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Israeli Inflation from an International Perspective

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Israeli Inflation from an International Perspective¹

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Abstract

<p>The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.</p>
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Israel's post-stabilization experience of moderate inflation and eventual disinflation is compared with experiences in other countries. Lessons that emerge from an examination of international experiences indicate the importance of establishing early on credibility in the nominal anchor and a commitment to persevere with disinflation policies, achieving and maintaining a tight fiscal position, measures to reduce nominal rigidities, and widespread structural reform. Israel falls short on several criteria which explains why taming inflation in the post-stabilization period has been difficult. The paper concludes with a consideration of institutional arrangements that could sustain the current low inflation levels.

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I. INTRODUCTION

In its 50 year history, Israel has undergone almost the full range of inflation experiences, including periods of low inflation in the 1950s and 1960s, double digit inflation in the 1970s, triple digit inflation through the mid-1980s, back to a prolonged period of moderate double digit inflation after the 1985 stabilization program, then finally recently achieving low single digit levels. The only missing experiences are those of deflation and genuine hyperinflation, although the high inflation of the mid-1980s is often described as a hyperinflation.

The Israeli inflationary experience and its successful 1985 stabilization program have been extensively compared with the experiences of other countries (see for example Bruno, et al, 1988, 1991; Bruno, 1993). The main focus of this paper is on the post-stabilization period. In particular, we compare Israel's experience of moderate inflation and eventual disinflation with those of other countries, to draw conclusions for both Israeli policy and the disinflation process in general.

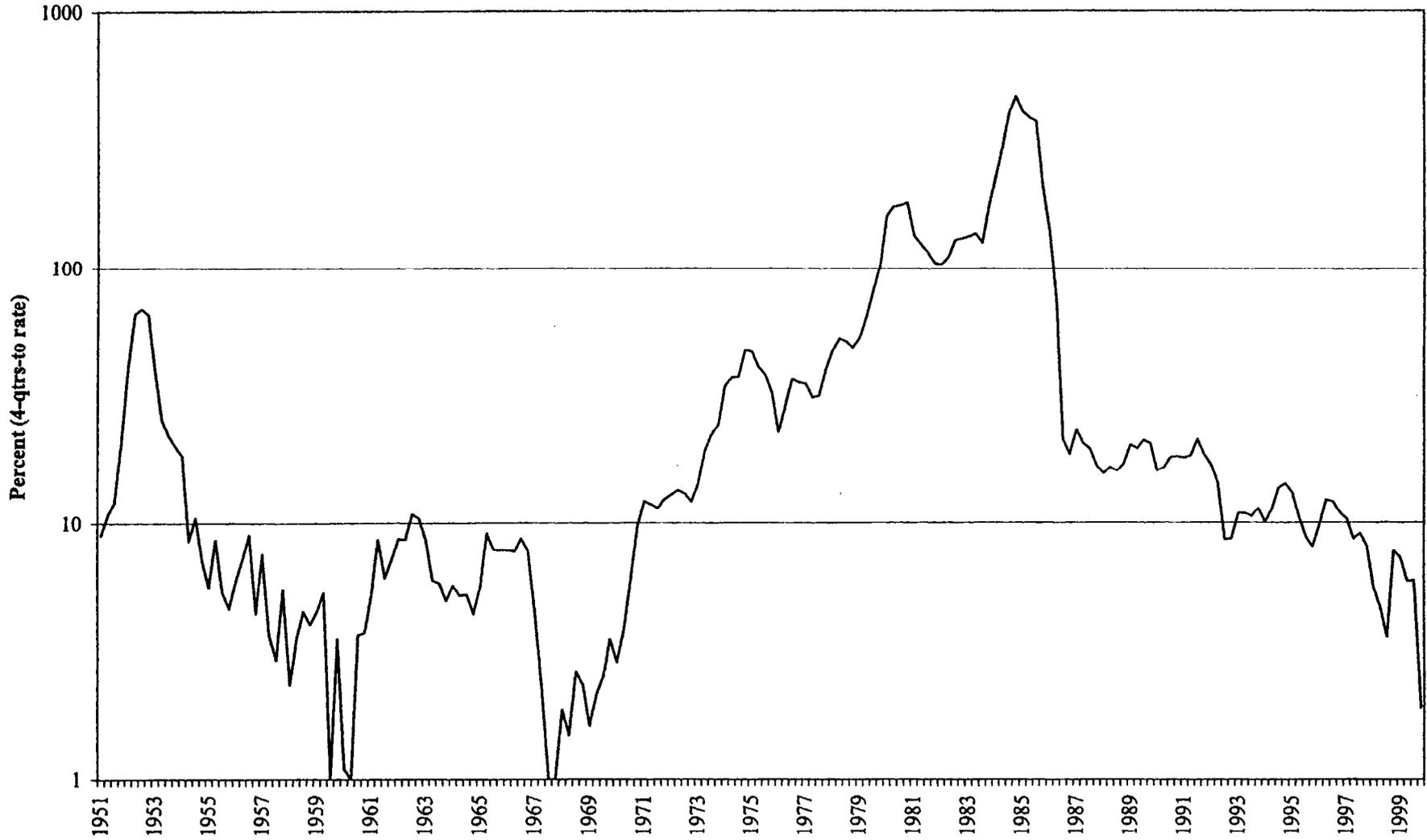
The paper is organized as follows. In Section II we provide a brief overview of Israel's long-term inflation history. This sets the context for the description in Section III of Israel's struggle during the post-stabilization period to disinflate from moderate to low single digit levels. In Section IV we summarize lessons on the disinflation process that have emerged from experiences in other countries, which are drawn in reference to nine countries, three of which moved from high to low inflation levels without an intervening period of moderate inflation, four which experienced moderate inflation for a period and then lowered inflation to single digit levels, and two which were for a long time stuck with moderate inflation. Drawing on these general lessons, we analyze in Section V why it proved so difficult to tame inflation in Israel. In the final section we address institutional issues that will help determine whether Israel is able to sustain the current low inflation levels.

II. RISING INFLATION PRESSURES AND STABILIZATION, 1951-85

Figure 1 plots (on a logarithmic scale) the inflation rate² in Israel during the last half-century. After rising briefly in the early 1950s to a peak of 60 percent per annum as previously controlled prices were deregulated and the exchange rate was devalued, inflation remained below 10 percent for virtually the entire period until the 1970s. This was the period of Israel's miracle economic growth, which averaged 10 percent per annum until 1965 when, in the face of an increasing external deficit and rising inflation, policy turned sharply contractionary and a recession began that reduced inflation to close to zero and raised the unemployment rate to more than 10 percent.

² The inflation rate plotted in Figure 1 is the rate of increase of the CPI, for each quarter, relative to the same quarter a year before.

Figure 1: Israeli inflation, 1951-99



The restrictive fiscal and monetary policies were reversed at the end of 1966. Although the Six-Day War resulted in a large increase in government spending,³ it also in effect increased the labor force, as Palestinians began to be employed in Israel, and inflation, although rising, continued low through the end of the 1960s. Growth too returned to the former miracle rates. The pace of inflation then rose rapidly, first to double digit levels in the early 1970s as expansionary policies continued, to annual rates that averaged 35 percent in 1974–77, then to rates around 125 percent in 1980–83, and finally to annual rates that peaked at over 450 percent in 1984–85.

The initial rise in inflation to levels that were more than 30 percent per annum was linked to the sudden slowdown in annual growth to just 3 percent, itself a function of the first oil price shock in 1973, the Yom Kippur War (after which military expenditure increased by 10 percent of GDP, partly financed by increased foreign aid), the failure to adjust other fiscal expenditures to reflect the slower pace of growth and hence of revenues, and the rapid growth in real wages even as total productivity in the business sector declined. Inflation then accelerated after 1977 as the nominal anchors in the economy were weakened with the introduction of a real exchange rate rule, liquid foreign exchange (PATAM) accounts which decreased the demand for shekel-denominated assets, and other policies that limited the Bank of Israel's (BoI) control over the monetary base.⁴ In response, efforts to reduce inflationary pressures were either pursued for too short a period (nine months in 1979), or focused on price and wage controls rather than on a lasting fiscal retrenchment (1982–83), an approach that provided at best a brief respite.

The famous mid-1985 stabilization program represented a comprehensive attack on the root causes of high inflation in Israel. It was based on the following components:

- The high fiscal deficit—which had been at the core of both the excess demand conditions for nearly 20 years and of the rising public debt level—was substantially reduced through a cut in subsidies for basic foods, transport, and export credits, reductions in defense spending, the imposition of new taxes including a temporary surcharge on self-employed income, and increased foreign aid.⁵ The fiscal deficit fell

³ The overall public sector balance turned from a surplus of 6 percent of GNP in the early 1960s to a deficit of almost 10 percent of GNP at the start of the 1970s due to a sharp increase in military (after the 1967 war), social (education, health, and welfare) and subsidy expenditures.

⁴ In particular, the opening of the capital account in 1977–79 which compromised efforts to control domestic credit, the ongoing expansion of export credits (control over which was in part the responsibility of the Ministry of Finance), official steps to stabilize the price of government bonds on the secondary market to lower the cost of borrowing, and maintaining a low discount rate low so the large fiscal borrowing did not crowd out private sector activity.

⁵ About half the fiscal adjustment came from revenue increases and half from expenditure declines.

from 13 percent of GDP in 1984, to less than half that level in the second half of 1985, and the budget was in surplus by 1986.

- The effectiveness of monetary policy was enhanced: the Bank of Israel (BoI) restricted the growth of credit by raising reserve requirements and the real discount rate on deregulated bank lending; the minimum term for dollar-indexed (PATAM) deposits was raised to one year; a new central bank law in 1986 forbade borrowing from the BoI to finance the budget except for bridging loans within the fiscal year; and the tradability of government bonds was improved.
- The exchange rate was devalued by 25 percent at the start of the program, and partially unified for exporters and importers. To anchor price expectations, the rate was fixed to the U.S. dollar at NIS 1.5 per dollar, conditional on maintaining an “appropriate” level of wages.
- Backed by the solid adjustment in the macroeconomic fundamentals, an incomes policy was used to reduce inflationary inertia. Backward-looking wage indexation was temporarily suspended, replaced with a flat increase in nominal wages by 14 percent in August and 12 percent in September designed to compensate for the initial devaluation and inflation, with further wage increases delayed until December. The prices of virtually all (90 percent) goods and services were frozen for three months after an initial 17 percent increase. The extensive indexation of financial assets was not altered.⁶
- The credibility of the stabilization program was enhanced by large-scale U.S. financial aid to help finance the fiscal deficit and guarantee balance of payments viability (\$1.5 billion over two years, or over 3 percent of GDP per year), and by the withdrawal from Lebanon in the same month the Knesset voted on the stabilization package. Patinkin (1993) argues that the withdrawal from Lebanon increased the government’s policy credibility by showing its ability to deliver on controversial policies.

As a result of these aspects, the 12-month inflation rate fell quickly from 450 percent in mid-1985 to 20 percent by the start of 1986. Indeed, Israel’s stabilization program remains one of the most successful on record.

⁶ There were labor protests immediately following the announcement of the stabilization program, which initially included a wage freeze. Negotiations resulted not only in the wage adjustments for August and September, but also in an agreement that wages would increase in December, January, and February by 4 percent per month plus a COLA payment of 80 percent of the excess of inflation above 4 percent per month. New wage negotiations would begin in April 1986.

III. ISRAEL'S EXPERIENCE WITH MODERATE INFLATION, 1986–2000

There have been three distinct inflation periods in Israel since the stabilization program in 1985: the first from 1986–91 when annual inflation was around 15–20 percent, the second from 1992 to mid-1997 when annual inflation hovered around 10 percent, and the third from mid-1997 onwards, when inflation fell rapidly to recent levels around 2 percent although there was a temporary spike in inflation at end-1998 due to the effect on the price level of the large depreciation. Economic indicators for the post-stabilization period are shown in Table 1 and Figures 2–3.

The discussion in this section and later in the paper is informed by the results of empirical work on the interactions of changes in the money stock, interest rates, exchange rates, output and inflation in Israel during the post-stabilization period, which is summarized in Appendix I.⁷ Briefly, the Appendix indicates that restrictive monetary policy does reduce inflation and output levels. Further, while there is a short-run inverse relationship between output and inflation, there does not appear to be a long run relationship.

A. The Initial Post-Stabilization Inflation Plateau, 1986–91

Re-inflationary pressures were evident after mid-1986. In large part, these were caused by the nominal and real wage increases conceded in the early phases of the program and their accommodation by monetary policy, which was looser than originally envisioned as credit growth exceeded its target. While real interest rates were initially high in the deregulated segment of bank borrowing—6–7 percent per month in mid-1986—this segment constituted only a small share of total credit and real rates were much lower for the large directed credit segment. By end-1986, real rates in the deregulated lending segment had fallen to the still excessively high level of 2 percent per month (Leiderman, 1993).

Demand pressures increased as monetary restrictiveness was relaxed. The early success of the stabilization program—increases in foreign reserves and the rapid decline in inflation without an initial output cost—led to the perception that “now was the time to grow,” meaning to relax restrictive policies (Bruno and Piterman, 1988). Reflecting this view, marginal income taxes were reduced and investment incentives were increased, whereupon the *domestic* fiscal deficit (which abstracts from foreign assistance) deteriorated in each quarter from mid-1986, rising from 1 percent of GDP in 1986 to 4 percent of GDP by 1988. The *foreign* fiscal deficit also increased after 1986 after the conclusion of the extraordinary U.S. financial assistance.

Demand pressures were sustained by increases in real wages. After contracting by 7 percent in 1985, real business wages increased 9 percent in 1986 and 8 percent in 1987, indeed real business sector wages returned to their pre-stabilization level within 9 months of

⁷ This work was undertaken in cooperation with Phillip Swagel of the IMF.

Table 1: Israel: Economic Indicators, 1980-99
(in percent unless otherwise noted)

	GDP		Inflation		Money M1 grow.	Real Disc. 3/	Real wage index		Profits 4/	Employment		Deficit/GDP 1/		Pub. Debt GNP	RER 5/	Current Acc. Posn. SD Mill.	Off. Res. (mth imp)	ToTrade 6/		
	Growth	Overall	Nontradable Total	Tradable Partial 2/			Overall	Business (index: 1994=100)		Growth	Unemp. Rate	Overall	Domest.							
1980	3.6	132.9	...	...	96.7	...	77.5	80.1	13.7	1.1	4.8	-13.3	-12.8	...	92.4	-878	-4.2	...	...
1981	4.7	101.5	...	...	91.3	...	85.5	88.4	17.1	2.0	5.1	-17.5	-17.0	...	93.8	-1360	-6.0	3.1	91.6	
1982	1.4	131.5	136.3	140.6	117.1	109.2	...	85.3	89.8	14.8	1.4	5.0	-12.7	-10.8	...	98.2	-2255	-9.5	3.5	95.9
1983	2.6	190.7	191.8	201.2	197.2	139.9	...	90.4	93.9	12.4	3.2	4.5	-6.5	-8.9	125.2	106.8	-2370	-8.9	3.1	102.8
1984	2.2	444.9	438.2	402.1	455.0	353.7	...	90.1	93.0	14.5	1.4	5.9	-14.5	-19.4	148.2	100.4	-1571	-6.3	2.6	99.5
1985	4.4	185.2	202.1	206.6	160.4	246.1	...	82.0	86.7	11.9	-0.7	6.7	1.0	-6.5	157.7	97.2	990	4.3	3.1	99.0
1986	3.6	19.6	23.5	30.0	13.8	112.7	-11.1	88.4	94.5	4.7	1.4	7.1	3.9	-1.0	147.2	94.8	1302	4.5	3.8	103.7
1987	6.2	16.1	17.8	24.4	13.1	49.5	15.3	95.4	102.1	3.3	2.6	6.1	0.1	-4.5	123.3	92.5	-1406	-4.1	3.7	101.9
1988	3.4	16.4	20.3	20.6	10.0	11.3	5.1	101.1	107.0	5.9	3.5	6.4	-2.6	-4.0	129.6	101.5	-830	-1.9	2.8	107.1
1989	1.3	20.7	24.8	23.3	14.2	44.4	-5.4	99.8	105.3	6.8	0.6	8.9	-5.5	-7.9	132.4	102.5	213	0.5	3.6	105.9
1990	6.2	17.6	20.8	17.3	12.3	30.6	-1.0	98.8	103.8	9.5	2.1	9.6	-4.8	-7.6	122.3	100.1	161	0.3	3.5	103.0
1991	5.9	18.0	20.2	16.3	14.0	13.8	-3.9	95.8	98.3	13.6	6.1	10.6	-4.7	-7.9	109.8	102.0	-1314	-2.3	3.3	106.7
1992	6.7	9.4	9.7	11.8	8.8	32.0	-0.6	96.9	100.1	15.4	4.2	11.2	-4.9	-8.1	103.5	99.4	-980	-1.5	2.5	105.6
1993	3.3	11.2	13.7	9.5	6.5	27.9	0.3	97.5	100.4	13.2	6.1	10.0	-4.6	-6.3	101.3	98.2	-2560	-3.9	2.8	105.7
1994	7.0	14.5	17.9	10.6	9.0	7.7	1.6	100.0	100.0	10.2	6.8	7.8	-3.5	-4.6	92.5	99.2	-3387	-4.6	2.6	103.0
1995	6.8	8.1	8.4	9.5	7.7	15.1	4.6	102.2	100.6	10.7	5.0	6.8	-4.8	-5.9	89.9	100.0	-5197	-6.0	2.7	100.0
1996	4.6	10.6	12.0	11.8	8.3	20.4	4.7	103.8	102.1	8	2.4	6.6	-5.5	-6.6	89.7	105.9	-5434	-5.8	3.3	103.0
1997	2.9	7.0	7.7	7.9	5.8	11.3	5.0	106.3	105.7	6.1	1.4	7.5	-4.1	-5.4	88.3	113.3	-3514	-3.6	3.8	105.4
1998	2.2	8.6	8.6	8.1	8.7	12.2	7.3	108.6	108.8	5.7	1.5	8.6	-3.6	-5	88.3	109.9	-842	-0.9	6.7	107.5
1999	2.2	1.3	2.3	3.9	-0.1	20.4	6.7	110.6	112.5	4.1	3.1	8.9	-4.8	-5.5	87.8	105.7	-2601	...	5.9	108.4

Sources: IMF, International Financial Statistics; Bank of Israel, Annual Report 1999; and authors calculations.

1/ Operational general government deficit as reported in Bank of Israel, *Annual Report*.

2/ Excludes housing and fresh fruit and vegetables. All inflation data are end period.

3/ Nominal discount rate annualized, then deflated by overall ex post CPI. Data are similar if the Bol's price expectations series is used (this series is only available after 1989).

4/ Real rate of return on net capital.

5/ Defined in terms of local currency to that of trading partners. An increase is an appreciation. Index 1995=100.

6/ Civilian imports and exports, excluding capital services and diamonds. Index 1995=100.

Figure 2a. Israel: Overall and Underlying Inflation 1/, 1986-99

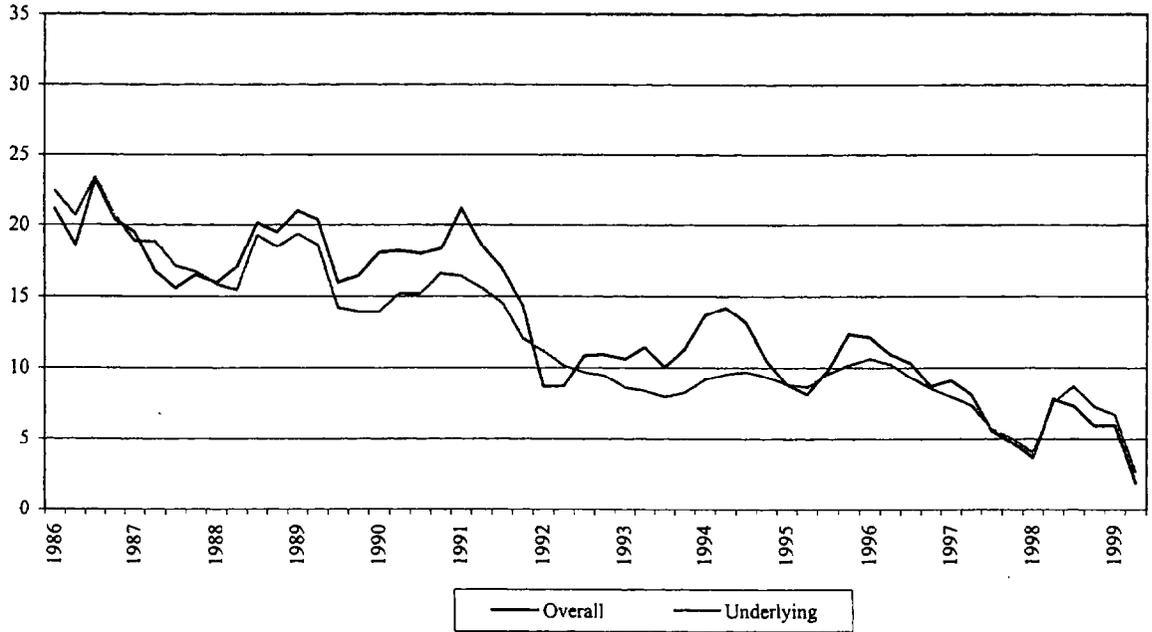
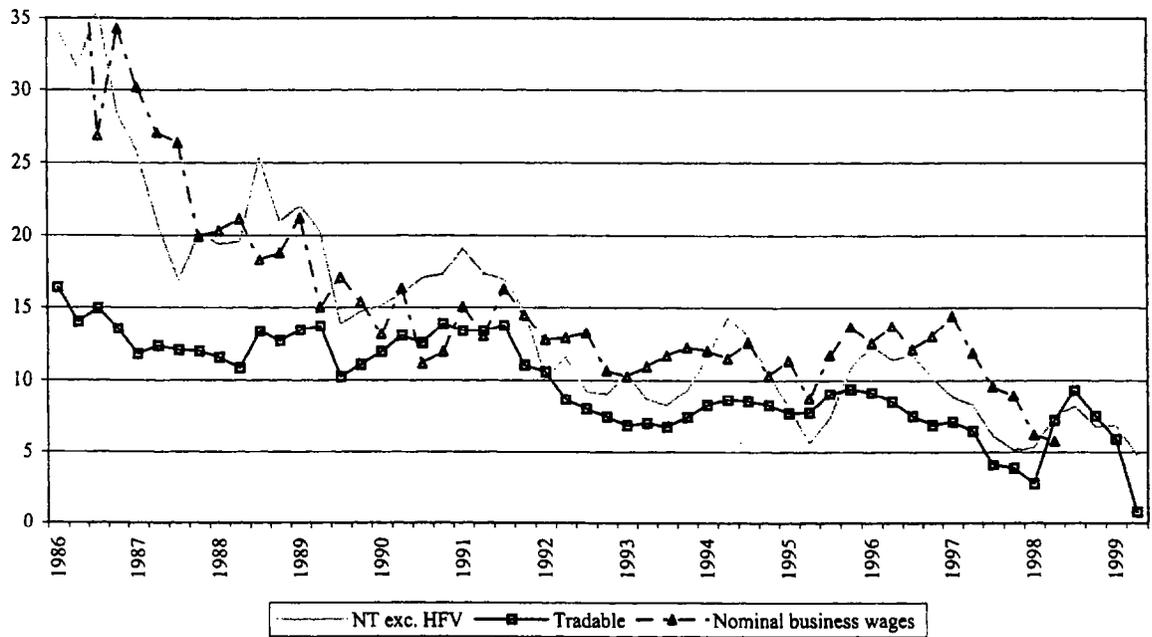


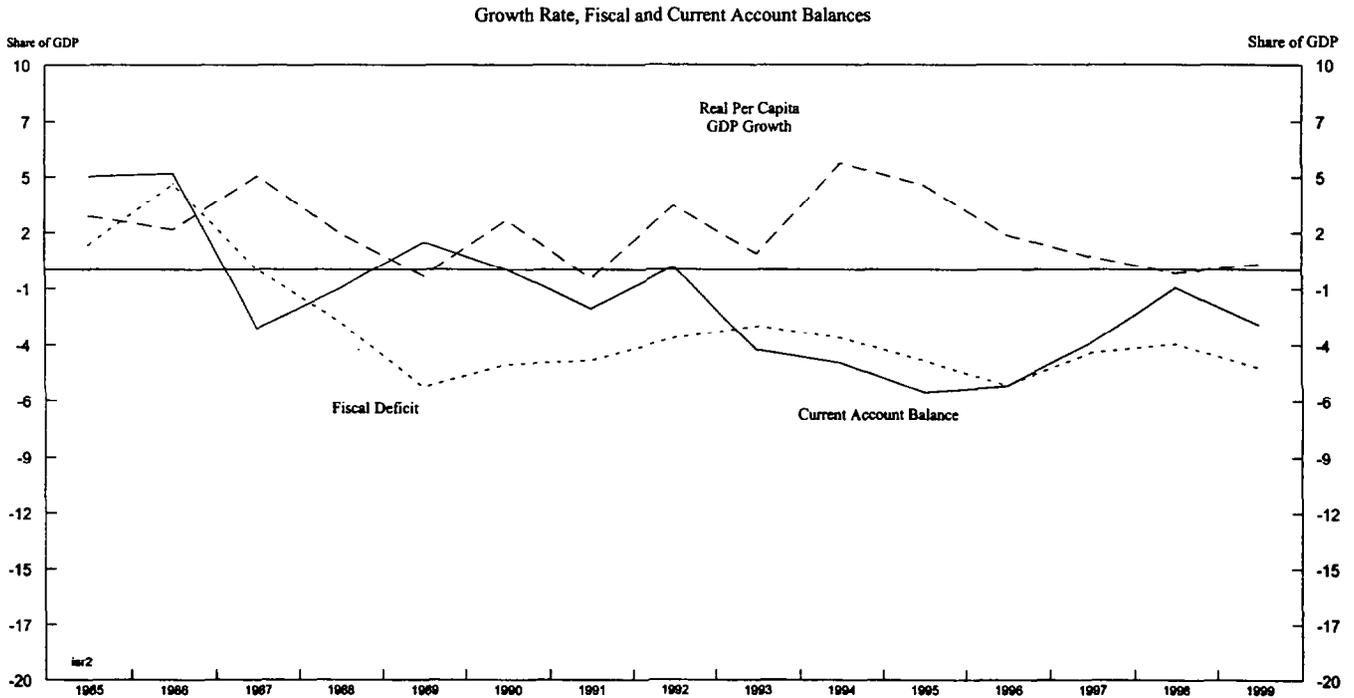
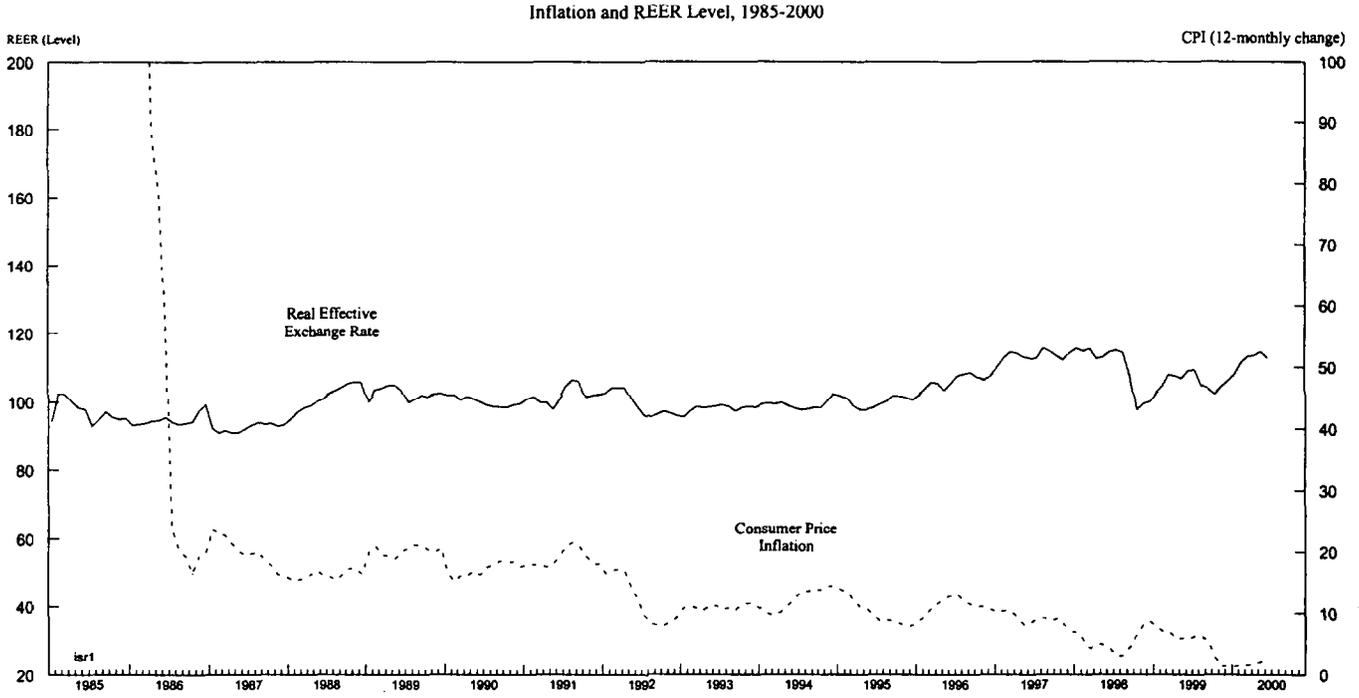
Figure 2b. Israel: Tradable, Nontradable, and Wage Inflation, 1986-99



Source: Bank of Israel.

1/ Excludes housing, fresh fruits and vegetables.

Figure 3. Macroeconomic Indicators: Israel, 1985-2000



the start of the program, and public sector wages within 12 months, levels which had been regarded before the stabilization as too high. This increased pressure on nontradable prices—most price controls had been removed by March 1986—and squeezed profitability levels, especially in the tradable sector.⁸ With the looser-than-envisioned monetary policy, a deteriorating fiscal position, and high real wage growth, there was only a very gradual decline in the rate of increase in underlying nontradable prices after the initial success.⁹

Tradable goods price increases were tied to the NIS/\$ peg. Initially, the decline in the U.S. dollar in the second half of 1985 against other major currencies imparted an inflationary boost to the overall price index—which helped offset the impact on competitiveness of the increase in nominal wages and hence in nontradable prices—but there were important counteracting pressures from the simultaneous decline in world oil prices. After the peg was set in terms of a currency basket in August 1986, competitiveness began to erode and with it profitability. At the same time, the interaction of the fixed exchange rate with the loose fiscal, monetary and wage policies noted above supported a consumption boom—a common feature in exchange rate based stabilization programs (Calvo and Vegh, 1990, 1991; Leiderman and Bufman, 1992)—which was reflected in a sharply deteriorating current account position. Faced with these pressures, the authorities devalued the currency by 10 percent in January 1987.

In response to the squeeze on profitability and some structural reform in the business sector, inflation pressures began to slow again from mid-1987. Monetary policy was then significantly relaxed, with real interest rates turning negative, and the automatic stabilizers acted to increase the fiscal deficit. At end-1988, the exchange rate was again devalued and the fixed rate regime was replaced with a horizontal band, which was then adjusted four times in a two and a half year period. These adjustments were made in response to speculative flows associated with the ongoing inflation premium vis-à-vis Israel's trading partners, which ensured that a correction would have to be undertaken, albeit by an unknown magnitude at an unknown time (Box 1 outlines the various exchange rate regimes of the post-stabilization period).

The first phase of the post-stabilization period ended around 1991, as the heavy immigration from the former Soviet Union continued, and as it became clear that the adjustable peg system with a band was not sustainable. The immigration was a major boon to the Israeli economy: its impact on economic performance was enhanced by the market-friendly absorption policies implemented by the government, and especially by the

⁸ The growth in nominal wages and underlying nontradable prices are closely linked (Figure 2). See also Appendix I for a discussion of the properties of underlying nontradable inflation in this period.

⁹ The price index for underlying nontradable prices excludes the prices of housing and fruit and vegetables, which have been very volatile in the post-stabilization period.

agreement to allow new immigrants to work at below-union scale wages. The immigration thus put downward pressure on business sector wages as unemployment increased (through an increase in the supply of labor) by 4 percentage points to 10½ percent in 1991, and enhanced labor market flexibility; it also added to demand pressures by requiring spending for settlement costs and the housing sector.

By 1991, the 12-month rate of inflation stood at 18 percent, only marginally below the rate achieved five years earlier.

Box 1. Israel: Exchange Rate Arrangements, 1980–2000

Real exchange rate rule (April 1979–September 1982): Exchange rate adjusted to follow a rough real exchange rate rule against a currency basket.

Tablita (September 1982–October 1983): Monthly exchange rate change limited to 5 percent.

Floating exchange rate (October 1983–July 1985): Floating regime after 23 percent up-front devaluation in October 1983.

Fixed exchange rate (July 1985–December 1988): Fixed rate initially against the U.S. dollar after 25 percent up-front devaluation in late June–early July. Rate set at NIS 1.5 per U.S. dollar. Peg switched to a currency basket instead of the U.S. dollar in August 1986, and a devaluation was undertaken in January 1987 (10 percent).

Horizontal exchange rate band (January 1989–December 1991): Devaluation of 13 percent to a midpoint of NIS 1.95 per currency basket unit, within an exchange band of +/- 3 percent in January 1989. Midpoint and band devalued with a midpoint of NIS 2.07 per currency basket unit in June 1989. Midpoint shifted to NIS 2.19 per currency basket unit with width of the band expanded to +/- 5 percent in March 1990. Midpoint shifted to NIS 2.41 in September 1990, and then to NIS 2.55 in March 1991.

Crawling exchange rate band (December 1991–present): Initially devaluation of 3 percent with midpoint of 2.63 moving at 9 percent per annum thereafter with a width of +/- 5 percent. Devaluation of 3 percent with midpoint at 2.93 with rate of crawl adjusted to 8 percent per annum in November 1992. Devaluation of 2 percent with midpoint at 3.15 with rate of crawl adjusted to 6 percent per annum in July 1993. Devaluation of 0.8 percent with midpoint at 3.54 with rate of crawl left at 6 percent per annum but width of the band expanded to +/- 7 percent in May 1995. Shift in the depreciated limit by 14 percent with rate of crawl of the depreciated limit left at 6 percent per annum, but rate of crawl of the appreciated limit lowered to 4 percent per annum in July 1997. Rate of crawl of the appreciated limit lowered to 2 percent per annum in August 1998. No changes to the exchange rate regime thereafter.

B. The Second Inflation Plateau, 1992–96

As the exchange rate regime shifted to a crawling peg with a band width of +/- 5 percent, inflation fell to around 10 percent in 1992, and for several years thereafter remained around this level, as a result initially of a decline in the rate of increase of tradable goods prices, and of the supply side effects of lower wage increases. The initial reduction in

tradable prices reflected a 6½ percent decline in U.S. dollar import prices in 1991–92 due to the appreciation of the dollar against other major currencies. The continuation of the lower rate of inflation resulted from the ongoing moderation in wages, the easing of housing price pressures as the number of new immigrants started to slow after 1992, and some tightening of monetary and fiscal policies.¹⁰

These lower inflation levels were by and large sustained in the period 1993–96. Annual tradable price inflation remained relatively constant at 8 percent, and underlying nontradable inflation at around 10 percent. In contrast, housing and fruit and vegetable prices showed a very high level of volatility.

In part, the consolidation of inflation at lower levels reflected important steps taken in 1991–92 to enhance the credibility and effectiveness of the policy framework. Firstly, the 1991 Budget Deficit Reduction Law aimed to provide some assurance that the expansion in fiscal spending associated with the immigrant inflows was temporary. Under this law, a four year domestic deficit¹¹ retrenchment path was outlined, the targets of which fell from 6 percent of GDP in 1992 to fiscal balance by 1995 (Bufman and Leiderman, 1997; Dahan and Strawczynski, 1997). The actual domestic deficit undershot these targets in both 1992 and 1993.

Secondly, as already noted, in December 1991 the mechanics of the nominal anchor were changed. A forward-looking crawling exchange rate band was introduced, with the rate of crawl based on the projected differential between inflation in Israel and abroad. Gradually, as the width of the band was increased from +/- 5 percent to +/- 7 percent—partly to accommodate capital account liberalization—interest rate policy switched from being used in support of the exchange rate regime to achieving the inflation target itself.¹² However, the official inflation targets set for the new monetary regime were not very ambitious (between 7–10 percent during this period) and there was little progress on disinflation. After moderating in 1993, nontradable price pressures accelerated sharply in 1994 in response to a premature easing of monetary policy from mid 1993, a consumption boom as new immigrants were absorbed into the labor force, the confidence imparted by the peace process, and a sharp increase in housing and especially fruit and vegetable prices. In

¹⁰ The U.S. guarantee in 1992 on future government foreign borrowing may have also lowered inflationary pressures by providing some assurances of future current account sustainability and reducing borrowing costs (Liviatan and Sussman, 1998).

¹¹ Recall that this is the *operational*, i.e. inflation-adjusted, deficit.

¹² If credible—a critical assumption, and a critical goal of monetary policy—an inflation targeting regime can serve as a transparent guide to monetary policy and coordination device in the wage and price setting process and formation of the public's inflation expectations; see Bufman and Leiderman (1997).

the face of these pressures, rather than being tightened, fiscal policy was eased, including a 16.5 percent increase in public sector wages at end 1994. The domestic deficit subsequently overshot its target (3.2 percent of GDP in 1995 compared to a target of 2.75 percent) and the current account began to deteriorate.

With the inflation target achieving increased operational significance, monetary policy was tightened sharply during the second half of 1994, with a 4.5 percentage point increase in the nominal rate, and nontradable inflation pressures eased in 1995. A premature easing of monetary policy during 1995 and substantial fiscal expansion in 1996 (the domestic deficit was 4.7 percent of GDP compared to a target of 2.5 percent) led to further inflationary pressures and a deterioration in the current account deficit during 1996. Monetary policy was again tightened, and this time it was kept restrictive.

The sharp increase in interest rates implied by the combination of loose fiscal and tight monetary policies, as well as the initiation of the peace process and relatively open capital account, led to heavy capital inflows from early 1995. These inflows resulted from direct and portfolio foreign investment, government borrowing under the U.S. loan guarantee program, as well as foreign currency credit from banks as the business sector perceived the costs of such borrowing would be lower than for borrowing in shekels.¹³ As the exchange rate appreciated to the lower bound of the band, monetary policy became seriously overburdened: the BoI was required to intervene to defend the band and to sterilize the inflows to protect the inflation target.¹⁴ In this environment, while monetary policy was used to offset the rising inflationary pressures caused by demand pressures, and hence consolidated inflation at annual rates around 10 percent, further advances in disinflation proved elusive.

C. Single-Digit Inflation, 1997–2000

At the end of 1996, the government announced a new policy package, including a front-loaded fiscal retrenchment path which aimed to reduce the overall fiscal deficit to 1.5 percent of GDP by 2001, and for the first time set a medium-term inflation target (but not path) for 2001 equal to the average of the OECD countries (operationally taken to be 4.5 percent). Almost immediately thereafter, with the ongoing tight monetary policy and associated low economic growth, actual trends indicated that the 1997 deficit target of 2.8 percent of GDP would be exceeded.

¹³ Foreign exchange credit increased from 7 percent of GDP in 1994 to 23 percent of GDP by 1998; shekel-denominated credit as a share in GDP increased from 54 percent to 57 percent in this period.

¹⁴ During 1995–mid-1997, the BoI purchased around \$15 billion (as compared with reserves of \$7 billion at end 1994), which was sterilized through the monetary deposit facility provided to commercial banks.

In mid-1997, the new minister of finance announced a fiscal package which in the end proved sufficient to achieve the 1997 deficit target,¹⁵ and at the same time the depreciated limit of the exchange rate band was widened significantly. With fiscal and monetary policy now both restrictive, the weak activity level (especially investment) and rising unemployment level, a real appreciation of the shekel, and initiation of some structural reforms which lowered prices (e.g., in the telecommunications sector), inflation pressures moderated rapidly after mid-1997. One year later, the 12-month inflation rate was 4 percent, well below the official target of 7–10 percent. In mid-1998, the 1999 target was set at 4 percent, and there was a sharp decline in nominal interest rates in the wake of the declining inflation trend.

Following the Russian crisis and world contagion in August-September 1998, the shekel depreciated sharply in the second half of 1988 as foreign and domestic agents reassessed the risks associated with their earlier unhedged foreign borrowing.¹⁶ The risk of renewed inflationary pressures was met forcefully with a 4 percentage point increase in official interest rates; the ongoing containment of fiscal policy and the impact of the depressed economy on the current account, helped to consolidate this monetary response. The BoI chose not to intervene by selling foreign exchange, relying rather on the interest rate increase and private sector responses to it to reverse the depreciation. The inflation rate rapidly returned to annual levels around 4 percent; output growth remained depressed and unemployment high. In 2000, inflation has fallen sharply to around 1½ percent per annum, undershooting the inflation target range for the year of 3–4 percent.

IV. Lessons from Other Countries' Experiences with Disinflation, 1985–99

We report here on the conclusions of comparative studies of the disinflation process, particularly for countries that have been stuck for a period with moderate inflation (we draw mainly on Dornbusch and Fischer, 1993, and Burton and Fischer, 1998). To provide a context for the subsequent comparative analysis of Israel's disinflation experience, we summarize experiences in nine countries: three which moved from high to low inflation levels without a period of moderate inflation (Argentina, Brazil, Croatia), three which experienced moderate inflation for a period and then reduced inflation to low levels (Chile, Egypt, Greece), and three which also experienced a period of moderate inflation and at the

¹⁵ While the overall deficit target as a share in GDP was met, the domestic deficit exceeded its target and the foreign surplus was larger than expected. The latter reflected high foreign earnings from official reserves, the level of which increased sharply as the BoI intervened after 1995 to defend the exchange rate band in the face of large capital inflows. The cost to the BoI of sterilizing capital inflows, incurred via interest payments to commercial banks that place funds at the BoI, is not reflected in the definition of BoI profits used in the fiscal accounts.

¹⁶ Interestingly, and as in many other countries, the recent strong and rising FDI flows were not affected by this reassessment.

time of writing still had inflation levels around 10 percent per annum (Colombia, Hungary, Mexico). The main macroeconomic series for these nine countries are shown in Figures 4–6 . A summary of critical features that affected each countries' success in reducing inflation is presented in Table 2, and their respective experiences are described in greater detail in Appendix II.

The experiences of these nine countries, along with those of others, suggest the following interrelated generalizations:

- *Stabilizing inflation at low single digit levels can take a long time.*

After a stabilization program was launched, it typically (but not always) took a considerable time to attain a low level of inflation. Indeed, of the nine countries discussed here, Croatia was the only country that reduced inflation to low single digit levels almost immediately following the start of the stabilization program. Two countries took around two years (Argentina, Brazil), but the others took much longer (on average around five years) to achieve this result, in part due to the lack of forcefulness in their disinflation policies. This result suggests the need for policy makers to be prepared from the outset to persevere with anti-inflation policies if their goal is indeed to achieve and then to sustain a low inflation level.

- *A sustainable fiscal balance is critical to the maintenance of low inflation. Accordingly, fiscal retrenchment is generally necessary to lower demand pressures and ensure the maintenance of low inflation.*

The establishment and maintenance of a sound fiscal position is a necessary, though not sufficient, condition to reduce inflation to low levels.¹⁷ All countries that managed to tame inflation had either already reduced fiscal imbalances (such as Argentina, Brazil, Chile) or made a major fiscal effort from the outset of the stabilization program (such as Croatia, Egypt). Achieving an initial fiscal adjustment was not, however, by itself sufficient to sustain low inflationary pressures. In some countries the fiscal position was relaxed soon thereafter since structural fiscal issues were not adequately addressed (Brazil, which did not forcefully address the pension system and intergovernmental relations, in contrast to the effort to address structural fiscal reform in Argentina and to a lesser extent in Greece), while in other countries non-fiscal issues were largely responsible for ongoing inflation levels (Mexico and initially Colombia). Countries that started with a large fiscal deficit and reduced it only slowly experienced a lengthy disinflation process (Hungary, Greece).

¹⁷ Note though that nominal deficits would typically decline along with inflation, as nominal interest rates decline.

Table 2. Selected countries: Policy and Other Factors in Inflationary Process

	Fiscal Policy	Exchange Rate Policy	Monetary Policy	Capital Inflows	Indexation	Incomes Policy	Relative Price Adjustment	Other
Countries that reduced high inflation rapidly								
Argentina	Deficit reduced prior to stabilization program; tight position thereafter, but stabilizers allowed to operate. Fiscal impulse 1992-94; thereafter fiscal structural weaknesses addressed but not eliminated	Currency board at outset of stabilization program	Supporting role; remonetization and fall in interest rates as inflation rate declined. Tightened with outflows due to the currency board regime	Inflows with return of earlier capital flight, remonetization, and privatization. External events prompted later outflows as well	Indexation of local currency wage and financial contracts banned	Freeze on public sector wages, pensions and prices for nine months	Up-front depreciation, adjustments in domestic prices, at outset of stabilization program	Wide-ranging structural reforms to improve competitiveness including tariff reform; inflexibilities remain in the labor market and unemployment is high
Brazil	Small operational surplus at outset of stabilization; inadequate fiscal structural reforms; fiscal stance subsequently weakened	Anchor role with the exchange rate initially subject to a floor; later crawling peg at less than the ensuing inflation	Loosening in fiscal stance placed increasing burden on monetary policy	Substantial inflows; exacerbated by imbalance between monetary and fiscal policy. External events and domestic policies prompted later outflows	Backward indexation for less than one year eliminated by denominating wages, prices, and financial transactions in the new unit of account	Following introduction of new currency, wages to remain fixed during contract period. Public prices fixed	Prior denomination of prices and wages in unit of account designed to avoid relative price misalignments	Wide-spread reform, but important areas remain to be adequately addressed, such as in social security
Croatia	Slow fiscal consolidation	Exchange rate peg with an unannounced narrow band; ten percent depreciation last two years	Supporting role	Significant inflows after investment grade; capital controls imposed	State sector wage and pension indexation abolished at outset of stabilization program	Some initial steps to control wage growth for public sector employees	Not a major factor. Most prices implicitly indexed to exchange rate before stabilization	Enterprise restructuring encouraged through privatization and financial control; not fully successful

	Fiscal Policy	Exchange Rate Policy	Monetary Policy	Capital Inflows	Indexation	Incomes Policy	Relative Price Adjustment	Other
Countries that experienced moderate inflation and then reduced it to low levels								
Chile	Central government fiscal surplus since late 1980s until 1997	Initially discrete depreciations in context of a crawling arrangement; thereafter backward-looking real rule within a band, which appreciated on several occasions to help reduce inflation; free float in 1999	Targets real interest rates to control domestic expenditures. Policy generally directed toward reducing inflation	Large throughout 1990s; capital controls imposed and later suspended when outflow pressures began	In practice still widely used in labor and financial sectors	Not a factor	Not a significant factor	Wide-ranging structural reform prior to program; central bank made more independent; positive shocks to terms of trade affected inflation
Egypt	Loose fiscal policy finally addressed and then remained at lower levels	Pegged throughout as nominal anchor	Supporting role; effectiveness increased with financial sector deregulation	Episodes of large inflows; offset with sterilized intervention and capital controls	Not a factor	Not a factor	Not a factor	Wide-ranging structural reforms
Greece	Loose fiscal policy gradually tightened after 1990; structural issues started to be addressed but more required	Crawling band anchor after 1994; ERM participant since early 1998 and entry into euro area from 2001	Supportive role; effective with financial sector deregulation	Large inflows of official assistance; capital account liberalization	Wages formally deindexed but in practice still widely used	Restriction of wages in public sector	Not a factor	Start to structural reform on a wide front related to ERM and euro area entry

	Fiscal Policy	Exchange Rate Policy	Monetary Policy	Capital Inflows	Indexation	Incomes Policy	Relative Price Adjustment	Other
Countries that experienced moderate inflation which is still around 10 percent per annum								
Colombia	Not a major factor initially; loosening after 1995	Crawling band with preannounce rate of crawl after 1994; large depreciation in 1998; peso was floated after September 1999	Supporting role	Large inflows led to imposition of capital controls	Backward-looking wage indexation	Voluntary social pact introduced in 1995; limited effectiveness	Not a major factor	Deeply entrenched inflation expectations
Hungary	Loose fiscal policy gradually tightened after 1995	Shift from ad hoc adjustments to crawling band as an anchor in 1995; rate of crawl gradually lowered	Initially loose, then supportive of tight fiscal stance	Hindered disinflation in 1995-96 leading to maintenance of capital controls and sterilization	Minor factor; no formal wage indexation	Restriction of wages in state enterprises in 1995 and flexible labor markets	Important factor	Wide-ranging structural reforms providing large productivity gains
Mexico	Major factor behind initial stabilization; influenced later changes in inflation performance	Initially fixed for one year, then crawling peg then band; increasingly used as nominal anchor until end-1994; flexible since	Main tool for reducing inflation in 1995-96	Inflows major factor in early 1990s; outflows triggered crisis at end-1994	Important factor prior to 1987; replaced later with social pact	Important factor under the social pact which set a convergence path for wages, selected public prices, and the exchange rate	Administered price increases minor factor	Wide-ranging structural reform prior to the program; ongoing weak banking sector

Figure 4. Macroeconomic Indicators: Argentina, Brazil, and Croatia, 1985-2000

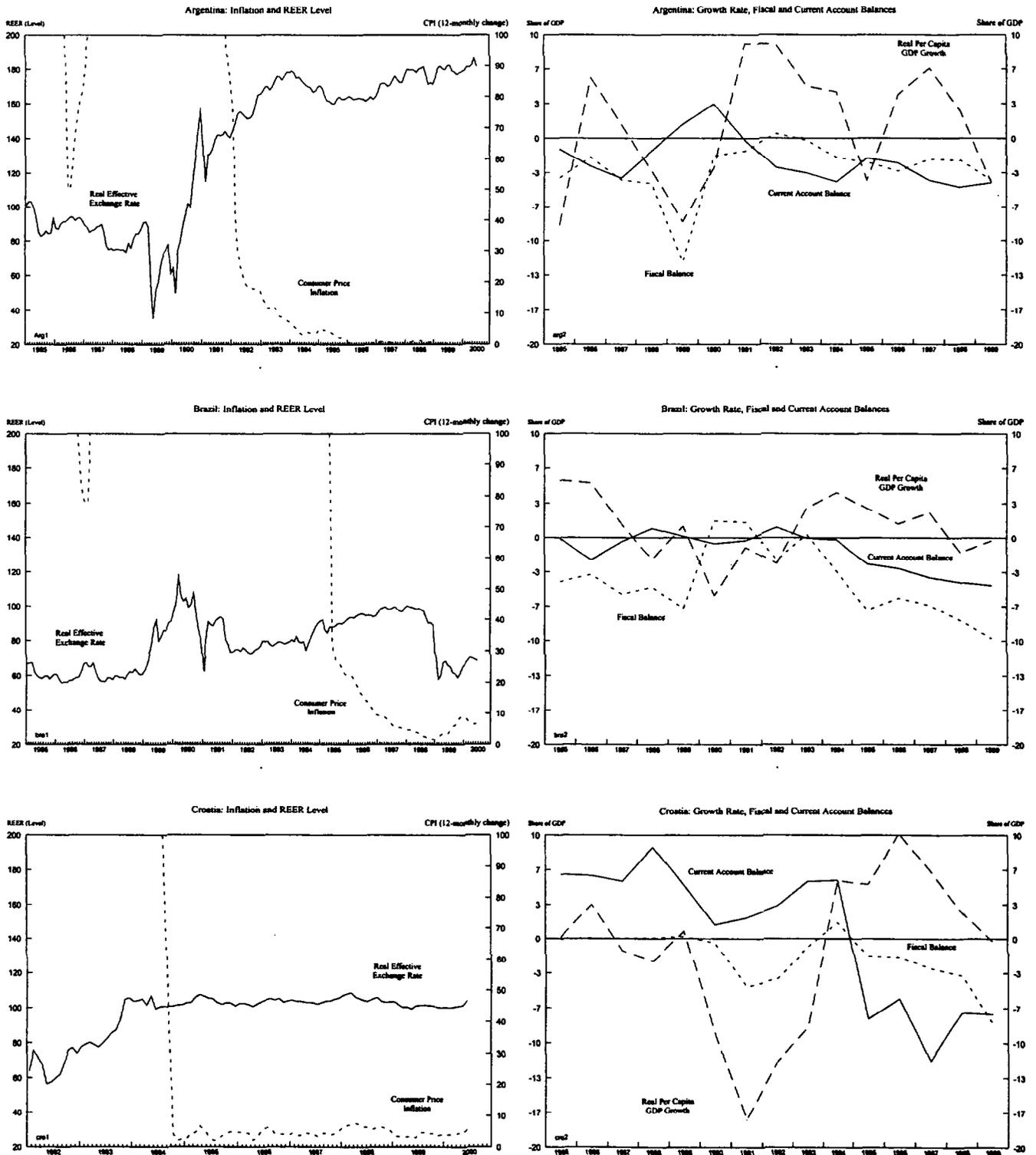


Figure 5. Macroeconomic Indicators: Chile, Egypt, and Greece, 1985-2000

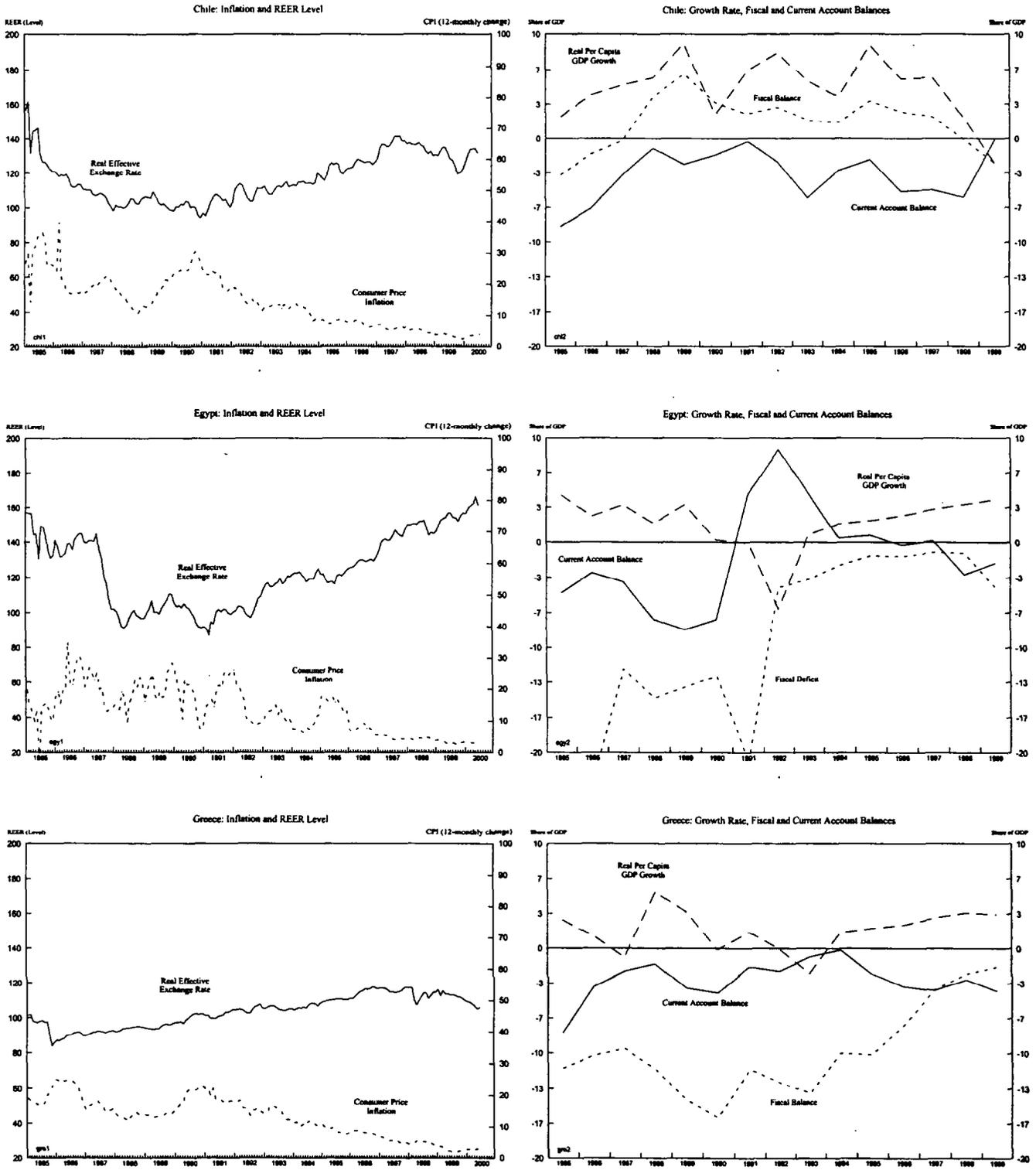
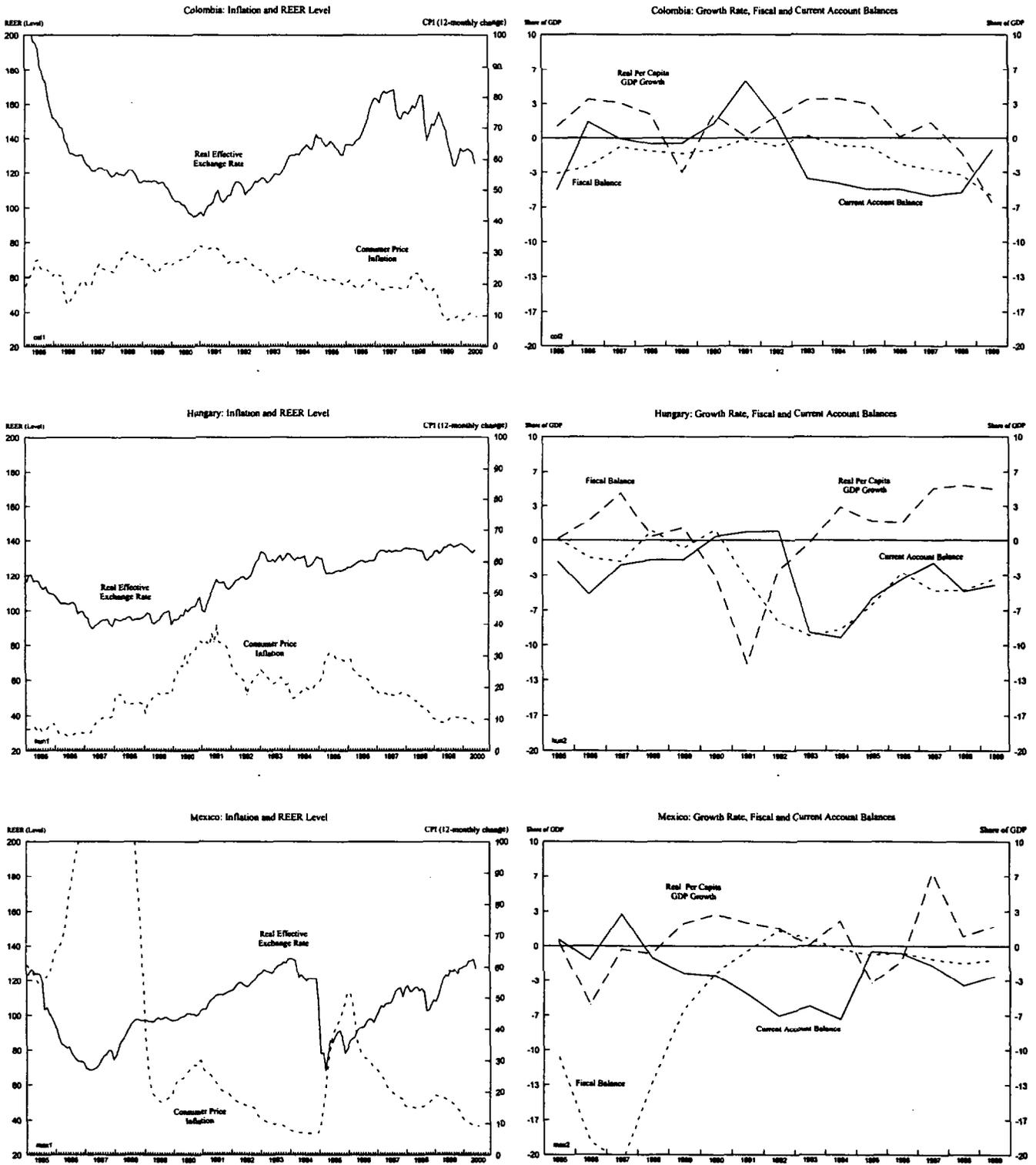


Figure 6. Macroeconomic Indicators: Colombia, Hungary, and Mexico, 1985-2000



- *Efforts to reduce nominal rigidities in order to lower the costs of inflation inertia during stabilization programs can be helpful. Price and wage controls can prove useful, especially in helping reduce the initial output costs of disinflation, though they are at best temporary measures—designed to reduce the output costs of the disinflation—and hence the disinflation effort needs to be backed by sound macroeconomic fundamentals. Steps taken during the stabilization period to enhance labor market flexibility also assist in the stabilization effort, including the modification or abolition of wage indexation.*

Efforts to break inflation inertia, if backed by a sustained adjustment in the fundamentals, reduced the time it took to disinflate. Official wage and price freezes or slowdowns—particularly in the public sector—were a feature in all the countries that reduced inflation without becoming stuck at moderate levels. Countries that banned wage indexation at the outset of the program disinflated quicker without becoming stuck at moderate levels (Argentina, Brazil, Croatia, and initially Mexico), although other rigidities in the labor market sometimes implied a heavy cost in terms of employment (Argentina). Two countries continued in practice with wage indexation: Chile where inflation fell only gradually (even against the background of weak labor market conditions), and Colombia which still has a rather high inflation level.

- *Exchange rate anchors lower inflation pressures rapidly but the real exchange rate appreciation that typically follows threatens medium term balance of payments stability.*

Virtually every country that tried to disinflate initially relied on the exchange rate as the nominal anchor. Success in reducing inflation rapidly and at low output cost with an exchange rate peg depended on the accompanying fiscal and monetary measures. In particular, as the anchor became perceived as credible, wage and nontradable price inflation pressures moderated. However, residual rigidities and entrenched expectations typically led to a period of real appreciation of the exchange rate. Thus maintenance of the inflationary gains from the initial stabilization often required a subsequent fiscal or monetary tightening to bring inflation down further.

This pattern did not hold in a few countries: there was no real appreciation in Croatia which ended inflation almost overnight. This unusual achievement is probably due to the fact that at the outset of the program virtually all prices were linked to the deutsche mark, which was used as the peg. In Hungary, a narrow band backed by tight fiscal and monetary policies and strong output growth as a consequence of earlier structural reforms managed to contain the real appreciation.

In most other countries, however, the real exchange rate appreciated, typically by around 30–50 percent, which soon called into question the sustainability of the current

account position.¹⁸ Subsequent movements away from pegs to crawling bands accommodated at least part of the ongoing domestic-foreign inflation differential (Greece). Countries that allowed their exchange rate to fully offset these differentials—moving to a backward-looking real exchange rate rule as in Chile or the recent floating exchange rate used in Mexico—weakened the nominal anchor, leading to more gradual disinflation. Real exchange rate rules also ran the risk of transforming one-time changes in the price level into permanent changes in the rate of inflation (Bufman and Leiderman, 1998). At the same time, such rules reduced the likelihood of subsequent balance of payments crises during the disinflation effort.

- *In countries where the capital account is open, policies need to adjust to capital inflows that threaten the maintenance of low inflation levels, and to capital outflows that threaten balance of payment sustainability. In economies that use an exchange rate peg as the nominal anchor and faced capital inflows, fiscal tightening is on balance a better choice than a relaxation of monetary policy, sterilization, and/or recourse to price or quantity based capital controls.*

All the countries detailed here experienced capital inflows, and most also subsequent outflows, both of which complicated the disinflation process. These inflows result from the combination of relatively high domestic interest rates to fight inflation with the appreciation of the currency typical in an exchange-rate based stabilization. In some cases, the high interest rates were clearly the consequence of an excessively expansionary fiscal policy, in which case fiscal adjustment could be undertaken. In other cases, the inflows reflected remonetization of the economy or simply increased investment opportunities, including from privatization.

In managing such inflows, the exchange rate peg regimes that were useful in anchoring expectations in the initial stages of adjustment programs could later prove a liability. In the absence of exchange rate flexibility, fiscal policy had to be tightened, although this could prove politically difficult for some countries. The alternatives to fiscal tightening under an exchange rate peg were not especially effective. Monetary loosening was inconsistent with the goal of bringing inflation down further; sterilization was costly, ineffective over the medium term, and stored up future problems by causing an increase in the open foreign exchange position of the private sector which increased vulnerability; and imposing controls on short term flows typically lengthened maturities rather than reduced the magnitude of the total inflows. Similarly, the countries that were most successful in addressing outflows were those that aggressively increased and sustained the restrictiveness of monetary policy, although this implied a willingness to endure a potentially large shock to the real sector (Argentina) which was not always viewed as credible (Brazil, Mexico).

¹⁸ For further discussion of this issue, see Kamin (1997).

- *Structural reform is important to provide a base for strong and sustainable growth which also assists in the maintenance of low inflation, including by preventing noncompetitive pricing behavior by protected firms.*

The countries that grew rapidly were often those that had the most far-reaching structural reform program (Argentina, Chile, Hungary), while those where growth has recently slowed were typically those with relatively weaker structural reforms, at least in some important areas (Brazil, Croatia, Colombia). Some structural reforms, such as a reduction in import tariffs, had the potential to lower price pressures, while a lack of reform could lead to price and wage inflexibilities. Typically these reforms were most likely to succeed if they were initiated at the outset of the program when political support was high.

- *Positive favorable shocks can be used to reduce inflation (opportunistic disinflation) and it is important to respond forcefully to adverse shocks.*

All countries experienced external shocks during their disinflation efforts. Several were able to take advantage of positive shocks—such as improvements in the terms of trade—to make further inroads into inflation (Chile). It was important that external negative shocks—usually transmitted via capital flight—were dealt with forcibly if the disinflation effort was not to be lost (Argentina, Mexico, Brazil in 1994).

- *Signals of a government's resolve to lower inflation via changes in institutional arrangements can have an important effect on underlying inflation pressures.*

Several countries changed the institutional framework in ways that enhanced the authorities' inflation-fighting credibility, such as the use by Argentina of a currency board arrangement, Chile's move in 1991 to make the central bank more independent, and Greece's commitment to join the ERM and euro area, all of which were effective in reducing inflationary pressures.

- *Finally, stabilization from high inflation levels supports economic growth, and there is little evident output cost of disinflating from moderate inflation levels either.*

In the countries reviewed here, growth did not decline and usually accelerated following the initiation of the stabilization program, and then remained strong for several years thereafter.

V. Explaining Israel's Disinflation Experience

We now return to the discussion of Israel, analyzing the disinflation period from the perspective of the lessons that emerge from the experiences in other countries. Clearly in Israel *stabilization of inflation to low single digits has taken a long time*. In large part this has simply reflected a lack of political consensus on the need to pursue single digit inflation. While the far ranging and bold initial stabilization program led to a sharp reduction in

inflation from very high levels in 1985, the effort to continue the disinflation effort—meaning in practice persistence with tight fiscal and monetary policies—waned thereafter.

After the initial success in lowering inflation, the next sustainable decline in inflation had more to do with exogenous factors associated with immigration levels and world commodity prices than deliberate policy decisions to reduce inflation. The conclusion that there was little political support for further disinflation is supported by the official inflation targets for the period 1993–98, all of which lay between 7–10 percent, and both monetary and fiscal policies were relaxed prematurely during this time. It was only after both fiscal and monetary policies were tightened in 1997 and the government set a medium-term inflation target for 2001 (but not a target path) and low inflation targets for 1999–00 that were treated seriously by the BoI that further advances on reaching and sustaining low inflation levels were made.

Reflecting this lack of consensus to disinflate quickly or at all, the *fiscal deficit has periodically been loosened* which complicated the stabilization effort. Indeed the fiscal deficit was relaxed almost immediately after the 1985 stabilization program began. Some credibility may have been initially gained by the introduction of the 1991 Budget Deficit Reduction Law—with a target end point of budget balance—but this was not lived up to. The 1996 fiscal retrenchment law set a front-loaded medium-term profile, but with a less ambitious target point than under the previous program (an overall deficit of 1.5 percent of GDP by 2001¹⁹).

Not only has periodic fiscal slippage had its impact on the credibility of the disinflation effort—it is hard to view the 16.5 percent public sector wage increase granted in 1994 as consistent with the official inflation target in that year of 8 percent—it has also implied that most of the disinflation effort has depended on restrictive monetary policy, a costly policy mix in terms of its impact on growth and complications from capital inflows. It is only recently that the fiscal sector has contributed more substantially to the disinflation effort, although there was some slippage in the domestic deficit due to the impact of the automatic stabilizers as growth has slowed. As for the composition of the fiscal accounts, expenditure has continually been curtailed on defense and subsidies, although there is room for further strengthening, including tax reform. Pressing areas to ensure a sustainable medium term fiscal position include further reform of the health sector and of the pension system.

Direct measures to reduce inflation were not a major part of the stabilization effort, except at the outset of the program, when they were politically important. Beyond the initial wage freeze, which was soon relaxed, and price controls for the first six months—which did play an important role in securing public support for the stabilization program and were

¹⁹ And it should be noted that this is the operational or inflation-adjusted deficit, which includes only the real component of interest payments on domestic government debt.

effective in helping reduce inflation at a low initial cost in terms of unemployment—there was no strong effort to contain inflation inertia. Wage indexation was maintained, and real wages returned rapidly to their pre-stabilization levels. This rapid increase in real wages at the outset of the program was in essence blessed by the government-agreed wage agreements made within two months of the start of the program; Bruno and Piterman (1988) argue that the increases reflected a lack of faith by firms in the government's initial resolve to deliver price stability and hence in the willingness to limit large nominal increases.²⁰ In any event, the consequence was to undo much of the initial real adjustment achieved through the incomes policy aspects of the stabilization program, implying that an increased emphasis would have to be placed on the other (orthodox) components of the program if the disinflation effort was to be sustained. Thereafter, it was not until the exogenous increase in immigration levels that the wage setting process became more flexible. In recent periods, further labor market rigidities have been added, including the lowering of the backward-looking inflation threshold above which a COLA is paid, and the linking of, and then increase in, the ratio of the minimum wage to the average wage.

The *exchange rate regime* has in stages shifted toward greater flexibility during the disinflation process. Given the ongoing domestic-foreign inflation differential, the government's resolve to protect the price anchor aspects of the stabilization policy was tested early in the period following the 1985 stabilization program. The initial devaluation in 1987, and the subsequent changes to the horizontal band between 1988-91, clearly signaled to the private sector that this nominal anchor had been weakened in order to keep the real exchange rate roughly constant and to thereby protect the balance of payments, at a time when there was no alternative and transparent anchor in place.²¹

This problem has gradually been resolved as a forward-looking inflation target has gained credibility and inflation has declined. The increased reliance on inflation targeting as a nominal anchor has been combined with a gradual exit from the exchange rate anchor, but the slow pace of the exit led to periodic conflicts as to whether the exchange rate or the inflation target was the dominant anchor. The credibility of the inflation target was enhanced by the firm monetary response to the initial price level effects of the depreciation at end 1998, and private sector inflation expectations fell back to levels close to the 1999-00 targets.

²⁰ It was not until almost four years after the initiation of the program that the COLA was switched from a quarterly to a semiannual payment, indicating the lack of credibility expressed by the private sector in the sustainability of the stabilization effort (Leiderman, 1993).

²¹ This is not to criticize the decision not to prevent the real exchange rate from appreciating excessively, which was amply justified—merely to emphasize the lack of alternative policies to maintain pressure to reduce inflation.

Large capital inflows from 1995–mid-1997 in response to the loose fiscal/tight monetary policy mix complicated the disinflation process and led to a sharp real appreciation of the exchange rate. The response of monetary policy—sterilized intervention—was not sustainable over the medium term, but managed for a period to contain inflationary pressures. The consequence, however, was a rapid build-up in the open foreign exchange position of the private sector—since the BoI was the counterpart for the inflows—which increased vulnerability, and which contributed to the sharp depreciation and inflation impulse when the risk of open foreign exchange positions was reassessed at end-1998.

Outside of extensive financial sector reform, which improved the effectiveness of monetary policy, *far reaching structural reforms were not a major part of the initial stabilization effort, nor has there been a consistent emphasis on structural reform subsequently*. The lack of widespread structural reform, which could have contained prices in noncompetitive sectors, precluded a potential downward pressure on the price level that could have aided disinflation (Ministry of Finance, 1998). The privatization program was begun late and has had a heavy focus on changing ownership of the government-owned banking sector without thus far corresponding efforts to increase competition in financial services. The most positive development has been the increasing competition in the telecommunications sector, where prices have declined sharply. Remaining areas for reform include, *inter alia*, the labor market, reform of the capital market including the pension system and taxation of financial income, increasing competition in goods markets, and reducing the size of the (large) government sector.

Turning to the other lessons that emerge from the international experience of disinflation, Israel was particularly successful in capitalizing on several *positive external shocks*. These included the decline in oil prices at the early stages of the stabilization program, the flexibility added to the labor market during the high immigrant inflows, and later declines in import prices. The government has frequently endeavored to *build credibility by signaling its policy resolve* such as by announcement of the two medium-term fiscal retrenchment paths, and the announcement of a medium-term inflation target, although the actual effect of these measures in lowering inflation is difficult to determine since in each case the resolve of the government was not fully believed. Finally, *the link between disinflation and growth has been mixed*. The initial disinflation effort was achieved at no immediate cost to growth, although this came later as the initial consumption boom faded. Recent disinflation efforts took place during a significant growth slowdown, in part a reflection of the previous poor policy mix, as well as the unwinding of extraneous factors.

VI. Strategy for the Future

By the end of 1999 and the start of 2000, the goal of moving Israeli inflation to the low levels of the better performing industrial countries was well in sight. Consolidating this achievement will require an appropriate policy environment, the elements of which should include: (i) fiscal policy restraint, with further consolidation of the underlying fiscal position; (ii) monetary policy aimed toward sustaining the recent low inflation levels; and (iii) bold structural reforms to move the economy to its potential level of growth as soon as possible.

To bolster these policies, the inflation experiences of Israel and the other countries studied here suggest the need for changes in institutional arrangements to provide the best chance of sustained low inflation levels and improved economic performance.

- *Central Bank operational independence and policy goals*

International experience suggests that the achievement and maintenance of low inflation and sustained growth is more likely if monetary policy has the primary goal of maintaining low inflation, and if the central bank is given the operational independence to achieve its goals. The inflation target itself can be specified by the government. The inflation experience of Israel, especially that prior to the stabilization program, indicates the cost of not providing the BoI with the independence to use the instruments of monetary policy toward the inflation goal, and using monetary policy to support goals for which it is not well suited. The Levin Committee recommendations on the appropriate policy objectives and operational practices for the BoI offer a suitable approach.

- *Inflation targeting regimes*

The worldwide experience with inflation targets is brief—mainly restricted to the 1990s—and hence the most effective mechanisms under such a regime are still being tested. Nonetheless, theory suggests that to be most effective at guiding monetary policy (which acts with a lag) and to enhance certainty for the private sector, the inflation targets should be set over the medium term (at least two-three years) rather than on a year-to-year basis as currently in Israel.²² The adoption of such a framework would increase the ability of the central bank to maintain low inflation on average, while taking account of whatever short-run tradeoffs might exist between inflation and economic activity. Further, most inflation-targeting countries (such as Australia, Canada, New Zealand, and the United Kingdom) have at least the operational (if not the actual) inflation target based on underlying rather than overall inflation, so that monetary policy is not hostage to fluctuations in volatile prices. Such a shift would contribute to the success of monetary policy in Israel, which has in the past tended to respond to short-term fluctuations in prices of fruits and vegetables and housing.²³ Note too that the experience to date suggests that, while the monetary authorities need not have goal independence, they must have a reasonable degree of instrument (operational) independence to meet the inflation goal (Debelle and Fischer, 1994) which bears relevance for changes in the central bank law.

²² While it is sometimes argued that the BoI in practice operates with a medium term path in mind, this lack of transparency for private sector decision making undermines much of the point of an inflation-targeting regime.

²³ See Orsmond (1998) for further details. It is sometimes suggested that the data series in Israel are too short for reliable seasonal adjustment and the creation of an index of underlying inflation; however operating with an imperfect index would be better than ignoring the problem entirely.

- *Consistency of inflation targeting regime with exchange rate and other policies*

Although Israel for some time operated with inflation targets in a crawling peg exchange rate regime, it is clear that there may well be conflicts between these two approaches to monetary policy. The question then arises as to which should have primacy when a conflict arises. Typically the conflict occurs when inflation is low and the real exchange rate appreciated, with the current account deficit becoming uncomfortably large. At that point there may be a short-run tradeoff between the current account and inflation targets: an expansionary monetary policy (cut in interest rates) will temporarily produce a real depreciation. Given that such a tradeoff is typically very short-term—especially in Israel—the real answer to the dilemma lies in the area of fiscal policy. Hence in general, particularly in economies open to international capital flows, the inflation target should predominate, and the exchange rate should be allowed to become flexible.

- *Fiscal policy framework*

Several countries such as Australia, New Zealand, and the United Kingdom have recently adopted formal fiscal policy frameworks, stressing the transparency of the fiscal accounts and the setting of medium-term policy goals; Argentina has also just completed a transparency report in line with the IMF's Fiscal Transparency Code. Israel was among the first in this decade to adopt a medium-term fiscal policy framework, but the credibility of the initial framework was undermined by the failure to follow it. Such a framework nonetheless can reinforce inflation and other economic performance, both by constraining potential occasional fiscal policy excesses, and by informing private sector expectations of future economic policy.

Mechanisms and Tradeoffs in Israeli Inflation²⁴

Modeling Inflation

To better understand the process of inflation in Israel, a structural vector autoregression was estimated to examine the interactions between activity, inflation, monetary policy, and the exchange rate (both nominal and real). The model is along the lines of the literature on identifying the effects of monetary policy in the United States, as surveyed by Bernanke and Mihov (1997), and Leeper, et al (1996), but the focus here is broader in that we examine the effect of activity on inflation as well as the effects of monetary policy. The model includes five variables: the price level, the real output level, growth of M1,²⁵ the growth rate of the nominal exchange rate of the NIS with the U.S. dollar, and the real interest rate differential between the federal funds rate in the United States and the discount rate set by the BoI, both adjusted for inflation.

The model can be thought of as being composed of three constituent parts: a real sector with GDP growth and inflation, a monetary sector with money growth and the interest rate differential, and a financial sector with the exchange rate. The variables used are similar to those in Eichenbaum and Evans (1995), but the identification of contemporaneous interactions between the variables differs because we put some rudimentary structure on the interrelationships of the variables rather than using a non-structural recursive ordering. The financial sector reacts continuously to events, so that the exchange rate is allowed to respond contemporaneously to all variables. In contrast, the real sector is assumed to respond slowly to the other variables, with the output level assumed to respond to the other variables with a one quarter lag, while the price level responds contemporaneously to output changes and to the exchange rate. Since all variables affect the exchange rate, prices are indirectly affected by all variables through their effect on the exchange rate. Money growth responds contemporaneously to interest rates, activity, and inflation in accordance with a standard money demand function. We assume that the interest rate differential responds to the other variables with a one quarter lag, which seems to fit the data well. Together, these provide the 11 restrictions on the contemporaneous interactions of the 5 variables.²⁶

²⁴ The work in this section was undertaken with Phillip Swagel. See Swagel (forthcoming).

²⁵ Several authors find changes in M1 are a good indicator of changes in inflation (Bufman and Leiderman, 1997), and that the money demand function is fairly stable for the post-stabilization period (see Bufman and Leiderman, 1997 for the period 1989–96; Azoulay and Elkayam 1996; Leiderman and Meron, 1988, and Melnick, 1993).

²⁶ Testing the one overidentifying restriction gives a χ^2 statistic of 0.46, with a p-value of 0.50; the restriction is thus not rejected at a moderate level of economic significance. Allowing a contemporaneous effect of exchange rates on the interest rate does not affect the results.

The model is estimated using quarterly data for the post-stabilization period from Q1 1987 to Q2 1998, with a break in the mean at the start of 1992 to allow for the regime change in that year as discussed above (mainly the consequence on real wages of the high level of immigration which is not proxied here by the other mainly monetary variables included). Four lags of each variable are used in the reduced form regressions that compose the VAR; the likelihood ratio tests do not reject the null hypothesis the additional lags are not significant. To create the real interest rate differential, the federal funds rate is deflated by actual U.S. inflation, while inflation in Israel is regressed on 12 lags, with the fitted values taken as expected inflation and used to deflate the BoI's nominal discount rate. The differential is then measured as the difference between Israel and the U.S., so that an increase in the differential corresponds to tighter (relative) monetary policy in Israel.

Effect of Changes in Interest Rates on the Economy

We first study the impact of interest rates on the economy. The econometric results indicate that a 1 percentage point increase in the real interest rate differential lowers the growth rate of output by 0.2 percent after one quarter, and that this constitutes the entire long run impact of the shock (Appendix Figure 1). The transmission mechanism operates through a lowering of the growth of money (by an immediate response of just over one percent), a ¼ percent decline in inflation, and a nearly 1 percent appreciation of the nominal exchange rate (and thus around 0.7 percent real appreciation of the shekel).²⁷ We find that the impact on the price level is sustained even after six years (Appendix Figure 2), suggesting that monetary policy has been an effective instrument in lowering inflation in the post-stabilization period. This result is similar to that in Bufman and Leiderman (1997), who found that higher real interest rates lower prices in subsequent quarters, with the largest impact one-two quarters after a rate increase, primarily through its effect on the exchange rate.

Inflation-Output Tradeoff

Next we study the relationship between inflation and output. Studies examining the existence of a Phillips Curve relationship in Israel generally show that there is a short run link between inflation and unemployment (or output to proxy for the impact of high immigration on unemployment)—although this relationship is not very stable—and that there is no long run relationship. In particular, Sussman (1990) finds separate Phillips Curve relationships for the four periods of 1960–73, 1977–80, 1981–84, and 1985–87, with the

²⁷ Similarly Klein (1997) says a 1 percent change in real interest rate reduces domestic demand by 0.2–0.4 percent within a short period.

differences stemming from supply shocks that shift the curves.²⁸ Sussman further finds that changes in the wage indexation provisions affect the slope of the Phillips curves, with stickier wages implying smaller elasticities of wages with respect to output and a flatter Phillips curve. Lavi and Sussman (1997) find a short run Phillips Curve relation between 1965–74 and 1987–96 with an elasticity of -0.5 to -0.7 for changes in the unemployment rate and changes in inflation, but again with no long-run relationship.

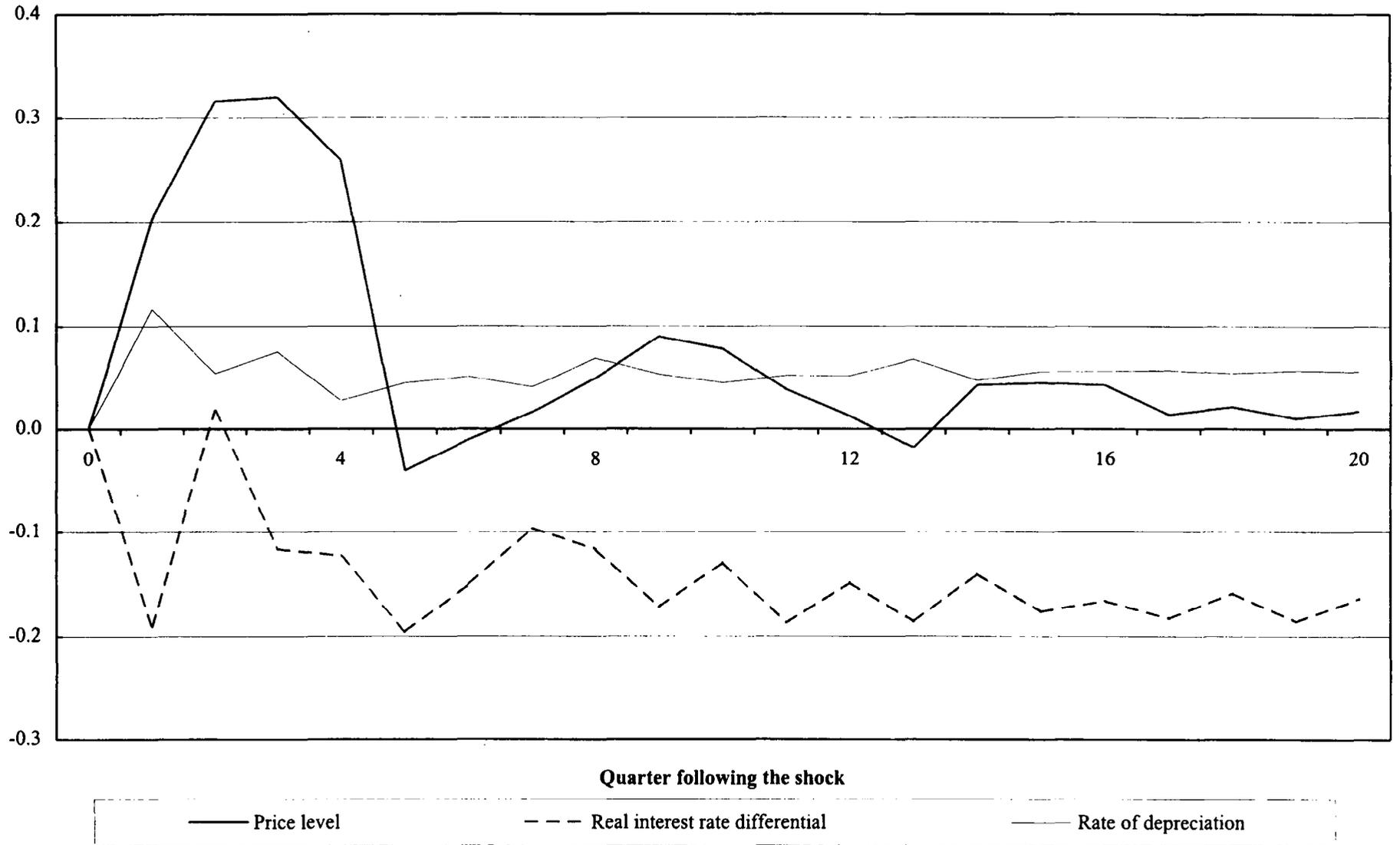
Using the estimated VAR, we find a strong contemporaneous link from inflation to output, with a 1 percent increase in the price level leading to an uptick in output by 0.3 percent within two quarters (Appendix Figure 1). The effect starts to tail off after the third quarter, and output returns to its previous level from the fifth quarter onwards. Hence, while we find a short run link, like other authors we also find no long run relationship.²⁹

Finally, using the VAR we also find that a 1 percentage point increase in the nominal exchange rate (i.e. a depreciation) has a mild positive impact on the output level (0.15 percent; Appendix Figure 1) and on the price level (0.2 percent; Appendix Figure 2).

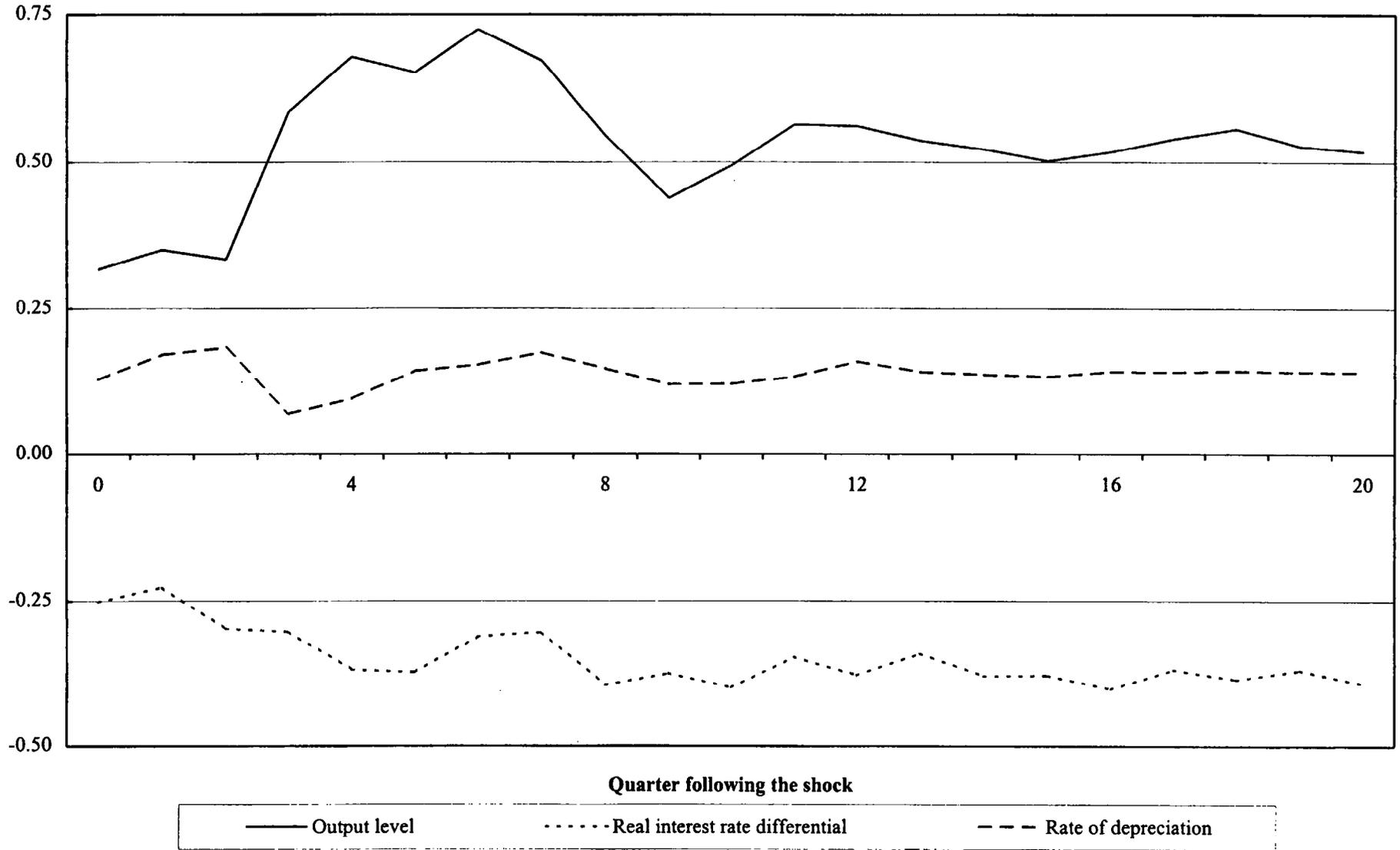
²⁸ The relevant supply shocks are changes in import prices and productivity growth and changes in controlled prices such as cancellation of subsidies and devaluation policies not supported by fiscal retrenchment.

²⁹ Reversing the causation, a 1 percent increase in output has an immediate effect on the price level over the following six quarters, raising it by 0.5 percent over the long run.

Appendix Figure 1: Impact on the output level from a one percentage point increase in the noted variable



Appendix Figure 2: Impact on the price level from a one percentage point increase in the noted variable



Case Studies of Disinflation in Nine Countries

Countries where inflation was reduced from high levels without experiencing a sustained moderate inflation period

Inflation in *Argentina* peaked at almost 5000 percent in 1989 in response to an extended period of loose fiscal policies, an adverse external environment, and failed stabilization efforts focused on short-lived wage-price-exchange rate controls rather than a large and sustained fiscal adjustment. In contrast, the Convertibility Plan that was initiated in early 1991 was set against the backdrop of a solid fiscal reform that addressed several underlying structural difficulties (tax policy and administrative reform, reduction in subsidies, cutbacks in civil service employment, and privatization of virtually all state enterprises); thereafter fiscal policy was strengthened with a social security reform, although the structural fiscal deficit was not eliminated. After an up-front devaluation, a currency board arrangement was adopted in order to provide a nominal anchor and to enhance the authorities' credibility by tying future monetary policy to the defense of the exchange rate. To support these policies, local-currency wage and financial indexation was banned, public sector wages, pensions, and public price tariffs were frozen for nine months, and import tariffs were reduced. Inflation reached close to zero within a few years and GDP growth responded strongly. Strong capital inflows were a complicating factor, mainly due to the remonetization of the economy, return of capital from abroad, and the privatization program. While the real exchange rate appreciated by 25 percent between 1991–94, the current account widened to 4 percent of GDP, underpinned in large part by investment flows and by the enhanced productivity from structural reform, including from initial efforts to reform the labor market.

However, the currency board arrangement implied that all external shocks were felt heavily on the real sector. The economy was hit hard by contagion effects from the Mexico crisis of December 1994; capital flowed out in early 1995 placing pressure on domestic interest rates, reserves, economic growth (which turned sharply negative), unemployment levels (which increased to 20 percent), the fiscal position, and the stability of the banking system. In this situation, the government showed a willingness to protect the exchange rate regime with a tightening of fiscal policy and an increase in liquidity to assist vulnerable banks; although there was a further cost to growth, the current account levels moderated and confidence returned. Reflecting the flexibility imparted to the economy from the earlier wide-ranging structural reform program, the economy bounced back soon thereafter and unemployment fell to 12 percent with continued low inflation levels. The economy was again hit hard by the 1998 Brazil crisis, with another downturn in growth and increase in unemployment level; inflation remains very low, which has actually complicated the ability of the economy to respond to this latest shock via a reduction in real wages.

Inflation in *Brazil* also peaked at a high level—3,000 percent in 1993—in response to weak domestic policies in the face of adverse external developments, the effects of which were compounded by stabilization efforts focused on wage-price-exchange rate freezes

which aimed to address inertia but were not accompanied by a tightening of monetary and fiscal policies. In the early 1990s, in the context of wide-ranging structural reforms, the fiscal deficit was brought back from high levels but several structural fiscal problems were not adequately addressed (in pensions and local government finances in particular). Under the 1994 Real Plan, the exchange rate served as the nominal anchor (its value being subject to a floor), public sector prices were frozen indefinitely, indexation for periods of less than one year was prohibited (indexation of financial contracts was allowed provided the interest rate was based on the 30-day CD yield) and remaining inertial aspects arising from the lack of synchronization in the wage and price setting process were addressed through an ingenious approach that shifted the various wage and price contracts to a structure that effectively implied contemporaneous indexation.³⁰ In March 1995, a crawling peg was introduced but at a rate of crawl that was less than the ensuing inflation level. Inflation fell back to low single digit levels.

The cost of this success on the inflation front was a sharp 35 percent increase in the real exchange rate. The authorities attempted to tighten credit during 1994 to offset the booming economy and the impact of strong capital inflows reflecting in part the remonetization of the economy. Capital controls were imposed for a short period, but in response to capital outflows following the December 1994 Mexico crisis, the authorities tightened credit and eased earlier restrictions on inflows; confidence soon returned. However, the failure to undertake key fiscal reforms led to a steady deterioration in the fiscal balance after 1994, which in turn complicated the widening current account and placed an increasingly heavy burden on monetary policy to maintain the exchange rate commitment. This unbalanced policy mix kept real interest rates high with adverse consequences for investment. A currency attack following the 1997 Asia crisis was successfully offset with tight monetary policy and the promise of a fiscal adjustment package, although in the end only the revenue components were ultimately delivered. The further external shock following the August 1998 Russian crisis led to heavy outflows as investors started to question the policy stance. Eventually the exchange rate peg was abandoned and inflationary pressures increased. Fiscal policy was eventually tightened in 1999—including importantly making a start to addressing the underlying fiscal problems—and with the maintenance of tight fiscal policy in 2000, inflationary pressures have moderated.

Inflation in *Croatia* was brought down almost overnight from levels of 30 percent per month which had been supported by backward-looking indexation and entrenched inflation expectations. The end-1993 stabilization program rested on a major fiscal adjustment that obviated the need for large domestic financing of the deficit, an exchange rate peg with an

³⁰ A real unit of value (URV) was used for the denomination of prices and contracts until the new currency was introduced, and its value was adjusted daily in terms of the old currency on the basis of estimated inflation. Wages in terms of the URV were set equal to the average of the value over the past four months to deal with variations in real wages over the wage cycle. The URV was also gradually introduced into financial transactions.

unannounced narrow band, the abolition of formal wage and pension indexation in the state sector, and limited growth of wages in the public sector. Enterprise restructuring was encouraged through privatization efforts and measures to control credit to large financially strapped companies; these efforts were not fully successful. After receiving an international investment grade, Croatia experienced heavy capital inflows enabling enterprises to borrow abroad to avoid their domestic credit controls. These inflows were moderated by the imposition of a reserve requirement on bank borrowing from abroad. The consequent rapid increase in money growth and widening of the current account deficit did not lead to a rise in inflation. In spite of a nominal depreciation of more than 10 percent and large increases in public sector wages, pressures on prices remained contained throughout 1999 as monetary policy was tightened and the economy fell into a brief recession. During 2000, however, inflation increased above 5 percent, partly due to the increase in international oil prices.

Countries that Experienced and then Ended a Period of Moderate Inflation

Inflation in *Chile* spiraled to over 500 percent by 1973 due to loose fiscal and monetary policies and an adverse economic environment. Initial efforts to reduce inflation relied exclusively on an orthodox tightening of monetary and fiscal policies combined with ambitious structural reform.³¹ The exchange rate was moved in line with a real exchange rate rule and there was no effort to reduce inertial aspects (indeed wage indexation was introduced for the public sector) and no effort to synchronize the movement of all the nominal variables. In this environment, inflation fell only gradually. In the late 1970s, a second stabilization effort attempted to use the exchange rate as an anchor for price expectations backed by the sound fiscal position. However, inflation inertia was entrenched further with the extension of wage indexation to the private sector, and certain major nontradable prices were indexed to ex post inflation (housing rentals, mortgages, tuition fees). As inflation continued to fall at only a gradual pace, the backward-indexation for the private and public sectors caused real wages to rise along with the real exchange rate, which supported a consumption boom and widening of the current account, that was financed through the now liberalized capital account at a cost of rising external debt; a major recession followed after world interest rates increased.

Subsequently, in the context of the prevailing high unemployment, the authorities endeavored to deindex the labor market to address inertia (although informally it is still widely used in collective bargaining agreements, and financial indexation is still pervasive) with a large reduction in real wages, undertake a series of discrete devaluations in the context of a crawling peg regime which led to a 50 percent decline in the real exchange rate, and deliver further fiscal and monetary contraction. Thereafter, the exchange rate moved in line with a backward-looking real exchange rate rule. Despite subsequent strong growth, sound

³¹ In particular, the fiscal balance was shifted from deficit to surplus, prices were deregulated, subsidies eliminated, trade restrictions substantially reduced, the tax structure reformed, public expenditures reduced, and privatization initiated.

fundamentals, structural reform and a weak labor market, inflation in Chile remained around 20 percent in the second half of the 1980s. Towards the end of the 1980s, inflation began to accelerate due to demand pressures. At this critical moment, the new (democratic) government tightened fiscal policy to slow the economy, which sent an important signal that an acceleration of inflation would not be tolerated. At the same time, the central bank was made independent, with primary responsibility for monetary stability rather than also for growth. Further, in the face of strong capital inflows during the 1990s—which averaged 7 percent of GDP per annum—the authorities allowed a real appreciation of the exchange rate and imposed high reserve requirements to discourage short term flows. These various steps enhanced credibility, and inflation has fallen since, although at a gradual pace given the ongoing presence of indexation procedures. The disinflation process was assisted by an improvement in the terms of trade in 1994–95, which enabled some further appreciation of the exchange rate without undue risk of a balance of payments crisis. During 1999, growth slowed and unemployment increased in response to unfavorable external conditions, and inflation was around 2 percent. During the year, the exchange rate was allowed to freely float and the authorities adopted a series of measures to formalize the inflation targeting regime, including announcing a target range for inflation of between 2 percent and 4 percent on a continuous basis starting 2001.

After several years of moderate inflation in *Egypt* that was fueled by loose fiscal and monetary policy, Egypt finally managed to tame its relatively well entrenched inflation. Disinflation was underpinned by a major fiscal adjustment, with the fiscal deficit cut from around 20 percent of GDP in 1990–91 to significantly lower levels soon thereafter. An exchange rate peg has been maintained throughout the period; there was no explicit reliance on incomes or wages policies due to the absence of widespread indexation. Monetary policy was also tightened in the context of a more liberalized financial sector, coupled with other structural reforms to the trade regime and in privatization. The real exchange rate appreciated by 10 percent, but the current account has remained contained. A major challenge was the large capital inflows at the outset of the stabilization effort; sterilization was successful at containing their inflationary impact since the fiscal cost could be borne given the other widespread fiscal reforms. Controls were also placed on capital inflows. Capital inflows moderated after the external crisis of 1997 in Asia and in other countries thereafter. Fiscal deficits remained lower than their pre-stabilization levels throughout the period, inflation has remained low, and growth has been supported by the earlier structural reforms.

Greece reduced inflation gradually from over 20 percent during the 1990s, as fiscal deficits were cut from over 15 percent of GDP and the current account, which approached 5 percent of GDP, was subsequently contained. The major fiscal adjustment rested heavily on revenue increases—including from improved tax compliance—while large capital inflows from the EU approaching 5 percent of GDP per annum (up by around 3 percent of GDP from their level in 1990) kept the current account contained despite adoption of a crawling peg at less than the domestic-foreign inflation differential after 1994 in the context of a liberalized capital account, financial sector liberalization, and other structural reforms. The currency came under pressure in the fall of 1997 which was defended with high interest rates, but which was superseded by the drachma's entry in March 1998 into the ERM following a

12 percent devaluation. The government simultaneously undertook a fiscal package and initiated major structural reforms, especially to public enterprises. Subsequently, all Maastricht reference values were observed and in June 2000 it was agreed that the drachma would enter into the euro area from January 2001. Nevertheless, as in other euro economies, pension, healthcare, and labor market reforms remain paramount.

Countries that experienced a period of moderate inflation where inflation levels are still around 10 percent per annum

The continuation of moderate inflation in *Colombia* reflected strong domestic demand and the role of inertia via backward-looking wage indexation. Buoyed by large-scale capital inflows, a private consumption and investment boom lasted into the second half of the 1990s. The surge of capital flows to Colombia reflected increased confidence resulting from the structural reforms introduced in the early 1990s and from large oil discoveries. Fiscal policy, instead of being tightened to limit the impact of the private sector boom on aggregate demand, was relaxed to accommodate new spending programs. The fiscal policy deterioration put a disproportionate burden on monetary policy which, despite sharp increases in domestic interest rates, could not avert a substantial real appreciation of the peso (by more than 40 percent during the 1990–97 period) and associated deterioration of the current account. A voluntary incomes and prices social pact introduced between 1995–97 failed to stabilize inflation. Colombia has had a crawling peg exchange rate since 1967, and a forward-looking crawling band at a preannounced rate of crawl was introduced in early 1994. Colombia's economic performance deteriorated markedly in 1998–99, reflecting the combined influence of external shocks and a weakening in confidence. Following a period of repeated episodes of attack on the currency, which was trading under a crawling band system since 1994, the central bank floated the peso in September 1999. The weak economic activity helped reduce inflation to 9 percent by end-1999, the lowest rate in thirty years.

Prior to 1995, inflation in *Hungary* was propelled by loose fiscal policies, rigidities in the labor market that protected real wages in the face of soft budget constraints (although there is no formal wage indexation process), an exchange rate that was devalued frequently and erratically but not by enough to prevent a widening of the current account deficit, and ongoing liberalization of administered prices. Over time however, the loose demand policies led to a current account of 10 percent of GDP. Beginning in 1995, the exchange rate was increasingly used as an anchor in the disinflation process though a pre-announced crawling narrow band of +/- 2.25 percent, supported by tighter fiscal policy, flexible labor markets, and limits on pay increases in the public sector. The rate of crawl was gradually reduced from around 2 percent per month in March 1995 to less than 0.5 percent per month since January 2000. Capital inflows in 1995–96 equivalent to 8 percent of GDP complicated the disinflation process; the authorities responded by maintaining remaining controls on short term borrowing and heavy sterilization. Inflation has gradually fallen back to the high single digits due mainly to tight monetary policies and productivity advances given earlier structural reforms that finally began to pay off (privatization, trade reform, enterprise restructuring), which in turn has prompted a new round of capital inflows. The real exchange rate appreciation has been contained and the current account deficit has declined.

In *Mexico*, rising inflation pressures during the 1970s and 1980s due to weak domestic policies and external shocks were tamed in the December 1987 stabilization plan which relied on tight monetary and fiscal policies, wide ranging structural reform (trade liberalization, privatization, deregulation), and a quarterly tri-partite arrangement (Pacto) to replace backward wage indexation wherein which a convergence path was set for the exchange rate, wages, and selected administered prices after an initial devaluation nominal wage increase. Public and private prices as well as the exchange rate were frozen for the balance of 1988. The exchange rate regime was switched to a crawling peg in January 1989 and crawling band in December 1991 with a widening depreciated limit, although this was never used as the rate remained close to the appreciated limit. Inflation fell immediately, though with a deterioration in the current account as imports boomed and the real exchange rate appreciated.

The inflationary impact of strong capital inflows in the 1990s was offset by tighter fiscal policy. The rate of crawl was gradually reduced as the exchange rate began to serve increasingly as a nominal anchor which led to a further sharp real appreciation by over 30 percent and widening of the current account deficit to reach 7 percent of GDP. Eventually, following the increase in interest rates abroad and domestic political strife, capital began to flow out. In the face of these pressures, the authorities delayed increasing interest rates, which led to currency collapse in December 1994 as reserves evaporated in the face of heavy outflows. Unemployment doubled amid sharp fiscal cuts, very high interest rates, and a banking sector crisis. Since then, the situation has begun to stabilize with tight monetary and fiscal policies; the currency has remained relatively stable despite a floating regime. Inflation initially increased sharply but has since declined.

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