

IMF WORKING PAPER

© 1990 International Monetary Fund

This is a working paper and the author would welcome any comments on the present text. Citations should refer to an unpublished manuscript, mentioning the author and the date of issuance by the International Monetary Fund. The views expressed are those of the author and do not necessarily represent those of the Fund.

WP/90/46

INTERNATIONAL MONETARY FUND

Fiscal Affairs Department

An Inflation-Proof Tax System? Some Lessons from Israel

Prepared by Efraim Sadka*

Authorized for Distribution by Vito Tanzi

May 1990

Abstract

This paper strengthens the claim made by Vito Tanzi that when the effect of a high inflation on the tax system is taken into account, then the overall revenues from inflationary finance may well be negative. The paper analyzes some genuine and neat measures taken in Israel in an attempt to construct an inflation-proof tax system. Despite these very elegant measures, the paper concludes that the Israeli experience suggests that it is more appropriate to talk about the "inflation subsidy" rather than the "inflation tax."

JEL Classification Numbers

130, 320

*The author is a Professor of Economics at Tel Aviv University, Tel Aviv, Israel. This paper was written while the author was a Visiting Scholar in the Fiscal Affairs Department of the International Monetary Fund, Washington, D.C., U.S.A. The author has benefited from several discussions with Vito Tanzi and Milka Casanegra de Jantscher on the issues of this paper.

	<u>Contents</u>	<u>Page</u>
I.	Introduction	1
II.	The Effects of Inflation on Taxable Business Income	3
III.	Partial Adjustments for Inflation: 1975-1981	5
IV.	A Comprehensive Treatment of Inflation in the Taxation of the Business Sector: 1982-Present	7
V.	Loopholes and Exceptions	9
	1. Industrial equipment and machinery	10
VI.	Wage Taxation: The Role of Withholding	13
VII.	The Consumption (or Cash Flow) Tax Versus the Income Tax in the Presence of Inflation	15
	Notes	18
	Text Table	
	1. The Effect of Inflation on Effective Tax Rates on Industrial Equipment and Machinery	12
	Appendix	
	References	22

Summary

Economists have been long interested in the so-called inflation tax, the real depreciation of money holdings that results from inflation. However, the revenue from this tax tends to be relatively small as a percentage of GDP. For instance, in the late 1970s and early 1980s, Israel achieved revenues of only about 2 percent of GDP, despite an inflation rate varying between 40 and 500 percent a year. Moreover, collection lags erode real tax revenues during inflation. As a result, the overall revenue from inflationary finance may well be negative.

The paper considers another aspect of the effect of inflation on the tax system, that arising from the very definition of income. Traditionally, a progressive individual income tax has been regarded as an automatic stabilizer causing real tax revenues to rise with inflation. However, full, and almost instantaneous, indexation of the income tax brackets now prevents individual real tax liabilities from going up with inflation. This paper emphasizes that the effect of inflation rests primarily on the definition of business income. As business income is defined according to nominal accounting procedures, high inflation virtually destroys the base of the income tax in the business sector.

Attempts have been made to correct the tax laws for the effects of inflation so as to re-establish a valid base for income tax in the business sector. These attempts were partial, however, most often correcting only one side of the balance sheet (for instance, by indexing capital gains without at the same time indexing their counterpart-- interest payments). Such adjustments tended to aggravate the detrimental effects of inflation on the tax system.

In 1982, with the annual rate of inflation exceeding 100 percent, Israel enacted a law aimed at providing a comprehensive adjustment to the effects of inflation on business income. The law contained several loopholes, however, and applied mainly to the corporate sector, allowing tax arbitrage between this and the rest of the business sector. Nevertheless, the law helped reduce the erosion of real tax liability in the wake of inflation even though it was unable to stop the erosion altogether. When the stabilization program of July 1985 succeeded in reducing inflation, the Government's budget deficit was erased. An automatic increase in real tax revenues caused by the sharp decline in inflation contributed to this result. Should not economists therefore abandon the traditional concept of the inflation tax in favor of the more realistic inflation subsidy?

I. Introduction

Economists have been long interested in the so-called "inflation tax," the real depreciation of money holdings. In a seminal paper, Martin Bailey (1956) studied the welfare cost of inflationary finance. Milton Friedman (1969) investigated the optimal inflation tax and concluded that it should be negative. These studies tend to ignore the fact that in the real world the alternatives to an inflation tax are not nondistortionary lump sum taxes but rather some other distortionary taxes, so that the inflation tax should be considered in a second-best framework. Later, Edmund Phelps (1973) and Elhanan Helpman and Efraim Sadka (1979) investigated the optimality of inflationary finance in a second-best context, employing an optimal taxation approach.

However, all of these studies considered just one aspect of inflationary finance: the real depreciation of money holdings or the revenues from money printing (seigniorage). These revenues tend to be relatively small as a percentage of GDP. For instance, the Israeli experience is of revenues in the order of magnitude of about 2 percent of GDP with an inflation rate varying in a wide range of between 40 to 500 percent per annum (see, for instance, Zvi Eckstein and Leonardo Leiderman (1989)). ^{1/} Furthermore, as the (perfectly foreseen) inflation rate rises, real money holdings decline; and with very high inflation rate a country may well find itself on "the wrong side of the Laffer Curve."

Vito Tanzi (1977, 1978) brought to our attention another, practically much more important, aspect of inflationary finance: the effect of inflation on the tax system. ^{2/} He emphasized the collection lag, which is "the time that elapses between a taxable event (e.g., earning of income, sales of a commodity) and the time when the tax payment related to that taxable event is received by the Government." Due to the collection lag, inflation erodes real tax revenues. As a result, the overall revenue from inflationary finance may well be negative. The collection lag may be shortened in order to lessen the effect of inflation on the tax system. Indeed, the filing period for the VAT in Israel was shortened from three months to just one month when inflation reached the triple-digit plateau. That is, businesses had to file a VAT return and pay the tax collected to the Government every month, thereby increasing both their bookkeeping costs and the Government's collection costs. Thus, shortening the collection lag is not costless. This is another real cost of inflation which should be added to the list put forward by Stanley Fischer and Franco Modigliani (1978) and by Stanley Fischer (1981).

This paper emphasizes yet another aspect of the effect of inflation on the tax system: the very definition of income. Traditionally, macroeconomic textbooks pointed out that with a progressive individual income tax (i.e., the average tax rate increases in income), nominal income, which rises in proportion to the rate of inflation, causes nominal tax liability to rise more than in proportion to nominal income

and inflation. Hence, real tax revenues increase and the progressive individual income tax serves as an automatic stabilizer. However, with full, and almost instantaneous, indexation of the income tax brackets, individual real tax liabilities no longer rise with inflation. Therefore, as this paper emphasizes, the effect of inflation rests primarily on the definition of business income. As business income is defined according to nominal accounting standards, high inflation virtually destroys the base of the income tax in the business sector.

Attempts were always made to correct the tax laws for the effects of inflation so as to re-establish a valid base for the income tax in the business sector during inflation. Milka Casanegra de Jantscher (1976) describes the early Latin American experience. As the early (1975-82) Israeli experience suggests too, these attempts are partial and not even-handed. Lawmakers are hard pressed to remove, first of all, those effects of inflation that hurt taxpayers (e.g., the taxation of inflationary capital gains). Only much later, they come to deal with those effects of inflation which play into the hands of taxpayers (e.g., the tax deductibility of nominal interest payments). These sort of "one-side-of-the-balance-sheet" adjustments tended to worsen the detrimental effect of inflation on the tax system. 3/

It took quite a few years of high inflation before a law aimed at providing a comprehensive adjustment to the effects of inflation on business income was enacted in Israel (1982). As any tax law, it contained several serious loopholes. Also, it applied mainly to corporations and neglected most proprietorships. Some loopholes were removed later on, but then inflation was brought down very rapidly in mid-1985 (to a 15-20 percent range). Thus, there is no clear test of how the "Israeli solution" to the effects of inflation on the tax system would have functioned during high inflation.

Nevertheless, it is a fact that during the period of high inflation, the tax on wage earners accounted for an unusually high fraction (about 65 percent) of all income tax revenues. Today, it accounts for only 40 percent. When inflation was rapidly brought down by the stabilization program of July 1985, the Government's budget deficit was erased. A significant contributor to this was an automatic increase in real tax revenues that was caused by the sharp decline in inflation. Should not economists abandon the traditional concept of the "inflation tax" in favor of the more realistic "inflation subsidy"?

The paper is organized as follows: Section II describes the main effects of inflation on business income. Section III summarizes some early partial adjustments for inflation in the tax laws. Section IV analyzes the main elements of a new law that was supposed to provide a comprehensive adjustment for inflation in the definition of business income. Section V describes the major loopholes and exceptions in that law. Section VI emphasizes the importance of withholding when income tax brackets are indexed and change within the same tax year. Section VII discusses some alternatives to income taxation (e.g., consumption or cash flow taxation) during inflationary periods.

Throughout this paper, inflation is assumed to take the form of an equiproportional increase in all prices so that relative prices do not change. This assumption allows us to abstract from the question of which price index to employ in converting nominal values into real values.

II. The Effects of Inflation on Taxable Business Income

Taxable income in the business sector is calculated according to standard accounting procedures. These are nominal in nature. In other words, one shekel (the Israeli currency unit) is treated as one shekel regardless of the date on which it was paid or received. Nominal business income (or profit) so calculated, which is the difference between revenues (or sales) and costs, amounts to adding together shekels received at different dates (and having different real values) and subtracting from them shekels paid at different dates and having different real values. When the inflation rates are in the range of 100-500 percent per annum a beginning-of-the-year shekel may be worth, in real terms, as much as two to six end-of-the-year shekels. As a result, nominal income cannot even serve as an approximation of the true, real income of the business firm in periods of high inflation rates, such as those which Israel experienced during the late 1970s and the first half of the 1980s.

Inflation creates several deviations of the nominal income from true, real income. Some of these deviations or biases are negative and some are positive, but they do not offset each other. Furthermore, as I shall explain below, their incidence and magnitude are not independent of the behavior of the taxpayer. In other words, the taxpayer may take certain actions that reduce the calculated nominal income even though the real income does not change. In such a case, a higher inflation rate reduces rather than increases real tax revenues; and the tax system fails to serve as an automatic stabilizer.

In a stylized manner, the deviations or biases of real income from nominal income that are caused by inflation may be classified into five main categories as follows:

(a) Nominal capital gains on an asset are composed of two components: an artificial or inflationary component which merely reflects an increase in the general price level of all goods and services; and a true, real component which reflects that portion of the appreciation in the value of the asset which is over and above the increase in the general price level. Thus, nominal income overstates real income by the sum of the inflationary component of capital gains. For later references, it is worth pointing out that capital gains are normally taxed upon realization, rather than on an accrual basis, so that the inflationary component of the capital gains is taxed only when the asset is sold or otherwise disposed of.

(b) Analogous to the distinction between the inflationary and the real components of nominal capital gains is the distinction between the inflationary and the 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 may 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. However, this argument is invalid on two grounds. First and quite familiar, the purchase of an asset may be financed by equity rather than by debt. Secondly, and less familiar, capital gains are taxed upon realization while interest is deductible on an accrual basis. Suppose, for instance, that a firm takes a fully indexed loan of 100 shekels to be repaid after five years in order to purchase a certain asset. If the annual inflation rate is 100 percent, then the firm will be allowed to deduct from taxable income an indexation differential (i.e., the inflationary component of the interest rate) of 100 shekels in the first year, 200 shekels in the second year, 400 shekels in the third year, and so on, even though these differentials were not actually paid before the end of the fifth year. 4/ The inflationary capital gains on the asset purchased, on the other hand, 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.

The above three sources for the deviation of real income from nominal income are well known and have received the focus of attention. In fact, many economists believed that these are the only significant effects of inflation on real tax liabilities (see, for instance, Daniel Halperin and Eugene Steuerle (1988)). Thus, many believed that in order to practically eliminate the effect of inflation on real tax liability, it would suffice to exempt from tax inflationary capital gains, to disallow tax deductibility of inflationary interest charges, and to allow replacement cost depreciation (or more simply, indexation of historic cost depreciation).

However, this simple suggestion on how to deal with the effect of inflation on taxable income might be adequate for relatively low rates of inflation, say up to 10-15 percent per annum. But when the annual rate of inflation reaches the three-digit range, some more, less familiar, factors come to play a crucial role in deviating nominal income from real income. The above suggestion totally fails to recognize these factors and is therefore extremely inadequate for dealing with the effects of inflation on real tax liabilities in the business sector.

When the inflation rate reaches the double-digit range on a monthly basis, there are two more major factors that cause nominal income to deviate significantly from real income. These factors, unlike the first three, pertain primarily to the determination of the real operating income, (i.e., income before taking into account capital gains, depreciation costs, and long-term financing costs). They relate to the very nature of the production process which is not timeless:

(d) As the production process takes place over time, output is usually sold at the end of this process, while the costs of labor and other inputs, raw materials, etc., are incurred earlier along this process. 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. Naturally, the time length of the production process is short relative to the length of life of fixed assets and long-term loans. Thus, the bias in the operating income, unlike the biases caused by capital gains and interest payments, is significant only when the inflation rate is relatively high (for instance, when the inflation reaches the triple-digit range per annum).

A special case of (d) applies in particular to a retail firm:

(e) A retail firm normally buys its merchandise and pays for it before it sells the merchandise. Thus, the sale price is inflated relative to the purchase price. As a result, the nominal profit from sales includes an inflationary appreciation in the value of the merchandise. The firm is thus taxed on the inflationary appreciation of the merchandise it sells.

III. Partial Adjustments for Inflation: 1975-1981

One may conclude from the preceding section that since the various deviations of nominal income from real income are not all of the same sign, then the effect of inflation on nominal taxable income, vis-à-vis real income, is ambiguous. However, such a conclusion would not be valid since it ignores the long-run behavior response of the taxpaying firm to the effect of inflation on nominal income. In the short run, after inflation unexpectedly picks up, firms are caught by surprise and may either lose or gain from inflation: for instance, those who are heavily invested in fixed assets which are financed by debt usually gain (because capital gains are taxed upon realization while interest charges are deducted on an accrual basis); those who use equity capital to finance their production process usually lose; etc. But in the longer run, various tax avoidance measures will be taken by firms in order to reduce nominal taxable income. For instance, they will use less and less equity capital and invest more and more in buildings and real estate. Such a tax avoidance activity is further fueled as we shall see below, by changes that are made in the tax laws in the wake of inflation, changes which are partial and unbalanced.

As inflation persists longer, lawmakers start introducing various provisions in the tax laws that are aimed at eliminating the effect of inflation on real tax liabilities. However, the Israeli experience suggests that these provisions are introduced in a piecemeal fashion and are most often unbalanced. Lawmakers first yield to the public outcry of those who are hurt by inflation and grant relief against taxation of inflationary (artificial) income. Only much later they abolish the loopholes that enabled taxpayers to reduce nominal taxable income much below real income. In Israel, it took about seven years and inflation reaching an annual rate of 140 percent until an attempt was made in 1982 to design a comprehensive law that would eliminate all effects of inflation on taxable income (and even that law was essentially confined to the corporate business sector).

One of the first provisions introduced in the tax laws in the wake of the persisting inflation was to reduce the tax rate on the inflationary component of capital gains to 10 percent, as compared to the 61 percent rate on ordinary corporate income (in 1975). ^{5/} Similarly, the holders of indexed government bonds and some other bonds were exempted from tax on the inflationary component of the interest (the indexation differential) earned. Owners of bank saving deposits were also tax-exempted on the inflationary component of the interest earned. Other ad hoc tax reliefs against inflation were also granted. For instance, in some years, firms were allowed a tax deduction which depended on the size of their (finished or unfinished) inventories. The rationale for this deduction was the need to offset some artificial, inflationary elements in the operating income of the firm which stem from the fact that the production process is not timeless (see subsections (d) and (e) of the preceding section).

All of the above provisions are of what I shall term "one-side-of-the-balance-sheet form." They all pertain to the asset side. The liability side was initially ignored. Only later on, it has become evident to all that it makes no sense, for instance, to exempt from tax or to tax at a low rate of 10 percent inflationary capital gains, while still allowing taxpayers to deduct from ordinary income all of the inflationary component of the interest incurred by them. As a result, firms increased their borrowing in order to invest in structures, equipment, machinery, inventories, stocks, indexed government bonds, etc. Some attempts to restrict the tax deductibility of inflationary interest charges were partial and clumsy and they failed. ^{6/} This sets the stage for an attempt to design a comprehensive adjustment of the tax laws in the wake of inflation, at least for the corporate sector.

Interestingly enough, the experience in Israel with the "one-side-of-the-balance sheet" approach to inflation which was a total failure did not serve as a lesson to other countries. For instance, the United States is currently considering indexation of capital gains. That is, the idea is to tax only real capital gains. Not much attention has been given, so far, to the other side of inflationary capital gains, namely, to inflationary interest charges.

IV. A Comprehensive Treatment of Inflation in the Taxation of the Business Sector: 1982-Present

As was mentioned earlier, after some partial measures to remove the effects of inflation on business income taxation had been found to be extremely inadequate, a new law was introduced in 1982. The aim was to remove in a comprehensive manner all effects of inflation on real tax liabilities. In principle, the law should have been applied to all businesses. However, as the various provisions of the law were based on the balance sheet of the firm, it was effectively confined to "big" businesses which are usually required to provide balance sheets, namely, to all corporations and some other proprietary firms (usually above a certain size).

From a theoretical point of view, the most natural method for eliminating the effects of inflation on taxable income is to evaluate each transaction in units of some stable currency (say, for the sake of ease of exposition, the European Currency Unit, ECU) instead of nominal Israeli shekels. In this way, income which is calculated by subtracting costs of labor and other inputs, finance costs, depreciation, etc., from receipts from sales, all evaluated in ECUs, will indeed reflect the true real income of the firm. However, it is very difficult and costly to implement this method in practice. As long as the Israeli shekel remains the only legal medium of exchange, and transactions are consequently made in shekels, this method requires bookkeepers to maintain a record of the exact date of each transaction. This is needed in order to be able to translate the nominal shekels involved in each transaction into ECUs, because the rate of exchange between the shekel and the ECU varies daily in a period of high inflation.

Furthermore, standard accounting procedures calculate income not on a cash-flow basis, but rather on an accrual basis. It is usually the case that there is some time elapsing from the date at which a sale of a good or a purchase of an input are made, and the date at which cash is actually received or paid. This complicates the way by which the shekel value of a transaction is translated into an ECU value. For instance, suppose that Firm A sells some merchandise to Firm B for 100 shekels. Suppose further that when the merchandise is shipped and an invoice is issued, the rate of exchange between the shekel and the ECU is one shekel for one ECU. Hence, at this date Firm A records a sale of 100 ECUs and debits the account of Firm B by 100 ECUs. Suppose also that the terms of the sale allow Firm B to pay for the merchandise within 30 days, a quite common trade practice. Suppose further that after 30 days, when the payment of 100 shekels is actually made, the rate of exchange between the shekel and the ECU becomes 1.25 shekels for one ECU. Thus, when Firm B pays its bill, its account with Firm A is credited for only 80 ECUs and there remains a balance due of 20 ECUs, which is, of course, false. Hence, an additional entry in Firm A's books is required at this time: the value of sales should be lowered by 20 ECUs and Firm B's account should be credited by the same amount. 7/ (An analogous entry is also needed in Firm B's books.)

Recall that the period in question was the late 1970s-early 1980s. At that time, the use of personal computers was not widespread. For many small to medium businesses accounting was still carried out manually. It was then felt that the method of dealing with the effects of inflation on taxable income by translating the shekel value of every transaction into units of some stable currency would be too complicated to implement in practice. Hence, an alternative, much simpler, but indirect, method was adopted.

The main features of the new comprehensive law that was enacted in 1982 are quite simple: first, calculate income in nominal terms according to standard accounting procedures; then for each one of the effects of inflation enumerated in (a)-(e) of Section II, an adjustment is introduced that either directly removes that effect or ensures that it is offset by another one or more of these effects. Nominal income, after these adjustments, will then reflect the true real income of the firm, evaluated at end-of-year prices.

We turn now to describing in more detail the adjustments that are needed. Consider first, items (d) and (e) of Section II. They relate to the fact that the costs (of labor inputs, raw materials, merchandise, etc.) are paid for some time before sales receipts are cashed in. These effects inflate nominal income because revenues are evaluated at prices which are inflated relative to the prices at which costs are evaluated. But now there are two possibilities: if the costs were financed by debt, then these two effects, namely, (d) and (e), are offset by item (b) (i.e., the deductibility of inflationary interest charges); if the costs were financed by equity, then these two effects are corrected for by the following adjustment, which puts equity on a par with debt:

(i) Allow a deduction equaling to an imputed inflationary interest on equity (i.e., a deduction which is equal to the amount of equity times the inflation rate).

Next, consider item (a), the inclusion of inflationary capital gains in taxable income. But once inflationary interest charges, both the genuine interest on debt and an imputed interest on equity, are tax deductible on an accrual basis, then it is indeed correct to include inflationary capital gains in taxable income. Furthermore, these inflationary gains should be included on an accrual basis. Thus, we have to make the following adjustment:

(ii) Add inflationary capital gains accruing (even if not yet realized) on all fixed and other non-monetary assets (i.e., on all assets which appreciate in nominal terms during inflation). That is, add to nominal taxable income an amount which is equal to the book value of these assets times the inflation rate; upon realization of the capital gains, tax only their real component.

Notice that once inflationary interest charges on both debt and equity are deducted from taxable income, then rule (ii) above should be applied also to business inventories. Specifically, recall that the cost of sales is defined as beginning-of-the-year inventory, plus new purchases during the year, minus end-of-year inventory. The latter should be evaluated at end-of-year prices so as to include in taxable income the inflationary capital gains accruing to it.

Adjustments (i) and (ii) above fully correct for items (a), (b), (d), and (e) of Section II. It remains to correct for item (c), namely, the historic cost depreciation:

(iii) Allow a depreciation which is evaluated at end-of-year prices.

The above three adjustments (i.e., (i), (ii), and (iii)) bring nominal income to truly represent real income, evaluated at end-of-year prices. In practice, (i) and (ii) were combined together. Since (i) calls for a deduction equaling equity times the inflation rate, while (ii) calls for an addition to income, which is equal to fixed (and some other) assets times the inflation rate, then the net effect of (i) and (ii) is to allow a net deduction which is equal to:

$$(\text{Equity} - \text{Fixed Assets}) \times \text{Inflation Rate.} \quad (*)$$

Notice that this net deduction may well be negative. It was termed "the deduction for the preservation of equity," since it may be interpreted as a deduction aimed at protecting against inflation that part of the equity which is not invested in "inflation-proof" assets.

Formula (*) may be derived in an alternative way which is based on the fact that the real income of the firm is nothing else but the difference between its net worth at the end of the year and its net worth at the beginning of the year, when both are evaluated at the same prices, say, end-of-year prices (see the Appendix).

V. Loopholes and Exceptions

The preceding section described in a schematic way the basic features or principles of the law that was introduced in 1982 and was aimed at providing a comprehensive adjustment for the effects of inflation on taxable income. However, some very serious practical considerations dictated a few deviations from these principles. In order to appreciate the difficulties in implementing these principles, let us elaborate a little further on the implications of items (i) and (ii) of the preceding section (or Formula (*), which combines both of them).

Equity may vary within any one tax year: new equity may be issued and some old equity may be retired by paying dividends. Thus, the firm has to keep track of the movements of equity within the tax year in order to be able to calculate the tax deduction that it is entitled to for its equity (item (i) of Section IV). Beginning-of-the-year equity, for instance, will be entitled for a deduction based on the annual rate of inflation (i.e., from the beginning of the year till its end), whereas a new issuance of equity will be entitled to a deduction which is based on the rate of inflation only from the date of issuance of the new equity to the end of the year. A similar caveat applies to fixed assets (item (ii) of Section IV). In general, one would encounter only a few changes in equity or in the stock of fixed assets within a relatively short period of just one year, so that the calculation of the deductions from income (item (i)) and the additions to income (item (ii)) is fairly manageable. However, this is not usually the case with business inventories. The latter are normally fast moving and typically include an extremely large number of items. Hence, calculating the inflationary capital gains accruing to end-of-year inventories is not practically feasible and is therefore left out. This is the first exception to the principles of the 1982 Law. The effect of this exception is to postpone the tax on inflationary capital gains on end-of-year inventories to the next year. 8/ A public committee recommended in 1985 to use some accounting formula for calculating the average holding period of inventories and accordingly adjust the value of the end-of-year inventories. But this recommendation was never adopted.

A second exception was granted to industrial equipment and machinery.

1. Industrial equipment and machinery

Industry in Israel was always treated favorably by the tax-subsidy system with the belief that it is essential for a long-term, export-led growth. 9/ Until 1986, for instance, the corporate income tax rate on industrial firms was substantially lower than on nonindustrial firms. Similarly, industrial firms are exempted from a general payroll tax.

Following this long tradition, the 1982 Law did not apply adjustment (ii) above to industrial equipment and machinery. That is, the inflationary appreciation of industrial equipment and machinery were exempted from tax until the date of realization. This was intentionally done with the purpose of encouraging investments in these capital assets, which were believed to enhance productivity and growth. As a partial offset for this tax relief, depreciation allowances for industrial equipment and machinery were not indexed.

The tax relief reduced the effective tax rates on income from industrial equipment and machinery and generated an overinvestment in them. The problem was that the magnitude of the decline in the effective tax rates depended on the rate of inflation: The higher the rate

of inflation, the lower are the effective tax rates. In order to find the magnitude of the reduction, I refer to previous papers by the author and A. Zigelman (1989a and 1989b). They adapted standard effective tax rate formulae (see, for instance, Alan Auerbach, 1983a and 1983b) to the 1982 Law and concluded that the effective tax rate (t_i) on the income generated by asset i is given by:

$$t_i = (MPK_i - D_i - r)(MPK_i - D_i)^{-1},$$

where MPK_i is governed by the profit-maximization condition:

$$MPK_i(1-t) = (D_i + r) [1-t(Z_i + U_i)]$$

and where:

- MPK_i - marginal product of asset i ;
- t - statutory corporate tax rate;
- D_i - physical depreciation of asset i ;
- r - real rate of return required by equity holders;
- Z_i - real present value of the depreciation allowances for asset i ; and
- U_i - real present value of the "equity preservation deduction" (see preceding section).

Employing the above formulae, Table 1 presents the effect of inflation on the effective tax rates on income from industrial equipment and machinery (for $t = 52$ percent, which was then the statutory tax rate, and $r = 4$ percent). As the annual inflation rate rises from zero to 400 percent, the effective tax rates fall by about 12-15 percentage points.

Table 1. The Effect of Inflation on Effective Tax Rates on Industrial Equipment and Machinery

(t = 52 percent, r = 4 percent)

Asset	Inflation Rate = 0 Percent	Inflation Rate = 400 Percent
General industrial equipment	28.9	16.5
Tools	27.3	15.4
Special industrial equipment	26.4	14.8
Construction equipment	34.7	20.5

A reduction in effective tax rates as a response to a higher inflation rate introduces a built-in automatic destabilizer into the tax system, against the conventional wisdom of all public finance textbooks which advocate fiscal automatic stabilizers. Indeed, the tax relief that was granted in 1982 to industrial equipment and machinery was abolished in 1985, when inflation in Israel reached its peak. Inflationary capital gains accruing to industrial equipment and machinery became taxable, and the depreciation allowances were indexed.

A third loophole arose because, due to some practical reasons explained above, the 1982 Law did not apply to all businesses.

2. Proprietorships and self-employed individuals

The 1982 Law covered all corporations but largely ignored the incomes of most proprietorships and self-employed persons (small businesses, brokers, law firms, plumbers, accountants, clinics, etc.). The latter were only somewhat restricted with respect to the amount of interest deductions they could claim. As a result, the 1982 Law has essentially created two tax sectors within the business sector: one to which the Law did apply, and I shall refer to it as the indexed sector (mostly corporations); and one which escaped the provisions of the Law, and I shall refer to it as the nonindexed sector (mostly proprietorships and self-employed individuals).

The nonindexed sector can maneuver the timing of its cash receipts and payments so as to deflate its taxable income and reduce its real tax liability. By advancing the date of the cash receipt for a certain real revenue, one deflates nominal revenues. Similarly, by postponing the date of the cash payment for a certain real expense, one inflates real tax liability.

A simple example can serve to illustrate this argument. Consider an individual whose real revenues, expenses, and net income, when measured in terms of a stable currency (say, the ECU), are as follows:

Revenues	-	250,000 ECUs
Expenses	-	150,000 ECUs
Net income	-	<u>100,000 ECUs</u>

Suppose that the annual inflation rate is 100 percent, so that prices double from the beginning of the year to the end of the year. Hence, if the rate of exchange is one shekel for one ECU at the beginning of the year, it will be two shekels for one ECU at the end of the year. Suppose further that the individual is able to advance the receipt of revenues to the beginning of the year and postpone the payment of expenses until the end of the year. The statement of nominal income will then show the following entries:

Revenues	-	250,000 shekels
Expenses	-	300,000 shekels
Net income (loss)	-	<u>(50,000) shekels</u>

Thus, by some maneuvers, a handsome real income was turned into a loss for tax purposes.

Notice that the validity of the above example rests on the ability of the individual to advance cash receipts and/or postpone cash payments. However, a receipt for one agent is a payment of another agent. Therefore, there should be other agents in the above example for whom payments of expenses were advanced and receipts of revenues were postponed. Would not it be then the case that the incomes of these agents were inflated and real tax liabilities increased? The answer is in the negative for these agents could belong to the indexed sector and their real tax liabilities are not affected by the manipulations described in the example. Or these agents may belong to the nontaxable, nonprofit sector, or the public sector. Or these agents may be foreign residents, or final consumers, etc.

VI. Wage Taxation: The Role of Withholding

The preceding section pointed out that tax manipulations will occur when there are both an indexed sector and a nonindexed sector within the business sector. Now, what about wage earners? Can they not also maneuver with the indexed sector in order to reduce their real tax burden? They could have indeed done so if it were not for the withholding system. The latter ensures that any maneuver of the timing of the cash receipts for wage earned will have only little, if any, effect on real tax payment.

A simple example will serve to illustrate this point. Consider, for the sake of simplifying the arithmetic, that the tax year consists of just two months. Suppose that in the first month the income tax schedule is as follows:

<u>Month I</u>	
<u>Income Bracket</u>	<u>Marginal Tax Rate</u>
0 - 1,000 shekels	0 percent
Over 1,000 shekels	30 percent

Suppose further that prices double between the first and the second month. With full indexation of the income tax brackets (as is indeed the case in Israel), the income tax schedule in the second month will be as follows:

<u>Month II</u>	
<u>Income Bracket</u>	<u>Marginal Tax Rate</u>
0 - 2,000 shekels	0 percent
Over 2,000 shekels	30 percent

Now, the way in which the income tax schedule is calculated for the annual tax returns is by adding up the brackets for the various months. That is, the annual tax schedule will be as follows:

<u>Annual Schedule</u>	
<u>Income Bracket</u>	<u>Marginal Tax Rate</u>
0 - 3,000 shekels	0 percent
Over 3,000 shekels	30 percent

Consider an individual who earns a steady wage income of 1,500 ECUs every month. Suppose also that the rate of exchange is one shekel for one ECU in the first month, and, consequently, two shekels for one ECU in the second month. Thus, the individual earns 1,500 shekels in the first month and 3,000 shekels in the second month. In the first month, the individual will be subject to a withholding of $(1,500 - 1,000) \times 30$ percent = 150 shekels, which are worth 150 ECUs. In the second month, she will be subject to a withholding of $(3,000 - 2,000) \times 30$ percent = 300 shekels, which are worth 150 ECUs. Altogether, there is an amount of 450 shekels, or 300 ECUs, which is withheld at source. When this individual files a tax return at the end of the year, she will report an

annual income of 4,500 shekels, on which the tax liability is $(4,500 - 3,000) \times 30$ percent = 450 shekels. The latter is also the amount that was withheld, and hence she will pay no further taxes. Real tax payment is therefore 300 ECUs.

Now, suppose the individual advances the receipt of her wage for the second month to the first month. That is, she will receive all her annual wage of 3,000 ECUs, or 3,000 shekels, in the first month. The amount of tax withheld will then be $(3,000 - 1,000) \times 30$ percent = 600 shekels, which are worth 600 ECUs. When she files a tax return at the end of the year, she reports an annual income of 3,000 shekels, on which the tax liability is zero. Therefore, she receives a refund of 600 shekels, which are worth now only 300 ECUs. Hence, her real tax payment is $600 - 300 = 300$ ECUs. This is also exactly what she paid when her income was spread evenly over the two months.

In the above example, the individual gained nothing by maneuvering the timing of her wage receipts. Of course, one may be able to cook a different example in which some gain could occur. But, nevertheless, the example serves to show the role of withholding in substantially curtailing the gains from advancing wage receipts. When a wage receipt is advanced, so is the tax withheld. Hence, the real gain from such a maneuver is mitigated.

VII. The Consumption (or Cash Flow) Tax Versus the Income Tax in the Presence of Inflation

The income (or direct) versus consumption (or indirect) tax controversy has been discussed at length in the literature.^{10/} For instance, many studies have emphasized the intra- and intertemporal distortions of the income tax as against the intertemporal distortions only of the consumption tax^{11/}--the so-called "double-taxation-of-savings" argument. In this section, I shall only discuss the relative performance of these two taxes in the presence of inflation.

As we have seen above, inflation poses some very serious difficulties in the very definition of business income. The consumption tax seems to escape these difficulties. This is why many economists and policymakers argue in favor of a consumption tax in a period of high inflation. Indeed, a consumption-type value-added tax (VAT) performed remarkably well in Israel even during the peak inflation period of 1984-1985.

However, a consumption tax is usually levied at a flat rate. In a life-cycle model, or in a Ricardian world, the present value of consumption is equal to the present value of income. Hence, a proportional consumption tax has the same equity implications as a proportional income tax (i.e., it is not progressive). In order to make the consumption tax more progressive, one could exempt from tax some necessities (such as food products, for example) and impose a higher tax rate on

luxuries. ^{12/} This is indeed the practice followed in many European Community countries with respect to the VAT. Yet, it is highly questionable how much progression one can achieve by a three-rate VAT system (i.e., a zero rate, a standard rate and a luxury rate). One certainly cannot, in general, match any progressive income tax with a three-rate VAT system.

In order to strengthen the progression capacity of the consumption tax, one has to tie the tax rate to the total consumption of the individual (in the same way as the income tax rate depends on the total income of the individual). In other words, there should be a consumption tax schedule which will be applied to the total consumption of each individual or household. Each individual will have to report her total consumption. And how can an individual truly report her total consumption? By subtracting real personal saving from real personal income. For a typical wage earner, it presumably would not be extremely difficult to calculate real personal income: real interest income, dividends, and real capital gains would be added to the wage income to yield real personal income. The corporate income tax is no longer needed and will be abolished. But for a self-employed individual or an owner of a small business (unincorporated) we still need to calculate real business income. Thus with this group of taxpayers, we are back to square one: the very definition of real business income in a high inflation time. On top of this, we also face another formidable task: to calculate real personal savings (i.e., the real increase in net (of debt) wealth). Hence, a progressive consumption tax does not promise to be an easy alternative to the progressive income tax in the wake of high inflation.

Another way to imitate the consumption tax is to abolish the income tax on business and to impose in its stead a cash flow tax (see Mervyn King (1987)) the latter is a tax on the net cash flow a company receives from its real economic activities. Its major departure from the income tax is essentially the granting of immediate expensing (100 percent first-year depreciation allowances) to all forms of investments. ^{13/} After analyzing the positive implications of the cash flow tax for the efficiency of resource allocation, King writes (1987, p. 379): "It is attractive for a further reason, namely that the base of the tax requires no adjustments for inflation and hence, that the complicated indexation provisions for depreciation, for example, required under alternative corporate tax systems are unnecessary with a cash flow tax.... The tax eliminates the necessity of calculating "economic profit." Hence, there is no need to construct a true measure of depreciation or to make any adjustment for the effects of inflation."

Obviously, with a cash flow tax under which immediate expensing is granted, the need for indexation provisions for depreciation vanishes. However, under a high inflation rate, there still remains the need to make other adjustments for inflation in the tax base. When the inflation rate is sufficiently high (say, in the triple-digit range), the cumulative price increase within any single tax year, from the first months to the last months, is quite substantial. In such a case, one

cannot simply subtract cash outflows from cash inflows in order to calculate the annual net cash flow of the firm, if the cash inflows were received at different points in time than the cash outflows were paid, even though both flows occurred within the same tax year. Thus, cash flows have to be indexed in calculating the annual net cash flow of the firm. Alternatively, the tax period can be shortened from one year to just one month. (In fact, the idea of a cash flow tax on a monthly basis was indeed briefly considered in Israel in 1984, but the time was not yet ripe for such a tax "revolution.") A big advantage of the cash flow tax in this respect is that, unlike the income tax, it does not require the calculation of depreciation allowances or the complicated evaluation of business inventories (especially inventories of unfinished goods in the production process). Hence, a monthly cash flow does not seem excessively costly to administer.

However, the monthly net cash flow of the firm varies considerably over time. Very often, the monthly net cash flow may be negative. (One would certainly expect a negative net cash flow in a month in which the firm makes a major investment.) Therefore, it is essential for the well-functioning of the monthly cash flow tax to either grant a full tax rebate in case the net cash flow is negative or allow net negative cash flows to be carried forward with full indexation and real interest.

All in all, the cash flow tax deserves a serious consideration as an alternative to the business income tax. In addition to its "fiscal neutrality" advantage over the standard income tax, it may also perform better in a period of high inflation.

Notes

1/ See also Stanley Fischer (1982) for a study of other countries where the inflation tax revenues seem a bit higher.

2/ Vito Tanzi credits Julio H.G. Olivera (1967) for the first study that contemplated the possibility that inflation may lead to a decline in real tax revenues.

3/ See also J. Kay (1977).

4/ These indexation differentials which are tax deductible for the borrower would, in principle, be a taxable income for the lender. However, in the Israeli case, in which major segments of the capital market are effectively nationalized, the lender is very often the Government itself, so that there would be no taxable lender that would pay the tax that the borrower saved.

5/ It is worth noting at this point that the Israeli tax laws are generally very generous with respect to capital gains accruing to individuals, even when they are real gains. For instance, securities traded on the stock exchange are exempted, residential housing (even if not owner-occupied) is also exempted under some (not significantly restrictive) conditions, etc.

6/ The restrictions applied to interest charges that could be attributed to the financing of tax-exempt government bonds and other securities.

7/ This example could be further complicated by supposing that Firm B's payment is made by a check which takes a few more days to clear.

8/ It should be pointed out that using the LIFO method (rather than the FIFO method) for evaluating end-of-year inventories would only worsen things because the LIFO method deflates rather than inflates the monetary value of end-of-year inventories.

9/ Of course, most academic economists in Israel do not approve of such a favorable treatment of one sector of the economy.

10/ See, for instance, Anthony Atkinson (1977).

11/ See, for instance, Anthony Atkinson and Agnar Sandmo (1980).

12/ For the theoretical foundation of this result see Angus Deaton (1977) and Yves Balcer and Efraim Sadka (1981).

13/ In order for the cash flow tax to imitate the consumption tax, interest payments should still qualify as a deduction if interest income is taxed at the individual level, for otherwise interest would be taxed twice.

In Section IV, we showed that the real income of the firm, evaluated at end-of-year prices, is equal to nominal income adjusted by Formula (*), "the deduction for the preservation of equity," and by an indexation differential on depreciation. In this Appendix, we provide an alternative, yet equivalent, definition of real income via the balance sheet of the firm.

If no new equity is issued within the tax year and no dividends are distributed, then the real change in the firm's net worth is equal to its real income. Thus, real income, evaluated at end-of-year prices, is equal to end-of-year net worth, evaluated at end-of-year prices, less beginning-of-the-year net worth, also evaluated at end-of-year prices.

If the firm neither purchases nor sells any fixed asset during the year, then its nominal balance sheets at the beginning and at the end of the year will typically appear as follows (a "zero" subscript stands for the beginning of the year and a "one" subscript stands for the end of the year):

<u>Beginning of the Year</u>	
<u>Assets</u>	<u>Equity and Liabilities</u>
FA NNA ₀	E L ₀
<u>End of the Year</u>	
<u>Assets</u>	<u>Equity and Liabilities</u>
FA-D NNA ₁	E NI L ₁

where:

- FA - fixed assets at historic (i.e., beginning-of-the-year) prices
- NNA - net nominal (nonindexed) assets. These may include cash, checking accounts, balances due from clients (less balances due to suppliers), etc.
- E - equity at historic prices
- L - long-term indexed liabilities at current prices
- NI - nominal income

D - depreciation at historic prices

Notice, of course, that:

$$FA + NNA_0 = E + L_0 \quad (1)$$

and

$$FA - D + NNA_1 = E + NI + L_1. \quad (2)$$

Suppose that the price level rises from the beginning to the end of the year at the rate π . Then, the beginning-of-the-year net worth of the firm, evaluated at end-of-year prices is:

$$(FA + NNA_0 - L_0) (1 + \pi). \quad (3)$$

Similarly, the end-of-the-year net worth of the firm, evaluated at end-of-the-year prices is:

$$(FA - D) (1 + \pi) + NNA_1 - L_1. \quad (4)$$

Hence, the real income of the firm, evaluated at end-of-year prices is obtained by subtracting (3) from (4):

$$\begin{aligned} \text{Real income} &= (FA - D)(1 + \pi) + NNA_1 & (5) \\ &- L_1 - (FA + NNA_0 - L_0)(1 + \pi) \\ &= (FA - D + NNA_1 - L_1) + (FA - D)\pi \\ &- (FA + NNA_0 - L_0)(1 + \pi). \end{aligned}$$

Employing (1) and (2), Equation (5) reduces to:

$$\text{Real income} = E + NI + (FA - D)\pi - E(1 + \pi) \quad (6)$$

Rearranging terms, Equation (6) becomes:

$$\text{Real income} = \text{NI} - D \pi - (E - \text{FA}) \pi \quad (7)$$

Notice that $(E - \text{FA})\pi$ is the deduction for the preservation of equity which is given by Formula (*) of Section IV. The term $D\pi$ is the indexation differential on depreciation. Thus, equation (7) suggests that real income is equal indeed to nominal income, adjusted by the deduction for the preservation of equity and by an indexation differential on depreciation. A similar formula is proposed also by Arnold Harberger (1988). He nevertheless understated the difficulties involved in the evaluation of business inventories, especially of unfinished goods in the production process. (See also Equation (9) in Vito Tanzi (1981)).

References

- Atkinson, Anthony B., "Optimal Taxation and the Direct versus Indirect Tax Controversy," Canadian Journal of Economics, 10, 1977, pp. 590-606.
- Atkinson, Anthony B., and Agnar Sandmo, "Welfare Implications of the Taxation of Savings," Economic Journal, 90, 1980, pp. 529-49.
- Auerbach, Alan J., "Corporate Taxation in the United States," Brookings Paper on Economic Activity, 14 (2), 1983b, pp. 451-505; Reprinted in Razin, Assaf and Efraim Sadka (eds.), Economic Policy in Theory and Practice, Macmillan Press, 1987.
- Auerbach, Alan J., "Taxation, Corporate Finance and the Cost of Capital," Journal of Economic Literature, XXI (3), September 1983a, pp. 905-40.
- Bailey, Martin J., "The Welfare Cost of Inflationary Finance," Journal of Political Economy, Vol. 64, pp. 93-110, 1956.
- Balcer, Yves and Efraim Sadka, "Budget Shares and Optimal Commodity Taxes without Computation," Economics Letters, 1987.
- Casanegra de Jantscher, Milka, "Taxing Business Profits during Inflation: The Latin American Experience," International Tax Journal, 1976, pp. 128-46.
- Deaton, Angus S., "Equity, Efficiency, and the Structure of Indirect Taxations", Journal of Public Economics, 8, 1977, pp. 299-312.
- Eckstein, Zvi and Leonardo Leiderman, "Estimating an Intertemporal Model of Consumption, Money Demand, and Seigniorage," Foerder Institute for Economic Research, Tel-Aviv University, 1989.
- Fischer, Stanley, "Towards an Understanding of the Costs of Inflation: II," Carnegie-Rochester Series on Public Policy, North-Holland, 1981, pp. 5-42.
- Fischer, Stanley, "Seigniorage and the Case for A National Money", Journal of Political Economy, 90, 1982, pp. 295-313.
- Fischer, Stanley and Franco Modigliani, "Towards an Understanding of the Real Effects and Costs of Inflation," Weltwirtschaftliches Archiv, 114, 1978, pp. 810-33.
- Friedman, Milton, "The Optimal Quantity of Money," in his The Optimum Quantity of Money and Other Essays, University of Chicago Press, 1969.

- Halperin, Daniel and Eugene Steuerle, "Indexing the Tax System for Inflation," in Aaron, Henry J., Harvey Galper, and Joseph A. Pechman (eds.), Uneasy Compromise: Problems of a Hybrid Income-Consumption Tax, The Brookings Institution, 1988, pp. 347-76.
- Harberger, Arnold C., "Comments on Indexing the Tax System for Inflation," in Aaron, Henry J., Harvey Galper, and Joseph A. Pechman (eds.), Uneasy Compromise: Problems of a Hybrid Income-Consumption Tax, The Brookings Institution, 1988, pp. 380-83.
- Helpman, Elhanan and Efraim Sadka, "The Optimal Financing of the Government's Budget: Taxes, Bonds or Money," American Economic Review, 69(1), 1979, pp. 152-60.
- Kay, j.A., "Inflation Accounting - A Review Article," The Economic Journal, Vol. 87, 1967, pp. 300-11.
- King, Mervyn A., "The Cash Flow Corporate Income Tax," in Feldstein, Martin S. (ed.) The Effects of Taxation on Capital Accumulation, University of Chicago Press, 1987.
- Olivera, Julio H.G., "Money, Prices and Fiscal Lags: A Note on the Dynamics of Inflation," Banca Nazionale del Lavoro, Quarterly Review, Vol. 20, 1967, pp. 258-67.
- Phelps, Edmund S., "Inflation in the Theory of Public Finance," Swedish Journal of Economics, 75, 1973, pp. 67-82.
- Sadka, Efraim and Avi Zigelman, "Income Taxation in the Industrial Sector," Economic Quarterly, 1989a.
- Sadka, Efraim and Avi Zigelman, "Inflation and Effective Tax Rates in the Industrial Sector," Bank of Israel Survey, 1989b.
- Tanzi, Vito, "Inflation Accounting and the Taxation of Capital Gains of Business Enterprises," in Roskamp, Karl W. and Francesco Forte (eds.), Reforms of Tax Systems: Proceedings of the 35th Congress of the International Institute of Public Finance, Wayne University Press, Detroit, 1981.
- Tanzi, Vito, "Inflation, Lags in Collection, and the Real Value of Tax Revenue," International Monetary Fund, Staff Papers, Vol. 24, 1977, pp. 154-67.
- Tanzi, Vito, "Inflation, Real Tax Revenue, and the Case for Inflationary Finance: Theory with an Application to Argentina," International Monetary Fund, Staff Papers, Vol. 25, 1978, pp. 417-51.

