

# CAPITAL FLOWS AND FOREIGN EXCHANGE REGIMES IN THE COLOMBIAN ECONOMY

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## I. INTRODUCTION

Since 1993, the Colombian Central Bank introduced a compulsory non-remunerated reserve requirement on capital inflows, which can be characterized as a Tobin tax. The main purpose of this paper is to evaluate the rationale and the effectiveness of this price-based mechanism to regulate international capital flows. We defend the idea that those regulations were effective, although, of course, they were just a marginal element affecting the whole macroeconomic environment. We argue that they contributed to reduce the economic vulnerability associated with short-term foreign capital flows. Also, 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 paper has five chapters including this introduction. The second one presents an overview of the business cycle in the Colombian economy during the nineties and the role of foreign capital flows in that cycle. 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. It also describes the process of liberalization of foreign capital flows that took place during the nineties together with the introduction of price-based capital account regulations. The fourth chapter presents a simple econometric model for the joint determination of the 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.

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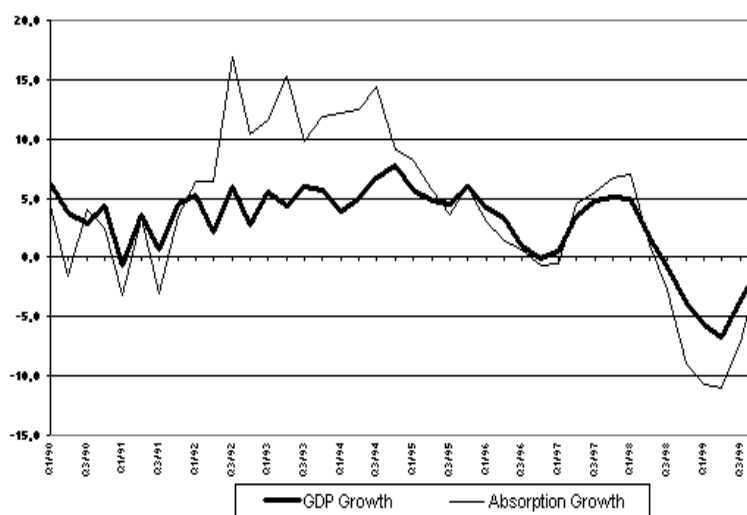
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## II. THE COLOMBIAN MACROECONOMY IN THE NINETIES: AN OVERVIEW

### A. The Business Cycle and the Balance of Payments

During the nineties, Colombia experienced a complete and deep economic cycle, with three main periods in the rate of growth of GDP (Graph 1): first, the period between 1990 and 1991, which was characterized by a decline in economic activity. Second, the period that goes from the last quarter of 1991 to the end of 1994, characterized by a rapid recovery, with high and increasing rates of GDP growth. The third period starts in 1995 and 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.

**Graph 1**  
**COLOMBIA: GDP AND ABSORPTION**  
(Yearly Growth Rates, Quarterly Data, 1990-99)

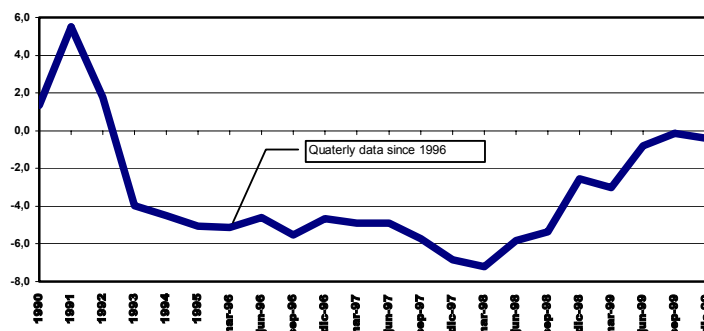


The cycle in economic activity, as measured by GDP growth, coincides thoroughly with a very similar cycle in domestic expenditure (absorption), which was, however, much more pronounced. Based on that fact, it might be argued that it was a demand- and not a supply-ridden cycle. Also, this explains the behavior of the current account of the balance of payments (Graph 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, coinciding with a low rate of growth of domestic absorption.<sup>1</sup> Between 1992 and 1994, absorption grew very rapidly, with a yearly rate of 12.4% in average, that was mirrored in a sharp deterioration of the current account of the balance of payments. Since 1995 there was

<sup>1</sup> Some analysts have argued that the huge surplus in the current account of the balance of payments during 1991 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 the current account balance improved and that the surplus was quite large in that year.

a negative trend in the rate of growth of aggregate expenditure and the 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 figures above 5% of GDP until mid-1998. In contrast, after the second quarter of 1998, aggregate absorption presented a strong downward adjustment, which coincided with the deep recession in economic activity mentioned above. As a result, the deficit in the current account of the balance of payments went down from 5.3% of GDP in 1998 to 1.1% of GDP in 1999.

Graph 2  
Current Account of the Balance of Payments  
(Shares of GDP)



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

Both the business cycle and the cycle in the current account deficit of the balance of payments during the nineties can be explained mainly by two different processes: a rapid increase in public expenditure, which followed the 1991 Constitutional Reform, and a deep cycle of private sector expenditure. These processes were greatly facilitated by huge foreign capital inflows. They financed the large and increasing imbalances in the current account of the balance of payments and in the fiscal accounts. Also, they explained the fact that, during several years in the nineties, the foreign exchange market was characterized by excess supply of dollars, which implied low domestic interest rates and a pressure towards a real appreciation of the Colombian peso. These two elements promoted a further increase in private expenditure, creating a vicious circle with the corresponding increase in private debt. Only when foreign capital inflows were interrupted, in 1998, partly as a consequence of the East Asian and the Russian crises, it became evident that both private and public disequilibria were unsustainable and the Colombian economy was forced to adjust in a quite drastic manner. Thus, foreign capital flows played a very important role in explaining the boom in economic activity after 1991 and the dramatic recession of the final years of the decade.

## B. Government Spending and Fiscal Deficit

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, the 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 19% of GDP, almost doubling the traditional level (Table 1).

For the consolidated non-financial public sector, data from the National Department of Planning (Table 1, panel B) suggest that public expenditure increased from 20.3% of GDP in 1990 to 36.6% in 1999. These data are, however, subject to criticism, partly because of difficulties in the identification of net transfers among public entities and because of low coverage of the sample of decentralized entities and enterprises. Hence, the total increase in public spending during the decade may have been less than suggested by the data mentioned above. In fact, data from National Accounts (Table 1, panel C) suggest that the increase in public consumption and investment during the nineties was about 13 percentage points of GDP.<sup>2</sup> In any case, the increase in total public expenditure was even larger than that of the central government.

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.<sup>3</sup> Three characteristics of the process are:

(i) 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 (states). The increase in transfers from the central government to local and regional governments accounted for almost three percentage points of GDP between 1990 and 1999. Total expenditure of departments and municipalities increased by even more than that. According to the data from the National Department of Planning, it rose by more than five percentage points of GDP, going up from 8.2% of GDP in 1990 to 13.9% of GDP in 1999.

(ii) 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.<sup>4</sup> The increase in

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<sup>2</sup> Data from the IMF also suggest that the increase in total expenditure of the non-financial public sector during the nineties was about 13 percentage points of GDP. According to that source, it went from 20.8% in 1990 to 33.9% of GDP in 1999.

<sup>3</sup> See, in particular, Comisión de Racionalización del Gasto y de las Finanzas Públicas (1997), Clavijo (1998) and Hernández y Gómez (1998).

<sup>4</sup> 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

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.

(iii) 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% to 8% during the rest of the decade. Hence, the decentralization of revenues was not reflected in a reduction of the central government spending.

It follows that the increase in public expenditures is a fundamental element in explaining the very rapid increase in domestic absorption during the first half of the nineties and the fact that it remained so high with respect to GDP during the second half. Thus, 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.

Paradoxically, as we will illustrate in section C of this chapter, 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. 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. As a result, 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, led to a reduction in domestic private savings and contributed to the increase in the private foreign debt through that channel.<sup>5</sup> 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 to 2.7% of GDP in 1997. Such a deficit, however, was financed mainly by foreign direct investment, through the privatization of public entities, notably in the banking and the electricity sectors. Only in 1998 and 1999, when the public sector deficit rose to 3.6% and 4.3% 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 5.8% of

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central bank to the government, see Ocampo (1997a) and the debate on his arguments in Herrera (1997b), Fainboim and Alonso (1997), and Ocampo (1997b).

<sup>5</sup> See Lopez (1998) and Lopez and Ortega (1998).

**Table 1**  
**COLOMBIA: FISCAL ACCOUNTS**  
**(shares of GDP)**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999 p
<b>A. Central Government</b>										
Total Expenditures	9,6	10,6	12,4	12,3	12,8	13,6	15,7	16,3	16,8	19,1
Interest payments	1,1	1,2	1,0	1,1	1,2	1,2	1,9	2,0	2,9	3,3
Transfers to departamentos and municipalities	2,6	2,8	3,3	3,6	3,7	3,6	4,5	4,5	4,8	5,3
Transfers to the Social Security System	0,8	0,8	1,0	1,0	1,3	1,6	1,8	1,9	2,1	2,3
Other	5,1	5,8	7,1	6,6	6,6	7,1	7,4	7,8	7,1	8,2
Total Revenues	8,9	10,4	10,8	11,6	11,4	11,3	12,0	12,6	11,9	13,2
Surplus (or Deficit)	-0,8	-0,2	-1,7	-0,7	-1,4	-2,3	-3,7	-3,7	-4,9	-5,8
Privatizations	0,0	0,0	0,0	0,0	2,1	0,0	0,7	0,4	0,0	0,1
Surplus (or Deficit) net of privatizations	-0,8	-0,2	-1,7	-0,7	0,7	-2,3	-3,0	-3,3	-4,9	-5,8
Debt Stock (*)	17,0	14,2	16,1	14,5	12,7	13,5	14,4	17,9	22,0	29,5
Domestic	4,1	3,0	5,5	5,6	5,1	6,1	7,2	9,3	11,0	14,6
External	12,9	11,2	10,6	8,9	7,5	7,4	7,2	8,6	11,1	14,8
<b>B. Non-Financial Public Sector</b>										
Total Expenditure (Net of Transfers)	20,3	21,6	23,1	24,3	26,1	28,1	32,7	34,1	33,9	36,6
Central Government	5,2	5,1	7,0	7,1	7,3	7,8	8,6	9,8	9,8	11,0
National Social Security System	2,6	2,7	2,7	3,3	3,9	4,7	5,6	6,1	6,8	7,7
National Decentralized Entities and Enterprise Departments and Municipalities	4,4	5,3	4,7	5,3	4,1	4,7	5,1	5,1	3,9	4,0
Departments and Municipalities	8,2	8,6	8,8	8,6	10,8	10,9	13,4	13,1	13,4	13,9
Total Surplus (+) or Deficit (-)	-0,5	0,0	-0,2	0,2	0,1	-0,3	-1,7	-2,7	-3,6	-4,3
Central Government	-0,8	-0,2	-1,7	-0,7	-1,2	-2,1	-3,3	-3,5	-4,7	-5,5
National Social Security System	-0,1	-0,1	0,1	0,5	1,1	1,9	2,0	1,2	1,3	0,9
National Decentralized Entities and Enterprise Departments and municipalities	0,3	0,3	1,4	-0,1	0,7	0,0	-0,2	-0,2	-0,1	0,7
Departments and municipalities	0,1	0,0	0,0	0,5	-0,5	-0,1	-0,2	-0,2	-0,1	-0,4
Privatizations	0,0	0,0	0,0	0,0	2,2	0,2	0,8	3,3	0,5	0,3
Total Surplus (+) or Deficit (-): Net of Privatizat	-0,5	0,0	-0,2	0,2	2,3	-0,1	-0,9	0,6	-3,1	-4,0
<b>C. Public Consumption and Investment (National Accounts)</b>										
Old base (1975)	16,9	16,6	19,3	19,9	21,4	22,9	25,5			
New base (1994)					22,7	23,6	26,4	28,8	28,0	31,6

Source: A. CONFIS, Contraloría General de la República, and Banco de la República. B. National Department of Planning (DNP). C. DANE and DNP.

(\*) Changes in debt stock do not correspond to the deficit (net of privatizations) because of exchange rate changes and other accounting problems

p: Preliminary

e: Estimate

GDP, respectively. 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, went up again very rapidly in the second half. Most of the increase in the central government debt, however, 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, partly as a consequence of the real appreciation of the peso that took place during the period. Afterwards, it rose again, specially in 1999, when it was 14.8% of GDP. In contrast, domestic debt of the central government experienced a continuous increase since 1991, going up from less than 3% of GDP to 14.6% of GDP in 1999. Most of this increase is represented in marketable bonds (TES) issued by the Treasury, a large part of which is held by the decentralized public sector, notably by the Social Security Institute (ISS).

### C. Balance of Payments Financing, Foreign Investment and Foreign Debt

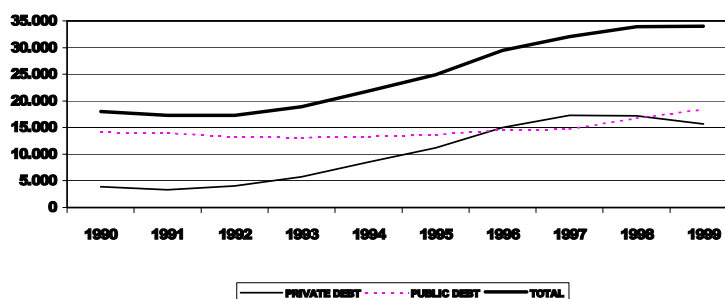
The current account surpluses that Colombia experienced in 1990 and 1991 led to a very large accumulation of international reserves in those years. After 1991, despite the huge deficits of the current account of the balance of payments, the foreign exchange market continued to be characterized, until 1997, by excess supply of dollars. This was 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. In this sense, foreign capital flows were even larger than required to finance the very large current account deficits in this period. Interestingly enough, despite the large increase in government expenditure that we described in the previous section, those capital flows were essentially private capital flows and foreign direct investment, rather than public indebtedness.

Graph 3 presents the evolution of private and public foreign debt in the nineties.<sup>6</sup> The private foreign debt, which at the end of 1991 was only US\$ 3.4 billion, 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 the process of private debt repayment during 1998 and 1999 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.

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<sup>6</sup> The breakdown that we use between private and public debt in Graph 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.

Graph 3  
COLOMBIA: FOREIGN DEBT  
(millions of dollars)

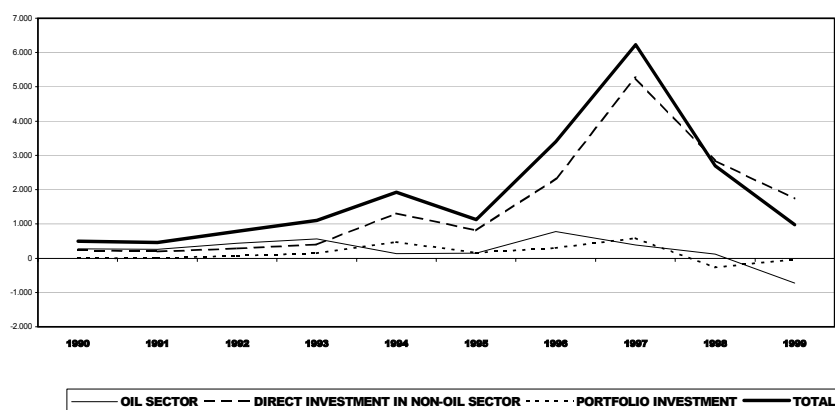


Together with the increase in private foreign debt, the current account deficit of the balance of payments that was observed during most of the nineties was financed by very large inflows of foreign investment, as shown in Graph 4. It is worth mentioning three characteristics of those inflows: (i) They were 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. (ii) The 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 peaks in foreign direct investment that were observed in 1994, 1996 and 1997, were very much explained by the privatization of public banks and of public entities in the energy sectors as well as by concessions in the telecommunications sector. 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.<sup>7</sup>

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 fact unveiled the large imbalances that had been accumulated during the previous period and forced the drastic adjustment in domestic expenditure that we already described. In addition, there was a rapid drop in international reserves and strong pressures towards a devaluation of the Colombian peso.

<sup>7</sup> As highlighted in the previous section, 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.

Graph 4  
COLOMBIA: NET FOREIGN INVESTMENT FLOWS  
(millions of dollars)



Source: Banco de la República

#### D. Real interest rates and the real exchange rate

Private capital flows were not only very important in financing external imbalances but in determining the behavior of aggregate expenditure and economic activity in Colombia during the nineties. Besides their role in financing the increase in government expenditure, through the mechanisms described above, they affected private expenditure through their impact on the real exchange rate and on the domestic interest rates.

In fact, foreign capital flows were key in explaining the behavior of the real exchange rate since 1991 (see Graph 5, panel D).<sup>8</sup> 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 as a consequence of nominal devaluation implemented by monetary authorities in order to compensate for the effects on the domestic tradable sectors after the elimination of import quotas and the reduction in import tariffs that was taking place by that time. Since the beginning of 1991, however, coinciding with the surge in foreign capital inflows, the real exchange rate 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 almost 40%. The recovery of the real exchange rate would start only in the third quarter of 1997, when foreign capital inflows were interrupted.

The process of real appreciation of the peso during most of the decade reinforced the deterioration of the current account of the balance of payments that we have already

<sup>8</sup> 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.

described. Together with the opening up of the economy, it increased the demand for tradable-goods and helped to explain the boom in aggregate expenditure. Moreover, the expectations of further real appreciation that predominated among private economic agents led them to increase the demand for foreign debt and created a vicious circle between real appreciation and foreign capital flows.

Foreign capital flows were also key in explaining the cycle in private aggregate expenditure through their impact on the domestic interest rates. The ample cycle in aggregate expenditure during the nineties was closely associated with a very similar cycle, although in the opposite direction, of interest rates (Graph 5, panels B and C).<sup>9</sup> 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. In Villar and Rincón (2000, Appendix 1), we performed Granger Causality tests and impulse-response functions between the real interest rate, the growth rate of aggregate demand (absorption) and the growth rate of real GDP. The results suggest that in the nineties real GDP growth was ‘caused’ by the behavior of both the real interest rate and the growth of real absorption. Interestingly enough, none of these results hold when data from the eighties are included.<sup>10</sup>

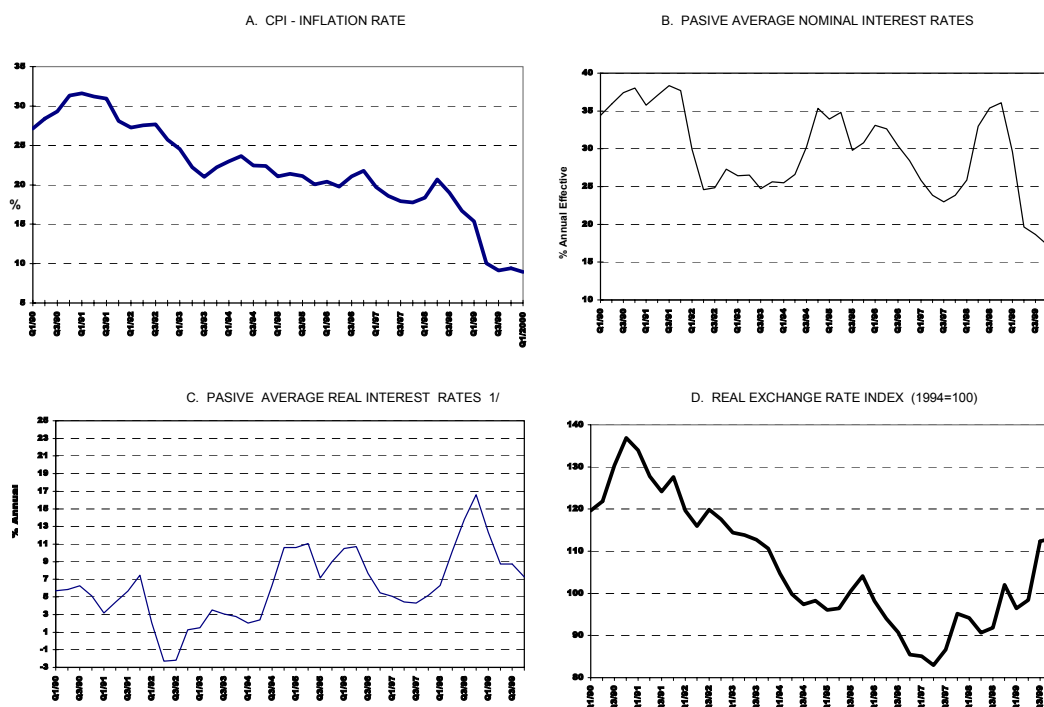
Observe, however, that the importance of the real interest rate in explaining the economic cycle in the Colombian economy during the nineties does not imply that monetary policy was the main factor behind that cycle. In the first two years of the decade, the increase in the interest rate can certainly 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. After 1991, in contrast, interest rates were determined mainly by foreign capital flows. This will become clear with the econometric model that we estimate in Chapter 4, according to which the behavior of the domestic (*ex-ante*) real interest rate can be mostly explained by the behavior of the foreign interest rate, the Colombian country-risk and the non-remunerated reserve requirement that was imposed on capital inflows since 1993.

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<sup>9</sup> Along this paper, we use the 90-days deposit rate 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.

<sup>10</sup> 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.

Graph 5  
COLOMBIA: MACROECONOMIC INDICATORS  
(Quarterly Data, 1990.1- 1999.4)



Source: DANE and Banco de la República

## E. Private sector imbalances

The low level of the real interest rate after 1991 led the private sector to increase its peso-denominated debt with the domestic financial system at an even more rapid pace than the outstanding increase in foreign debt that we have already described. As shown in Table 2, the peso-denominated loan portfolio of the Colombian financial system went up from less than 22% of GDP in 1991 to 33% of GDP in 1997. Through its effect on the domestic interest rate, therefore, foreign capital flows were key in determining not only the rapid increase in the foreign debt but also the impressive increase in the debt of the private sector with the domestic financial system. As a whole, the level of private indebtedness rose from less than 30% of GDP in 1991 to 51% 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%.

**Table 2**  
**COLOMBIA: PRIVATE DEBT**

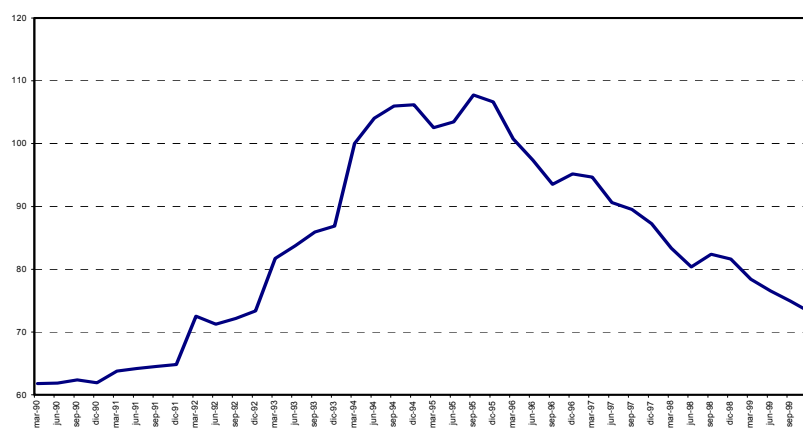
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999 p
<b>A. SHARES OF GDP</b>										
1. Domestic (Peso-denominated) debt	23,5	21,5	22,4	25,8	27,6	29,8	31,7	33,0	32,5	31,0
2. Foreign (Dollar-denominated) debt	9,4	7,8	7,6	9,1	10,5	13,1	15,0	18,4	18,8	19,3
a. Through Domestic Financial System	4,8	3,8	3,9	4,4	4,1	4,8	4,7	5,8	5,3	4,0
b. Direct Foreign Lending	4,5	4,0	3,7	4,7	6,4	8,3	10,3	12,6	13,5	15,3
3. Total Private debt (1+2)	32,9	29,4	30,0	35,0	38,1	42,9	46,6	51,4	51,2	50,2
<b>B. MILLIONS OF US DOLLARS</b>										
Total Foreign private debt	3.876	3.369	4.042	5.799	8.551	11.233	14.998	17.319	17.191	15.652
a. Through Domestic Financial System	1.995	1.646	2.071	2.784	3.354	4.143	4.664	5.485	4.825	3.249
b. Direct Foreign Lending	1.881	1.722	1.971	3.015	5.196	7.090	10.334	11.835	12.366	12.403

Source: Banco de la República, Subgerencia de Estudios Económicos

p: Preliminary

The rapid increase in private indebtedness was accompanied during its initial steps by a boom in asset prices. The relative price of new housing in Bogotá went up by about 60% between the beginning of 1992 and mid-1994. The increase in the real interest rate that was observed after mid-1994 stopped the upward trend in real asset prices. They, however, remained at very high levels until the end of 1995 when they started to fall very rapidly until 1999 (Graph 6).

**Graph 6**  
**Relative Price of New Housing in Bogotá <sup>1/</sup>**  
March of 1994 = 100



<sup>1/</sup> Deflator: CPI  
Source: DNP and Banco de la República

The sharp decline in asset prices, together with the very high level of the private sector debt, created the conditions for the financial crisis that exploded in 1998 and 1999.<sup>11</sup> As we have seen, following the East Asian and the Russian crises, the flows of foreign financing decreased sharply and could not cover anymore 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. Under such 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.

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 5.4% in real terms and private fixed capital investment fell 45% in 1999<sup>12</sup>. 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. 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. It is still too early to have a good estimate of the fiscal and quasi-fiscal costs of the financial crisis, but it might be no less than 6% 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 4.3%. 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.

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 and the process of private indebtedness that took place along the nineties. 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. Also, they contributed to explain very low levels of the domestic interest rates that led the private sector to increase its domestic debt together with its foreign debt and that facilitated a boom in asset prices. However, the increase in private debt, the boom in asset prices and

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<sup>11</sup> See Urrutia (2000).

<sup>12</sup> 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.

the real appreciation of the peso associated with private capital flows 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 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. A higher interest rate by the middle of the decade 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, 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%. The contractionary effects of these measures were however 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 restrictions on domestic credit and the high level of the domestic interest rate. By mid-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 a very strict monetary policy.

## 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.<sup>13</sup>

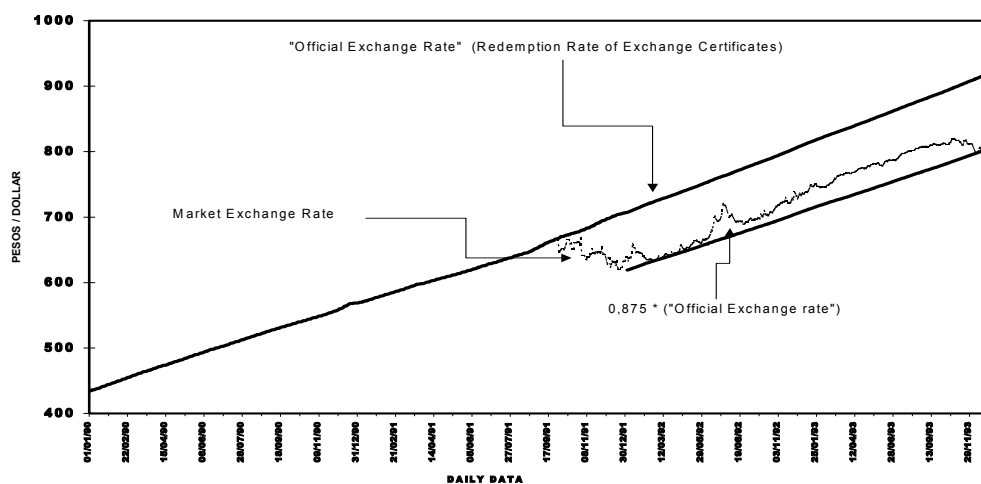
By itself, the decentralization of foreign exchange transactions did not imply the abolition of the crawling-peg regime. However, through Resolutions 55 and 57 of June 1991, the Monetary Board introduced an additional important reform that created the conditions for the development of a foreign exchange 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

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<sup>13</sup> 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.<sup>14</sup> 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 7).

Graph 7  
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.<sup>15</sup>

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

<sup>14</sup> 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.

<sup>15</sup> 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.

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.<sup>16</sup>

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. 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.

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

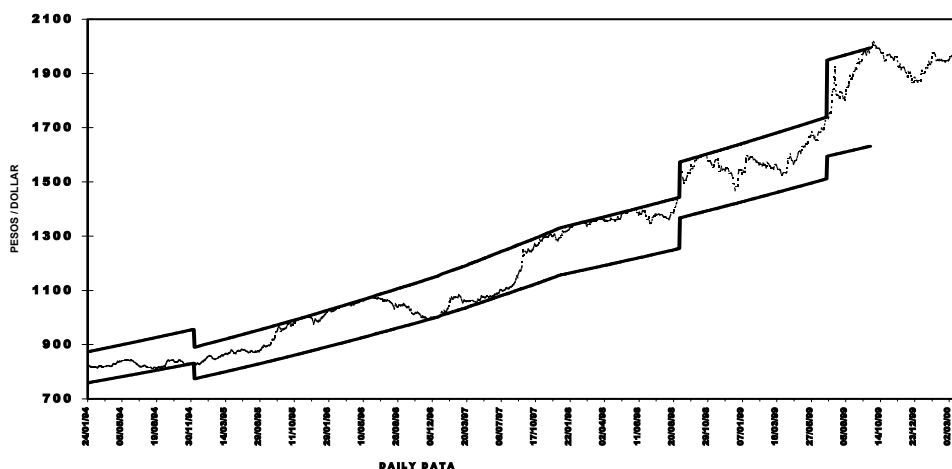
As we said before, between mid-1991 and 1994 the domestic real interest rate was at historical lows but still capital inflows were very large and the Colombian peso appreciated at a relatively rapid pace. Initially, the exchange rate certificates had the desired effect of postponing the monetary expansion created by the accumulation of international reserves. Sooner than later, 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 8). The center of

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<sup>16</sup> 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.

Graph 8  
NOMINAL EXCHANGE RATE AND EXCHANGE RATE BANDS  
January 22 1994 - April 2000



Source: Banco de la República - Subgerencia de Estudios Económicos

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.<sup>17</sup> 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 band 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.<sup>18</sup> 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).

<sup>17</sup> 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*).

<sup>18</sup> 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%.

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 that 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. 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 losing reserves, the reserve requirements were lessened and the minimum maturity for the loans to be exempted went down to four and three years, respectively.

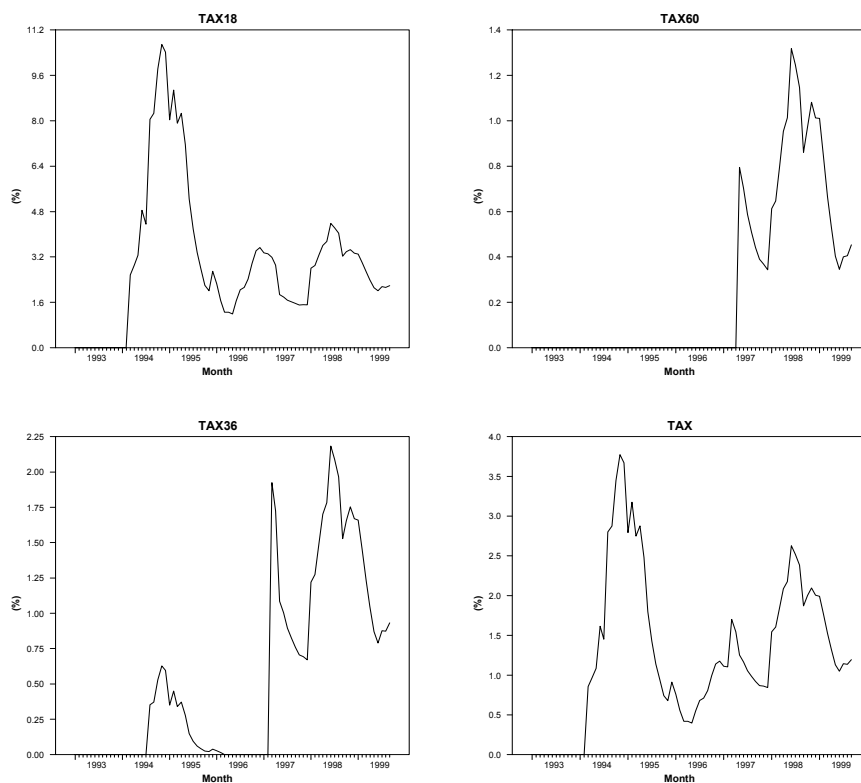
After the huge increase in international reserves that took place in the last part of 1996, the Government issued in January 1997 an State-of-Emergency Decree which, among other measures, established an explicit Tobin tax on all capital inflows (trade financing included), in addition to the reserve requirement 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. In June 2000, the reserve requirement was reduced to zero.

Graph 9 summarizes the evolution of the tax equivalent of the reserve requirement for alternative maturities of 18, 36 and 60 months, as well as a simple average of those measures that we will take as our proxy for the tax on capital inflows in the empirical analysis of Chapter 4.<sup>19</sup> The highest level of this proxy was observed during the second half of 1994 and the beginning of 1995. In that period, the tax was extremely high on short-term capital inflows (above 9% for 18-month maturities). After May 1997, the tax was much lower for short maturities but became significant for longer maturities. Our proxy for the overall tax went down from more than 3.5% by the end of 1994 to less 1% at the beginning of 1996, experienced an increasing trend in the following period until September 1998 and decreased quite rapidly thereafter.

**Graph 9**

**Alternative Measurements of the Tax Equivalent of Deposits**



<sup>19</sup> The methodology for the derivation of the tax equivalent of the non-remunerated reserve requirement on foreign borrowing is explained in Villar and Rincón (2000). It draws heavily on Ocampo and Tovar (1999) and the modifications introduced by Rincón (2000).

#### 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 despite the fact that the domestic interest rate has 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).

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. (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\$ 400 million until June 2000. 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 Tax on Foreign Capital Inflows.

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. Before entering into the arguments in favor of or against this type of regulation, it is important to highlight three working hypothesis that must be taken in mind in the analysis:

- (i) 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.
- (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. In other words, 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.<sup>20</sup> The relevant question is whether or not a tax on capital inflows may have significant effects, in the margin, on the relationship between the exchange rate and the interest rate.

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.

#### 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 were 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 no 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.

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<sup>20</sup> 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), Gómez (1996), Herrera (1997a) and Posada (1999).

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, the use of price-based regulations on foreign capital inflows as a *permanent* liability policy may have significant costs in the long run. An alternative 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 loans are clearly 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 (2000) 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 Cordella (1998), who uses a formal model to show 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.<sup>21</sup> 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.<sup>22</sup>

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 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

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<sup>21</sup> The simple correlation between the introduction of the tax in 1993 and large volumes of capital inflows in the following period has led many analysts 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.

<sup>22</sup> This view is consistent with the rationale for capital controls presented by McKinnon and Pill (1996), who argue that they are a useful tool in order to increase domestic interest rates and to discourage the “over-borrowing syndrome”.

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 NON-REMUNERATED RESERVE REQUIREMENT ON CAPITAL INFLOWS

##### A. The Model

This chapter introduces an alternative procedure for evaluating the macroeconomic 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 ( $TAX$ ):

$$(1) \quad i = i^* + TAX + \Delta s^e$$

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  $\Delta s^e$  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,  $i^* = i^{US} + spread$ ).

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.<sup>23</sup> In fact, the Fisher equation states that both for the domestic country and for the rest of the world:

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

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

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

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

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:

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

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

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

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

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

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

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

where the coefficients  $\alpha_i$  need to be estimated and  $\varepsilon$  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*.<sup>24</sup> In the short run, therefore, the dynamics of the real exchange rate can be represented by the following function:

$$(9) \quad \Delta r = F(\Delta r^*, \Delta TAX, \Delta \Delta q^e, \text{ermb}, \varepsilon_1).$$

(+)    (+)    (+)    (-)    (-)

<sup>23</sup> This is a standard procedure. See, e.g., Meese and Rogoff, 1988; Edison and Pauls, 1993; Clarida and Gali, 1995; MacDonald, 1997, 1998, 1999.

<sup>24</sup> The fact that we allow some room for 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). As we will see, from an statistical point of view, the introduction of the 'excess' of real money balances improves the statistical properties of the model.

## 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.<sup>25</sup> In particular, we include the log of the terms of trade (*tot*), the log of current real government expenditure of the central government (*ge*), and the log of net total real capital inflows (*cf*):

$$(10) \quad q = \beta_1 + \beta_2 cf + \beta_3 tot + \beta_4 ge + u$$

(-)      (-)      (-)

where  $u$  is a 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 ( $\Delta s$ ), as shown in the following function:

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

(-) (-)    (-) (+) (-)

Assuming rational expectations, the expected rate of real devaluation ( $\Delta q^e$ ) that appears in equations (8) and (9) should be the fitted value of  $\Delta q$  estimated in equation (11).<sup>26</sup>

## 3. Capital flows equation

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

$$(12) \quad cf = F(r, r^* + TAX)$$

(+) (-)

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

<sup>25</sup> See Khan and Montiel (1987), Edwards (1989a, 1989b), and Cottani *et al.* (1990). For the Colombian case, see, among others, Herrera (1997a), Calderón (1995), Cárdenas (1997, chapter 2), Carrasquilla and Arias (1997), Ocampo and Gómez (1997), Otero (1997), and Arias and Misas (1998). Notice, however, that capital flows are included among those real factors and they may be affected by expected devaluation. Hence, through this mechanism, the nominal exchange rate might have permanent effects on the real exchange rate. This mechanism makes the model consistent with previous empirical findings according to which the pass-through of nominal devaluation into the inflation rate is less than unity in Colombia (Rincón, 1999).

<sup>26</sup> It is clear from the model that the current and the expected real exchange rate are affected by the regulation on capital inflows that we capture through the variable  $TAX$ . The theoretical justification for this is given by models of Stockman (1980), Mussa (1976, 1984), and Edwards (1989b).

simultaneity problems. First, the capital flows equation (Equation 12) is estimated with a 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.  $TAX$  is computed as the simple average of the tax-equivalent of the reserve requirement on foreign debt disbursements with alternative maturities of 18, 36 and 60 months (see Graph 9 in Chapter 3). 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). 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. The variable  $erm$  was estimated following Edwards and Khan (1985).

### C.- The capital flows equation

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. Table 3 reports those coefficients that resulted significant at the 10% level, following the procedure of “testing down” suggested by Hendry *et al.* (1990).

**Table 3**  
**The Regression Model for Capital Inflows**  
**(Equation 12)**

<i>Dependent Variable: <math>cf_t</math></i>		
<i>Explanatory Variable</i>	<i>Regression 1</i>	<i>Regression 2 (Separating TAX)</i>
$cf_{t-2}$	0.62 (.00)	0.60 (.00)
$cf_{t-3}$	0.39 (.00)	0.42 (.00)
$r_{t-1}$	0.02 (.08)	0.02 (.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)
	$\bar{R}^2 = 0.34$ $Q(12) = 11.1$ ( <i>p-value</i> =0.52)	$\bar{R}^2 = 0.34$ $Q(12) = 11.1$ ( <i>p-value</i> =0.52)

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

*Regression 1* in Table 3 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.

#### D. The Real Exchange Rate Equations

Table 4 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*), or the unrestricted one, in which there are separate coefficients for the effect of  $TAX$  (*Regression 2*). The results of both regressions are very similar, although *Regression 1* provides slightly better statistical characteristics. The estimated coefficients for all variables are correctly signed and significant. 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.<sup>27</sup>

**Table 4**  
**The Estimates for the ‘Equilibrium’ Real Exchange Rate**  
**(Equation 10)**

<i>Dependent Variable: <math>q_t</math></i>		
<i>Explanatory Variable</i>	<i>Regression 1</i>	<i>Regression 2</i> <i>(Separating TAX)</i>
<i>constant</i>	6.56 (.00)	6.23 (.00)
<i>tot<sub>t</sub></i>	-0.15 (.05)	-0.17 (.06)
<i>ivcf<sub>t</sub></i>	-0.12 (.00)	-0.05 (.00)
<i>ge<sub>t</sub></i>	-0.11 (.00)	-0.12 (.00)
	$\bar{R}^2 = 0.49$ $Q(12) = 56.5$ ( <i>p-value</i> =0.00)	$\bar{R}^2 = 0.37$ $Q(12) = 96.1$ ( <i>p-value</i> =0.00)

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

<sup>27</sup> 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. The expected real devaluation ( $\Delta q^e_t$ ) and the ‘excess’ of money balances (*ermb<sub>t</sub>*) were the only variables which behave as stationary processes.

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 best estimates, after dropping the variables that did not result statistically significant at a 10% level, are presented in Table 5 (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. 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 5**  
**The Estimates of the Error Correction Regression Model for the Real Exchange Rate**  
**(Equation 11)**

<i>Dependent Variable: <math>\Delta'q_t</math></i>		
<i>Explanatory Variable</i>	<i>Regression 1</i>	<i>Regression 2 (Separating TAX)</i>
$\Delta q_{t-1}$	1.27 (.00)	1.46 (.00)
$\Delta q_{t-2}$	-0.64 (.00)	-0.71 (.00)
$\Delta ivcf_{t-1}$	-0.10 (.00)	
$\Delta ivcf_{t-2}$	-0.03 (.04)	-0.03 (.05)
$\Delta ivcf_{t-3}$	-0.05 (.00)	-0.01 (.04)
$\Delta ge_{t-1}$		0.02 (.06)
$\Delta s_t$		-0.75 (.00)
$\Delta s_{t-1}$	0.41 (.03)	0.83 (.00)
$\hat{u}_t$	-16.26 (.02)	-11.55 (.07)
	$\bar{R}^2 = 0.79$ $Q(12) = 12.3$ ( <i>p-value</i> =0.42)	$\bar{R}^2 = 0.83$ $Q(12) = 6.19$ ( <i>p-value</i> =0.90)

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

### E. The Estimation of the Real Interest Rate equation

Since we already have estimates of the unobservable variables  $r_t$ ,  $r_t^*$  and  $\Delta q_t^e$ , we can proceed to estimate the regression model given by equation (8). Our aim is to evaluate if the equilibrium condition holds and to quantify the effect of  $TAX$  on the *ex ante* real interest rate ( $r$ ). We evaluated for the presence of cointegration using the Dickey-Fueller (DF) procedure. It showed that the null hypothesis (i.e., that there is not presence of cointegration) could not be rejected at 5%. When we excluded  $\Delta q_t^e$  from the regression, however, the null hypothesis was fully rejected, even at 1%.<sup>28</sup> Hence, evidence goes against the existence of a long-run relationship between  $r_t$ ,  $(r^*+TAX)_t$  and  $\Delta q_t^e$ . 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 6**  
**Estimates of the ‘Equilibrium’ *Ex-Ante* Real Interest Rates**  
**(Equation 8)**

<i>Dependent Variable: <math>r_t</math></i>		
<i>Explanatory Variable</i>	<i>Regression 1</i>	<i>Regression 2 (Separating TAX)</i>
<i>constant</i>	0.70 (.56)	0.74 (.54)
$r_t^* + TAX_t$	1.13 (.00)	
$r_t^*$		1.01 (.00)
$TAX_t$		1.70 (.00)
	$\bar{R}^2 = 0.45$ $Q(12) = 108.1$ ( <i>p-value</i> =0.00)	$\bar{R}^2 = 0.45$ $Q(12) = 117.6$ ( <i>p-value</i> =0.00)

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

Table 6 reports the results from the OLS output of the ‘equilibrium’ relationship stated in Equation (8) augmented by a constant, with and without separating  $TAX$ . 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, notice 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

<sup>28</sup> To double check these results, we used the Johansen and Juselius approach. The *Trace* and  $\lambda_{max}$  tests indicated the presence of just one cointegrating relationship. When testing *weak exogeneity* we found that  $r_t$  resulted the endogenous variable, as expected, while  $(r^*+TAX)_t$  and  $\Delta q_t^e$  resulted *weakly* exogenous. When testing for *exclusion*, we found that  $(r^*+TAX)_t$  was part of the *cointegration space* while  $\Delta q_t^e$  was excluded. We estimated then the *conditional (partial)* system and tested it again for cointegration. The results confirmed the existence of just one cointegration vector. We use the critical values from “Table 3” in Harbo *et al.* (1998) with  $p_1=1$  and  $p_2=1$ , a 95% quartile and correction for *small* samples as suggested by Reinsel and Ahn (1992).

(*Spread*), the domestic *ex-ante* real interest rate ( $r$ ) will rise by about the same amount. 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.

Table 7 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  $\Delta q_t^e$  and  $ermb_t$  (both are stationary processes), we introduced these variables in levels in the dynamic equation. The expected real devaluation ( $\Delta q_t^e$ ) 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 produces a temporary decrease in the domestic *ex-ante* real interest rate.

**Table 7**  
**Estimates of the Error Correction Model for the Domestic Ex-Ante Real Interest Rate**  
**(Equation 9)**

<i>Dependent Variable: <math>\Delta r_t</math></i>		
<i>Explanatory Variable</i>	<i>Regression 1</i>	<i>Regression 2</i> <i>(Separating TAX)</i>
$\Delta r_{t-1}$	0.21 (.06)	0.20 (.04)
$\Delta r_{t-2}$	0.25 (.02)	
$\Delta TAX_{t-1}$		2.31 (.00)
$Erm b_t$	-14.20 (.02)	-12.95 (.02)
$\hat{\varepsilon}_{t-1}$	-26.83 (.00)	-16.44 (.00)
	$\bar{R}^2 = 0.28$ $Q(12) = 5.99$ ( $p$ -value=0.91)	$\bar{R}^2 = 0.41$ $Q(12) = 7.3$ ( $p$ -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 and the observed values of the exogenous variables ( $TAX$ ,  $r^*$ ,

$ermb$ ,  $tot$ ,  $ge$  and  $\Delta s$ ) in order to estimate the endogenous variables. 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. Graph 10 plots the results for the period 1994:1 to 1999:6 using the model with and without separating  $TAX$ .

It is clear from Graph 10 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.<sup>29</sup>

The point that we want to make with this analysis is 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.<sup>30</sup>

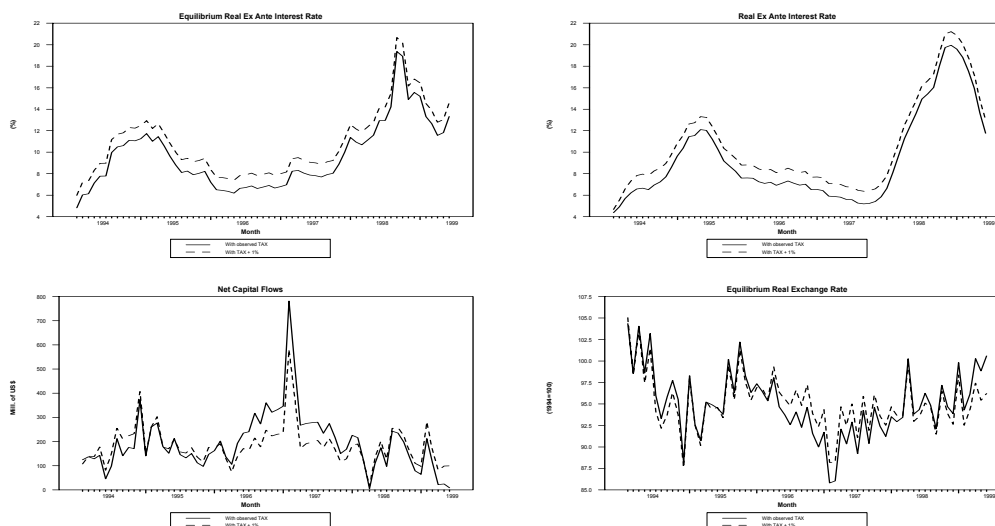
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<sup>29</sup> It is important to stress that we are working with a partial equilibrium model in this exercise. Thus, the dynamics of the model is not taking into account the macroeconomic implications that would arise from the increase in the domestic real interest rate as a result 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.

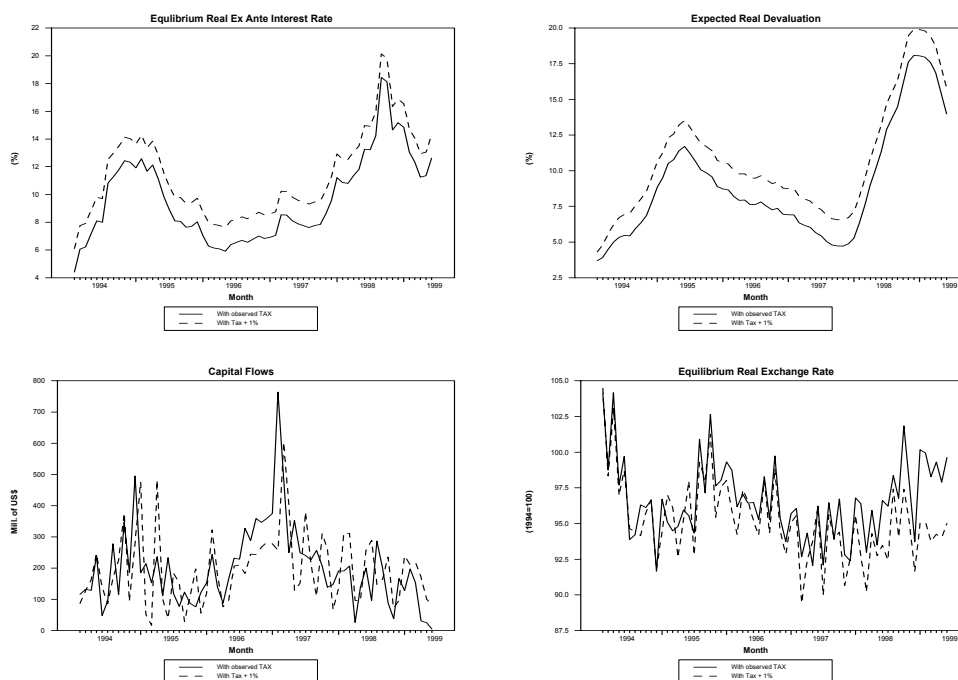
<sup>30</sup> The importance of avoiding a temporary and unsustainable process of real appreciation of the domestic currency should be part of the objectives of any central bank in globalized economy. A recent survey of the world economy published in *The Economist* (1999) have stressed the importance 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 measured in foreign exchange, is an additional element that central banks should take care of as it may come

## GRAPH 10 SENSIBILITY TO A 1% INCREASE IN TAX

### A. Without separating TAX



### B. Separating TAX



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.

## 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 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.
- 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.
- Cardoso, Eliana and Ilan Goldfajn (1997), “Capital Flows to Brazil: The Endogeneity of Capital Controls,” *IMF Working Paper*, September.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- McKinnon, Ronald I. and Huw Pill (1996), "Credible Liberalizations and International Capital Flows: The 'Overborrowing Syndrome'", in Takatoshi Ito and Anne O. Krueger, eds., *Financial Deregulation and Integration in East Asia*, pp. 7-42, Chicago, IL, Chicago University Press.
- 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 (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 y Javier Gómez (1997), "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 (1999), "Devaluación y Precios Agregados en Colombia, 1980-1998", forthcoming in *Borradores de Economía*, Banco de la República, Bogotá.

- 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.
- 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, Jorge (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 and Hernán Rincón (2000), "The Colombian Economy in the Nineties: Capital Flows and Foreign Exchange Regimes", Banco de la República, *Borradores de Economía*, No. 149, Bogotá.
- World Bank (1997), *Private Capital Flows to Developing Countries: The Road to Financial Integration*, A World Bank Policy Research Report, Oxford University Press.