

IMF WORKING PAPER

© 1996 International Monetary Fund

This is a *Working Paper* and the author(s) would welcome any comments on the present text. Citations should refer to a *Working Paper* of the International Monetary Fund, mentioning the author(s), and the date of issuance. The views expressed are those of the author(s) and do not necessarily represent those of the Fund.

WP/96/33

INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

**Fiscal Balance During Inflation, Disinflation, and
Immigration: Policy Lessons**

Prepared by Assaf Razin and Efraim Sadka 1/

Authorized for distribution by Peter S. Heller

April 1996

Abstract

The paper provides an overview of the role of the fiscal imbalances and the ensuing public debt in explaining major episodes in Israel's recent economic developments. The main conclusions from the Israeli budgetary developments may have more general validity: (a) deficits lead to inflation and stopping inflation requires elimination of deficits; (b) a major effect of inflation is a large shift of the tax burden from capital to labor; and (c) shocks to labor supply, such as massive labor inflow through immigration, can be absorbed without worsening government finances, when the labor and the housing markets are sufficiently flexible.

JEL Classification Numbers:

E10, E31, E40, H3

1/ Assaf Razin is a professor of economics at Tel Aviv University. His main research areas are macroeconomics, public economics, and international economics. Efraim Sadka is a professor of economics at Tel Aviv University. He has done research on tax systems, public economics, and international economics. This paper was written while Assaf Razin was visiting the Fiscal Affairs Department at the International Monetary Fund. The authors wish to thank Nils Gottfries for useful comments. This will be published in the Swedish Economic Policy Review, 1996.

<u>Contents</u>	<u>Page</u>
Summary	iii
I. Introduction	1
II. Macroeconomic Effects of Debt: Theory	1
III. The Inflation Process: Fiscal and Monetary Fundamentals	3
IV. Fiscal Contraction and Aggregate Demand	6
1. Private and public saving rates	6
2. Can fiscal contraction be expansionary?	7
V. Inflation-induced Shift in the Composition of Tax Revenue	8
VI. What Factors Caused the Postdisinflation Immediate Boom and Subsequent Recession?	14
1. A tax-based cycle	14
2. An exchange rate-based cycle	14
3. Fiscal discipline	15
4. Another effect	15
VII. Tax Smoothing, Labor Supply Bulges, and the Government Finances	16
VIII. Conclusions	19
<u>Text Table</u>	
1. Effective Average Tax Rates	13
<u>Figures</u>	
1. Total Public Sector Deficit	4a
2. Real Wage in Manufacturing	4b
3. Annual Inflation Rate, 1960-89	4c
4. Budget Deficit (positive) or Surplus (negative), 1980-88	6a
5. M ₃ Developments, 1980-89	6b
6. The Real Cost of Bank Credit, 1980-87	6c
7. Private and Public Savings	8a
8. Unit Labor Costs and Real Effective Exchange Rate	16a
9a. Public Debt	18a
9b. Public Spending	18a
10. Selected Labor Market Indicators	18b
References	21

Summary

This paper outlines the role of the fiscal deficit and the ensuing public debt in Israel's contemporary economic history. It focuses is on the inflation and disinflation episodes of the 1980s and on the massive labor inflow in the form of the wave of immigration in the 1990s. These episodes serve as a testing ground for old and new theories of the role of fiscal policies in economies that are subject to various external and domestic shocks.

The following main policy lessons emerge from Israel's budgetary developments: (1) deficits lead to inflation and stopping inflation requires elimination of deficits; (2) a major effect of inflation is a large shift of the tax burden from capital to labor; (c) in low-debt cases, the aggregate demand effects of fiscal stabilization are not large because of debt neutrality; (4) aggregate demand may rise with severe fiscal contractions in high-debt cases; (5) when the exchange rate is used as a nominal anchor, in the presence of international capital movements, the economy typically ends up with an overvalued currency, which eventually leads to recession; (6) inflation-induced and disinflation-induced redistributions of the tax burden between capital and labor cause a poststabilization output-employment cycle; (7) shocks to the labor supply, for example, through massive immigration, can be absorbed without worsening government finances when the labor and the housing markets are sufficiently flexible; and (8) productivity increases with a significant lag, however, in the presence of large inflow of skilled labor.

The main policy implication that can be drawn is that the absence of budget discipline, coupled with an almost inevitable monetary accommodation, will eventually fuel an inflationary process that could run out of control. The huge budgetary expansion in Israel and the associated monetary expansion were initiated by wars and severe terms of trade shocks (the oil crises). At the same time, subsidies, other transfers, cheaper public education, as well as some "supply-side economics" measures were maintained. The emergent inflation proved in the end to be detrimental to income distribution objectives, to factor productivity, and to economic growth. Inflation undermined the tax system and tilted income distribution in favor of capital and against labor. Even worse, the inflation-induced tax concessions to capital were highly distortionary without having any positive effect on growth.

The budgetary expansion associated with the absorption of the massive immigration from the countries of the former Soviet Union did not increase the public debt in a relative sense even though the tax burden was not raised. This surprising outcome occurred because output was capable of responding swiftly to the increase aggregate demand, through the use of excess capacity of capital (residual of the poststabilization recession) and high labor force participation rates among the newcomers.

I. Introduction

This paper provides an overview of the role of the fiscal deficit and the ensuing public debt in explaining major episodes in Israel's contemporary economic history. We focus on the inflation and disinflation episodes in the 1980s, and the more recent experience of massive immigration in the 1990s. These episodes can serve as a testing ground for old and new theories concerning the role of fiscal policies in economies which are subject to various external and domestic shocks. The main questions addressed in the paper are: What is the relation between deficits and inflation? How do inflation and disinflation affect effective tax burdens and the distribution of income between capital and labor? Is there evidence of debt neutrality and tax smoothing? Can a fiscal contraction be expansionary? What factors caused the immediate boom and the subsequent real appreciation and recession observed in Israel after the 1985 stabilization program? How are government finances affected by massive immigration and why is the recent Israeli experience so different from the German unification experience in this respect?

The paper is organized as follows. Section 2 overviews the theoretical underpinnings of the macroeconomic effects of fiscal policies. Section 3 highlights the main features of the inflation process in Israel. Section 4 analyzes the links between fiscal contractions and aggregate demand. The income distribution issues associated with inflation and disinflation are considered in Section 5. Postdisinflation cycles are considered in Section 6. The roles of tax smoothing and the labor market in the successful absorption of immigrants are analyzed in Section 7. Section 8 contains a summary and concluding remarks.

II. Macroeconomic Effects of Debt: Theory

There are a number of ways to model the macroeconomic impacts of the government deficit and its accumulation into government debt. We argue that the Israeli experience can best be cast within two main frameworks, which we now sketch briefly.

The first is the traditional Mundell-Fleming model, which emphasizes short term, cyclical effects of macroeconomic policies (fiscal and monetary) on inflation, the real exchange rate, employment, external imbalances, and the like. ^{1/} In this framework, government deficits lead to inflation if money creation is used to finance them. The second framework emphasizes long-term intertemporal considerations pertinent to economies with forward-looking individuals, as in Barro, 1974. Within this framework, issues such as tax smoothing, debt neutrality, the effect of government deficit on private savings and interest rates, public consumption versus public investments, policy credibility, fiscal contraction and consumption boom, and the like, can be usefully analyzed. In the general equilibrium

^{1/} The real exchange rate measures the relative price of foreign-produced goods in terms of home-produced goods.

analysis, fiscal shocks affect the path of prices if they change the present value of current and future government surpluses at the pre-existing equilibrium prices.

The small economy version of the Mundell-Fleming model is suitable for assessing the impact of government deficits and the associated monetization on the short-run adjustment to equilibrium. The model consists of four key elements. The first is the demand-supply equation for the domestic product. (Its mirror image states that the current account deficit is equal to investment minus savings, both private and public.) The second is a standard market-clearing equation for domestic money. The third states that international mobility of financial capital must yield interest parity: the nominal rate of interest is equal to the world (nominal) rate of interest plus the expected rate of depreciation of the domestic currency. The fourth key element is a slow short-run adjustment of wages and prices, due to pre-set nominal contracts. The model predicts that a government deficit would lead to a higher real rate of interest, an appreciation of the real exchange rate, an increase in the current account deficit, higher aggregate demand and employment, and higher domestic prices. When, as is typically the case, the government deficit is at least in part monetized (in the current as well as expected future periods), prices, employment and the external deficit grow even higher, while there is an offsetting effect on real interest rates and the real exchange rate. The real effects of monetary policy, however, dissipate in the longer run when wage and price contracts adjust fully. ^{1/}

Now, when more long-run driving forces of individual optimization behavior à la Barro are taken into account, some of the conclusions of the above, a more traditional framework, are modified. Economic agents with a long horizon may well realize that higher government deficits today will eventually necessitate surpluses in the future, so as to keep government solvency intact. As a result, private savings may offset government dissavings, thereby mitigating the Mundell-Fleming effects of government deficits on the real rate of interest and the real exchange rate.

^{1/} Under a flexible exchange rate, a current transitory fiscal expansion (which does not alter expectations about the future path of the exchange rate) induces a rightward shift of the IS schedule, raising both the level of output and the domestic interest rate. To maintain interest parity, the rise in the interest rate must result in appreciation of the domestic currency. Under a fixed exchange rate, interest arbitrage ensures equality between the domestic and foreign interest rates. Consequently, a fiscal expansion that induces a rightward shift of the IS schedule gains full potency in raising the level of output, because there is no currency appreciation to offset it. Monetary policy is only weakly effective under exchange rate targeting since a tight monetary policy which puts upward pressure on the domestic interest rate induces capital inflow from abroad, which has to be monetized given the commitment to the exchange rate target. The monetization of the capital inflow neutralizes the initial monetary tightness.

Nevertheless, with slow-adjusting prices, the associated monetary expansion may still be effective, as in the Mundell-Fleming framework.

Since taxes cause deadweight losses, with an increasing marginal burden, it may not be optimal for the government to increase taxes each time its spending rises. Consequently, it may be optimal to smooth taxes over time, by allowing deficits in high-spending and/or low-output years, and surpluses in low-spending and/or high-output years. This tax pattern will then equate the marginal excess burden over time, thereby minimizing the sum total of excess burdens over time. Thus, a balanced-budget rule, which is in direct conflict with tax smoothing, is bound to involve significant deadweight losses.

Interestingly, if the deadweight loss is expected to rise with fiscal pressure, then a drastic fiscal consolidation may untraditionally generate a rise in aggregate private demand. The reason for the increase in aggregate private demand in this case is twofold. First, when the growth of public debt comes to a halt through the fiscal contraction program, consumers realize that future debt service is considerably less distortionary. The fiscal contraction which accordingly helps restore balance in the inter-temporal allocation of the tax burden will increase consumers' lifetime wealth. Consequently, private consumption will then expand as well, contrary to the prediction of the traditional model. Second, private investment may rise as a result of the expected future decline in capital income (especially corporate income) taxes. Thus, a fiscal-based disinflation program is plausibly expansionary under these circumstances, raising aggregate demand and employment (see Giavazzi and Pagano, 1990).

All in all, in practice, persistent government deficits typically generate inflationary processes. The latter have significant real effects on the distribution of income, the tax system, and growth.

III. The Inflation Process: Fiscal and Monetary Fundamentals

Israel's flirtation with inflationary cycles can ironically serve as a good testing ground for macroeconomic theories. Following the Yom Kippur War of October 1973 and the pursuant oil crisis (OPEC I), Israel's fiscal and monetary disciplines were significantly weakened. A key factor in this process was a sharp increase in military expenditures with an associated slowdown in economic growth and, consequently, a low growth of the tax base. Government deficits persisted, resulting in a growing public debt. Figure 1 describes the public sector deficit as a percentage of GDP. It shows a sharp increase in the deficit to a level of 12 percent to 20 percent of GDP following the 1973 war. These deficits accumulated to generate a peak public sector debt of 175 percent of GDP at the end of 1984, just before a sharp disinflation policy was implemented. (See Figure 9a for the development of the public sector net debt.) Eventually, the public deficit was partly monetized. Also, weak fiscal discipline must have pushed up wages well above productivity increases (see Figure 2), a trend which was

accompanied by an accommodating monetary policy. Furthermore, controls on capital imports were largely relaxed in October 1977. This occurred when domestic rates of interest were significantly higher than their world counterpart and the exchange rate, though officially flexible, was in practice still severely managed at a rate of depreciation which fell short of purchasing parity. The deviation from purchasing parity favored domestic financial investments. This generated a massive capital inflow which was largely monetized by the managed exchange rate mechanism. The growing public debt gave rise to expectations of future monetization of budget deficits, thereby raising current inflationary pressures (see Sargent and Wallace, 1981). In sum, under the apparently managed exchange rate system, the central bank could not control the money supply: higher interest rates only generated capital inflow and sterilization of the capital flows was to a large extent ineffective. At the same time, with growing budget deficits, any anti-inflation monetary policy would have been severely contractionary, which made this kind of policy politically infeasible. In a nutshell, these factors are the fundamentals behind the eruption of high inflation in Israel in the late 1970s, lasting until mid-1985 (see Figure 3).

In mid-1985, with the external debt reaching a record high of 80 percent of GNP, the government finally decided to get its act together and embarked on a comprehensive stabilization policy which proved remarkably successful. Before that, several attempts had been made at slowing the rate of inflation. These were based on holding back devaluations and/or using administrative measures aimed at restraining price increases or actually freezing prices, even though it was evident that the economic fundamentals were not in line with the "anti-inflation" measures. Most importantly, none of these attempts included a significant budget consolidation. ^{1/}

The distinct feature of the mid-1985 disinflation program was major and severe fiscal and monetary restraint, coupled with a major realignment of key prices. Government subsidies of basic food products and public transportation were severely slashed. In addition, there was a cut in domestic defense spending (following the pullout of the Israeli army from

^{1/} Ruge-Murcia (1995) addressed the issue of credibility of disinflation programs from an econometric perspective. In his application to Israel, he provided evidence as to the lack of credibility of the failed stabilization programs of 1984 and early 1985. The skepticism about the content of spending cuts in the disinflation package explains, in part, the volatility of inflation in this period. In contrast, his estimates show that for the July 1985 program, individual agents correctly inferred that a major shift in regime drives the spending process. Thus, his estimates confirm that the fiscal regime shift was indeed credible and effective.

Figure 1
Total Public Sector Deficit
(In percent of GDP)

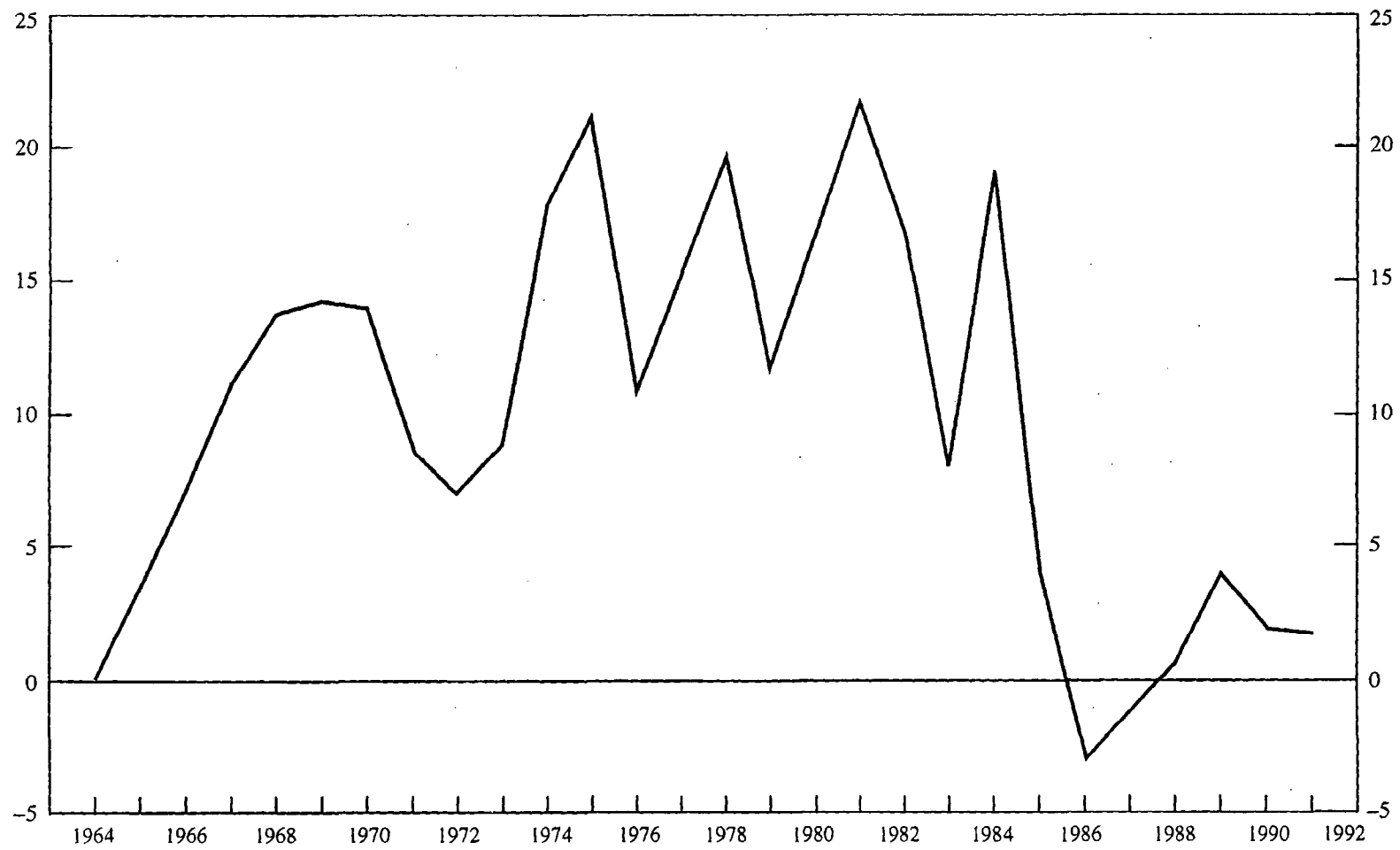
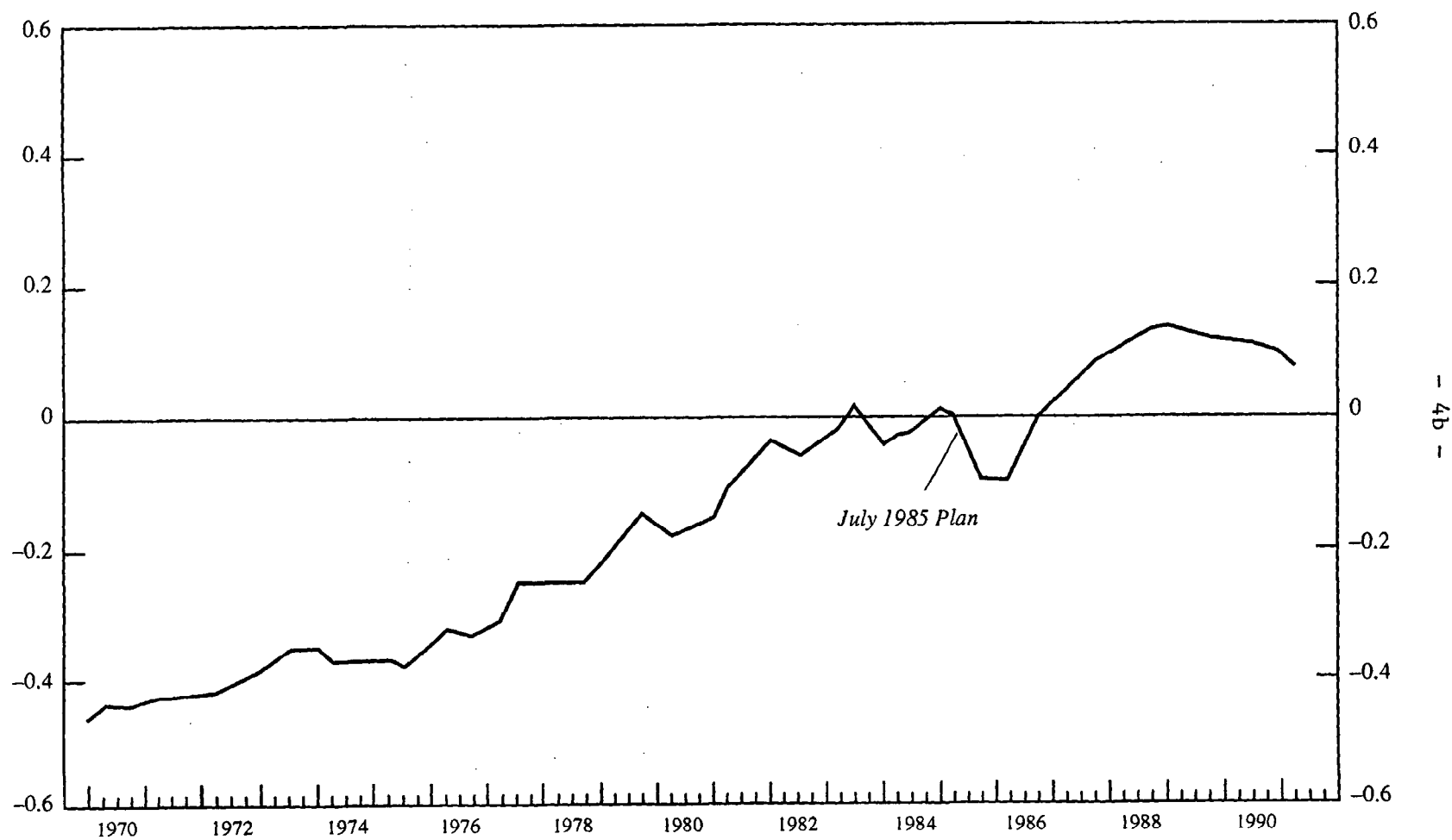
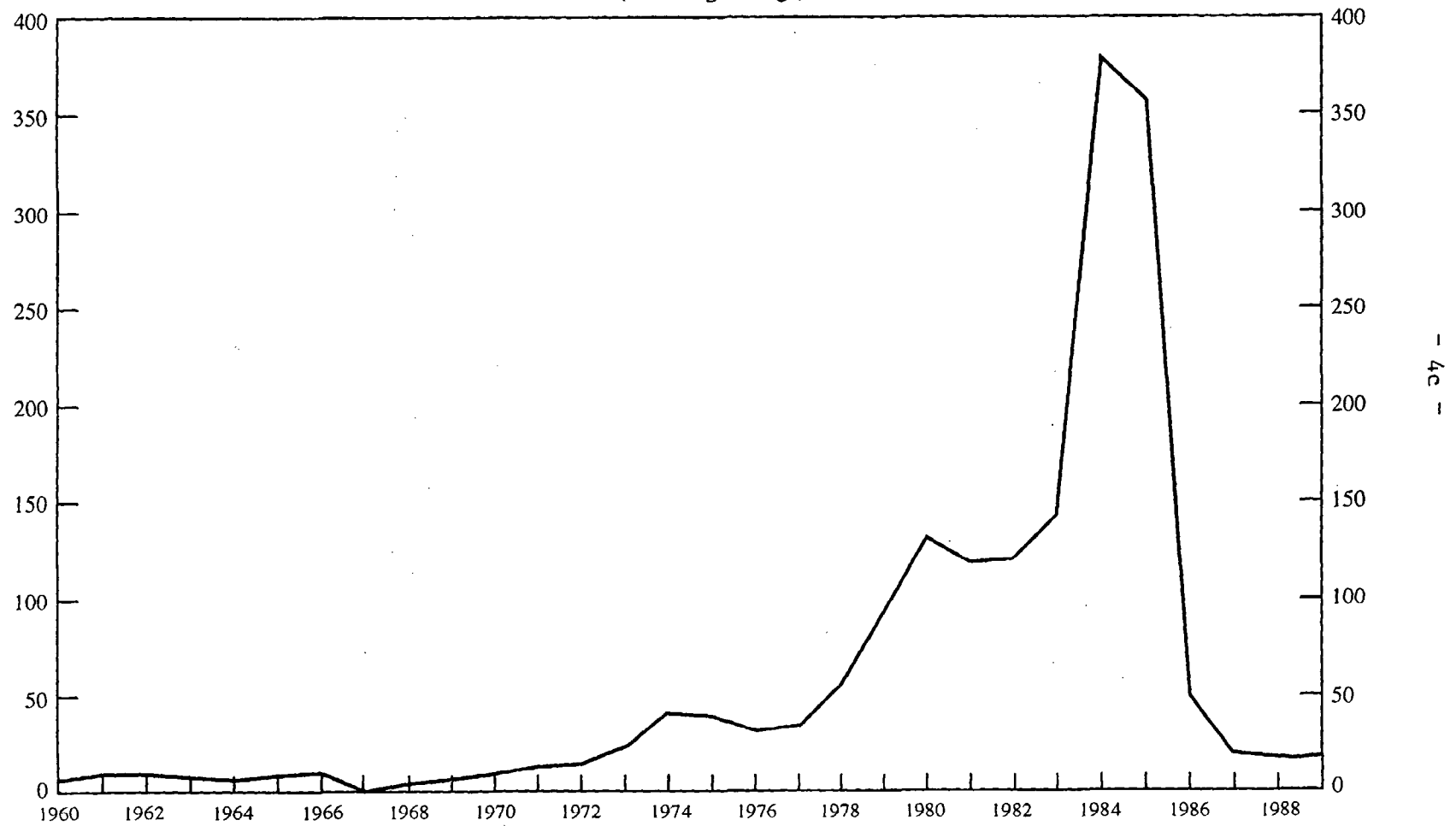


Figure 2
Real Wage in Manufacturing
(Index, 1985 = 0)



Source: Bruno (1993).

Figure 3
Annual Inflation Rate, 1960-89
(Percentage change)



Lebanon). ^{1/} In addition to the significant expenditure cuts, tax revenues increased substantially. A significant part of the increase in tax receipts was a direct consequence of the lower inflation rate. Indeed, when inflation rates are high, the time lapse between accrual of the tax liability and actual payment of that liability erodes the total amount of tax revenue collected in real terms (the so-called Tanzi effect). Thus, when inflation rates drop, real tax collections automatically rise. Another reason for the growth in tax revenues was the adoption of a Blue-Ribbon Commission's recommendations for taxing the business sector under conditions of inflation that tightened the indexation procedures for calculating real income in the business sector for tax purposes. Also, a temporary surtax was levied on the income of self-employed.

Figure 4 shows the effects of the ensuing fiscal restraint. The public sector domestic deficit fell to 0 to 2 percent of GNP, from about 12 percent prior to stabilization. Together with a total of about 1.8 percent of GNP in emergency aid (over a two-year period) provided by the United States Government, this helped to generate an overall budget surplus amounting to some 2 percent of GNP. Despite the pegged exchange rate policy, tight restrictions on international capital movements enabled the monetary authorities to exercise severe restraint. (For instance, a surcharge was levied on financial capital imports.) The effects of the monetary restraint are shown in Figure 5. A curbing of the M3 monetary aggregate (which includes means of payments, interest-bearing unindexed assets, and resident deposits linked to foreign currencies) became immediately apparent after the stabilization program was implemented. The sharp decline in the rate of growth of the money supply came at a time when the demand for money grew drastically due to lower inflation expectations. As a result, monetary restraint also manifested itself through a sharp rise in real interest rates, immediately after the program was implemented (see Figure 6). These measures naturally contributed to a drastic fall in inflationary pressures, and consequently, to an almost immediate economic stabilization.

The realignment of some key prices included, in addition to the cut in subsidies, a remedial adjustment in the exchange rate. The Israeli sheqel was devalued by 42 percent up front. In fact, the exchange rate at that point reached a real level that was not experienced again until recently, 10 years later. Indeed, the deficit cut facilitated the sharp real depreciation in the immediate aftermath of the program. The direct effects of the devaluation and the cut in subsidies on the CPI were

^{1/} Wage and price controls were used in the first few months, immediately after the stabilization program. However, price controls were partial and relatively ineffective. Wages were renegotiated, on a national level, to sacrifice the first cost of living adjustment but to pick up most of the price increases later on. Real wages, which suffered a short-term reduction in the immediate aftermath of the program, increased significantly in the following two years.

initially sterilized from the cost of living adjustment (COLA) to wages. Real wages later recouped this decline within one year (see also Figure 2).

Following the stabilization program, the Government used the exchange rate as a nominal anchor. Together with a fairly tight monetary policy which was reflected in high interest rates (see Figures 5 and 6), the exchange rate peg generated, in line with the Mundell-Fleming hypothesis, a continuous process of real appreciation of the Israeli sheqel. Thus, in the poststabilization phase, tight monetary policy and high interest rates supported the pegged exchange rate in the presence of capital inflows and generated a loss of competitiveness (real appreciation). With a lag of about two years, the policy mix of fiscal and monetary restraint and real appreciation of the Israeli sheqel led the economy into a recession and rising unemployment, very much like the experience of Sweden, Italy, and the United Kingdom prior to the ERM currency crisis of 1992.

IV. Fiscal Contraction and Aggregate Demand

In this section, we analyze the relationship between public and private savings and the effect of fiscal contraction on aggregate demand.

1. Private and public saving rates

The possibility of public debt neutrality has gained renewed interest since Barro's (1974) seminal contribution, "Are Government Bonds Net Wealth?" Specifically, assume a given path of government expenditures. Now, suppose the government cuts taxes and issues new bonds in order to finance the resulting deficit. Naturally, the current disposable income of the private sector rises. The question then is whether the entire current increase in disposable income will be saved by the private sector in anticipation of higher taxes (and the consequently lower disposable income) in the future, needed to finance the larger government debt service. If the answer is in the affirmative, that is, additional private savings completely offset the additional government dissavings, then national saving must remain intact, a phenomenon dubbed "debt neutrality." In this case, government bonds in a nonmonetary economy as in Barro (1974) are not net wealth in the hands of the private sector, since the latter immediately capitalizes the future tax liability generated by increased government debt. Indeed, if capital markets are well functioning (so that there are no liquidity constraints), taxes are nondistortionary, prices are market clearing, and the private sector does not suffer from myopia, debt neutrality is expected to prevail: a debt-financed tax cut has no effect on

Figure 4
Budget Deficit (positive) or Surplus (negative), 1980-1988
(In percent of GNP)

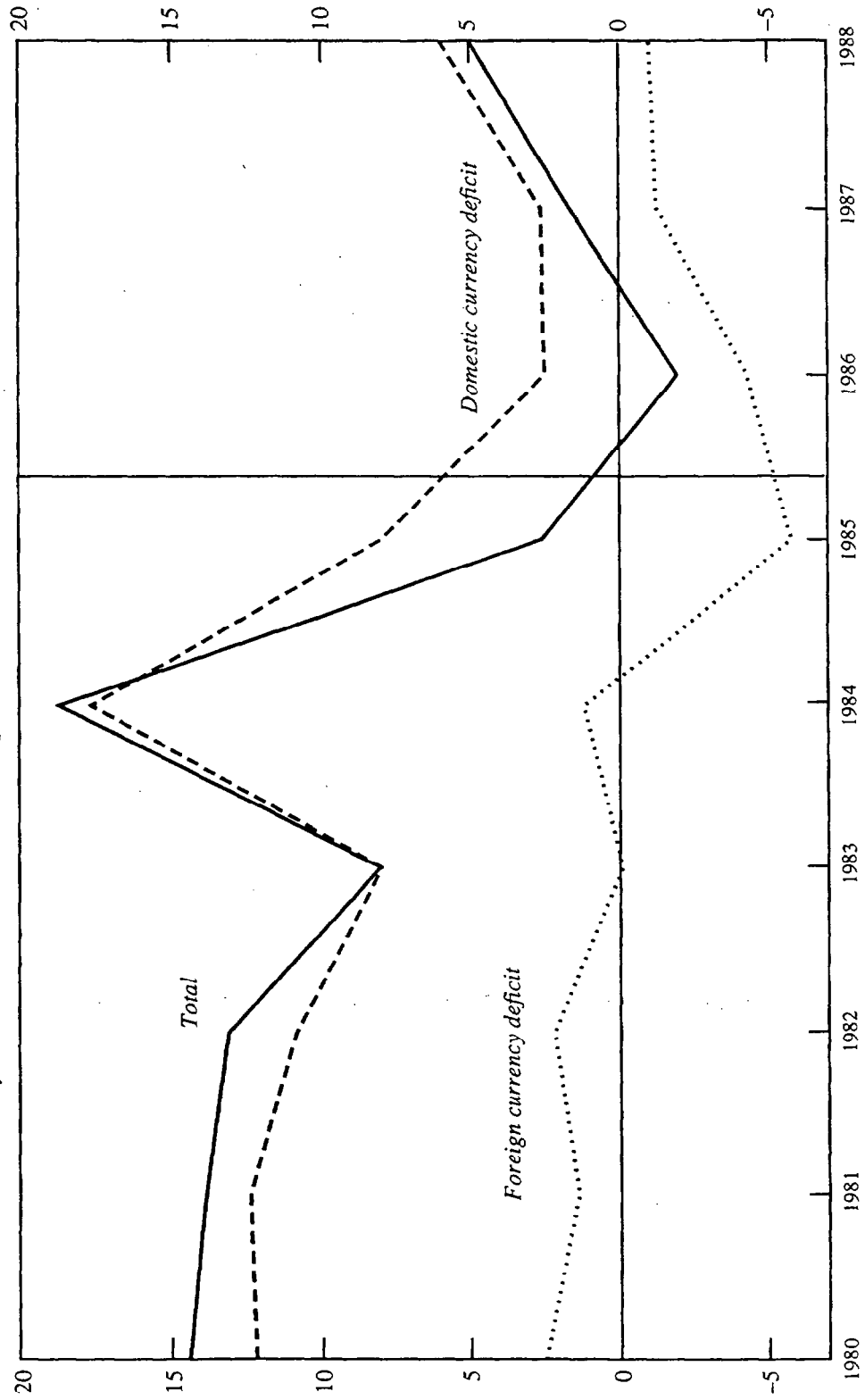


Figure 5
M₃ Developments, 1980-89
(Nominal, quarterly rates of change)

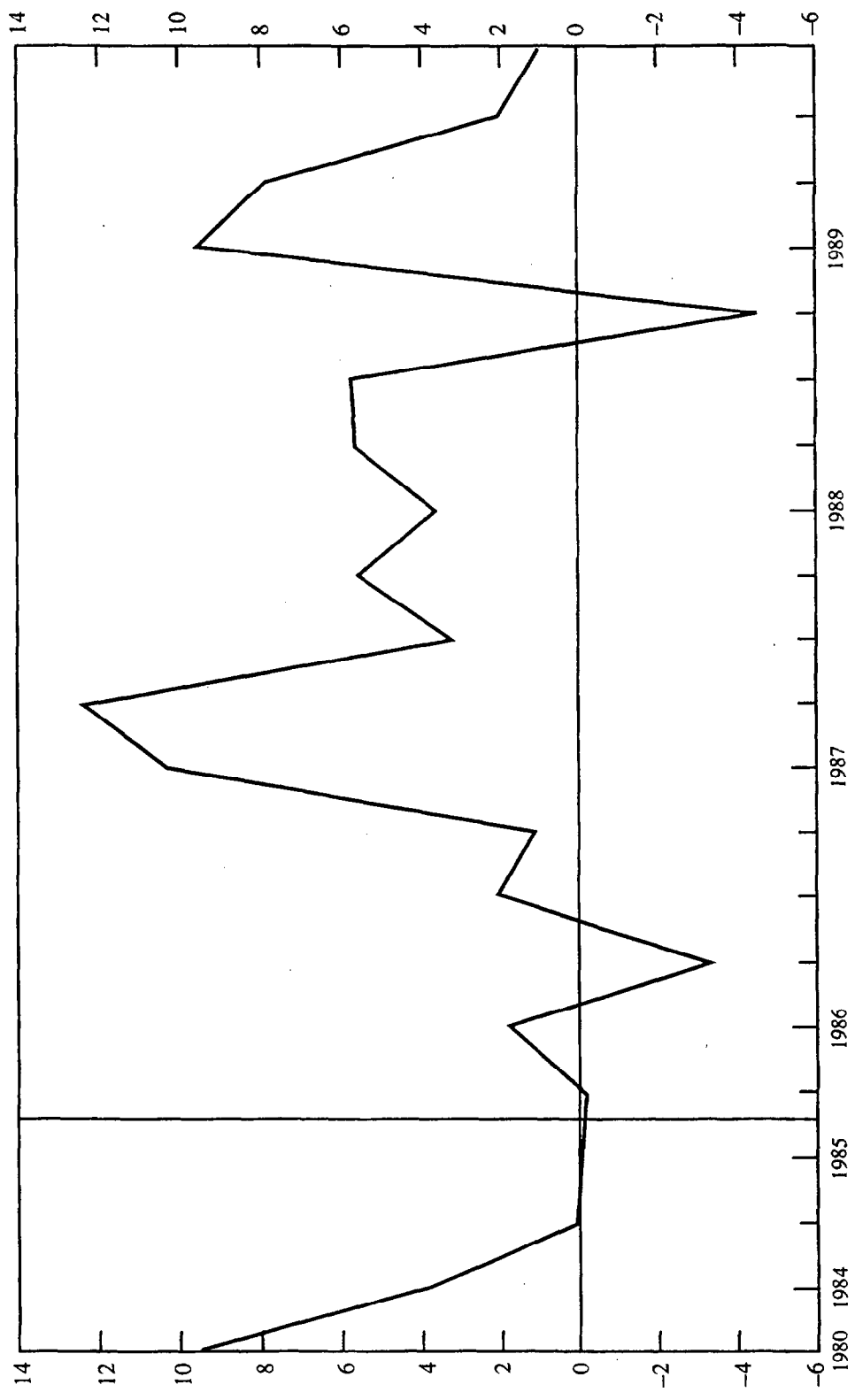
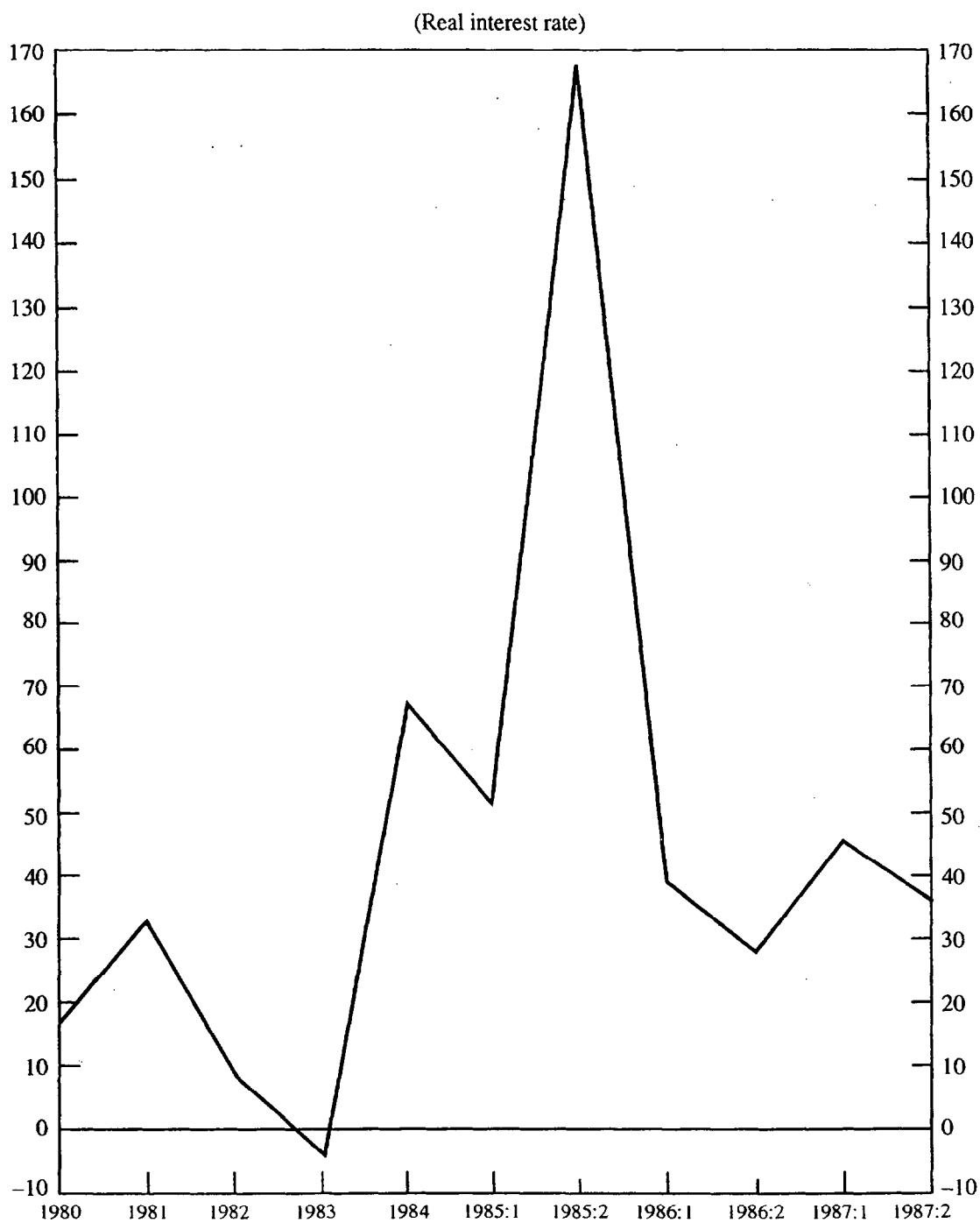


Figure 6
The Real Cost of Bank Credit, 1980-87



national saving. ^{1/} This is in contrast to the more traditional Keynesian notion that such a fiscal measure stimulates private sector consumption and pushes interest rates upward.

As already mentioned, Israel's disinflation program of 1985 involved a sharp reduction in the public deficit. Thus, it can provide a testing ground for the validity of the debt-neutrality hypothesis. Indeed, Figure 7 reveals that when government savings rose after the stabilization, private savings fell so that national savings increased only moderately. Furthermore, this figure shows that the national saving rate, defined relative to a broad measure of income (which includes, in addition to GNP, unilateral transfers from abroad), is fairly trendless; the private saving rate is almost a mirror image of the public saving rate. It can be seen, however, that there was some increase in national saving in 1985-86, after the sharp fiscal contraction which was the backbone of the disinflation program. In other words, the associated decline in private saving was smaller than the increase in public sector saving.

An econometric study of the neutrality of public debt by Leiderman and Razin (1988) centers around the stabilization episode. They implemented a model with two deviations from debt neutrality (consumers with finite horizon and liquidity constraints, but not tax distortions) on monthly data from Israel during the first half of the 1980s. They found some econometric support for the debt-neutrality hypothesis, but only after proper adjustment was made for liquidity constraints. Furthermore, the proportion of liquidity constrained individuals in the population was found to be small (but significant).

Why was the sharp rise in public saving less than fully offset by changes in private saving? We think that the sharp increase in productivity that followed the disinflation program, despite the resulting consumption boom (see below), was the major reason why private saving did not fall to an extent that would fully offset the increase in public saving.

2. Can fiscal contraction be expansionary?

In the presence of significant deadweight losses of taxation, sharp fiscal policy changes could potentially be expansionary (see Giavazzi and Pagano, 1990). Such policy changes generate expectations regarding a future decline in the excess burden of taxes and, thereby, raise current private consumption. This was indeed the case in the fiscal consolidation in Israel, which was accompanied by a significant increase in aggregate private

^{1/} Strict debt neutrality holds under the assumption that each family has an operational bequest motive, based on equating the marginal utilities of all generations. Rising real wages in the future may, however, render the bequest motive nonoperational for some families, since parents are likely to want to receive transfers from their children although such transfers may not be enforceable.

demand. By bringing the fiscal situation under control, stabilization produced a wealth effect that generated a boom. This occurred even though taxes increased in the short run, especially since the success of stabilization came as a surprise that was counter to the expectations which had been ingrained by past divergence between the expenditure path and the tax revenue path.

The sharp cut in the deficit, as a key part of the stabilization program, apparently had a direct effect on inflation, both current and expected, even though by itself it had only a relatively small effect on national savings. A partly monetized current deficit and accelerated public debt, accompanied by an already high tax burden (on a base which was shrinking as a result of inflation) must have generated expectations regarding future monetization of the debt service (à la Sargent and Wallace, 1981) which fed into the current inflation process. Consolidation of the public budget halted this process. Also, the fiscal consolidation put the government squarely into its intertemporal budget constraint, with a low inflation path of prices in the present and in the future (see Woodford, 1996).

The elimination of the public deficit, which was partly achieved through spending cuts, was indeed a key ingredient in the policy to halt inflation--even though it led to growth in private consumption, so that national saving did not change much. ^{1/} An increase in unilateral transfers from abroad, induced mostly by a special grant from the United States, and a sharp fall in domestic investment (driven down by an increased tax burden on capital; see the next section) also helped to eliminate the external current account deficit.

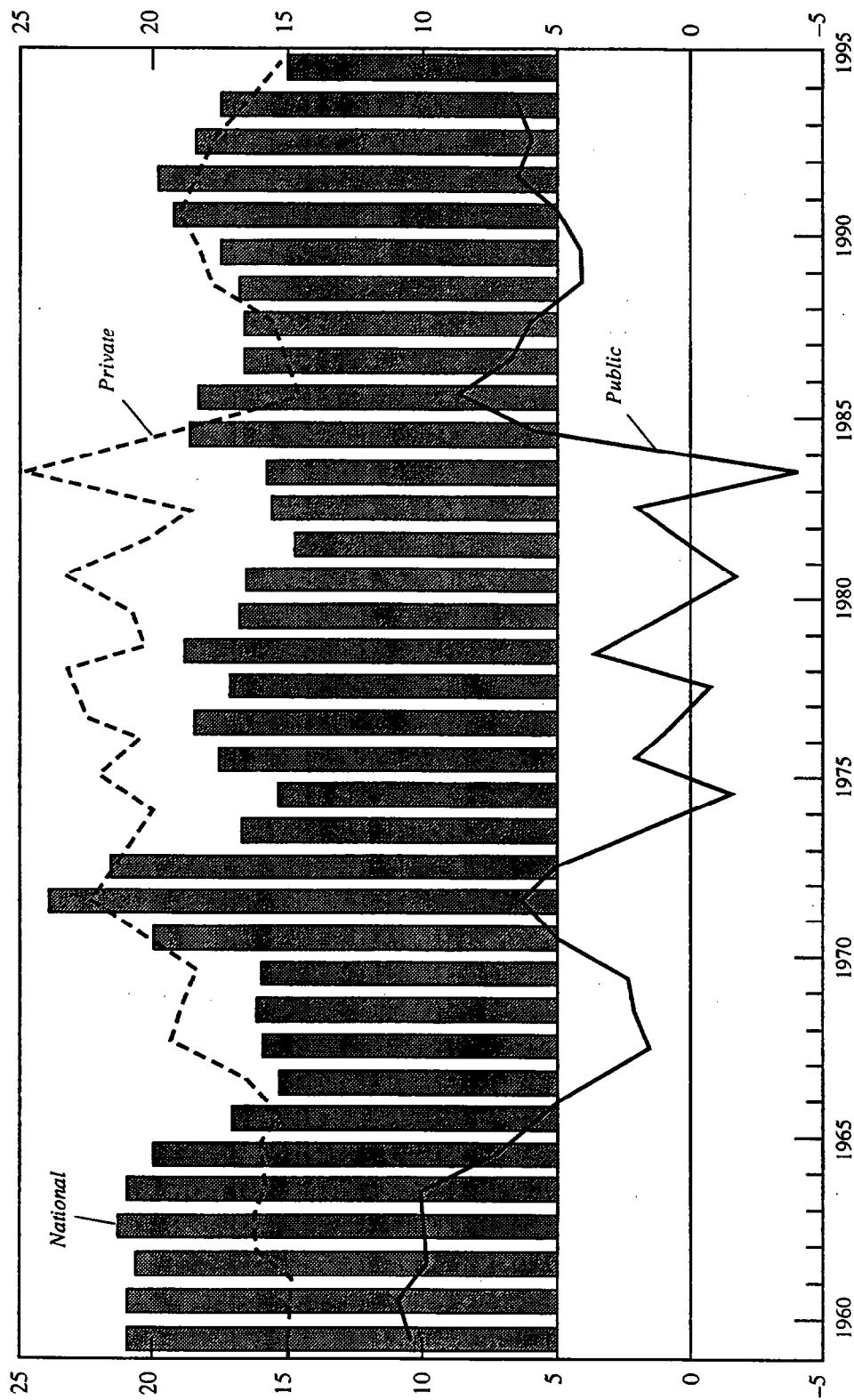
V. Inflation-induced Shift in the Composition of Tax Revenue

The Israeli experience unequivocally suggests that sudden stabilization of the economy generated an automatic increase in tax revenues which, by itself, helped reduce the public deficit. Furthermore, such a stabilization shifted a tax burden from labor to capital. Since the capital stock is fixed in the short run, such a tax shift generated a short-lived consumption-based boom in economic activity (à la Giavazzi and Pagano). However, in the medium (and long) run, the higher tax burden on the accumulation of new capital had a significant negative effect on growth and productivity.

In this section, we uncover a marked shift in the functional distribution of disposable income in the sudden transition from high to low inflation in Israel. As mentioned before, the massive fiscal adjustment, which provided the backbone of the stabilization policy package, reflected

^{1/} Alesina and Perotti (1996) show that successful fiscal contractions are typically those that manage to cut the most politically sensitive budget items: government wages and transfers.

Figure 7
Private and Public Savings
(In percent of GNP plus unilateral transfers)



an increase in tax revenues and a fall in subsidies as well as some spending cuts. The increase in the overall real burden of taxes was not shared equally among income groups and across various tax bases. An effective subsidy to capital that characterized the high inflation period had been switched to a relatively high tax burden on capital in the aftermath of disinflation. At the same time, the real tax burden on labor income declined sharply. Moreover, a large portion of the revenue increase was due to a significant rise in consumption rates (mostly VAT) which, like a wealth tax, entails an equal burden on laborers and capitalists.

Economists have long been interested in the inflation tax, defined as the real depreciation of money holdings. The revenue (seigniorage) obtained by the government is generated because the public holds zero interest-bearing assets in the form of cash, and the government requires commercial banks to hold reserves at much below market rates of interest. Eckstein and Leiderman (1992) found that while inflation fluctuated between 40 percent and almost 500 percent per annum, the ratio of seigniorage to GNP remained between 2 percent and 3 percent. 1/

Tanzi (1977) identified another important and practical aspect of inflationary finance which operates to reduce real tax revenues when inflation rises in the opposite direction to the seigniorage effect. Due to collection lags, defined as the time that elapses between the date when the tax liability accrues and the time when the tax payment is received by the government, inflation causes erosion of the real tax revenue. The collection lag can be shortened to lessen the effect of inflation on the tax system, but such measures are themselves not without costs. For example, when inflation reached triple digits, the filing period for the VAT was shortened from three to one month, thereby increasing both bookkeeping costs and government collection costs. 2/

The experience with inflation in Israel emphasizes yet another aspect of the effect of inflation on the tax system: the difficulty of properly defining taxable income in the business sector. Taxable income in the business sector is calculated according to standard accounting procedures which are nominal in nature. In other words, one sheqel is treated as one sheqel regardless of the date on which it was paid or received. Nominal business income (or profit), that is, revenues (or sales) minus costs, is calculated by adding together sheqalim received at different dates (and having different real values) and subtracting from them sheqalim paid at different dates (and having different real values). When inflation rates

1/ See also Bruno and Fischer (1986). Nevertheless, the welfare costs associated with this relatively small revenue were quite significant and rising with the rate of inflation.

2/ The Bank of Israel's annual report for 1984 estimated that before shortening the collection lag, the loss of tax revenues due to the Tanzi effect had reached about 10 percent of overall tax revenues (see Bank of Israel, 1984, p. 103).

are 100 percent to 500 percent per annum, a beginning-of-the-year sheqel may be worth, in real terms, as much as 2-6 end-of-the-year sheqalim. As a result, nominal income cannot serve as even an approximation of the real income of a business firm in a period of high inflation rates, such as those existing in Israel during the late 1970s and the first half of the 1980s.

Inflation creates several deviations of nominal income from real income. Some of these deviations (or biases) are negative and some are positive, but the main point is that they do not offset each other. Furthermore, their incidence and magnitude are not independent of the taxpayer's behavior. In other words, a typical taxpayer will take certain tax-avoidance actions that will reduce her calculated nominal income even though her real income remains unchanged. In such a case, a higher inflation rate reduces real tax revenues; the tax system thus fails to serve as an automatic stabilizer.

The deviations (or biases) of real income from nominal income that are caused by inflation may be briefly classified into four main categories (for more details see Sadka, 1991, or Razin and Sadka, 1993):

(a) Nominal capital gains on an asset have two components: an artificial or inflationary component that merely reflects an increase in the general price level of all goods and services, and a true, real component that reflects the appreciation in the value of the asset resulting from fundamentals such as increased demand for, or scarcity, of the asset. Thus, nominal income overstates real income by the sum of the inflationary component of capital gains.

(b) Analogous to the distinction between the inflationary and real components of nominal capital gains is the distinction between the inflationary and real components of the interest rate. Thus, allowing deductibility of nominal interest accumulations causes nominal income to understate real income by the sum of the inflationary component of the interest accumulations.

At first glance, one might argue that (a) and (b) above offset each other. On the one hand, inflationary capital gains on an asset are included in taxable income, but on the other hand, the inflationary interest charges incurred for the purpose of acquiring the asset are tax deductible. This argument is invalid on two grounds. First, the purchase of an asset may be financed by equity rather than by debt. Second, capital gains are taxed upon realization whereas interest is deductible on an accrual basis. Thus, the inflationary component of the interest charges is deductible annually, while the inflationary capital gains on the asset purchased will not be taxed until the asset is sold.

(c) The depreciation allowance on a physical asset is calculated on the basis of the nominal (historic) cost of the asset. In this respect, nominal income overstates real income. When the monthly inflation rate reaches double digits, an additional major factor causes nominal income to deviate significantly from real income. This factor, which affects operating income, relates to the nature of the production process, which takes place over time.

(d) Output is usually sold at the end of the production process, while the costs of labor, raw materials, and other inputs are incurred earlier. Thus, output is sold at high (inflated) nominal prices, relative to the low nominal prices of the inputs. As a result, the nominal operating income overstates the real operating income.

One might conclude that since the various deviations of nominal income from real income are not all of the same sign, the effect of inflation on nominal taxable income, vis-à-vis real income, is ambiguous. However, such a conclusion ignores the long-run response of the taxpaying firm to the effect of inflation on nominal income. In the long run, firms will take various tax-avoidance measures in order to reduce nominal taxable income. For instance, they will rely to a lesser degree on equity capital and invest more and more in buildings and real estate. Such tax-avoidance activity is further fueled by changes that are made in tax laws in the wake of inflation--changes that are typically partial, unbalanced and usually aimed at relieving the burden on those sectors negatively affected by the tax treatment of inflation. Indeed, one of the first measures taken in Israel was to exempt from tax (or tax very lightly) inflationary capital gains without, at the same time, disallowing the deductibility of nominal interest charges.

Quantitatively, therefore, the deductibility of nominal interest charges combined with light taxation of capital gains (for example, real estate investments were effectively subsidized) was a main reason for the understatement of capital income. Furthermore, the law permitted self-employed individuals and proprietorships to manipulate the timing of their cash receipts and payments (vis-à-vis some sectors of the economy which were indexed and thus indifferent to such manipulations) in a way that reduced taxable income to ridiculously low levels. In fact, this sector of the economy benefitted the most from inflation.

Unlike taxpayers in the business sector, wage earners cannot maneuver the time schedule of their wage payments in order to reduce their real tax burden because of the withholding system. This system ensures that any manipulation of the timing of cash receipts for wages earned will have a negligible--if any--effect on real tax payments.

The bottom line is that inflation stabilization is expected to raise the burden of taxes such as income taxes on the business sector and the VAT, and to reduce the tax burden on wage earners. To confirm this hypothesis,

we computed effective average tax rates during and after the inflation stabilization period.

Our computation was based on a stylized tax model in which the economy is aggregated to have three goods: consumption, labor, and capital (see Razin and Sadka, 1993, for details). ^{1/}

^{1/} Tax revenue is classified according to taxes on labor income, capital income, and excise taxes. In our three-good economy the transfers, b , government good purchases, g , and taxes, t , should be understood as (three-tuple) vectors in line with the three-good disaggregation. For example, the first component of the b -vector, b_1 , denotes government transfers in terms of the consumption good, while the second and third components, b_2 and b_3 , are transfers in terms of labor and capital. In the case of transfers, however, the last two components of b are typically zero. Similarly, on the expenditure side, g_1 denotes purchases of the consumption good, g_2 denotes government hiring of labor services, and g_3 denotes government hiring of capital services from the private sector. The tax vector, t , consists of rate of excises, t_1 , rate of labor income tax, t_2 , and rate of capital income tax, t_3 . We denote the consumer price vector by p (that is, the posttax price) and the producer price vector (that is, the pretax price) by q . The tax rates are computed from the good-by-good percentage difference between the price vectors p and q . For example, the excise tax rate (in percent) is given by $[(p_1 - q_1)/q_1] \times 100$.

Using this notation, the household budget constraint is specified as follows:

$$px - pe - pb - qy - q_1 B_1^P + p_1 D_1 \leq 0 \quad (1)$$

where, x , e , b , and y denote consumption, endowments, government transfers, and production, respectively; B_1^P denotes the private sector current-account deficit, and D_1 denotes the public-sector deficit. Note that by convention, the first component of the production vector, y_1 , which denotes the private-sector gross output, is positive, while the second and third components, y_2 , and y_3 , denoting, respectively, labor and capital inputs, are typically negative. Note also that under the assumption of constant returns to scale in production, the value of the output vector in producer prices, qy , must equal zero. Otherwise, there are infinite profits to be made and this is inconsistent with competitive equilibrium.

An immediate implication of this simplification is that in the single-period model, saving (which is equal to future consumption) must be added to current consumption in order to obtain a meaningful indicator of the economy (lifetime) consumption. Similarly, government deficit (representing future taxes) is lumped together with current taxes to get a meaningful measure of the overall tax revenue.

Table 1 describes the evolution of effective average tax rates from the high-inflation period to the low-inflation period. The table reveals that the effective average tax rate on consumption went up from 6-12 percent during the period of high inflation to 22 percent in 1990. This is due to VAT rate hikes, cuts in subsidies to necessities (mostly food and public transportation), and the curbing of the Tanzi effect. The effective average tax rate on labor went down from 31-32 percent during the high-inflation period to 19 percent in 1990. The effective tax rate on capital, which was negative in the high-inflation period, went up and exceeded the labor income tax rate in 1990. As explained above, this is due mostly to the fact that inflation erodes the real tax base in the business sector. ^{1/} In fact, taxes on wage earners accounted for approximately two thirds of all income tax revenues on the eve of the stabilization program, compared to only about one third nowadays.

Table 1. Effective Average Tax Rates

(In percent)

Type of Tax	1980	1985	1990
Consumption	6.4	12.1	22.3
Labor income	31.0	31.6	19.2
Capital income	-4.4	-34.8	34.5

^{1/} This change occurred even though statutory tax rates on business income were sharply reduced.

VI. What Factors Caused the Postdisinflation Immediate Boom and Subsequent Recession?

An interesting issue is why, in the aftermath of the 1985, stabilization program, there was first a boom and later a recession. In this section, we offer two possibly reinforcing explanations: (1) a shift in the tax burden from labor to capital; and (2) exchange rate policy. Interestingly, the first explanation has to do with a long-term, credible restructuring of the tax system, while the second, associated with an unsustainable overvaluation of the exchange rate, is based on the policy not being fully credible.

1. A tax-based cycle

Recall the shift of the tax burden from labor to capital as a consequence of drastic disinflation. The lighter tax on wage income could have helped fuel the consumption boom, together with the wealth effect emanating from the elimination of inflation-based distortions. The effect of the shift towards a high capital income tax rate can explain why a recession came later, since the capital formation which is directly affected adversely by this tax is typically a slow process. But the tax burden on capital could eventually have caused the decline in the rate of growth of capital and recession. Indeed, while disposable wages showed a sharp increase (after a very short decline in the first quarter after the mid-1985 program), the capital income tax effect (along with the detrimental effect of a high short-term interest rate) seems to be the reason, along with the high short-term rates of interest, behind the fall in the investment-output ratio. The fall in investment spending led to a sharp decline in the capital-output ratio of the business sector, which went down from about 1.8 before 1985 to about 1.5 in 1990.

2. An exchange rate-based cycle

Using the exchange rate to accomplish further disinflation after the stabilization program led to persistent real appreciation. An examination of similar episodes in high-inflation countries suggests the possibility of a common pattern for exchange-rate-based stabilization programs. (See Kiguel and Liviatan, 1992; and Calvo and Vegh, 1993.) Those countries which rely on the exchange rate as a nominal anchor experience a poststabilization boom in economic activity, a large real exchange rate appreciation, and a rise in real wages. Later on in the programs, real appreciation of the domestic currency and a rise in real wages eventually lead to a sharp economic contraction.

One possible explanation is that the private sector may regard the appreciating path of the exchange rate as unsustainable, because it generates persistent current account deficits, which at some point in the future will call for a policy reversal. But an overvalued currency which is perceived to be temporary could generate a consumption boom because it creates incentives to shift consumption from the future to the present, that

is, a consumption cycle which drives the postdisinflation business cycle. However, the 1985 stabilization started with a large real depreciation so that the 1986-87 consumption boom took place when the real exchange rate was relatively low (see Figure 8). With this as a background, it is not very plausible that strong expectations regarding exchange rate policy reversals in the near future could have been developed so as to sustain significant intertemporal substitution in consumption. Thus, in the case of the Israeli stabilization episode, the exchange-rate-based explanation is not convincing.

3. Fiscal discipline

It could be argued that while fiscal discipline was very tight immediately after stabilization, it gradually became more lax later on. The Mundell-Fleming model predicts that this pattern of the fiscal stance can deliver a gradual process of real appreciation. This could have contributed to the emergence of the recession down the road. 1/

4. Another effect

As we describe in Razin and Sadka (1995a), overvaluation of the exchange rate implies that the prices of low labor-intensive tradable goods fall relative to the prices of high labor-intensive nontradable goods. Thus, through the Stolper-Samuelson (1941) effect, wages rise relative to capital rental values. This change in relative prices could help explain why the (pretax) share of labor income in GDP has increased significantly. 2/ Similar to the tax shift noted above, this income

1/ According to Frenkel, Goldstein, and Masson (1991) and Giavazzi and Pagano (1988), fixed exchange rates afford more fiscal discipline than flexible exchange rates, because by adapting a lax fiscal policy under the fixed exchange rate system, international reserves will eventually be exhausted; thus putting an end to the peg. The collapse of the system is costly for the authorities. Therefore, the fear of suffering political punishment will discipline the fiscal authorities under the fixed exchange rate system. However, as argued by Tornell and Velasco (1995), there is also a similar flip side to a lax fiscal policy under a flexible exchange rate system. Unsound policies lead to an immediate depreciation of the currency (hence inflation). Since inflation is costly for the fiscal authorities, forcing the political costs up-front in the flexible system can provide more fiscal discipline.

2/ There is a striking similarity to the German episode in the early 1920s. In the aftermath of the successful disinflation, there were negligible transitional costs since neither industrial production declined nor unemployment rose (see Garber, 1982). The German economic decline started one to two years after the sudden end to hyperinflation. In the German post-disinflation period, the relative prices of labor-intensive goods increased together with the wage-rental ratio, and there was a significant increase in the share of labor in national income.

redistribution between labor and capital could have been a driving force behind the postdisinflation cycle.

VII. Tax Smoothing, Labor Supply Bulges, and Government Finances

When the government levies taxes, it not only transfers resources from private hands to public use. The tax-transfer process also entails some waste of resources. In other words, when the government raises one dollar in tax revenues, private losses amount to more than one dollar. The difference between the loss and tax revenue is called the excess burden (or the deadweight loss) of taxation. Some important studies have shown that the deadweight loss can be very substantial and, at the margin, reach as much as 50 cents per dollar of tax revenues. 1/2/

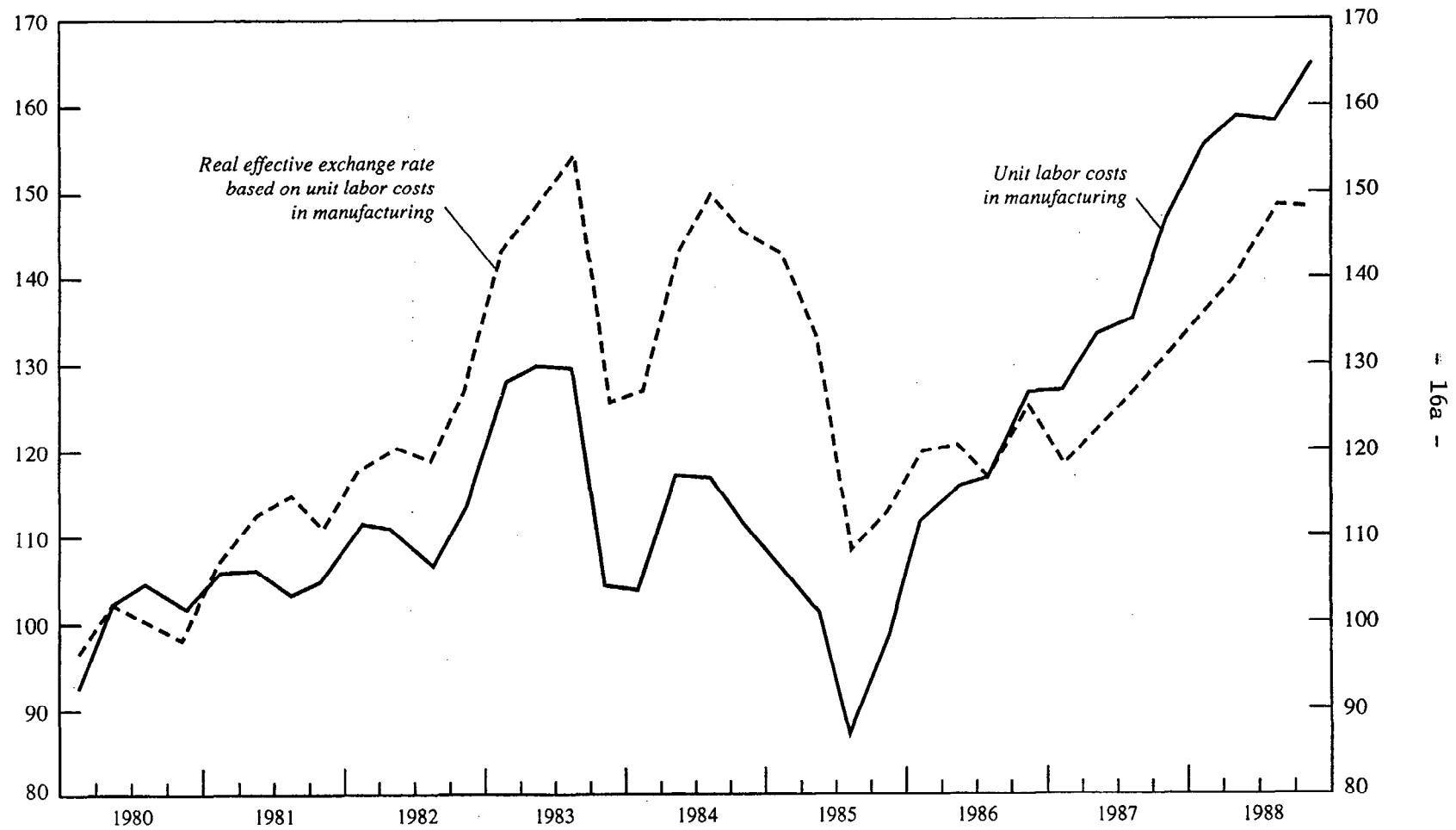
This all means that it would not be optimal to maintain a continuously balanced budget by raising tax rates whenever spending increases or output falls. Rather, if these changes are not persistent, it is desirable to adjust tax rates only slightly and let future taxpayers chip in by raising the deficit and, consequently, the debt. Similarly, a transitory fall in spending or increase in output should not be met by one-to-one cuts in tax revenues. Instead, surpluses should be created and the public debt reduced. An implication of this policy prescription is that the ratio of the public debt to GNP cannot by itself serve as a policy target in the short run. On the contrary, the deficit should serve as a short-run shock absorber for nonpersistent shocks in spending and/or output. That is, the fluctuations followed by the public debt are a mirror image of the tax-smoothing policy prescription. It is only in the framework of multiyear averages that the ratio of public debt to GNP can serve as an important target of public policy.

Hercowitz and Strawczynski (1994) confronted the tax-smoothing policy prescription with evidence from Israel during the years 1961-89. They specified stochastic processes for the deviations of output and government spending from a common linear trend over time. Assuming a constant average tax burden (à la tax-smoothing hypothesis), they derived the implied path for the evolution of the public debt as a function of these deviations. Their method of analysis was built on the premise that the average tax burden was in fact fairly constant and the evolution of public debt was mainly determined by variations in expenditure. The derived debt evolution is shown to fit the data relatively well, thereby seemingly supporting the tax-smoothing hypothesis. However, their methodology lumps together

1/ See, for instance, Browning (1987). Furthermore, it is likely that the marginal excess burden rises when the average tax burden (as measured by the ratio of tax revenues to GNP) rises. Therefore, an optimal long-term tax design, which aims at minimizing the present value of the stream of excess burdens, would tend to smooth the path of tax burden over time.

2/ See Barro (1979).

Figure 8
Unit Labor Costs and Real Effective Exchange Rate¹
 (In U.S. dollars, 1980 = 100)



¹Real effective exchange rate compares Israel's unit labor costs to a trade-weighted average for 17 trading partners.

tax-smoothing episodes (such as a war period), with others, which are evidently inconsistent with the tax-smoothing hypothesis during the high-inflation period (such as the sharp growth of public debt).

A brief overview of the evolution of the public debt, output, and government spending can also serve to illustrate the validity of the tax-smoothing hypothesis (see Figure 9). Noteworthy is the period 1966-78 which covered two wars (the Six-Day War of 1967 and the Yom Kippur War of 1973). As seen in Figure 9b, this period was characterized by a significant growth of government spending (led by defense expenditures), well above the growth of output: the percentage of government spending out of GNP rose from 40 to 80 with two discrete jumps in 1967 and in 1973. Evidently, tax burdens were not raised accordingly, so that the ratio of public debt to GNP, as depicted in Figure 9a, rose from about 60 percent to 150 percent. In the period following the 1985 stabilization, the ratio of public spending to output fell significantly, but again tax burdens did not follow suit, and the public debt to GNP ratio fell sharply. Indeed, the prestabilization period is a striking example of significant deviations from tax smoothing. Accumulating deficits tend to shift intertemporally the bulk of the tax burden into the future, thereby reducing consumers' real wealth. Thus, by suddenly halting the process of growing public debt, as was the case with the successful stabilization policy, the government was able to restore some intertemporal balance to the burden of taxes. This is a plausible reason why the tax hike elements of the stabilization policy were initially expansionary (similar to the Giavazzi-Pagano effect).

In this context, special attention should be devoted to the recent immigration experience. During the years 1990-94, about 600,000 immigrants, mostly from the countries of the former Soviet Union, arrived in Israel (about 12 percent of the premigration population of Israel). Civilian government spending for the absorption of these immigrants (housing, training, investments in infrastructure, etc.) rose significantly. The government adopted a labor absorption policy which facilitated the job search process for the immigrants. The housing market response to immigration, aided by various government incentives, was a key element in enhancing the mobility of labor. 1/

1/ The government followed a "direct absorption" approach designed to minimize involvement in the absorption process. The budget provided a standard "absorption basket" of about US\$7,000 per family of three during the first year as the main economic assistance instrument, and the immigrants themselves were left to determine the best use of their resources and location of residence and work. In addition, the budget included other immigration-related outlays for: (i) construction of housing and mortgage lending; (ii) language and professional training; (iii) wage subsidies for new employees in the manufacturing and construction sectors for a limited time; and (iv) enhanced infrastructure and education expenditures. The relatively free mobility of immigrants across jobs and geographical areas contributed significantly to the quick integration of immigrants into the labor market.

In spite of a curb on defense spending and other public services, the budget deficit rose significantly at first. However, government finances in a broader sense did not worsen, as the ratio of public debt to GDP declined.

A key to the successful integration of immigrants into the labor market was that real wages in Israel, particularly in the business sector, proved more flexible than envisaged by many economists. Unit labor costs fell, and together with a housing elastic supply, stimulated a revival of output growth (see the set of labor market indicators in Figure 10). At the same time, inflation did not pick up. On the contrary, the rate of inflation in 1992 decreased to a one-digit level for the first time since the Yom Kippur War of 1973. Output growth reached an annual average rate of about 6 percent. As a result, the ratio of government spending to GNP fell from 58.7 percent in 1990 to 54.0 percent in 1994. Interestingly, tax burdens did not fall to the same extent, so that the public deficit, as a percentage of GNP, declined from 4.2 percent in 1990 to 1 percent in 1994. Similarly, as mentioned above, public debt fell from 124 percent of GNP at the end of 1989 to 92 percent at the end of 1994.

Israel thus provides a striking example of a sudden increase in the labor force that has been smoothly absorbed, generating output growth, no inflation, and a fall in the public debt to output ratio. Although German unification provides another example of tax smoothing, it is in the opposite direction to the Israeli migration experience. German unification which amounted to absorption of about 17 percent of the labor force of preunification West Germany, similarly required massive government spending, but it did not simultaneously generate output growth. As a result, the ratio of public spending to output rose sharply in Germany. The tax burdens did not immediately rise to the same extent. Large public deficits ensued, resulting in a growing public debt to output ratio. The main difference in the Israeli experience as compared to Germany is that the Israeli immigrants got jobs whereas the East German workers lost jobs. Indeed, while the East German workers priced themselves out of the market (thanks to strong trade unions and the East-West currency union at terms which were unfavorable to East German employment). Accordingly, real wages in Israel fell while East German wages increased (see Figure 10). ^{1/}

^{1/} When wages are rigid (due to unionism, search costs, efficiency wage elements), migration, or labor market integration of two previously separate markets, may lower the income of the established population (see Razin and Sadka, 1995b). Relatively low job search and labor mobility costs, combined with a flexible housing market, and wage flexibility, can explain why there has been little resistance to migration in Israel, whereas resistance is relatively strong in some European countries.

Figure 9a
Public Debt
(In percent of GNP)

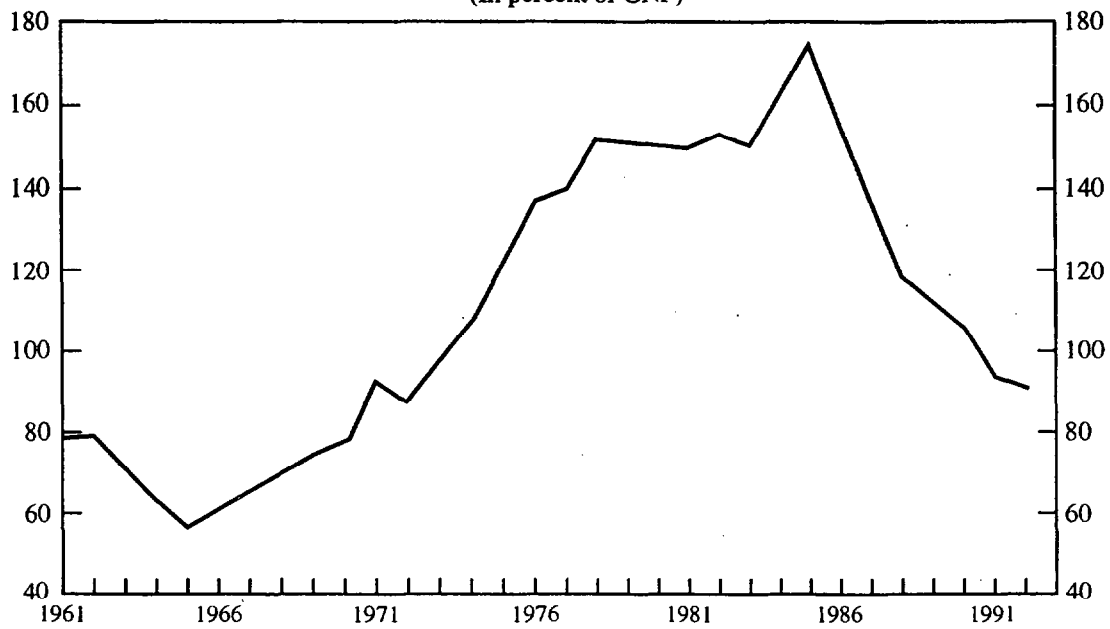
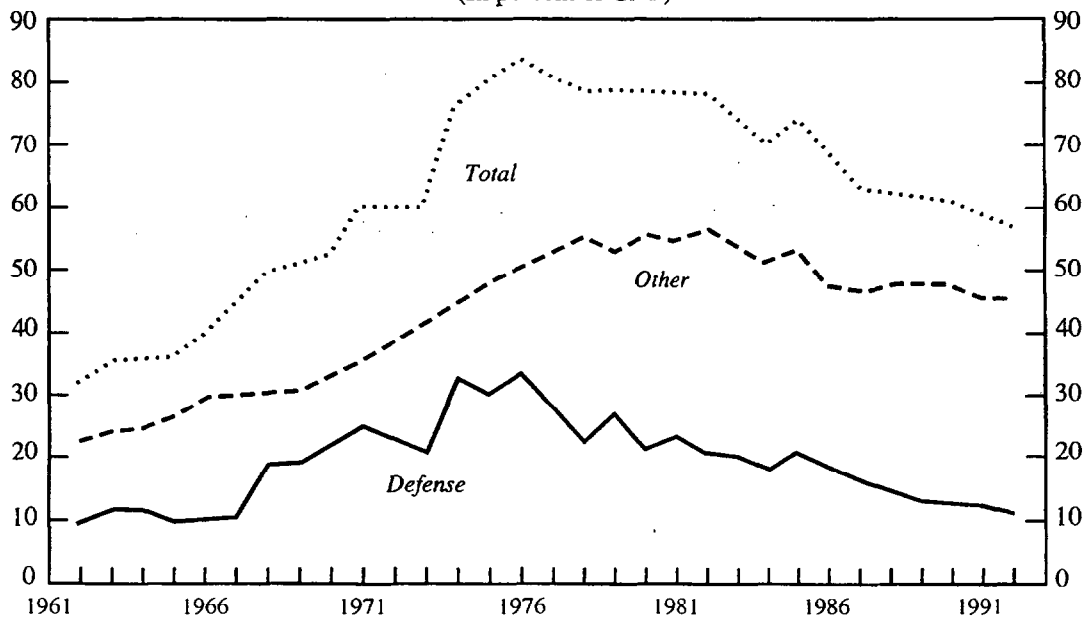
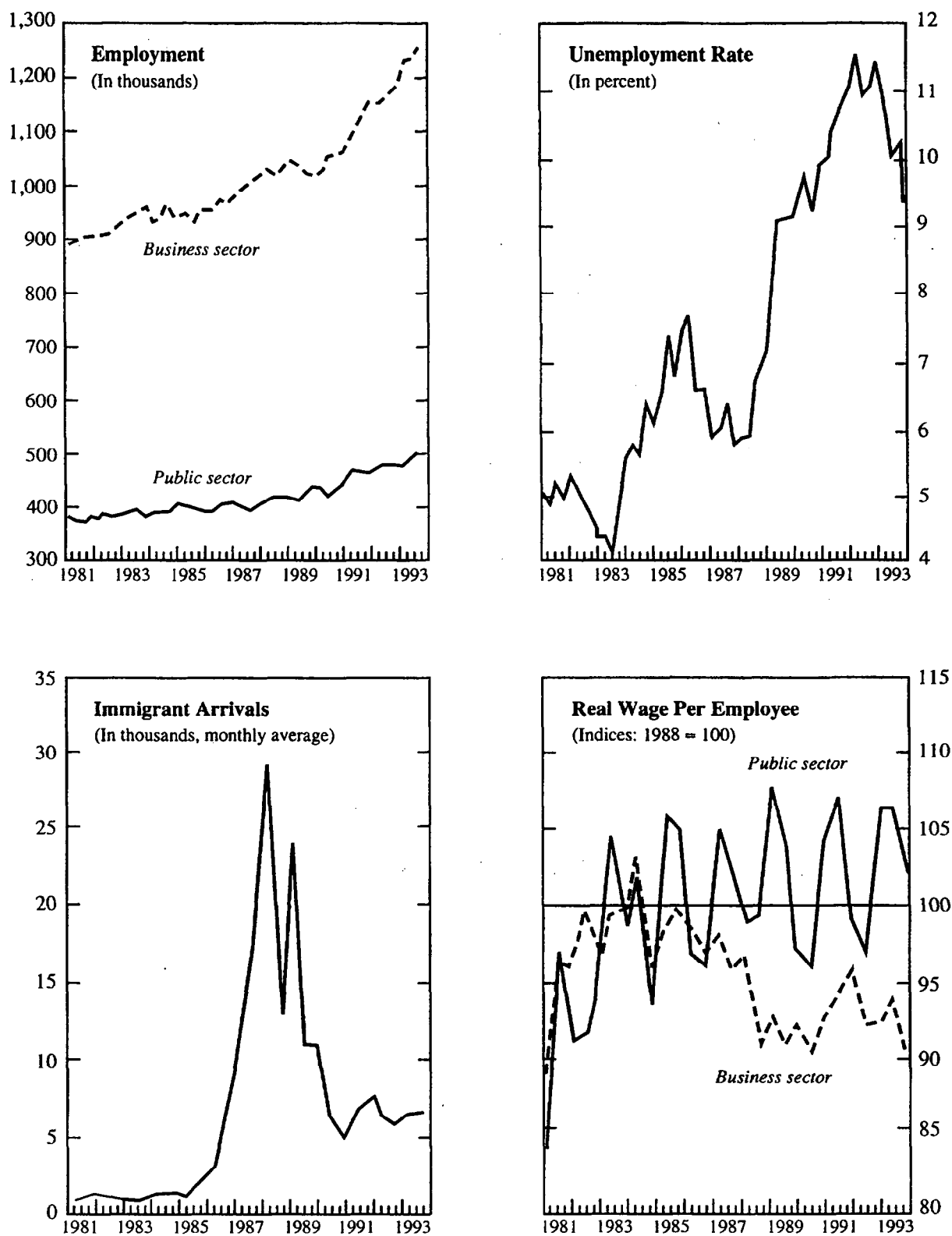


Figure 9b
Public Spending
(In percent of GNP)



Source: Hercowitz and Strawczynski (1994).

Figure 10
Selected Labor Market Indicators



Source: Bank of Israel.

VIII. Conclusions

The main conclusions from Israeli budgetary developments may have a general validity: (a) deficits lead to inflation and stopping inflation requires elimination of deficits; (b) a major effect of inflation is a large shift of the tax burden from capital to labor; (c) aggregate demand effects of fiscal stabilization are not large due to debt neutrality, in low-debt cases; (d) aggregate demand may rise with severe fiscal contractions in high-debt cases; (e) when the exchange rate is used as a nominal anchor, in the presence of international capital movements, the economy typically ends up with overvalued currency, which eventually leads to recession; (f) inflation-induced and disinflation-induced redistributions of the tax burden between capital and labor cause a poststabilization output/employment cycle; (g) shocks to labor supply, such as massive labor inflow through immigration, can be absorbed without worsening government finances when the labor and the housing markets are sufficiently flexible; and (h) productivity increases with a significant lag, however, in the presence of a large inflow of skilled labor. Only after jobs have been upgraded to accommodate the skills which the new workers bring with them, will there also be productivity gains. Furthermore, the learning by doing on downgraded jobs that these workers initially accept will also show up as an increase in productivity with a significant lag.

The main policy lesson that could be learned from the Israeli experience is that the absence of budget discipline, coupled with an almost inevitable monetary accommodation, will eventually fuel an inflationary process that could run out of control. The huge budgetary expansion in Israel and the associated monetary expansion were initiated by wars and severe terms-of-trade shocks (the oil crises). At the same time, there were the usual attempts in a democracy to "cater to the people" through subsidies to necessities, other transfers, cheaper public education, as well as some "supply-side economics" measures. As we have shown, the emergent inflation proved in the end to be extremely detrimental to income distribution objectives, to factor productivity and to economic growth. Inflation undermined the tax system and tilted the income distribution in favor of capital and against labor. Even worse, the inflation-induced tax concessions to capital that were highly distortionary without having any positive effect on growth.

Several attempts to curb inflation without fiscal consolidation were made but proved futile. A critical element in the successful stabilization policy of 1985 was the elimination of the fiscal deficit. The restoration of the tax system, with a background of a relatively stable economy proved beneficial to labor. Interestingly, in this episode, private savings reacted to a large extent according to the debt-neutrality hypothesis "à la Ricardo."

Another interesting aspect is that the budgetary expansion associated with absorption of the massive wave of immigration from the countries of the former Soviet Union was not reflected in growth of public debt relative to

output, even though the tax burden was not raised. This surprising outcome occurred because output was capable of responding swiftly to the increased aggregate demand, by utilizing excess capacity of capital (residual of the poststabilization recession) and high-labor-force participation rates among the newcomers.

REFERENCES

- Alesina, Alberto, and Roberto Perotti, "Reducing Budget Deficits," Swedish Economic Policy Review (1996).
- Bank of Israel, Annual Reports (1984).
- Barro, Robert J., "Are Government Bonds Net Wealth?", Journal of Political Economy, Vol. 82 (1974), pp. 1095-1117.
- , "On the Determination of Public Debt," Journal of Political Economy, Vol. 87, No. 5 (1979), pp. 941-71.
- Bruno, Michael, Crisis, Stabilization and Economic Reform: Therapy by Consensus (Oxford: Oxford University Press, 1993).
- , and Stanley Fischer, "Israel's Inflationary Process: Shocks and Accommodation," in: Yoram Ben-Porath (ed.), The Israeli Economy: Maturing Through Crises (Cambridge, Massachusetts: Harvard University Press, 1986).
- Browning, Edgar, K., "On the Marginal Welfare Cost of Taxation," The American Economic Review, Vol. 77, No. 1 (March 1987), pp. 11-23.
- Buffman, Gil, and Leonardo Leiderman, "Israel's Stabilization: Some Important Policy Lessons," in: Rudiger Dornbusch and Sebastian Edwards (eds.), Reform, Recovery and Growth: Latin America and the Middle East (Chicago, Illinois: University of Chicago Press, 1994), pp. 177-222.
- Calvo, Guillermo, and Carlos A. Vegh, "Exchange Rate-Based Stabilization Under Imperfect Credibility," in: Helmut Frisch and Andreas Wargotter (eds.), Open Economy Macroeconomics (London: MacMillan, 1993), pp. 3-28.
- Eckstein, Zvi, and Leonardo Leiderman, "Seigniorage and the Welfare Cost of Inflation," Journal of Monetary Economics, Vol. 29 (1992), pp. 389-410.
- Frenkel, Jacob, Morris Goldstein, and Paul Masson, "Characteristics of a Successful Exchange Rate System," Occasional Paper, International Monetary Fund (Washington), No. 82 (July 1991).
- Garber, Peter M., "Transition from Inflation to Price Stability," Carnegie-Rochester Conference Series in Public Policy, Vol. 16 (1982), pp. 11-42.
- Giavazzi, Francesco, and Marco Pagano, "The Advantage of Tying One's Hand: EMS Discipline and Central Bank Credibility," European Economic Review (June 1988).

- _____, "Can Severe Fiscal Contractions be Expansionary? Tales of Two Small European Countries," NBER Macroeconomics Annual (1990), pp. 75-116.
- Helpman, Elhanan, and Assaf Razin, "Exchange Rate Management: Intertemporal Tradeoffs," American Economic Review, Vol. 77 (1987), pp. 107-23.
- Hercowitz, Zvi, and Michel Strawczynski, "Public Debt Policy" in Israel, Bank of Israel Discussion Paper Series No. 94.06 (April 1994) (in Hebrew).
- Kiguel, Miguel, and Nissan Liviatan, "The Business Cycle Associated with Exchange Rate Stabilization," World Bank Economic Review, Vol. 6 (1992), pp. 279-305.
- Leiderman, Leonardo, and Assaf Razin, "Testing Ricardian Neutrality with an Intertemporal Stochastic Mode," Journal of Money, Credit and Banking, Vol. 20, No. 1 (1988), pp. 1-21.
- Razin, Assaf, and Efraim Sadka, The Economy of Modern Israel: Malaise and Promise (Chicago, Illinois: The University of Chicago Press, 1993).
- _____, "Israel's Disinflation: Taxation and Income Distribution," International Journal of Finance and Economics, Vol. 1, No. 1 (1995a) pp. 37-46.
- _____, "Resisting Migration: Wage Rigidity and Income Distribution," American Economic Review, Papers and Proceedings, Vol. 85, No. 2 (1995b), pp. 312-16.
- Ruge-Murcia, Francisco, J., "Credibility and Changes in Policy Regimes," Journal of Political Economy, Vol. 103 (1995), pp. 176-208.
- Sachs, Jeffrey, Aaron Tornell and Andres Velasco, "The Collapse of the Mexican Peso: What Have we Learned?", mimeo (Harvard University, 1995).
- Sadka, Efraim, "An Inflation-Proof Tax System? Some Lessons from Israel," Staff Papers, International Monetary Fund (Washington), Vol. 1, No. 1 (1991), pp. 135-55.
- Sargent, Thomas, and Neil Wallace, "Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis Quarterly Review, Vol. 9, No. 1 (1985), pp. 15-31.
- Stolper, Wolfgang, and Paul A. Samuelson, "Protection and Real Wages," Review of Economic Studies, Vol. 9 (1941), pp. 58-73.

Tanzi, Vito, "Inflation, Lags in Collection, and the Real Value of Tax Revenue," Staff Papers, International Monetary Fund (Washington), Vol. 24 (1977), pp. 154-67.

Tornell, Aaron, and Andres Velasco, "Fiscal Discipline and the Choice of Exchange Rate Regime," European Economic Review, Vol. 39 (1995), pp. 759-70.

Woodford, Michael, "Control of the Public Debt: A Requirement for Price Stability?" Paper presented in the International Economic Association Conference, The Debt Burden and its Consequences for Monetary Policy, (Frankfurt, March 20-23, 1996).

