Capital controls and foreign exchange market intervention in Colombia

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1. Introduction

This paper examines two aspects of the Colombian experience with capital flows between 1990 and 2003. First, it discusses capital account liberalisation, the evolution of external debt and the role of the price-based capital account regulations imposed in Colombia in September 1993. Second, it describes the intervention mechanisms set up by Banco de la República (the central bank) from September 1999 onwards, when the crawling exchange rate band system was abandoned and a free float was adopted in a fully fledged inflation targeting regime.

The main conclusions are as follows: (i) the price-based capital account regulations improved the profile of external debt and may have reinforced monetary control in a period of strong capital inflows to the country; (ii) the low level of short-term external debt did not reduce Colombia's vulnerability to the effects of a "sudden stop" in capital inflows to the region in the years 1998-99; (iii) the price-based capital account regulations (or non-remunerated deposits) provided an unwarranted protection to the domestic financial system that resulted in a broadening of intermediation margins, while simultaneously supporting the fiscal expansion of the period 1993-97; (iv) the development and use of an option-based auction mechanism to execute foreign exchange market intervention has allowed the central bank to achieve its foreign exchange intervention goals; and (v) the efficiency of a sterilised foreign exchange intervention performed to stop a devaluation - which compromises the inflation target - works primarily through the signalling effect sent to the market by the central bank. Selling a limited amount of international reserves does not seem to have a significant or lasting impact on exchange rate dynamics.

2. Liberalisation, flows and capital controls

A. The liberalisation of the capital account

Colombia, like other Latin American countries, liberalised its capital account at the beginning of the last decade. This was part of a process called "economic opening" that included trade liberalisation and the liberalisation of the local financial system.

The liberalisation of the capital account started with Law 9 of 1991, which modified the strict exchange control regime established in 1967 and allowed Colombian residents to hold and transact foreign currency at home and abroad. Thus, the central bank's monopoly in the exchange market was eliminated.

The liberalisation was executed in two phases. First, foreign direct investment (FDI) was, for the most part, liberalised and management of foreign exchange through national financial intermediaries or bank accounts abroad was authorised. However, restrictions on the final use of external resources (ie investment, imports and exports) for capital transactions remained and a minimum maturity (one year) was established for external loans. Access of foreign investment funds to the Colombian capital market was also authorised, as well as the issuance of bonds in foreign capital markets by Colombian firms.

In the second phase, Resolution 21 of 1993 granted access to credits in foreign currencies to Colombian residents with both domestic and external financial institutions. The parties concerned were allowed to freely negotiate the relevant financial conditions, and no restrictions were applied to the use of these funds. Colombian residents were also authorised to invest freely in liquid assets abroad.

External factors, the structural reforms and the regulatory changes were quickly reflected in the evolution of capital flows. Both foreign direct and portfolio investment increased from 1992. In addition, private expenditure and investment began to be increasingly financed with external resources and the private sector started to invest abroad.

B.   Evolution of capital flows

Table 1 summarises the evolution of capital flows and the financing of the current account in the period 1990-2003.[2] The following facts can be inferred:

- Two periods can be clearly defined in the evolution of capital flows. First, there is a period of strong capital inflows from 1990 to 1997. The consensus view in Colombia is that the figures for 1990 and 1991 ($97 million and –$420 million) understate capital inflows: during these years the private sector brought a substantial amount of capital through the current account in order to evade the capital controls that prevailed until September 1991. Second comes a period of net capital outflows or moderate capital inflows from 1998 to 2003. The year 2001 is atypical due to a strong increase in FDI and public external debt, which can be partially explained by the policy of prefinancing part of the public sector deficit for the year 2002.

- Private and public external debt exhibited differing trends. While private sector debt generally increased between 1990 and 1997, it subsequently fell for most of the period after 1998. The increase in private debt between 1994 and 1997 in part financed privatisation (by $2.4 billion). Public debt fell in the first half of the 1990s and rose significantly after 1997. An important proportion of the increase in the public external debt from 1997 onwards reflected the financing of the rising central government deficit after 1995. Privatisation revenues virtually disappeared from 1997 onwards.

- FDI started to increase after 1992, accelerating in 1994 and reaching a peak in 1997. FDI inflows from 1998 onwards, although lower than those registered between 1994 and 1997, were higher than those observed in the first two years of the 1990s. Graph 1 shows the evolution of direct external investment for the period 1990-2003, by sector. Financial sector activities (22%), the electricity, gas and water sector (15%) and manufacturing (21%) are particularly important.

- The current account balance changed from a deficit of –$5,800 million in 1997 to a surplus of $671 million in 1999. The financial account moved from a surplus of $6,587 million to a deficit of –$555 million over the same period. A sharp decrease in external debt was only seen for the private sector; the public net debt figures for 1998, 1999 and 2001 are the highest observed in the sample period.

C.   Controls on capital inflows

The capital account liberalisation of the 1990s was not a full liberalisation. Capital inflows were subject to six types of regulations: (i) a price control consisting of a reserve requirement which obliged debtors to maintain a non-remunerated dollar deposit at the central bank for a minimum period of time against short-term debt; (ii) controls on the net foreign exchange position of financial intermediaries ("posición propia") that prevented them from funding peso loans with external liabilities; (iii) restrictions over commercial debt, including a maximum period for the payment of consumption and intermediate goods imports and special quotas for export prefinancing; (iv) previous approval from the Securities Superintendency for foreign investment funds operating in Colombia; (v) taxes and explicit controls to reduce interest rate arbitrage in service transactions; and (vi) direct controls on illegal capital flows.

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[2]   For more details, see Alonso et al (2003): "Evolución de los flujos de capital y de la deuda externa del sector privado en Colombia, 1990-2003", *Borradores de Economía*, no 266, November.

Table 1

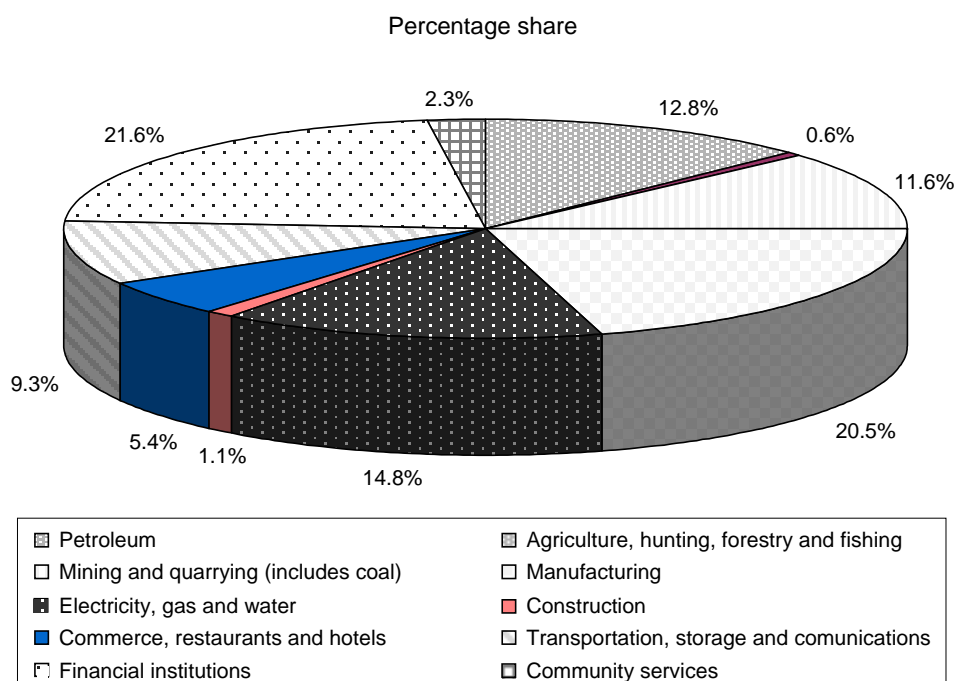**Colombia: capital flows and current account financing, 1990-2003**

In millions of US dollars

	Change in international reserves	Current account	Capital and financial account	Public sector			Private sector				
				External debt	Change in external assets	Subtotal	Net foreign direct investment	Portfolio investment	External debt	Short-term external assets and errors and omissions	Subtotal
1990	610	544	97	−172	−46	−217	484	0	−295	124	314
1991	1,763	2,347	−420	−319	28	−291	433	5	−373	−193	−129
1992	1,274	876	348	−424	−368	−792	679	66	499	−104	1,140
1993	464	−2,221	2,199	−44	126	82	720	145	1,799	−548	2,116
1994	199	−3,674	3,393	−89	−1,162	−1,251	1,298[1]	478	3,000	347	5,123
1995	2	−4,528	4,560	509	863	1,372	712	165	2,784	−503	3,158
1996	1,721	−4,642	6,683	1,301	−564	737	2,784[2]	292	3,909	−1,359	5,626
1997	277	−5,751	6,587	674	−287	388	4,753[3]	593	2,996	−2,701	5,640
1998	−1,390	−4,858	3,314	1,658	−71	1,588	2,033[4]	−265	468	−356	1,880
1999	−315	671	−555	1,485	−584	901	1,392	−27	−1,234	−2,018	−1,887
2000	870	626	−15	682	−223	459	1,973[5]	17	−1,011	−1,194	−215
2001	1,217	−1,251	2,390	3,061	−1,620	1,441	2,493	−41	46	−1,471	1,027
2002	138	−1,639	1,295	−1,199	1,560	361	1,171	16	−1,007	1,236	1,416
2003[6]	−470	−806	124	298	−238	60	872	14	−141	−468	277

[1] Includes revenues from the privatisations of: Banco de Colombia ($326 million) and Banco Central Hipotecario ($156 million). [2] Includes revenues from the privatisation of Chivor ($638 million), Betania ($301 million), Banco Popular ($274 million) and EPSA ($132 million). [3] Includes revenues from the privatisation of: Empresa de Energía Eléctrica de Bogotá ($2,177 million), EPSA ($496 million) and Cerromatoso ($166 million). [4] Includes revenues from the privatisation of Electrificadora de la Costa ($511 million). [5] Includes revenues from the privatisation of Carbocol ($465 million). [6] Preliminary data as at June 2003.

Source: Banco de la República.

Graph 1

Foreign direct investment by sector, 1990-2003

Percentage share

⊞ Petroleum		▨ Agriculture, hunting, forestry and fishing
☐ Mining and quarrying (includes coal)		☐ Manufacturing
▧ Electricity, gas and water		☐ Construction
■ Commerce, restaurants and hotels		☐ Transportation, storage and comunications
⊓ Financial institutions		▥ Community services

Source: Banco de la República.

For the purpose of this paper we will focus on the non-remunerated reserve requirements on capital inflows. The literature (most of which refers to Chile) emphasises the following goals of non-remunerated reserve requirements on capital inflows: (i) to generate a bias against short-term external debt in order to decrease the economy's vulnerability to negative external shocks that reduce the supply of foreign funds; (ii) to stabilise capital flows without negatively affecting long-term capital productivity; and (iii) to facilitate an increase in interest rates without generating additional upward pressure on the real exchange rate. In the first case non-remunerated reserve requirements on capital inflows are understood as a liability management instrument, and in the other two as a macroeconomic policy tool (see Villar and Rincón (2000)).

In Colombia, non-remunerated reserve requirements on capital inflows were imposed in September 1993, following Chile's previous experience. The prime motivation was to replace quantitative controls (which forbade obtaining external debt for working capital through the domestic financial sector) in place at the time with a price control (in order to match the internal interest rate with the external one). This measure was later considered a powerful tool to promote a long-term structure in private capital flows. However, at the time it was seen as a backward step from the capital account liberalisation that started in 1991.

The non-remunerated deposit requirement was initially set at 47% of the value of debt for debt maturities of 18 months or less. In the following years several modifications were made to the rate and terms. At the beginning of 1994, the minimum maturity period was extended to three years and in August, to five. In the two following years it was modified further, taking into account the behaviour of capital flows, the internal interest rate and devaluation expectations. In May 1997 a single reserve requirement that applied to all debt was adopted, and subsequently reduced to reach a value of zero in May 2000. With the reserve requirement at zero, the restrictions on short-term indebtedness were eliminated in practice but the mechanism remained available for future use.

The control has been evaluated by a number of authors, using different methodologies and considering different time horizons. All the studies reach the same conclusion: the non-remunerated reserve requirement lengthened the maturity structure of external debt.

Table 2 shows the composition of private external debt according to the term structure. Three periods are clearly defined. In the first period (1990-93) the private sector external debt level was low and

about 55% was short-term. In the second period (1994-98) the private sector external debt grew quickly and concentrated on the medium and long term. The ratio of medium- and long-term debt to short-term debt was about four to one. In the third period (1999-2002) the private sector external debt fell and the share of short-term debt rose. This trend was accentuated in 2003 according to data for the first half of the year. The period of strongly increasing mid- and long-term debt coincided with the years of strong private sector indebtedness to pay for the privatisation of public assets. Even though these medium- and long-term debts would have been acquired anyway, the impact of reserve requirements on the term structure of private debt is evident.

Ocampo and Tovar (1999) use formal methods to evaluate the effect of non-remunerated reserve requirements on the term structure of external borrowing. Their results suggest that the term structure of private capital flows is determined not only by the relative cost of debts but also by the exemption regime for debts with a minimum maturity. On this basis they conclude that a flat tax on all debts, although easier to administer, is not a perfect substitute for the system in place between September 1993 and May 1997, which imposed reserve requirements on debts with a certain minimum maturity.

Estimates of the impact of the reserve requirement on the volume of capital inflows vary significantly. Cárdenas and Barrera (1997) use regression analysis, with data for 1985-95, and conclude that the non-remunerated reserve requirement for external debt was not effective in reducing capital flows. However, as noted by Ocampo and Tovar (1999), the analysis is erroneous, since it does not take into account that the non-remunerated reserve requirement for external debt replaced an administrative form of capital control. To avoid this problem, the authors begin the sample period for their econometric analysis in 1993, the year in which the administrative controls were eliminated. They conclude that the reserve requirement on external debt was, in fact, effective, not only because it generated an increase in the cost of short-term debt, but also due to imperfect substitution between debts of different maturity. Rincón (1999) and Rocha and Mesa (1998) reach the same conclusions.

Villar and Rincón (2000) criticise earlier research for not addressing the problem of simultaneity that arises because capital controls influence interest rates, which in turn affect capital inflows. Thus, the papers cited earlier, "… 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". The authors present a simple model that relates the real interest rate and the real exchange rate and estimate it over 1993-99. They conclude that the reserve requirement for external debt allowed for an increase in interest rates and lowered the growth of aggregate demand without generating additional real exchange rate appreciation pressures. In their words, price-based regulation on capital flows is "… an effective and a 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" (p 55).

The mainstream view in Colombia on the effects of price controls on capital inflows is in line with the conclusions of Villar and Rincón (2000) and Ocampo and Tovar (1999). In their view, this kind of control improves the term structure of external debt, decreases capital inflows (Ocampo and Tovar) and makes it easier for authorities to increase the interest rate in order to control expenditure without creating an appreciation of the real exchange rate. However, a number of disadvantages are also cited:

- The unwarranted protection to the domestic financial system resulted in wider intermediation margins;

- The capital control increased the difference between internal and external returns, perpetuating the need for the control (Suescún (1995));

- The control segmented the credit market. A few agents (the more sophisticated ones) obtained financing at (lower) foreign interest rates while the rest had to endure very high domestic interest rates;

- Although the control resulted in a low proportion of short-term to total external debt, it is not clear that it decreased external vulnerability. Colombia, along with Chile, still experienced the harsh effects of the sudden stop in capital inflows in 1998-99. With the external shock of 1997-98, the private sector stopped borrowing abroad, prepaid some of the outstanding stock, and hedged for foreign exchange risk. The capital control did not prevent any of these developments;

Table 2

Private sector external debt stock

Figures do not include leasing
In millions of US dollars

Year/quarter	Financial sector			Non-financial sector			Total		Total stock
	Short-term	Long-term	Subtotal	Short-term	Long-term	Subtotal	Short-term	Long-term	
1990	640	...	640	768	1,113	1,881	1,408	1,113	2,521
1991	443	...	443	741	981	1,722	1,184	981	2,165
1992	890	...	890	721	1,250	1,971	1,611	1,250	2,861
1993	1,619	...	1,619	968	2,046	3,015	2,587	2,046	4,634
1994	2,301	...	2,301	912	3,981	4,893	3,213	3,981	7,194
1995	2,654	...	2,654	1,266	5,598	6,864	3,920	5,598	9,519
1996	1,620	1,725	3,346	1,530	8,304	9,834	3,151	10,029	13,180
1997	1,893	2,190	4,083	1,543	9,992	11,535	3,436	12,182	15,618
1998	1,393	1,835	3,228	1,609	10,443	12,053	3,002	12,278	15,281
1999	720	1,189	1,909	1,547	10,251	11,798	2,267	11,440	13,707
2000	743	717	1,460	1,572	9,772	11,344	2,315	10,489	12,804
2001 (Provisional data)	861	433	1,294	1,869	9,898	11,767	2,730	10,331	13,061
2002 (Provisional data)	917	217	1,134	2,146	8,928	11,074	3,062	9,145	12,208
2003[1] (Preliminary data)	856	149	1,005	2,830	8,377	11,207	3,686	8,526	12,212

[1] End-June.

Source: Banco de la República.

- The extensive use of the capital control reduced its effectiveness. The strong surge of foreign direct investment in Colombia suggests that the control was being avoided through this channel (among others);

- It is not clear that the capital control reduced foreign capital inflows (see, for instance, Villar and Rincón (2002)). But even if we accept that it did reduce external credit, it is not clear that internal credit did not grow to compensate. In any case, if total credit decreased, it is not clear that this helped to substantially increase saving levels. Doubts about this latter effect come not only from studies of credit restrictions in Colombia but also from the behaviour of private savings; as a percentage of GDP, such savings fell by almost 50% between 1992 and 1998;

- The illusion that the capital control was going to reduce private expenditure may have contributed to a surge in public expenditure between 1993 and 1998;

- The deposit seems to have increased the costs of hedging and therefore hindered the development of a derivatives market for the exchange rate (Banco de la República (2000)).

3. Foreign exchange market intervention

The central bank of Colombia adopted inflation targeting with a floating exchange rate in October 1999, after abandoning the crawling exchange rate band system in place since 1994. In November 1999 the central bank announced a foreign exchange market intervention mechanism aimed at accumulating foreign reserves and controlling the volatility of the exchange rate. Two years later it announced an intervention scheme designed to reduce foreign reserves.

The main characteristic of Colombia's foreign currency market intervention is its transparency and exclusive reliance on an option-based auction system. The intervention is carried out in an open manner and with rules that are public knowledge. Furthermore, the Treasury is treated in the same way as any other market agent.

The objectives of intervention are to:

- Avoid excessive movements of the nominal exchange rate in a manner consistent with achieving the inflation target;

- Strengthen the international liquidity position of the country by accumulating foreign reserves without compromising the achievement of the quantitative target for inflation or causing the exchange rate to deviate from its fundamental values;

- Moderate excessive and abrupt movements in the exchange rate from its recent trend (20-day moving average). Those movements can generate expectations of appreciation or depreciation that can result in a significant deviation of the exchange rate from its fundamentals.

By law, the Board of Governors of the central bank is directly responsible for exchange rate policy. However, the Finance Minister is one of the seven members of the Board, so the government participates in the intervention decision. The central bank executes the intervention in an independent manner.

The central bank has four types of options, two to accumulate or sell international reserves and two to dampen excessive exchange rate volatility. Agents have access to these options only through auctions held by the central bank.

- *Put (call) options for accumulating (selling) international reserves.* These options give the holder the right to sell (buy) foreign exchange to (from) the central bank. The amount of the options to be auctioned is set by the Board at its own discretion. The options are valid between the first and the last working day of the month immediately following the day of the auction (these have usually coincided with calendar months) or in the period specified in the announcement. The options can be exercised, partially or totally, during this period, as long as the condition for exercise is in place. The condition for the put (call) option is that the representative market exchange rate (TRM, certified by the Banking Superintendency) be below (above) its 20 working day (arithmetic) moving average. The strike price of the option

is the TRM of the exercise day. In the event that the options are totally exercised before their expiration date, the Board can announce new auctions.

- *Put (call) options for controlling volatility in the exchange rate*. Auctions of these options can be held by the central bank the same day that the nominal exchange rate (TRM) is 4% or more below (above) its last 20 working day moving average. This condition also applies for the exercise of the option. The amount of the auction is set by the Board at its own discretion (it is currently set at $180 million). The strike price of the option is the market exchange rate (TRM) of the exercise day. The options expire one month after the day of the auction. The central bank can call a new auction whenever the exercise condition is met (even if the options auctioned have not expired). The amount of these new volatility options is announced at the same time the auctions are called.

Dutch auctions are used for all interventions through options. Premiums are ordered from the highest to the lowest. Bids equal to or higher than the premium at which the amount offered is covered are granted at this premium. Each participant may include up to five bids with the restriction that, in aggregate, these may not exceed the total offered amount. The institutions that are allowed to participate in the auctions include the Treasury and the "foreign exchange market intermediaries", the latter excluding brokers and retail currency exchange houses (*bureaux de change*). On some occasions the Board announces auctions for put options to accumulate foreign reserves months in advance.

Table 3 shows the frequency of intervention. As can be seen, auctions of put options are the most frequently used mechanism. In fact, during the period between November 1999 and September 2002, Banco de la República performed monthly auctions with amounts to be accumulated that ranged from $30 million to $200 million. Auctions for call options to sell foreign reserves were performed only during March, April and May 2003, with an offered amount of $200 million each month. In addition, the volatility control mechanism through call option auctions was activated automatically three times - in July, August and October 2002 for an amount of $180 million each time.

The use of public auctions of options enhances the visibility and openness of the foreign exchange intervention mechanisms for markets while giving the central bank the discretion to choose the timing and amount of foreign reserve adjustments. These decisions are usually taken at the monthly meeting where the Board analyses the inflation report. In auctions for volatility control, the central bank's discretion is limited to fixing ex ante the amount offered per auction and the tolerated deviation of the exchange rate from its 20-day moving average. After these parameters have been set, the auctioned call and put options to control foreign exchange volatility are triggered automatically.

Banco de la República also has the discretion to announce the amounts awarded in the auctions. In all cases, the intervention amount is announced to the public the same day as the option is executed by any of its holders. No entity or individual outside the central bank is supposed to have access to privileged information. Only two types of information are not disclosed: the name of the institution that exercised the option and the nature of the intervention (whether or not it has been sterilised). However, information on the level of reserves and the monetary base is published weekly on the central bank's website with a delay of eight days. This allows market participants to infer the amount and nature of the intervention. Afterwards, information on whether the intervention was sterilised is revealed. Recent interventions have all been sterilised.

The objectives of the foreign exchange intervention have largely been achieved, in particular those set for the put and call options to accumulate or sell foreign reserves. As can be seen in Table 3, nearly $1.4 billion in reserves have been bought since auctions for put options were introduced. This mechanism and the returns obtained in our investments have allowed Colombia to increase its foreign reserve level substantially, after the reduction that came with the defence of the currency band in 1998 and the first three quarters of 1999. At no point have the central bank or the markets deemed that this reserve accumulation could jeopardise the achievement of the inflation target.

The intervention mechanism has been designed so that it does not target any specific level of the exchange rate. The central bank buys dollars at the official exchange rate determined by market transactions of the day before. The amounts offered in these auctions have been below one third of the average daily turnover, except for the first time they were offered. The options have a one-month maturity and can only be exercised when the exchange rate falls below its 20-day moving average. With all these features, the exchange rate can appreciate substantially in periods in which the options are operating.

Table 3

Foreign exchange market intervention

In millions of US dollars

Month	Put options to accumulate reserves		Call options to sell reserves		Call volatility options	
	Auction amount	**Auction exercises**	**Auction amount**	**Auction exercises**	**Auction amount**	**Auction exercises**
1999						
November	200.0	200.0	.	.	.	.
December	80.0	.	.	.	.	.
Total	**280.0**	**200.0**	.	.	.	.
2000						
January	80.0	12.0	.	.	.	.
February	80.0	.	.	.	.	.
March	100.0	74.0	.	.	.	.
April	55.0	.	.	.	.	.
May	100.0	.	.	.	.	.
June	100.0	15.5	.	.	.	.
July	100.0	.	.	.	.	.
August	99.9	17.1	.	.	.	.
September	100.0	100.0	.	.	.	.
October	100.0	100.0	.	.	.	.
November	100.0	.	.	.	.	.
December	100.0	80.0	.	.	.	.
Total	**1,114.9**	**398.6**	.	.	.	.
2001						
January	75.0	69.3	.	.	.	.
February	50.0	.	.	.	.	.
March	50.0	.	.	.	.	.
April	30.0	30.0	.	.	.	.
May	30.0	30.0	.	.	.	.
June	30.0	30.0	.	.	.	.
July	30.0	30.0	.	.	.	.
August	80.0	.	.	.	.	.
September	100.0	100.0	.	.	.	.
October	140.0	140.0	.	.	.	.
November	119.9	119.9	.	.	.	.
December	50.0	50.0	.	.	.	.
Total	**784.9**	**599.2**	.	.	.	.
2002						
January	49.9	1.5	.	.	.	.
February	50.0	50.0	.	.	.	.
March	100.0	100.0	.	.	.	.
April	100.0	.	.	.	.	.
May	100.0	.	.	.	.	.
June	100.0	.	.	.	.	.
July	50.0	.	.	.	180.0	180.0
August	50.0	.	.	.	180.0	109.5
September	50.0	50.0	.	.	.	.
October	.	.	.	.	180.0	124.5
November	.	.	.	.	.	.
December	50.0	.	.	.	.	.
Total	**699.9**	**201.5**	.	.	**540.0**	**414.0**

Table 3 (cont)

Foreign exchange market intervention

In millions of US dollars

Month	Put options to accumulate reserves		Call options to sell reserves		Call volatility options	
	Auction amount	**Auction exercises**	**Auction amount**	**Auction exercises**	**Auction amount**	**Auction exercises**
2003						
January	.	.	.	.	.	.
February	.	.	.	.	.	.
March	.	.	200.0	144.7	.	.
April	.	.	200.0	.	.	.
May	.	.	199.9	199.9	.	.
June	.	.	.	.	.	.
July	50.0	.	.	.	.	.
Total	**50.0**	.	**599.9**	**344.6**	.	.
Accumulated total	**2,929.7**	**1,399.3**	**599.9**	**344.6**	**540.0**	**414.0**

The call options for selling foreign reserves have also been successful. The first auction was announced in February 2003, when the annual depreciation of the peso went beyond 25% and inflation expectations were beginning to deviate from the inflation target set by the central bank. Another two auctions were carried out to sell options for the months of April and May. In each monthly auction a total of $200 million in call options was offered, for a total of $600 million, of which $344 million were exercised.

As can be seen in Graph 2, the nominal exchange rate stabilised immediately after the announcement of the auction in mid-February and then began to appreciate slowly. With a stable exchange rate and with food prices falling, inflation and inflation expectations levelled out and then started to fall. In view of this behaviour, the Board suspended the call options in June. At the time of writing, total inflation at the end of 2003 was due to be near the upper limit of the target range (5-6%). All of this was achieved in a year in which the value added tax on some products was increased and during which there was a large increase in utility and gas prices.

The auction for foreign reserve deployment was announced in February jointly with the decision of the Board of Governors to sell up to $1,000 million through this mechanism. These announcements came after a 100 basis point hike in the central bank's interest rate and were followed by another of the same magnitude. Intervention in the foreign currency market continued as described above and it led subsequent changes in monetary policy. The foreign exchange intervention served as a complement to, not as a substitute for, the monetary policy tools of the central bank.

Table 4 shows the representative exchange rate (TRM), its deviation from its 20-day moving average during July and August 2002, when the central bank auctioned volatility options. As can be seen in the table, the exchange rate did not deviate more than 4.3% from its moving average, had appreciated 0.5% six days after the second volatility option was exercised, and remained within 2.5% of its moving average weeks later. A similar phenomenon is observed for October.

The central bank's volatility options prevented abrupt and excessive deviations of the exchange rate. In that sense, they achieved the purpose for which they were designed. Nevertheless, there are doubts about the efficiency of the mechanism (it can be very expensive if there is a strong devaluation of the peso) and whether it should or could be replaced by the options to accumulate and sell reserves.

Graph 2

Nominal exchange rate

Pesos/$

Central bank announces foreign exchange market intervention
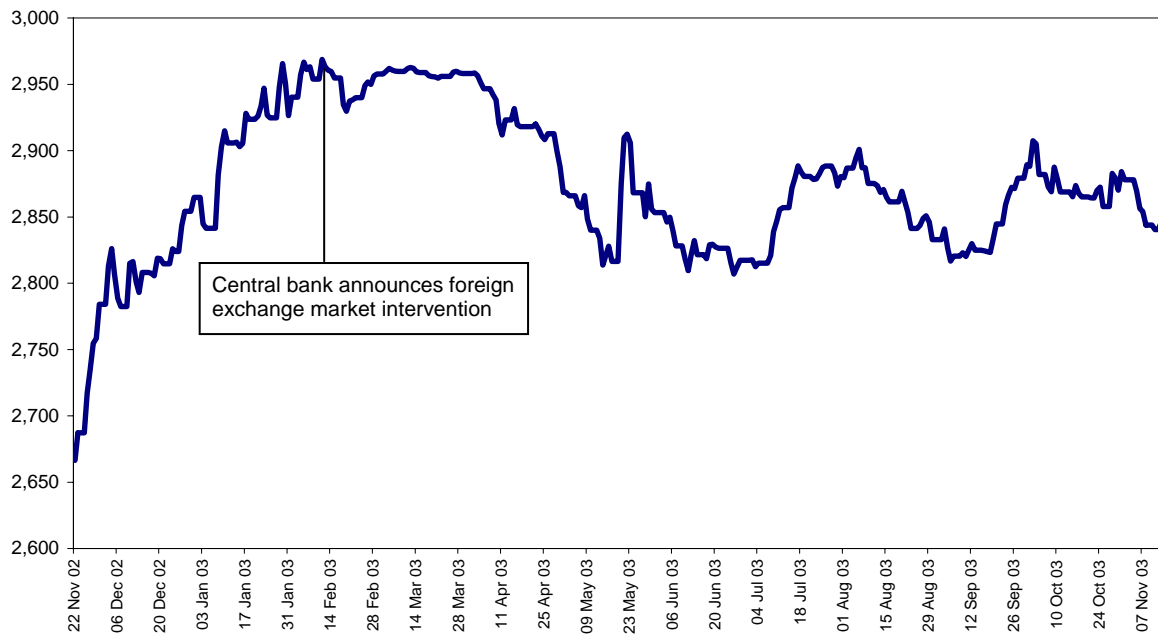
Source: Banco de la República.

The Colombian experience with option-based exchange market intervention so far has been very successful. For example, with these options it was possible to accumulate close to $1,400 million in reserves without compromising the inflation target or affecting the trend of the exchange rate. Also, the options to sell reserves have been an important support for the implementation of monetary policy and the credibility of the local currency. The intervention was completely sterilised. Therefore, it was probably successful because of its signalling effects. It is not clear from Graph 2 that the simple announcement of option auctions was enough. The threat of massive intervention and the subsequent response of monetary policy were crucial success factors. The threat was also supported by the effective intervention in the exchange rate market and a credible level of foreign reserves.

Table 4

Call volatility option (2002)

Date	Exchange rate	Exchange rate (TRM) Deviation from its moving average (%)	Auction amount ($ m)	Option exercised ($ m)
2 July	2,398.80	1.5	.	.
3 July	2,410.50	1.8	.	.
4 July	2,425.40	2.2	.	.
5 July	2,426.40	2.0	.	.
8 July	2,434.30	2.1	.	.
9 July	2,457.40	2.8	.	.
10 July	2,462.20	2.8	.	.
11 July	2,482.20	3.3	.	.
12 July	2,506.80	4.0	.	.
15 July	2,514.00	3.9	.	.
16 July	2,507.20	3.4	.	.
17 July	2,499.90	2.8	.	.
18 July	2,524.80	3.5	.	.
19 July	2,538.50	3.8	.	.
22 July	2,529.60	3.1	.	.
23 July	2,517.40	2.3	.	.
24 July	2,539.00	2.9	.	.
25 July	2,572.40	3.9	.	.
26 July	2,580.20	3.8	.	.
29 July	2,596.30	4.0	180	117
30 July	2,599.60	3.7	.	.
31 July	2,625.10	4.3	.	63
1 August	2,636.30	4.3	180	69
2 August	2,640.40	4.0	.	17
5 August	2,643.00	3.7	.	.
6 August	2,663.80	4.1	.	23.5
8 August	2,670.60	3.9	.	.
9 August	2,649.30	2.8	.	.
12 August	2,568.80	−0.5	.	.
13 August	2,595.80	0.4	.	.
14 August	2,658.00	2.5	.	.
15 August	2,635.90	1.4	.	.
16 August	2,648.80	1.7	.	.
20 August	2,663.60	2.0	.	.
21 August	2,620.90	0.2	.	.
22 August	2,626.20	0.2	.	.
23 August	2,653.00	1.0	.	.
26 August	2,643.40	0.5	.	.
27 August	2,653.30	0.7	.	.
28 August	2,672.30	1.3	.	.
29 August	2,688.60	1.7	.	.
30 August	2,712.50	2.5	.	.

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