the non-remunerated reserve requirements on capital inflows differs quite significantly depending on the maturity of the foreign loan for which it is estimated. This is so because in some periods the requirement has applied only to loans with shorter maturities than 12, 18, 36 or 60 months. To obtain a unique indicator, we took a simple average of the estimates of the tax-equivalent for loans with 18, 36 and 60 months. We did not include shorter maturities in the computation of the average *TAX* since the corresponding tax-equivalent levels were prohibitive for them.

Variable *ermb*, as mentioned before, represent the excess supply of real money balances. Following Edwards and Khan (1985), we define the 'excess' of real money balances as the residual from a linear OLS regression of the seasonally adjusted time series of the log of real narrow money on a constant, the seasonally adjusted time series of the log of real industrial production index (as a proxy of real GDP), the estimated expected inflation rate (π^e_t, as estimated in Appendix 2) and a trend.

C.- <u>The capital flows equation</u>

Following equation (12), capital inflows at period *t*, cf_t, were estimated as a function of lagged domestic and foreign interest rates, the tax-equivalent of the non-remunerated reserve requirement, and lagged values of the dependent variable. We tried three lags of

each of the explanatory variables. Table 4.1 reports those coefficients that resulted significant at the 10% level, following the procedure of "testing down" suggested by Hendry *et al.* (1990).

Regression 1 in Table 4.1 was estimated with the restriction that follows from equation (12), according to which the coefficients for the foreign interest rate (r^*) and for the *TAX* should be equal. Hence, the variable included in the regression is $r^* + TAX$. The coefficients have the expected signs for both r_{t-1} and $(r^* + TAX)_{t-3}$. In *Regression 2*, the restriction is lifted in order to evaluate the separate effect of *TAX*. The effects of r_{t-1} and r^*_{t-3} are again significant and with the expected signs. The effect of TAX_{t-3} is also significant and with the expected (negative) sign. There is, however, a positive effect of TAX_{t-2} which makes the total effect of this variable ambiguous. A possible explanation for this result, as argued above, is the indirect effect of the non-remunerated reserve requirement on capital inflows that goes through the domestic interest rate. This equation alone, therefore, cannot be conclusive about the effectiveness of those reserve requirements.

Table 4.1
The Regression Model for Capital Inflows
(Equation 12)

Dependent Variable: cf_t		
Explanatory Variable	*Regression 1*	*Regression 2 (Separating TAX)*
cf_{t-2}	0.62	0.60
	(.00)	(.00)
cf_{t-3}	0.39	0.42
	(.00)	(.00)
r_{t-1}	0.02	0.02
	(.08)	(.07)
$(r^* + TAX)_{t-3}$	–0.05	
	(.02)	
r^*_{t-3}		-0.05
		(.03)
TAX_{t-2}		0.32
		(.02)
TAX_{t-3}		-0.37
		(.01)
	$\bar{R}^2 = 0.34$	$\bar{R}^2 = 0.34$
	$Q(12) = 11.1$	$Q(12) = 11.1$
	(*p-value*=0.52)	(*p-value*=0.52)

1/ The value in brackets is the *p-value*. *Q* is the Ljung-Box statistic for serial correlation.

D. The Real Exchange Rate Equations

Table 4.2 shows the estimates of the regression model for the 'long run equilibrium' real exchange rate following Equation (10). To avoid endogeneity problems we use the fitted value of the capital flows equation as the instrumental variable for capital inflows (*ivcf*). *Regression 1* and *Regression 2* in the Table differ on whether the capital flows equation for the computation of the instrumental variable is the restricted one, in which r^* and *TAX* are taken together (*Regression 1* of Table 4.1), or the unrestricted one, in which there are separate coefficients for the effect of *TAX* (*Regression 2* of Table 4.1). The results of both regressions are very similar, although *Regression 1* provides slightly better statistical characteristics. In both regressions the instrumental variable for capital flows show a negative and significant effect on the equilibrium real exchange rate. The time-trend variable (*trend*) that was supposed to capture technological and productivity changes resulted insignificant and was dropped. The estimated coefficients for all other variables are correctly signed and significant. The negative effect of the terms of trade variable (*tot*) implies that, as expected, the income (or wealth) effect dominates the substitution effect. Finally, the negative impact of *ge* is consistent with a two sector (tradeable - nontradable) model in which the current government spending is concentrated in the non-tradable sector. Although serial correlation is present, it does not bias our estimates. They are inefficient, though. To test the *stability* of the model a Dickey-Fueller cointegration type of test was implemented and the null hypothesis of no cointegration was rejected.[39]

As said above, the error term of the 'long run equilibrium equation' allows for short-run deviations of the real exchange rate. Then, we can estimate an error-correction model, in which the differences of the variables from the 'long run' model, as well as the estimated error term ($\hat{u}$), might affect the short-run behavior of the real exchange rate. As stated by Equation (11), we assume that the variations in the nominal exchange rate (Δs) may also affect the short run behavior of the real exchange rate.

For the estimation of the error correction model we define the dependent variable as the future variation of the real exchange rate ($\Delta' q_t = q_{t+3} - q_t$). This differs from the traditional Engle-Granger procedure as we are interested in the future variation of the real exchange rate that may be expected given the information that the economic agents have at time *t*. The fitted value of $\Delta' q_t$ is to be used later as the rational expectation of real devaluation in our real interest rate equation. The explanatory variables include the error term of the cointegration equation at time *t*, the lagged values of the dependent variable and the contemporaneous and lagged values of the time-differences of the terms of trade, the instrumental variable for capital inflows, the current government expenditure and the nominal exchange rate.

[39] Henceforth, when the results of a test and/or estimation are not reported, they are available under request from the authors. The first case is that of the unit root tests. All series were tested first for unit roots using standard tests before any estimation. We will make explicit only the cases when a series was found to be stationary. Otherwise, all series behave as non-stationary processes.

Table 4.2
The Estimates for the 'Equilibrium' Real Exchange Rate
(Equation 10)

Dependent Variable: q_t		
Explanatory Variable	*Regression 1*	*Regression 2 (Separating TAX)*
constant	6.56 (.00)	6.23 (.00)
tot_t	–0.15 (.05)	-0.17 (.06)
$ivcf_t$	–0.12 (.00)	-0.05 (.00)
ge_t	–0.11 (.00)	-0.12 (.00)
	$\overline{R}^2 = 0.49$ $Q(12) = 56.5$ (*p-value*=0.00)	$\overline{R}^2 = 0.37$ $Q(12) = 96.1$ (*p-value*=0.00)

1/ The value in brackets is the *p-value*. *Q* is the Ljung-Box statistic for serial correlation.

The best estimates, after dropping the variables that did not result statistically significant at a 10% level, are presented in Table 4.3 (where for any variable *x*, we denote: $\Delta x_t = x_t - x_{t-1}$). *Regression 1* presents the estimates for the case in which the instrumental variable for capital inflows was estimated with the restriction of $r^* + TAX$ acting with the same coefficient. As can be observed, capital flows have negative effects on the real exchange rate both in the short and long run. As we hypothesized, the nominal exchange rate has short-run positive effects on the real exchange rate. In contrast, the terms of trade and the government expenditure do not have significant short run effects on the real exchange rate.

Regression 2 uses the instrumental variable for capital inflows with a separate effect of *TAX*. The results are very similar. However, in this case we got two coefficients with signs contrary to expected: a negative effect of nominal devaluation at time *t* and a positive effect of the lagged increase in government current spending.

Table 4.3
The Estimates of the Error Correction Regression Model for the Real Exchange Rate (Equation 11)

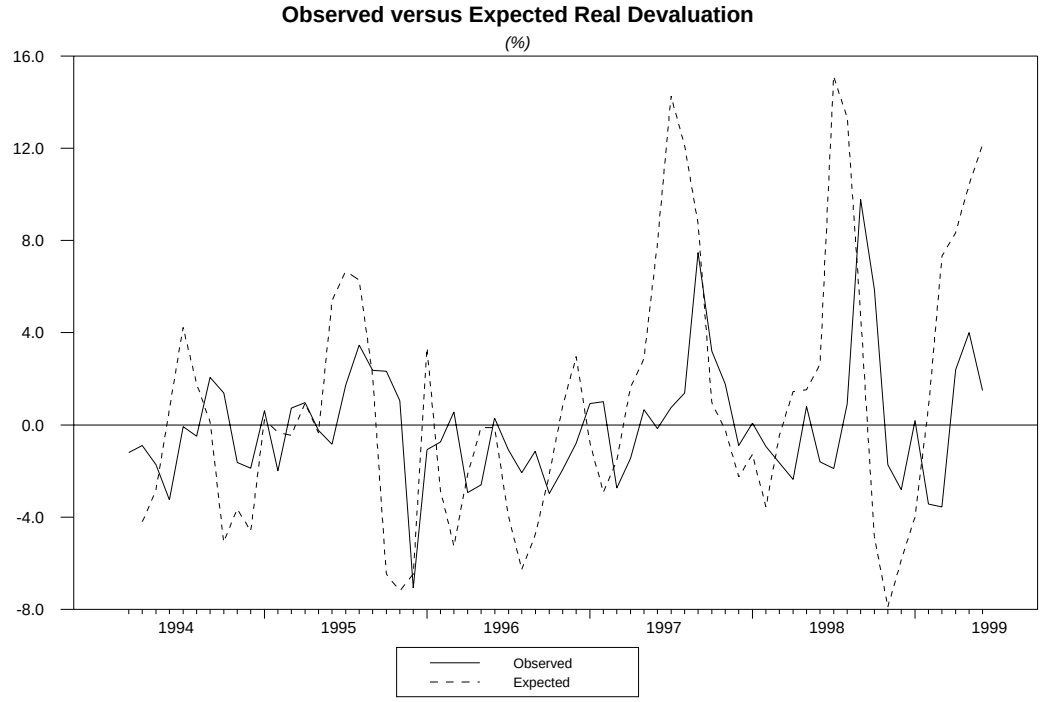
Dependent Variable: $\Delta' q_t$		
Explanatory Variable	*Regression 1*	*Regression 2 (Separating TAX)*
$\Delta q'_{t-1}$	1.27	1.46
	(.00)	(.00)
$\Delta q'_{t-2}$	–0.64	-0.71
	(.00)	(.00)
$\Delta ivcf_{t-1}$	–0.10	
	(.00)	
$\Delta ivcf_{t-2}$	–0.03	-0.03
	(.04)	(.05)
$\Delta ivcf_{t-3}$	–0.05	-0.01
	(.00)	(.04)
Δge_{t-1}		0.02
		(.06)
Δs_t		-0.75
		(.00)
Δs_{t-1}	0.41	0.83
	(.03)	(.00)
$\hat{u}_t$	–16.26	-11.55
	(.02)	(.07)
	$\overline{R}^2 = 0.79$	$\overline{R}^2 = 0.83$
	$Q(12) = 12.3$	$Q(12) = 6.19$
	(*p-value*=0.42)	(*p-value*=0.90)

1/ The value in brackets is the *p-value*. *Q* is the Ljung-Box statistic for serial correlation.

Figure 4.1 plots the observed (*ex-post*) real devaluation ($\Delta' q_t$) *versus* the fitted value of Regression 1, which we interpret as the expected real devaluation with the information available at time *t* (Δq^e_t). The estimate of expected real devaluation seems to be a good predictor of *ex-post* real devaluation.[40]

[40] When the fitted value of regression 2 is used, the corresponding plot is very similar to the one shown in Figure 4.1. It is available under request from the authors.

Figure 4.1



E. The Estimation of the Real Interest Rate equation

Since we already have estimates of the unobservable variables r_t, r^*_t and Δq^e_t, we can proceed to estimate the regression model given by equation (8). Our aim is to evaluate, first, if the equilibrium condition holds; that is, if the real interest rate parity condition holds; second, we aim to estimate the long and short-run elasticities; and third, to quantify the effect of the tax equivalent of the non-remunerated reserve requirement on capital inflows (*TAX*) on the *ex ante* real interest rate (*r*). In order to capture the role that may have played the monetary policy in affecting the real interest rate, we introduce a measure of the 'excess' of real money balances (*ermb*) in the dynamic presentation of the regression model (Equation 9).[41]

The first thing we did was testing for the presence of unit roots. Standard unit root tests indicated that *TAX* and the *ex-ante* real interest rates (r, r^* and r^*+TAX) behave as unit root processes while the expected real devaluation (Δq^e_t) and the 'excess' of money balances ($ermb_t$) behave as stationary processes (the tests are not reported).

[41] The fact that we allow some room for the monetary policy is based not only on the findings in this paper on the effectiveness of capital controls but also on other results from the literature in Colombia (Edwards, 1985; Toro, 1987; Gómez, 1996). From an statistical point of view, the introduction of the 'excess' of real money balances might improve the statistical properties of the model. We assume (and the estimation confirms) that the negative direct liquidity effects of *ermb* on the interest rate dominate over the indirect (positive) effects through higher inflationary expectations.

Secondly, we evaluate for the presence of cointegration using two procedures: Johansen and Juselius (JJ) and Dickey-Fueller (DF). The JJ procedure consist of a full information maximum likelihood estimation of a system characterized by *n* cointegrating vectors. The *Trace* and *L-max* statistics indicated the presence of just one cointegrating relationship.[42] When testing *weak exogeneity* we found that r_t resulted the endogenous variable, as expected, while $(r^*+TAX)_t$, Δq^e_t, and $ermb_t$ resulted *weakly* exogenous. When testing for *exclusion*, we found that $(r^*+TAX)_t$ was part of the *cointegration space* while Δq^e_t and $ermb_t$ were excluded. We estimated then the *conditional* (*partial*) system and tested it again for cointegration following the recommendations and, respective table, from Harbo et al. (1998).[43] The results confirmed the existence of just one cointegration vector.

The Dickey-Fuller procedure consists simply on running an OLS regression and testing for unit roots on the residual from the regression model based on Equation (8). The test showed that the null hypothesis (i.e., that there is not presence of cointegration) could not be rejected at 5%. When we excluded Δq^e_t from the regression, however, the test was fully rejected, even at 1%. This corroborates the results from the JJ procedure: the presence of just one cointegrating relationship and the exclusion of the expected value of the real devaluation.

Hence, evidence goes against the existence of a long-run relationship between r_t, $(r^*+TAX)_t$ and Δq^e_t. However, data suggest that there is a long-run relationship between r_t and $(r^*+TAX)_t$. For completeness we repeated the full exercise but separating the tax-equivalent of the non-remunerated reserve requirement, TAX_t, from r^*_t, and the results did not change much.

Table 4.4 reports the results from the OLS output of the 'equilibrium' relationship stated in Equation (8) augmented by a constant, with and without separating *TAX* .[44] It is clear from the results that the foreign real interest rate is the driving force of the domestic real interest rate, which can be considered evidence of the high degree of integration of Colombia to the world capital markets in the 90s. Moreover, it is interesting to note that the long run coefficient of the foreign real interest rate is close to unity. This result is particularly strong when we separate the tax equivalent of the non-remunerated reserve requirement. This implies that if the relevant foreign real interest rate (r^*) rises by 100 basic points, whether it is because of an increase in the US interest rates or because of an increase in the Colombian country risk (*Spread*), the domestic *ex-ante* real interest rate (*r*) will rise by about the same amount.

[42] Before testing for cointegration, we tested for the deterministic component in the statistical *system* and for specification and misspecification problems. The tests showed that data contained a constant in the cointegration space and that the specified VEC model adjusted generally quite well the data.

[43] We use the critical values from "Table 3" in Harbo *et al.* (1998) with p_1=1 and p_2=1, a 95% quantile and correction for *small* samples as suggested by Reinsel and Ahn (1992).

[44] Estimates of Table 4.4 will be used in the next subsection for the sensibility analysis. The results from the JJ procedure are quite similar but are computationally harder to use for the next subsection so that we decided to show just those coming from the Dickey-Fueller procedure.

The most relevant result for our original hypothesis is that the non-remunerated reserve requirement on capital inflows (*TAX*) does have a positive effect on the domestic *ex-ante* real interest rate. This result holds in both regressions in Table 4.4.

Table 4.4
Estimates of the 'Equilibrium' *Ex-Ante* Real Interest Rates
(Equation 8)

Dependent Variable: r_t		
Explanatory Variable	*Regression 1*	*Regression 2 (Separating TAX)*
Constant	0.70 (.56)	0.74 (.54)
$r^*_t + TAX_t$	1.13 (.00)	
r^*_t		1.01 (.00)
TAX_t		1.70 (.00)
	$\overline{R}^2 = 0.45$ $Q(12) = 108.1$ (*p-value*=0.00)	$\overline{R}^2 = 0.45$ $Q(12) = 117.6$ (*p-value*=0.00)

1/ The value in brackets is the *p-value*. *Q* is the Ljung-Box statistic for serial correlation.

Table 4.5 presents the estimation of the error-correction model for the domestic *ex-ante* real interest rate given by equation (9).This equation captures the dynamics of *r* in the process of adjustment towards its long-run equilibrium level. Given the economic and statistical properties of Δq^e_t and $ermb_t$ (as stationary processes), we introduced these variables in levels in the dynamic equation, as recommended by JJ. The expected real devaluation (Δq^e_t) did not result significant in explaining the short run behavior of the domestic real interest rate. Changes in the foreign real interest rate were not significant either. In contrast, changes in *TAX* have a positive short-run effect on the domestic *ex-ante* real interest rate. Also, the estimates of the coefficient for $ermb_t$ show that a expansionary monetary policy, as measured by the 'excess' of real money balances, produces a temporary decrease in the domestic *ex-ante* real interest rate.

Table 4.5
Estimates of the Error Correction Model for the Domestic *Ex-Ante* Real Interest Rate (Equation 9)

Dependent Variable: Δr_t		
Explanatory Variable	*Regression 1*	*Regression2 (Separating TAX)*
Δr_{t-1}	0.21	0.20
	(.06)	(.04)
Δr_{t-2}	0.25	
	(.02)	
ΔTAX_{t-1}		2.31
		(.00)
$ermb_t$	-14.20	-12.95
	(.02)	(.02)
$\hat{\varepsilon}_{t-1}$	-26.83	-16.44
	(.00)	(.00)
	$\overline{R}^2 = 0.28$	$\overline{R}^2 = 0.41$
	$Q(12) = 5.99$	$Q(12) = 7.3$
	(*p-value*=0.91)	(*p-value*=0.83)

1/ $\hat{\varepsilon}_{t-1}$ is the error correction term. The value in brackets is the *p-value*. The table reports only those coefficients with *p-value* <0.10. *Q* is the Ljung-Box statistic for serial correlation.

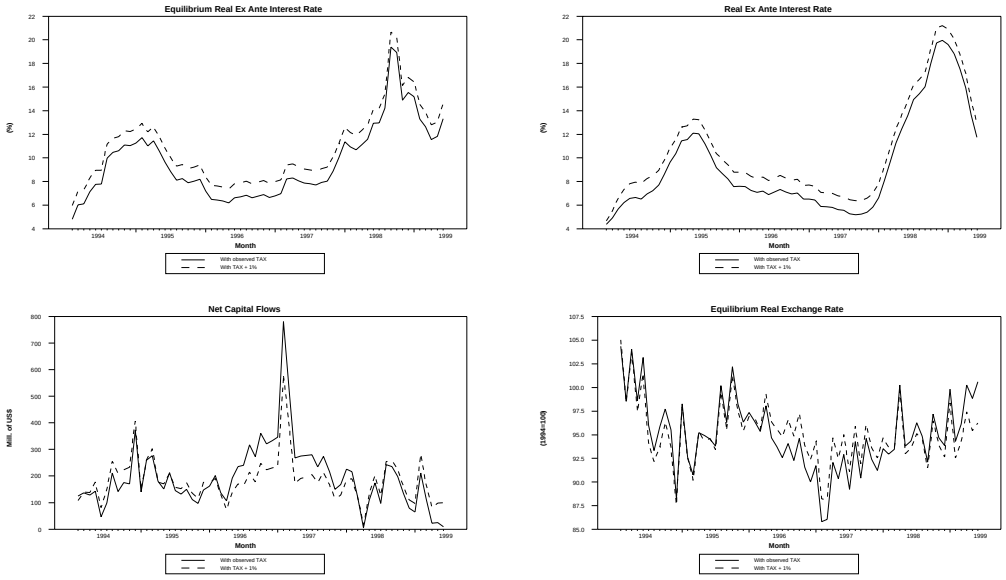
F. Sensibility Analysis: macroeconomic effects of the non-remunerated reserve requirements on capital inflows

In order to summarize the implications of our econometric results in terms of the macroeconomic effects of the non-remunerated reserve requirement on capital inflows, this section presents a counterfactual sensibility analysis to evaluate the simultaneous effect of a marginal change in *TAX* on the endogenous variables of our model, that is, on the domestic *ex-ante* real interest rate (*r*), the long-run equilibrium level of this variable, the net capital inflows (*cf*), and the long-run 'equilibrium' real exchange rate.

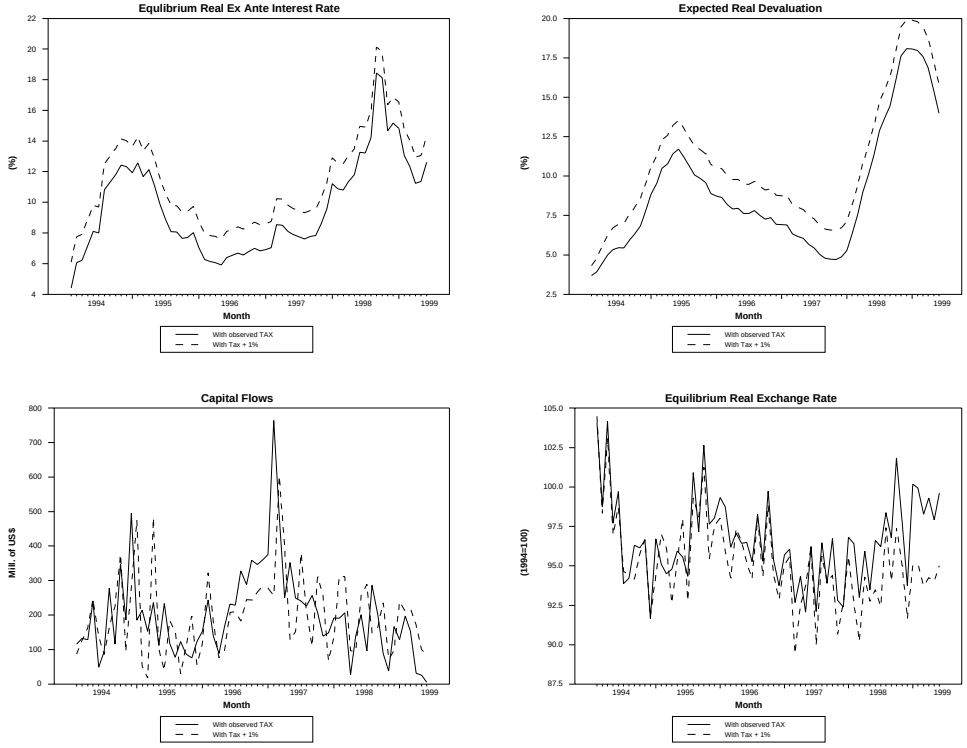
For this purpose, we used the parameters of the model in order to estimate the values of the endogenous variables by taking the observed values of the exogenous variables (*TAX*, r^*, *ermb*, *tot*, *ge* and Δs). These values differ from the observed values only because of estimation errors. Then, we simulated the values of the endogenous variables assuming an increase of 1% in *TAX* and keeping the other exogenous variables at their observed levels. Figure 4.2 plots the results for the period 1994:1 to 1999:6 using the model with and without separating *TAX*.

GRAPH 4.2
SENSIBILITY TO A 1% INCREASE IN *TAX*

A. Without separating *TAX*



B. Separating *TAX*



It is clear from Figure 4.2 that the permanent increase in *TAX* leads to a permanent increase in the domestic *ex-ante* real interest rate (*r*). The effect on capital inflows is ambiguous and quite small, as far as the increase in *TAX* and the increase in *r* have opposite effects. For the same reason, the effect of *TAX* on the equilibrium real exchange rate is ambiguous and almost negligible.

It is important to stress that we are working with a partial equilibrium model in this exercise. Thus, the dynamics of the model is not taking into account the macroeconomic implications that would arise from the increase in the domestic real interest rate as a consequence of an increase in *TAX*. It is likely, for instance, that an increase in the domestic interest rate by the middle of the nineties, compared to the levels that were observed in that period, would have reduced aggregate demand and the current account deficit of the balance of payments. By the same token, the behavior of the *spread*, as a measure of country risk, would have had a different trajectory. Hence, the sharp increase in the relevant foreign interest rate and the domestic interest rate that took place by the end of the decade would have probably been mitigated.

The main point that we want to make with this analysis is to show that our estimates confirm the effectiveness of *TAX* in the sense we have described in this paper: it allows to increase the domestic real interest rate in a context of an open economy with a low degree of monetary autonomy. Moreover, it does so without creating pressures towards a real appreciation of the peso. The tax, therefore, is useful as a macroeconomic policy tool addressed to reduce aggregate demand and to contribute in a process of macroeconomic stabilization.

Notice that in our model, an increase in the domestic real interest rate (*r*) for stabilization purposes can also be achieved through a tightening of monetary policy (reducing *ermb*). Nevertheless, in this case, the increase in *r* would be only temporary as far as the long-run equilibrium level of this variable does not depend on monetary policy. Moreover, the increase in *r* through this mechanism would necessarily and unambiguously increase capital inflows (reduce *cf*) and reduce the real exchange rate during the period in which the domestic real interest rate is above its long run equilibrium level. Thus, the increase in capital inflows and the real appreciation of the peso would also be temporary and unsustainable in the long run.

In summary, it is clear that if the authorities aim to increase the domestic real interest rate in order to stabilize aggregate demand without creating pressures towards a real appreciation of the peso, an increase in the tax on capital inflows is a superior policy than a tightening of money supply.[45]

[45] The importance of avoiding a temporary and unsustainable process of real appreciation of the domestic currency should be part of the objectives of any central bank in globalized economy. A recent survey of the world economy published in *The Economist* (1999) have stressed the importance of asset price bubbles and bursts as something that should be taken in mind by central bankers as a signal of sustainable economic stability. In addition to current and forecasted inflation, as measured by CPI, central banks should look at asset prices and credit. Overvaluation of domestic prices of both goods and services and of assets, as

V. CONCLUSIONS AND FINAL REMARKS.

The Colombian economy in the nineties can be characterized as an increasingly open economy in which capital flows play an extremely important role. As a consequence, the long-run behavior of the domestic real interest rate was determined mainly by the foreign real interest rate, adjusted by the specific country risk (as reflected in the spreads on the Government bonds in the international financial markets) and by the costs of the implicit tax imposed through the non-remunerated reserve requirements on capital inflows.

The high and increasing degree of financial integration of the Colombian economy with the rest of the world greatly reduced the ability of the authorities to affect the behavior of both the nominal and the real exchange rate through monetary and exchange rate policies. This explains the process of gradual liberalization of the foreign exchange regime during the nineties, which went from a crawling-peg system in the initial years of the decade to a fully flexible regime in 1999.

In this context, the ability of monetary and exchange rate policies to contribute in the macroeconomic stabilization was also greatly reduced during the nineties. The dilemmas for the Central Bank were, therefore, extremely difficult when faced with an unprecedented increase in government spending, a rapid increase in the private sector debt, and large current account imbalances financed by huge but unsustainable foreign capital flows.

The non-remunerated reserve requirements on capital inflows introduced in Colombia in 1993 were a useful macroeconomic policy tool in helping to deal with the mentioned dilemmas. They allowed to increase the domestic real interest rate and to discourage aggregate demand in the process of stabilization without creating additional pressures towards a real appreciation of the Colombian peso, which would have aggravated the external imbalances.

Of course, the implicit tax on capital inflows could only act as a marginal element in a macroeconomic environment in which the lack of fiscal austerity was creating tremendous risks which, at the end, led to the severe recession of 1998 and 1999. Indeed, the usefulness of price-based capital account regulations does not mean that they are a substitute for a sound fiscal policy. The differences in the Colombian and the Chilean experiences, two countries that used an implicit tax on capital inflows but with very different fiscal policies, are a good illustration of this point.

Price-based regulation instruments on capital inflows were also useful in Colombia as a liability policy since they led to a higher average maturity of foreign private debt, which in turn helped to avoid a massive debt repayment in the crisis period. However, discouraging short-term foreign capital inflows through a tax creates distortions that work against the development of domestic capital markets. We argue, then, that other type of measures to deal with this problem may be preferable in the long run. In particular, we propose that

---

measured in foreign exchange, is an additional element that central banks should take care of as it may come about as a result of an unsustainable appreciation of the domestic currency. It is another indicator of overheating and is closely related with unsustainable trade imbalances.

prudential regulation should be used to discourage both a large reliance on short-term debt, in foreign and in domestic currency, and a currency mismatch in assets and liabilities of businesses and families.

In summary, we found that price-based regulation of the capital account is an effective and useful tool for macroeconomic policy which should be used in periods of large capital inflows to an economy with excess aggregate demand. Nevertheless, it is not a tool that should be kept as a permanent liability policy.

REFERENCES

Arias, Andrés Felipe y Martha Misas (1998), "Neutralidad Monetaria en la Tasa de Cambio Real Colombiana", *Coyuntura Económica*, Fedesarrollo, Vol. XXVIII, No. 4, Bogotá, Diciembre.

Banco Interamericano de Desarrollo (1995), *Hacia una Economía menos Volátil, Informe Anual sobre Progreso Económico y Social en América Latina*, Washington, Octubre.

Calderón Alberto (1995), "La Tasa de Cambio Real en Colombia: Mitos y Realidades", *Coyuntura Económica*, Fedesarrollo, Vol. XXV, No. 2, Bogotá, Junio.

Cárdenas, Mauricio (1997), *La Tasa de Cambio en Colombia*, Cuadernos de Fedesarrollo, No. 1.

Cárdenas, Mauricio y Felipe Barrera (1996), "Sobre la Efectividad de los Controles a los Flujos de Capitales en Colombia", *Coyuntura Económica*, Fedesarrollo, Vol. XXVI, No. 2, Bogotá, Junio,

Cárdenas, Mauricio y Felipe Barrera (1997), "On the Effectiveness of Capital Controls: The Experience of Colombia during the 1990s," *Journal of Development Economics*, Vol 54.

Cárdenas, Mauricio y Andrés Escobar (1997), "Determinantes del Ahorro en Colombia: 1925-1994", *Coyuntura Económica*, Fedesarrollo, Vol. XXVII, No. 2, Bogotá, Junio.

Cardoso, Eliana and Ilan Goldfajn (1997), "Capital Flows to Brazil: The Endogeneity of Capital Controls," *IMF Working Paper*, September.

Carrasquilla, Alberto (1999), *Estabilidad y Gradualismo: Ensayos sobre Economía Colombiana*, Banco de la República y Tercer Mundo Editores, Bogotá, Febrero.

Carrasquilla, Alberto (2000), "El Programa Económico para el Año 2000", *Economía Colombiana y Coyuntura Política*, Revista de la Contraloría General de la República, Edición 277, Bogotá, Febrero.

Carrasquilla Alberto y Arias, Andrés Felipe (1997), "Tipo de Cambio Real en Colombia: ¿Qué Pasó? Un Modelo de Tres Períodos", en Santiago Montenegro (coord.), *Los Determinantes de la Tasa de Cambio Real en Colombia*, Universidad de los Andes, CEDE, Debates No. 1.

Carrasquilla, Alberto y Hernán Rincón (1990), "Relaciones entre déficit público y ahorro privado: Aproximaciones al caso colombiano," *Ensayos de Política Económica*, Banco de la República, No. 18, Bogotá, Diciembre.

Clarida, R. and J. Gali (1995), "Sources of Real Exchange Rate Fluctuations: How Important are Nominal Shocks?" *Carnegie-Rochester Series on Public Policy*, 41, 1-56.

Clavijo, Sergio (1998), *Política Fiscal y Estado en Colombia*, Ediciones Uniandes, Bogotá.

Comisión de Racionalización del Gasto y las Finanzas Públicas (1997), *Informe Final: El Saneamiento Fiscal, Un Compromiso de la Sociedad*, Ministerio De Hacienda y Crédito Público, Santafé de Bogotá.

Cordella, Tito (1998), "Can Short-Term Capital Controls Promote Capital Inflows?" *IMF Working Paper*, September.

Correa, Patricia y Jaime H. Escobar (1990), "Radiografía de la Inflación Actual", *Coyuntura Económica*, Fedesarrollo, Vol. XX, No. 3, Bogotá, Octubre.

Correa, Patricia (2000), "Public Debt, Public Debt Markets and Monetary Policy in Colombia," *Mimeo*, Banco de la República, Document presented at the second OECD/World Bank Workshop on Development of Fixed Income Securities Markets in Emerging Economies, Washington D.C., January 24-26.

Cottani, J. A., D. F. Cavallo y M. S. Khan (1990), "Real Exchange Rate Behavior and Economic Performance in LDCs,**" *Economic Development and Cultural Change,*** 39, 61-76.

Dornbusch Rudiger and Stanley Fischer (1992), "Inflación Moderada", *Ensayos sobre Política Económica*, No. 21, Banco de la República, Bogotá, Junio.

Echeverry, Juan Carlos (1999), "La Caída del Ahorro durante los Noventa: Teoría y Evidencia Empírica", en *Planeación y Desarrollo*, Departamento Nacional de Planeación, Vol. XXX, No. 1, Bogotá, Enero-Marzo.

Edison, H. and B. Pauls (1993), "A Re-Assessment of the Relationship Between Real Exchange Rates and Real Interest Rates: 1974-90," *Journal of Monetary Economics*, 31, 165-87.

Edwards, Sebastián (1985), "Money, the Rate of Devaluation, and the Interest Rates in a Semi-open Economy: Colombia, 1968-82," *Journal of Money, Credit, and Banking*, 1, 59-68.

Edwards, Sebastian (1989a), *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, Cambridge, MIT Press.

Edwards, Sebastián (1989b), "Real Exchange Rates in Developing Countries: Concepts and Measurement," *Working Paper 2950*, NBER, Cambridge, MA.

Edwards, Sebastián and M. Khan (1985), "Interest Rate Determination in Developing Countries: A Conceptual Framework," *IMF Staff Papers*, 3. 377-403.

Fainboim, Israel y Julio César Alonso (1997), "Sobre el Uso Indiscriminado de Indicadores Fiscales Complementarios", en *Coyuntura Económica*, Fedesarrollo, Vol. XXVII, No. 3, Bogotá, septiembre.

Fedesarrollo (1999), "Editorial", *Coyuntura Económica*, Vol. XIX, No. 3, Bogotá, Septiembre.

Florez, Luis Bernardo y Mauricio Avella (1998), "El Ahorro en Colombia y las Opciones para el Futuro", en Asobancaria, *Banca 98: Agenda para el Fin del Milenio: Paz, Política Social y Economía*, Asociación Bancaria y de Instituciones Financieras de Colombia, Bogotá, Septiembre.

García Ascencio, Felipe (1999), "Chile and Colombia: A Tale of Two Pesos," *IDEAglobal.com*, October 26.

Gomez, Carolina. (1996), "Movilidad de Capital en la Economía Colombiana, Período: 1970-1994," ***Ensayos de Economía,*** 11, UN de Medellín, 11-42**.**

Harbo, I., S. Johansen, B. Nielsen, and A. Rahbek (1998), "Asymptotic Inference on Cointegrating Rank in Partial Systems," *Journal of Business and Economic Statistics*, 4, 388-399.

Hendry, D., E. Leamer y D. Poirier (1990), "The ET Dialogue: Conversation on Econometric Methodology," *Econometric Theory*, 6, 171-261.

Hernández, Antonio y Carolina Gómez (1998), "Ajuste Fiscal: de la Retórica a los Acuerdos", *Mimeo*, Banco de la República, Bogotá.

Herrera, Santiago (1997a), "El Tipo de Cambio Real y la Cuenta Corriente de la Balanza de Pagos de Largo Plazo en Colombia", Fedesarrollo, *Coyuntura Económica*, Vol. XXVII, No. 1, Bogotá, Marzo.

Herrera, Santiago (1997b), "Una Evaluación Distinta de la Situación Fiscal Colombiana", en *Coyuntura Económica*, Fedesarrollo, Vol. XXVII, No. 3, Bogotá, septiembre.

Hommes, Rudolf, Armando Montenegro and Pablo Roda (coordinadores, 1994), *Una Apertura Hacia el Futuro: Balance Económico 1990-1994*, Tercer Mundo Editores y Departamento Nacional de Planeación, Bogotá, septiembre.

Jaramillo, Juan Carlos, Roberto Steiner and Natalia Salazar (1999), *The Political Economy of Exchange Rate Policy in Colombia*, FEDESARROLLO, Working Paper Series, No. 11, January.

Khan, M. S. y P. J. Montiel (1987), "Real Exchange Rate Dynamics in a Small, Primary-Exporting Country," *IMF Staff Papers*, 34, 681-710.

López, Alejandro (1998), "¿Por qué cayó el ahorro privado en Colombia a comienzos de la década de los noventa?", en Fabio Sanchez (Compilador, 1998).

López, Alejandro and Juan Ricardo Ortega (1998), "Private Saving in Colombia," *IMF Working Paper*, WP/98/171, December.

MacDonald, R. (1997), "What Determines Real Exchange Rates?: The Long and The Short of It," *IMF Working Papers*, WP/97/21, IMF.

MacDonald, R. (1998), "What Do We Really Know About Real Exchange Rates?" *Working Paper*, 28, Oesterreichische Nationalbank, Wien.

MacDonald, R. (1999), "The Long-Run Relationship Between Real Exchange Rates and Real Interest Rate Differentials: A Panel Study," *IMF Working Papers*, WP/99/37, IMF.

Meese, R. and K. Rogoff (1988), "What is Real? The Exchange Rate-Interest Differential Relation over the Modern Floating-Rate Period," *Journal of Finance*, 4, 933-48.

Mishkin, F. (1984), "The Real Interest Rate: A Multi-Country Empirical Study," *Canadian Journal of Economics*, 2, 283-311.

Mussa, Michael (1976), "The Exchange Rate, the Balance of Payments, and Monetary and Fiscal Policy Under a Regime Controlled Floating," *Scandinavian Journal of Economics*, 2, 229-48.

Mussa, Michael (1984), "The Theory of Exchange Rate Determination," in Bilson and R. C. Marston (eds.), *Exchange Rate Theory and Practice*, NBER Conference Report, Chicago University Press.

Ocampo, José Antonio y Leonardo Villar (1992), "Trayectoria y Vicisitudes de la Apertura Económica Colombiana", en *Pensamiento Iberoamericano*, No. 21, Volúmen Especial sobre "Comercio Apertura y Desarrollo: Casos Seleccionados,", Madrid, Enero-Junio.

Ocampo, José Antonio (1997a), "Una Evaluación de la Situación Fiscal Colombiana", en *Coyuntura Económica*, Fedesarrollo, Vol. XXVII, No. 2, Bogotá, junio.

Ocampo, José Antonio (1997b), "Evaluación de la Situación Colombiana: Réplica a los Comentarios", en *Coyuntura Económica*, Fedesarrollo, Vol. XXVII, No. 3, Bogotá, septiembre.

Ocampo, José Antonio (1998), "La Política Económica durante la Administración Samper", en *Coyuntura Económica*, Fedesarrollo, Vol. XXVIII, No. 4, Bogotá, Diciembre.

Ocampo, José Antonio y Javier Gómez (1997a), "Los Efectos de la Devaluación Nominal sobre la Tasa de Cambio Real en Colombia", en *Los Determinantes de la Tasa de Cambio Real en Colombia*, Santiago Montenegro (coord.), Universidad de los Andes, CEDE, Debates No. 1.

Ocampo, José Antonio and Camilo Ernesto Tovar (1999), *Price-based capital account regulations: the Colombian Experience*, CEPAL, Serie Financiamiento del Desarrollo, Santiago de Chile, Octubre.

Ortega, Francisco (1991), "La Política Económica en 1991", en *Notas Editoriales, Revista del Banco de la República*, Vol. LXIV, No. 770, Bogotá, Diciembre.

Otero, Jesús (1997), "Los determinantes de la tasa de cambio real en Colombia", en *Coyuntura Económica*, Vol. XXVII, No. 4, Bogotá, Diciembre.

Posada, Carlos Esteban (1999), "Las Tasas de Interés en una Economía Pequeña con Movilidad Imperfecta de Capitales: El Caso Colombiano del Siglos XX (1905-1997)", *Borradores de Economía*, Banco de la República, No. 113, Febrero.

Reinsel, G.C. and S. K. Ahn (1992), "Vector Autorregressive Models with Unit Roots and Reduced Rank Structure: Estimation, Likelihood Ratio Tests, and Forecasting,", *Journal of Time Series Analysis*, 13, 353-75.

Rennhack, Rob y Guillermo Mondino (1989), "Movilidad de Capitales y Política Monetaria en Colombia", *Ensayos sobre Política Económica*, No. 15, Banco de la república, Bogotá, Junio.

Rincón, Hernán (1999a), "Devaluación y Precios Agregados en Colombia, 1980-1998", forthcoming in *Borradores de Economía*, Banco de la República, Bogotá.

Rincón Hernán (1999b), "Testing the Short-and-Long-Run Exchange Rate Effects on Trade Balance: The Case of Colombia", Banco de la República, *Borradores de Economía*, No. 120. Forthcoming in *Ensayos sobre Política Económica*.

Rincon, H. (2000), "Efectividad del Control a los Flujos de Capital: Un Reexamen Empírico de la Experiencia Reciente en Colombia," *Revista de Economía del Rosario*, Universidad del Rosario, Bogotá, Vol. 3, No. 1.

Rocha, Ricardo y Fernando Mesa (1998), "Flujos Internacionales de Capital en Colombia: Un Enfoque de Portafolio", *Archivos de Macroeconomía*, Departamento Nacional de Planeación, No. 78, Bogotá, Marzo.

Sánchez, Fabio (Compilador, 1998), *El Ahorro en Colombia: Evolución y Comportamiento Global y Sectorial*, Tercer Mundo Editores y Departamento Nacional de Planeación, Bogotá, Julio.

Steiner, Roberto (1996), "La Reciente Afluencia de Capital Extranjero a Colombia", *Coyuntura Económica*, Fedesarrollo, Vol. XXVI, No. 2, Junio.

Stockman, A. C. (1980), "A Theory of Exchange Rate Determination," *Journal of Political Economy*, 88, 673-98.

Toro, J. (1987), "Tasa de Interés y Variaciones en el Grado de Apertura de la Economía Colombiana durante el Período 1967-1985," *Desarrollo y Sociedad*, CEDE, 20, 127-175.

The Economist (1999), "Central Banks: Navigators in Troubled Waters," *The Economist: A Survey of the World Economy*, September 25.

Urrutia, Miguel (1993), "La Política Económica en 1993", *Notas Editoriales, Revista del Banco de la República*, Vol. LXVI, No. 794, Bogotá, Diciembre.

Urrutia, Miguel (1995), "El Sistema de Bandas Cambiarias en Colombia", *Notas Editoriales, Revista del Banco de la República*, Vol. LXVIII, No. 807, Bogotá, Enero.

Urrutia, Miguel (2000), "Políticas para evitar burbujas especulativas en finca raíz", *Notas Editoriales, Revista del Banco de la República*, Vol. LXXIII, No. 867, Bogotá, Enero.

Villar, Leonardo (1999), "Política Cambiaria en un Proceso de Ajuste Ordenado", *Revista del Banco de la República*, Vol. LXXII, No. 864, Bogotá, Octubre.

Villar, Leonardo (2000), "¿La Economía Colombiana se Abrió o se Cerró en la Década de los Noventa? Una Nota sobre Indicadores de Apertura Económica", *Revista del Banco de la República*, Vol. LXXII, No. 864, Bogotá, Octubre.

World Bank (1997), *Private Capital Flows to Developing Countries: The Road to Financial Integration*, A World Bank Policy Research Report, Oxford University Press.

APPENDIX 1

Granger Causality Tests on Colombian Real Interest Rates, Real Absorption and Real GDP

This appendix presents Granger causality tests between the *ex-post* real interest rate (*PRIR*), the growth rates of real absorption (*GRABS*) and the growth rate of real GDP (*GRGDP*) for the Colombian economy. For that purpose we use quarterly data for the period 1980:III through 1999:III and for the sub-sample 1990:I through 1999:III.

Since all series behave as unit root processes, the exercise tests first for cointegration *à la* Johansen and Juselius. In Table 1, the λ_{max} and the λ_{Trace} tests show that cointegration is not present at the 10% significance level for both the complete sample and for the sub-sample.

Table 1
Tests of Cointegration Rank 1/

$\hat{\lambda}_i$ (i=1,2,3,4)	Ho:	Ha:	λ_{max}	ACV (10%)	Ho:	Ha:	λ_{Trace}	ACV (10%)
			1980:III through 1999:III					
0.168	*r=0*	*r=3*	11.01	14.09	*r≤1*	*r >1*	16.30	31.88
0.068	*r=1*	*r=2*	4.24	10.29	*r≤2*	*r >2*	5.28	17.79
0.017	*r=2*	*r=1*	1.03	7.50	*r≤3*	*r >3*	1.03	7.50
			1990:I through 1999:III					
0.412	*r=0*	*r=3*	16.52*	14.09	*r≤1*	*r >1*	26.34	31.88
0.241	*r=1*	*r=2*	8.56	10.29	*r≤2*	*r >2*	9.82	17.79
0.039	*r=2*	*r=1*	1.25	7.50	*r≤3*	*r >3*	1.25	7.50

1/ "ACV" stands for Asymptotical Critical Values. "*" means significant at the 10% level. The calculated value of the statistics has a small sample correction according to Reinsel and Ahn (1992).

Table 2 shows de Granger causality tests on the quarterly variation (denoted by "*C*") of the series. For the complete sample, causality is found only from the interest rate to itself. In contrast, for the sub-sample, the real interest rate causes real GDP and the real absorption causes real GDP and real interest rate. Also, real GDP causes itself.

Table 2
Granger Causality Tests 1/

Dependent Variable	Explanatory Variable	*F-test*	Signif.	Normality	*Q*(12)	*ARCH*(12)
		1980:III through 1999:III				
CPRIR	*CPRIR*	2.73	**.02**	23.35*	11.63*	15.02
	CGRABS	1.53	.18			
	CGRGDP	.92	.48			
CGRABS	*CPRIR*	.54	.77	79.44*	11.46*	13.60
	CGRABS	.55	.76			
	CGRGDP	1.09	.38			
CGRGDP	*CPRIR*	.86	.52	978.50*	2.45	15.03
	CGRABS	1.72	.13			
	CGRGDP	.91	.49			
		1990:I through 1999:III				
CPRIR	*CPRIR*	1.37	.29	.54	6.70	4.45
	CGRABS	3.62	**.02**			
	CGRGDP	.38	.87			
CGRABS	*CPRIR*	.54	.76	3.84	9.60	14.55
	CGRABS	.38	.87			
	CGRGDP	1.15	.38			
CGRGDP	*CPRIR*	9.25	**.00**	.31	13.03*	13.15
	CGRABS	18.14	**.00**			
	CGRGDP	6.95	**.00**			

1/ The symbol "*" means statiscal significance for the Normality, serial correlation *Q* and hereroskedasticity *ARCH* tests.

Hence, the Granger causality tests suggest that in the nineties the real GDP growth was caused by the behavior of both the interest rate and the growth of real absorption. Interestingly enough, none of these results hold for the complete sample, when data from the eighties are included.

Figures 1 and 2 depict the impulse response functions (order: *CGRABS*→CPRIR→CGRGDP) for both the complete sample and the sub-sample, respectively. Figure 1 corroborates the results from the causality tests for the complete sample. None significant cross-effects appears. In contrast, in Figure 2 cross-effects show up. For instance, a one standard deviation shock to the real interest rate has a very important negative effect on the real GDP by the second quarter. A one standard deviation shock to real absorption initially decreases the real GDP but has a positive effect on it after the third quarter. It is surprising that the interest rate appears not having effects on the real absorption.

Figure 1
Impulse Response Function
(1980:III through 1999:III)

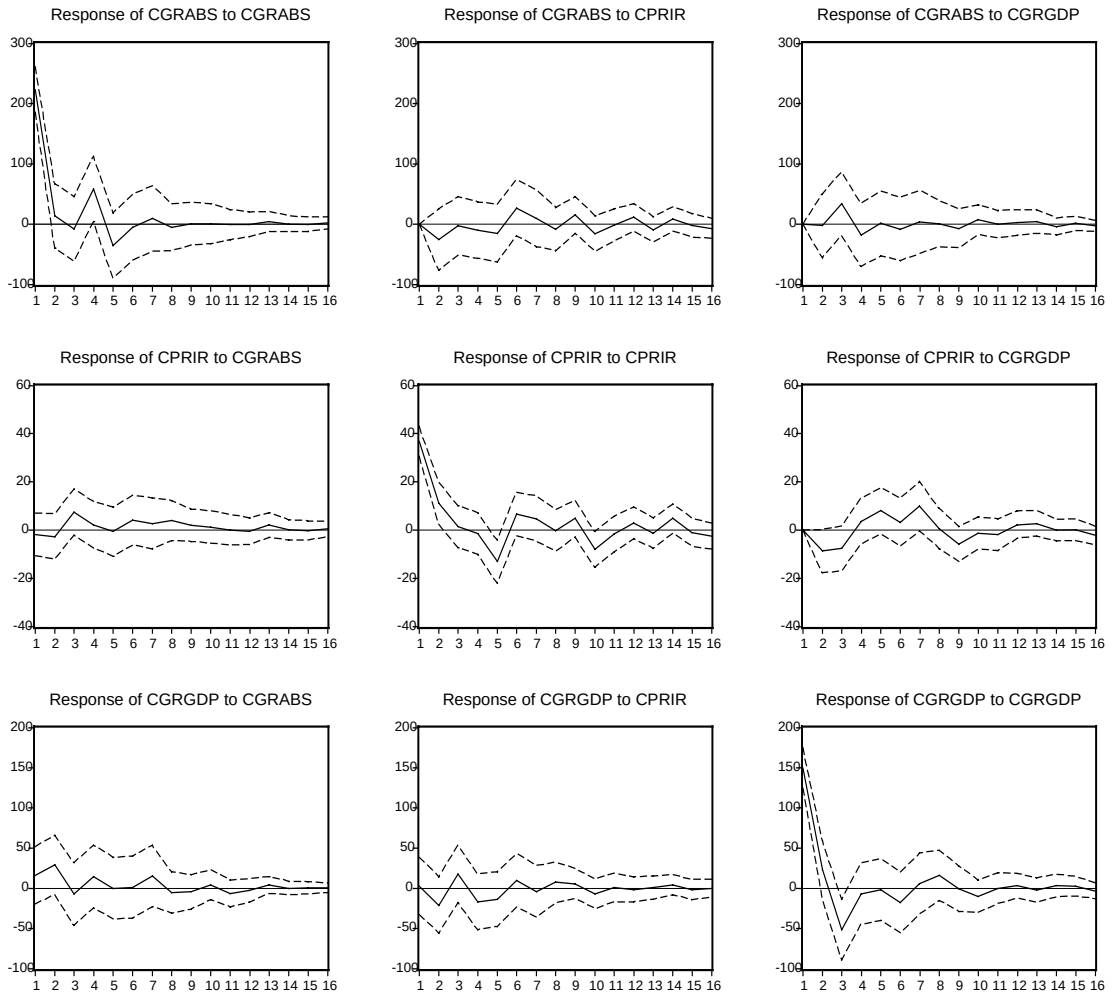
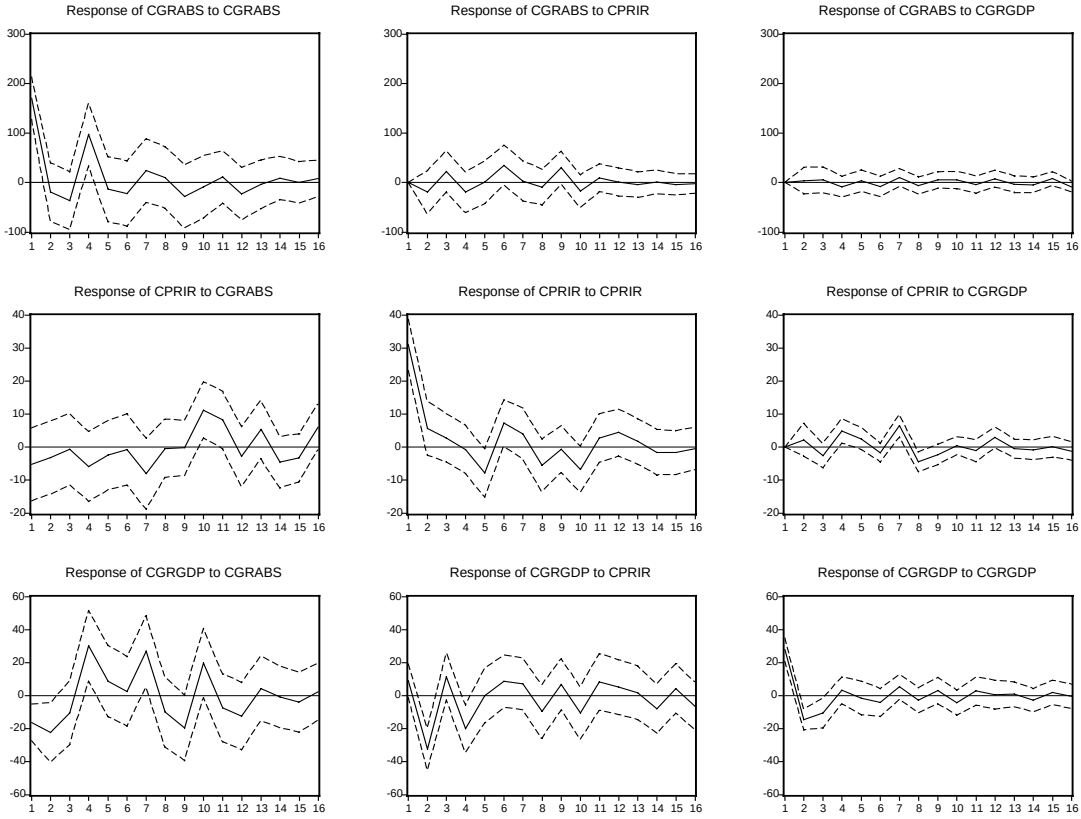


Figure 2
Impulse Response Function
(1990:I through 1999:III)



Response to One S.D. Innovations ± 2 S.E.

Appendix 2

Estimation of *Ex-Ante* Real Interest Rates

We follow Mishkin (1984) for the estimation of the *ex-ante* real interest rates (r_t), which are non-observable, on the basis of the observable *ex-post* real interest rates ($r_{(ex\ post)t}$). The *ex post* real interest at time *t* is defined as: $r_{(ex\ post)t} \equiv i_t - \pi_t \equiv r_t - (\pi_t - \pi^e_t) \equiv r_t - \upsilon_t$, where υ_t is the forecast error for inflation. Under rational expectations, $E(\upsilon_t/\mathbf{I}_{t-1})=0$, where $\mathbf{I}_{t-1}$ equals all available information at time *t-1*. If $\mathbf{x}_{t-1}$ is a vector of dimension *k*x1 which contains elements of the available information set $\mathbf{I}_{t-1}$, then the optimal estimate of r_t given $\mathbf{x}_{t-1}$ is the fitted value of $r_{(ex\text{-}post)t}$ resulting from a linear regression into $\mathbf{x}_{t-1}$.[1]

For statistical purposes, the dependent variable $r_{(ex\text{-}post)t}$ equals the difference between the nominal CDs 3 months rate (i_t) and the observed annual inflation rate forwarded three months (π_t). For the *rest of the world*, $r^{US}_{(ex\ post)t}$ equals the difference between the LIBOR 3 months at time *t* and the United States inflation rate from *t* and *t+3*.

Both for Colombia and for the *rest of the world*, the vectors $\mathbf{x}_{t-1}$ and $\mathbf{x}^{US}_{t-1}$ included three lags of each of the following variables: the inflation rate, the growth rate of narrow money, the domestic nominal interest rate, the growth rate of the industrial production index and the dependent variable.

Table A.2.1 summarizes the econometric results. We report only those coefficients that resulted significant at the 10% level following the procedure of "testing down" suggested by Hendry et al. (1990). The estimated coefficients presents the expected signs and the global adjustment is quite good in both cases. Figures A.2.1 and A.2.2 plot the fitted values for the *ex ante* interest rates, compared to their *ex-post* values. Both plots show that there are not important differences between the *ex ante* real interest rates and the *ex post* rates. Notice that those differences also correspond to the differences between observed and expected inflation rates ($\pi_t - \pi^e_t$).

There is a negative correlation (–0.39) between the Colombian *ex ante* real interest rate and the expected inflation, which says that the short-run nominal interest rate is not quite effective in protecting against the (expected) inflation rate. However, the Fisher parity condition seems to be present in the data (the correlation coefficient between the nominal interest rate and the expected inflation is 0.39).

---

[1] Notice that by the *law* of iterated projections $P(\nu_t/\mathbf{x}_{t-1})=0$. This implies that is ν_t orthogonal to $\mathbf{x}_{t-1}$. Now, substituting r_t into $r_{(ex\ post)t}$ yields: $r_{(ex\ post)t} = \mathbf{x}'_{t-1}\boldsymbol{\beta} + \nu_t - \upsilon_t$. This equation can be estimated since the *ex-post* real interest rate is observable. The $\boldsymbol{\beta}$ estimates can then be used to obtain estimates of the *ex-ante* real interest rate as follows: $\hat{r}_t = \mathbf{x}'_{t-1}\hat{\boldsymbol{\beta}}$. Since υ_t and ν_t are orthogonal to $\mathbf{x}_{t-1}$, the resulting $\hat{\boldsymbol{\beta}}$ s are consistent estimates of the projection equation $\boldsymbol{\beta}$ in the equation for r_t. As a result, using the *ex-post* real interest rate will asymptotically produce the same estimates of $\boldsymbol{\beta}$ as a regression using the ex ante real interest rate. The estimate for π^e_t, the expected value of the inflation rate for time *t+1*, follows: $\hat{\pi}^e_t = i_t - \hat{r}_t$.

Table A.2.1
Estimates of the *Ex Ante* Real Interest Rates

Colombia		**United States**	
Dependent Variable: $r_{(ex\ post)t}$		*Dependent Variable:* $r^{US}_{(ex\ post)\ t}$	
Explanatory Variable	*Coefficient*	*Explanatory Variable*	*Coefficient*
$GRM1_{t-2}$	–0.11	---	---
	(.01)		---
I_{t-1}	0.06	---	---
	(.02)		---
$GRIPI_{t-2}$	0.15	$GRIPI^{*}_{t-1}$	0.07
	(.00)		(.00)
$r_{(ex\ post)t-1}$	0.80	$r^{US}_{(ex\ post)\ t-1}$	0.91
	(.00)		(.00)
$\bar{R}^2 = 0.88$		$\bar{R}^2 = 0.95$	
$Q(12) = 9.63$ (*p-value*=0.65)		$Q(12) = 8.17$ (*p-value*=0.77)	

1/ *GRM*1 is the growth rate of real narrow money, *I* is the nominal interest rate, *GRIPI* is the growth rate of the real industrial production index, and $r_{(ex\ post)t-1}$ is the *ex post* real interest rate, as was defined above. The value in brackets is the *p-value*. The table reports only those coefficients with *p-value* <0.10. *Q* is the Ljung-Box statistic for serial correlation.

Figure A.2.1

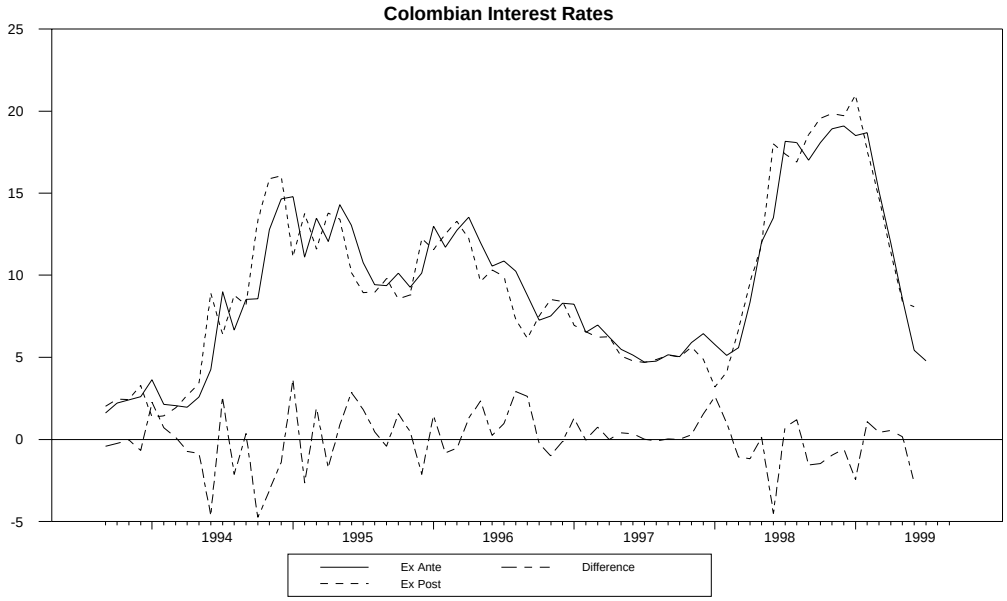
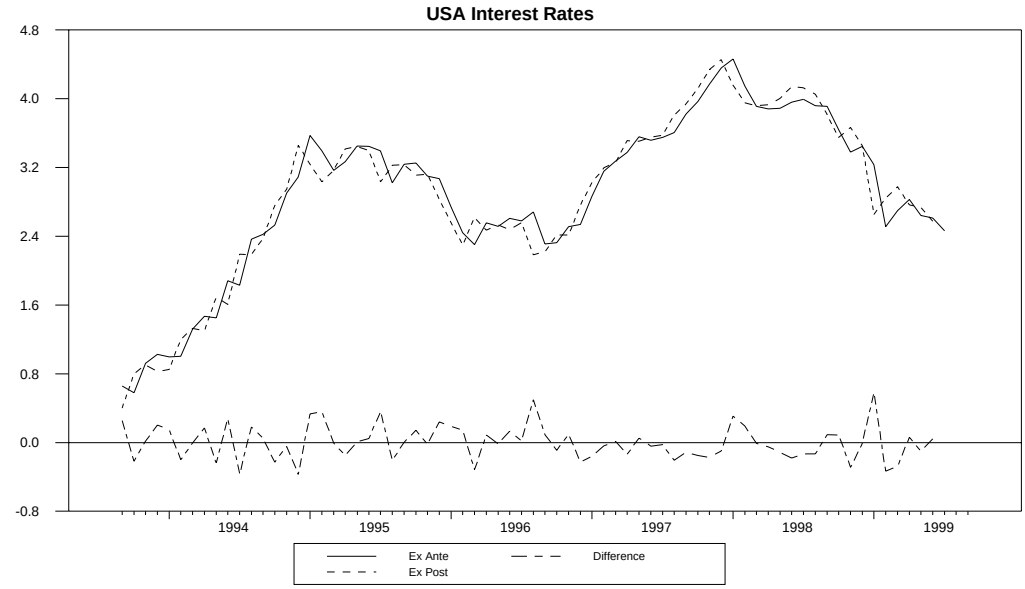


Figure A.2.2



Appendix 3

Derivation of the Tax Equivalent of the Non-Remunerated Reserve Requirements on Foreign Borrowing (*TAX*)

The methodology for the derivation of the tax equivalent of the non-remunerated reserve requirements on foreign borrowing (*TAX*) draws heavily on Ocampo and Tovar (1999) and the modifications introduced in Rincón (2000).

Assuming *tm* is length of the period in which non-remunerated deposits must be held, the present value of one-dollar reserve-deposit is:

$$R_{PV} = \{1 - [(1 + \theta\ \Delta s^e)/(1 + i)]\}^{tm}$$

where $\theta = 1$ when the reserve-deposit is dollar-denominated (as between September 1993 and May 1997) and $\theta = 0$ when it is peso denominated (as since May 1997); i and Δs^e stand for the domestic nominal interest rate and for the expected nominal rate of devaluation, respectively[2].

Denote by i^* the relevant nominal interest rate on foreign borrowing, which we compute as the LIBOR 3 months rate (i^{US}) plus the spread on Colombian Government bonds (*spread*), that is assumed to reflect the Colombian country risk (hence $i^* = i^{US} +$ *spread*). Let *tc* denote the credit period length and ε denote the non-remunerated reserve-deposit rate. Then, the annual total cost of the loan, including the cost of the non-remunerated reserve-deposit is:

$$z = \{ [(1 + i^*)(1 + \theta\ \Delta s^e)]^{tc} + R_{PV}(1 + i)^{tc} \}^{(1/tc)} - 1$$

And the tax-equivalent of the non-remunerated reserve requirement is:

$$TAX = \{ (1 + z)/[(1 + i^*)(1 + \Delta s^e)] \} - 1$$

The level of *TAX* can be estimated with this methodology for different credit periods (different values for *tc*) and their respective deposit rates (ε), according to the percentages established by the authority.[3] Figure A.3.1 shows the alternative estimations of *TAX* for *tc* = 18, 36, and 60 months. To have a unique measure of *TAX* we took a simple average of those three estimates. We did not take shorter credit maturities because for them the tax on foreign credit was prohibitive, so that its specific level is irrelevant.

---

[2] We use the CDs 3 months nominal interest rate. Since Δs^e is non-observable, we used the observed nominal devaluation between period *t*–3 and period *t*+3. An *ad hoc* implicit assumption here is that agents take decisions with respect to the exchange rate market combining perfect foresight and adaptive expectations.

[3] We kept the interest rate, the spread and the expected devaluation constant for all different credit periods in the calculation of *TAX*.

FIGURE A.3.1

Alternative Measurements of the Tax Equivalent of Deposits