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## Monetary Correction and Indexation: The Brazilian and Israeli Experience

### II INTRODUCTION

The growing interest which indexation proposals have attracted in developed economies in recent years has inevitably raised the question whether indexation has been a success in the countries where it was adopted in the past and whether the latter's experience could be repeated elsewhere. This paper compares the operation of indexation in two of the three countries where it has been extensively practiced: Brazil and Israel.<sup>1</sup> Without presuming that such a comparison can answer the questions raised above, I hope that, by pointing out the similarities and differences in the experiences of these two countries, it may provide some insight into the relevance of indexation to solving problems faced by others.

The advocates of indexation sometimes tend to regard it as a panacea for all inflationary ills, while its critics tend to deprecate it for not being that. To keep the limits of the present discussion clear, let me start, therefore, with an attempt to define what is meant here by indexation and what the ends are it is supposed to serve. Basically, indexation—or monetary correction, as it is sometimes called—is a procedure of automatic adjustments of nominal values, used as a device to minimize the social and

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economic costs of inflation. Consider first the case where inflation develops unexpectedly, after a period of price stability. Since it was not taken into account in the formulation of existing nominal contracts, their real outcomes will ex post differ from those envisaged by the ex ante premises on the basis of which they were signed; and the divergence between the two sets of outcomes will be greater the longer the period of the contract and the smaller the possibility of reopening it during its originally agreed-upon lifetime. It is these conditions which give rise to the common conclusion that inflation results in the redistribution of income from creditors to debtors and, to a lesser extent (for wage contracts are generally of shorter duration), from labor income to profits. Unless inflation was induced expressly for this purpose, the resultant redistribution is one of its major social costs. It will also result in a waste of resources, caused by attempts to force the revision of contracts through such acts as strikes. Furthermore, some resource misallocation may also occur, since the real price actually paid for goods and services supplied under existing contracts is artificially lowered below their future replacement cost.

Suppose now that inflation persists. The values at which new contracts are now signed may be expected to take into account future declines in the purchasing power of money. And it is sometimes argued that if they do this correctly—i.e., if the expected rate of inflation incorporated into present contracts is the one that will, in fact, materialize—continued inflation will result in no further distributive or allocative costs beyond those incurred in the initial stages and, from the point of view of the individual, the inflation tax on the cash balances he voluntarily chooses to hold (which may turn out to be less distortive than any other alternative tax considered). However, this argument abstracts from both market imperfections and the uncertainty factor inherent in inflationary situations. Economic agents should be regarded as faced not by a point expectation of inflation, but rather by a spectrum of inflationary values, with different probabilities attached to them. If, as we may assume, they are risk-aversers, lenders will then demand a nominal interest rate which incorporates not only an element of compensation for the expected (mean) decrease in the value of money but also a premium to compensate them for the extra risk element involved; and, for a similar reason, the nominal rate offered by borrowers, while augmented by the expected rate of inflation, will also incorporate a negative, disagio element, reflecting their aversion from this same risk. The effect of uncertainty on the ex-ante real interest rate depends on the relative strength of risk-aversion in the two groups; but whatever its direction, it will result in a decrease in the total volume cleared in the market—i.e., in the total volume of saving and investment.<sup>2</sup> As uncertainty increases with the length of the time horizon, this last result will be accompanied by a change in the time structure of credit transactions, away from long-term

contracts. With the collapse of the capital market, the savings no longer channelled into it are diverted, partly to current consumption, and partly to direct real investment—in particular, to stockpiling and the purchase of real estate and durable consumer goods. Thus, even when prices and interest rates can adjust in full to inflationary expectations (but with uncertainty present), resource misallocation is unavoidable. And if, ex post, the rates of inflation turn out to differ from those expected, a redistribution of income will be added to it.

In the absence of institutional and legal restrictions, market institutions may be expected to adjust to this situation, albeit often with a costly time lag. One such form of adjustment may be recontracting, allowing the frequent renegotiation of existing contracts and obligations. However, such adjustments are far from being costless. The problem is therefore one of choosing that adjustment system which will be cheapest to operate, both in terms of the amount of misallocation and redistribution it will be unable to prevent and in terms of the actual costs of operation. Indexation can be viewed as a device simulating the market adjustments made necessary by inflation, but at a lower cost. To illustrate, consider developments in the labor market in a demand-pull inflation, such as is brought about in full employment by government deficit financing. Under conditions of pure competition, as output prices rise, and with them also the value of marginal product of labor, individual firms will try to attract workers from their competitors by offers of higher nominal wages. Equilibrium will finally be re-established at the same real wage as before, but not before some reshuffling of labor among enterprises has taken place. Alternatively, with a highly unionized labor market, the initial fall in real wages will result in demands for nominal wage rises before the expiration of existing wage contracts. In both cases, some working time will be lost, either in the process of workers' transition from one firm to another or through industrial disputes. Assuming the change in the price level to be the only change that has taken place, the same adjustment could be attained through wage contracts stipulating that the nominal wage will be raised proportionately whenever the price level rises. In this case, however, no man-days would be lost.

It follows from the above example that, to constitute a cost-saving simulation device, indexation has to ensure in advance the automatic adjustment of nominal values to the price level. Otherwise, it will be unable to prevent the operation of the alternative, more costly, mechanisms. In particular, this will happen with so-called "ex-ante indexations" whenever the inflation rate realized diverges from that postulated in them. (Nor can ex-ante indexation remove the expectation-induced misallocations due to the risk element mentioned earlier.) The assumptions made in our illustration also bring out the fact that indexation is not a substitute for

mechanisms providing adjustment to changes other than that in the purchasing value of money. Thus, if the rise in the general price level were accompanied by changes in the structure of demand requiring, in turn, a change in the real wage or in the relative wages of different groups of workers, they would not be taken care of by indexation: as its alternative name implies, indexation is designed to provide only monetary (nominal) corrections, not real ones.

In the example, indexation neutralizes the effects of inflation on both real wages and real profits, and therefore also on the distribution of income. Suppose, however, that the rise in the price level was due to, say, a worsening of the country's terms of trade. This amounts to a decrease in the real value of national income which, under competitive conditions, would affect all income groups. Insofar as full indexation protects the real income of any one of them, say, labor vis-à-vis capital or lenders vis-à-vis borrowers, it can no longer simultaneously neutralize the effects of the inflation on the distribution of income. Its effects will then be similar to those of an attempt of one economic group to increase its share of the national income at the expense of another. Finally, while indexation may slow down inflationary pressures if the actual inflation rate turns out to be lower than expected, in the opposite case it may enhance it (though, at the same time, doing away with some of the negative distributive and allocative effects by means of which inflation would otherwise be slowed down). But basically, it is not an anti-inflationary device and should not be judged as such.

It is with these reservations in mind that we can now turn to the way indexation has actually been operating. As the Brazilian experience has been widely treated at this conference, I first survey the way indexation evolved in Israel and then proceed to compare the experiences of the two countries.

### **[[III] INDEXATION IN ISRAEL**

#### **History**

Indexation was first introduced in what is now Israel in the early years of World War II. With the intention of avoiding the frequent industrial disputes that could be expected to result from the rise in the cost of living, the British government of Palestine encouraged an agreement between the trade union federation and groups of industrial employers that linked wages to prices through a cost-of-living allowance. Over the years, the coverage of this agreement was extended to apply to almost all employees. For a long time this remained the only form of indexation in the country.

The linking of financial instruments came in the wake of the brief runaway inflation that followed the establishment of the state of Israel in 1948. The very primitive tax system inherited from the British administration, as well as a certain lack of economic sophistication, caused the Israeli government to resort to the printing press to finance the 1948 war and the absorption of mass immigration. An attempt to repress inflation through price controls and rationing, at first successful, could not withstand the growing pressures for long. By the beginning of 1952 the printing of money was curtailed and prices were allowed to rise in order to wipe out the public's excess purchasing power. As a result of the latter decision, the index of official retail prices rose by nearly 60 percent in that year alone.<sup>3</sup> Such a development could not but destroy any money illusion people might have nourished until then.

Unwilling to refrain from all transactions involving a time element, households and firms began searching for units of value alternative to the purely nominal one. In particular, they had to find devices which would make possible to contract and repay debts. The making of actual payments in gold or foreign exchange notes was heavily restricted by the prohibition on trade in the former and on both trade in and possession of the latter. As an alternative, contracting parties resorted to the local black market prices of gold and dollars and the rate of the Israeli pound (IL) on the Zurich exchange as a constant measure of value. Thus, payments were made in IL, but their size was *linked* to the price of some good, in this case that of foreign exchange. But contracts based on a black market price are not easily enforceable in the courts, nor can they be expected to be looked upon favorably by the authorities. The use of this type of linkage was therefore limited to transactions between small, family-owned enterprises—of which, however, the majority of the private sector of the economy then consisted. It could not be resorted to by the few big companies trying to raise capital on the market. Some of them tried, instead, to issue bonds whose nominal value was linked to the price of the goods they produced. However, the legality of even this output-specific linkage was in some doubt because of an old anti-usury law dating back to the days of the Ottoman empire, which set an upper limit on the nominal interest rate. (This explains also why nominal interest rates could not fulfil their expected function by adjusting to take account of inflationary expectations.)

As long as the government financed itself by practically unlimited loans from the central bank (or, as was then the case, from the issue department), it had, of course, no incentive either to raise the legal rate of interest or to offer any but nominal repayment. At the same time, it made no effort, either, to secure the linkage of the funds it lent to private enterprises through its development budget. The main objection to the linkage of

government credits seems to have been the fear that this would be interpreted as a sign that the government expected inflation to persist, thus adding fuel to the inflationary bonfire.<sup>4</sup> The situation changed when, under the pressure of balance-of-payments considerations, the government decided to curtail its borrowing from the issue department and tried to raise money by loans from the general public. Not wishing to discourage investment, and regarding interest primarily as a cost component which could push up prices, it was unwilling to tamper with the legal ceiling on interest rates. But the lottery prizes it offered instead were not sufficient to induce the public to buy government bonds. At the same time it became evident that the real value of the government's outstanding credit would be greatly reduced by the time of its repayment. Combined with the business sector's need of a stable value standard, the government's financial requirements led, by the mid-1950s, to the adoption of widespread linkage.

The first government constant-value bonds, linked to the official foreign exchange (i.e., dollar) rate, came into being almost unintentionally. They were issued in 1950 to compensate owners of foreign securities for their forced purchase by the state at the overvalued official rate of the Israel pound.<sup>5</sup> The successive devaluations of the IL in the early 1950s convinced the public of the validity of the linkage clause. And from 1954 onward the government had to offer either dollar or price level linkages for its bond issues to be acceptable to the public. The introduction of linkage in government borrowing inevitably raised the question of its extension to government lending as well. In 1955 the government accepted the recommendation of a public commission set up for that purpose that linkage be required on all state credits extended for a period of two or more years.<sup>6</sup> By the end of the decade linkage of medium- and long-run financial contracts was almost universally accepted. Not only regular loans, but also mortgages, life insurance, and saving deposits acquired linkage clauses, which were even extended to some commercial bills. On the whole, the two value standards used were the official exchange rate of the U.S. dollar and the Consumer Price Index (CPI). There were, however, some minor exceptions: for example, the value of down payments in certain housing schemes was linked to a construction cost index for the purpose of final settlement. As a rule, both principal and interest were linked. The choice of standard, at least in credits emanating from the government, was optional, and some private credits had mixed linkage (by which changes in the U.S. dollar rate and the CPI each applied to one half of a loan's initial nominal value).

After the massive devaluations of the early 1950s, the government preferred to cope with balance-of-payment problems by varying the effective rates of exchange rather than the formal rate, not least because a large



share of its internal debt was dollar-linked. Its professed revulsion from devaluation caused many of its debtors to opt for dollar linkage. Though inflation had been considerably slowed down by then, the real value of their current interest and repayment burden was nevertheless reduced by more than one quarter between 1955 and 1961. This fool's paradise was rudely shattered by the 1962 devaluation of the IL, from 1.8 to 3.0 to the dollar. As this was accompanied by some downward scaling of tariffs and export subsidies, its full impact was in the main reserved for financial assets and liabilities. The shock of having their outstanding debt increase suddenly by 67 percent created considerable unrest among the government's debtors. The government had to bow to political pressure: it declared a moratorium on some of the linkage in development-budget loans to agricultural and industrial producers, and allowed the recipients of mortgages financed from state funds to opt retroactively for linkage to the Consumer Price Index. It could not, however, default on its own dollar-linked obligations. Not surprisingly, therefore, the government discontinued issuing such obligations and curtailed the granting of dollar-linked credits, most of its lending and all of its borrowing being henceforth linked to the CPI. Some exchange rate linkage survived, however, in government loans to export industries and in transactions between private individuals.

The internal price stability which characterized the late 1960s seems to have misled the government into thinking that it would carry over to the next decade as well. In late 1967 it offered to forgo the linkage clauses in most of its existing linked credits for a "linkage insurance" premium of four percent per annum. A similar premium had been introduced some time before to insure firms borrowing abroad against the risk of changes in the official exchange rate of the IL. Its extension to cover indexation risks as well created a curious situation, for the premium fell short of the public's expected rate of inflation. Consequently, almost all of the internal medium- and long-term public debt in Israel is linked, while a large part of the government's outstanding credit is not. With the renewal of inflationary pressures in 1971, and particularly their very rapid acceleration after the 1973 war, the government found itself badly pressed by this asymmetry. As a result, various government departments and agencies raised the conflicting demands of reintroducing linkage on state credits and taxing the public's indexation profits on state loans.<sup>7</sup>

The last development which should be mentioned here is the abolition, in 1970, of the old Turkish law which imposed a ceiling on interest rates. In view of the great uncertainty regarding price developments in the more distant future, the nominal interest rate could not substitute for indexation in long-term credit, but freeing it probably checked the spread of indexation to short-term transactions.

### Indexation of Wages

The wage indexation mechanism in Israel is formally based on a periodically renewable agreement between the central trade union organization (Histadrut) and the Manufacturers Association of Israel. But both the Histadrut-owned enterprises and the government—the two biggest single employers in the country—adhere to it automatically, and other nonsignatories can be forced to comply.<sup>8</sup> Its coverage has been gradually broadened, so that by 1963 it was estimated to apply to about 85 percent of all employees.<sup>9</sup> By now, the only groups not covered are such marginal ones as domestic help, seasonal agricultural labor, etc.

These agreements provide for the payment of a proportionate cost-of-living allowance (COLA) whenever the rise in the consumer price index (CPI) exceeds a certain (cumulative) threshold. Initially, the allowance could be adjusted every three months. But over the years its frequency has been reduced to twice a year, in January and in July, except for periods of very rapid price increases, such as may follow a devaluation. The allowance is paid only on that part of an employee's earnings which does not exceed a certain ceiling. While this ceiling has been periodically upgraded to keep pace with both inflation and the rise in real incomes, its adjustment has been far from automatic. Consequently, the share of the total wage bill on which COLA was paid has varied between one adjustment of the ceiling and the next one.<sup>10</sup>

Originally, the COLA was calculated on the basis of the change in the CPI *during* the period since the last adjustment was made. This, however, as well as the method used to calculate the CPI in the 1950s, made it worth while for the government to manipulate the CPI for purposes of COLA. Because of the threshold condition, it also made the adjustment of the allowance highly sensitive to short-term price variations. The calculation was therefore changed to a comparison of the average price level in the period which elapsed since the last adjustment was made to the average for the preceding period of the same length. Also, the most seasonally volatile component of the CPI, the price of fruits and vegetables, is included in the computation only once a year, and the price averages are annual ones, even when all other prices are compared on a six-month basis. Another, more sophisticated, correction has been the exclusion of changes in the imputed rent of owner-occupied housing, on the grounds that they constitute a self-balancing increase in both income and consumption expenditure.

Regarded at its inception as something of a social security measure, the allowance has been tax-free until now.<sup>11</sup> It thus increased the government's wage-bill without providing a parallel source of tax revenue. In the earlier years this asymmetry caused the government to try manipulating the prices

on the basis of which the COLA was calculated. It should be stressed here that it never tried to tamper with the index itself. But in the 1950s the weights of the index, supposedly representing the bundle of goods purchased by an average urban wage earner's household, were not adjusted often enough to allow for changes in actual consumption patterns; price data were collected on certain specific dates, and, as mentioned above, the allowance itself was calculated according to the change in the index between two points in time. All this made it easy for the government to, in effect, manipulate the index through short-term subsidies on overrepresented items.<sup>12</sup> Since 1959, however, the frequent updating of the index weights, the collection of price information on a continuous basis, and the use of six-month, or even longer, price-level averages in calculating COLA made such manipulation no longer worthwhile.<sup>13</sup> The calculation of the CPI, which is used also for most other indexation purposes in Israel, is performed by the Central Bureau of Statistics, a government agency the integrity of whose procedure is guaranteed partly by law and partly by a system of public advisory committees. The index is published monthly, with a fortnight's lag, becoming available on the 15th of the month (or the next day if this happens to fall on a Saturday) following the one to which it pertains.

For many years the government took no part in the periodic renegotiations of the COLA agreement, though it adhered to it voluntarily as an employer. Since 1970, however, it has been taking an active part in them, regarding the allowance as part of the general incomes policy. As this policy tended to take the form of tripartite agreements between government, employers, and unions regarding the simultaneous determination of wages, prices, and taxes, the COLA became less automatic; more recently, however, all three parties have agreed to restore its automatic character, at the same time restricting the proportion of the price increase compensated for. Some of the new, so far untested, arrangements are described in Section III below, in the comparison of the Brazilian and Israeli systems of wage indexation.

#### Financial Assets

The government's domination of the Israeli capital market can be ascribed partly to necessity and partly to ideology. The investment funds required by the doubling of the population within the three years of mass immigration, 1949-1951, could not be mobilized within the economy. Private investments from abroad were not forthcoming in sufficient volume, so practically all of capital formation was financed in those early years by the aid and loans the government succeeded in obtaining from abroad. While

most investment funds were thus received by the government, it was both unable and, in view of its commitment to a mixed economy, unwilling to undertake the actual investment process. In lending these funds to semipublic agencies and private enterprises, it performed the function of the then almost nonexistent capital market. In later years private capital imports and domestic savings came to play an increasingly important role in investment financing. The government did not, however, curtail its role as the main financial intermediary in the country, partly owing to its wish to control the industrial and regional distribution of economic activity.

Originally, the funds obtained through aid or through government borrowing abroad were channelled through the development budget. With the increasing availability of domestic financing, much of both government borrowing and lending operations have been shifted to banks and other financial institutions, some state-owned and some private. These issue long-term bonds to the public and lend the proceeds according to treasury instructions. The government's power to allocate these funds comes ultimately from its willingness to subsidize the cost of capital to the investor. The government even subsidizes the capital cost of some enterprises, mainly state- or Histadrut-owned, which themselves issue bonds to finance their own investment projects. Formally, the proceeds of such issues are deposited with the treasury, who then lends them to the bond issuer, to be used for the purposes and on the terms specified by it. For all practical purposes they are indistinguishable from bonds issued directly by the government.<sup>14</sup>

With the exception of the Short-Term (up to eighteen months) Loan, government or government-sponsored bonds are issued for periods of four to ten years, and their principal, and often also their interest, is index-linked. The index used is the CPI, the one which serves as the base for the COLA computation. However, unlike the latter case, the monetary correction on index bonds is proportionate to the increase in the price level from the month preceding issue to the month preceding redemption (or payment of interest), and not on longer period averages; also, the CPI is not adjusted for either seasonal fluctuations or changes in the prices of owner-occupied housing. While some of the bonds pay interest twice yearly, in others it is cumulated up to maturity. One peculiar variant is a bond that allows its holder to opt retroactively for either index linkage or the alternative higher nominal interest rate. These are the results of a period in the 1960s when expectations of price stability made the regular linked bonds unattractive compared with the Short-Term Loan, which is unlinked but pays a higher nominal interest rate. The monetary correction, or, as it is called in Israel, the indexation differential, on the principal of these bonds is not taxable, and they enjoy the privilege of a flat-rate tax on the interest, deducted at the source.<sup>15</sup> In addition, there exist also long-term, nonnegotiable bonds

(seventeen to twenty years) issued exclusively to provident funds and insurance companies.

In 1974 bonds amounted to 85 percent of the total market value of securities registered at the Tel Aviv stock exchange. Of this, nearly nine-tenths was accounted for by indexed bonds, and a further 8 percent by those linked to or traded in foreign currency. The tiny remainder consisted almost exclusively of bonds convertible into shares at some later date.

Other indexed financial assets available to the public are savings deposits, life insurance policies, and savings accumulated in provident funds and pension plans. Indexation applies also to compulsory loan certificates. While some of these are nonnegotiable, they can substitute for other forms of savings within the individual's portfolio. Demand and ordinary time deposits, as well as the Short-Term Loan, are unindexed.

Indexed liabilities of the public, owed to the government and the banking system, by now consist almost exclusively of some categories of housing mortgages. Since the abolition of linkage on development loans, described earlier, most of the government's outstanding credit is no longer indexed. The short-term credit supplied by the banking system is also unindexed.

It is difficult to ascertain the prevalence of indexation in the private sector of the economy, other than in its transactions with the government or with the banking sector. Both exchange rate and index linkage were fairly common in the direct bill brokerage market.<sup>16</sup> But since the abolition of the usury law in 1970 (and the tightening of regulations regarding the volume of brokerage a bank may guarantee) this market is no longer significant.

In concluding this survey of the various forms of debt linkage practiced in Israel, mention should be made of another type of asset regarded in Israel as linked—foreign exchange deposits. With certain exceptions, exchange control regulations make it illegal for Israeli residents to hold foreign currencies or securities. However, to provide incentives for exchange transfers despite the overvaluation of the IL, the recipients of foreign currency (mainly private restitution payments from the German Federal Republic) are allowed to hold a certain fraction of it in special time deposits. These funds can be used for their owners' personal needs, such as travel abroad, or for the purchase of foreign securities which can then be sold to other Israeli residents. The rest can be held in another type of time deposit, nominally valued in foreign exchange, but redeemable only in local currency. Thus, these deposits are in effect exchange-linked. In their speculative function they are very similar to straightforward foreign currency holdings in countries with no exchange controls; however, in the Israeli case the sale of foreign currency to the central bank precedes its actual conversion into the local one.

### Taxes

Though it accepted indexation in the labor market and introduced it in the capital market, until 1975 the Israeli government was not prepared to see it extended to its own revenues. Its only, reluctant, concession in this direction has been the exemption from personal income tax of the COLA. The position of self-employed taxpayers was equalized with that of employees by linking the minimum income exempt from taxation to the COLA. But income tax brackets were not adjusted automatically with inflation; revaluation of depreciable assets was inhibited by the capital gains tax and by the tax levied on real estate and business inventories, and LIFO valuation of the latter was not allowed for tax purposes. Instead, the government relied on occasional and unsystematic tax revisions, as well as a whole series of specific devices that went a long way to undermining the whole tax system.

Under the highly progressive personal income tax schedules, inflation rapidly increased the tax burden imposed on a given real income. To a certain extent, the rapid growth of real incomes in Israel helped to alleviate this effect. Nevertheless, the tax base came to be more and more eroded by tax concessions on various types of income: overtime income and productivity bonuses, profits from "approved" investments in industry, interest on government bonds—all became subject to flat, nonprogressive tax rates. As more and more taxpayers became liable to the highest marginal tax rate (which, together with the compulsory loan, recently reached 87 percent), an increasing share of profits came to be taken in tax-deductible expense accounts and an increasing share of wages came to be paid in the form of untaxed expense reimbursements. The valuation of depreciable assets at their historical cost of purchase creates illusory but nevertheless taxable profits. Rather than allow their continuous revaluation, the internal revenue authorities allowed them to be depreciated for tax purposes at rates far in excess of those corresponding to the length of their economic life. In one case, that of long-held real estate, the land betterment tax on the difference between sale and purchase prices—which includes a considerable inflationary profit—was reduced by a rebate proportionate to the number of years between the transactions.

While these measures helped to offset some of the negative allocation and distribution effects of inflation under a nominal tax system, they could not do away with all of them, and they themselves introduced some additional ones. Since they were not directly related to the rate of inflation, their impact also varied from one year to another. Furthermore, through a peculiar neglect, the government imposed only a nominal interest on tax arrears, thus creating an incentive, especially for corporations and the self-employed, not to pay their taxes on time.

The 1975 tax reform introduced the indexation of income tax brackets

and of the system of tax credits and allowances. In the future these are to be revised as often as quarterly, in line with the COLA. The reform also limited the capital gains tax to the index-deflated gain (but added a 10 percent tax on its inflationary element) and imposed CPI linkage on tax arrears. This new legislation, however, has yet to be tested in practice. Furthermore, it still does not allow for continuous revaluation of depreciable assets, nor does it recognize LIFO valuation of inventories. While there seems to be some intention of applying the indexation principle to some other taxes as well, such as the estate duty, this has not been done so far.

### [III] COMPARISON AND EVALUATION

#### Wages

As was pointed out in several of the papers submitted at this conference, there is no "true" indexation of wages in Brazil.<sup>17</sup> It may be argued that to some extent this is because the formula relating nominal wages to the price level constitutes an instrument of government policy and not an automatic contractual mechanism. But even in Israel, where the COLA system much more nearly approaches true indexation, the Histadrut has nevertheless been known on occasion to forgo the allowance when it considered its payment to be against the interest of the workers or the national economy. It is the frequency and arbitrariness of discretionary action, however, which seem to justify the view that the mechanism operating in Brazil would be more correctly described as incomes-policy guidelines. This was certainly true of the situation before 1968, when the wage formula allowed only for expected inflation, but not for that actually experienced in the past. In addition to the discretionary element and the narrowness of coverage, the present Brazilian wage indexation system differs from the Israeli also in the following respects:

1. The wage base to which monetary correction is applied, and the inclusion of productivity changes in the wage formula.
2. The length of the time lag with which the correction is made.
3. The inclusion in the Brazilian system of the expected rate of inflation.
4. The proportion of price level changes for which wage earners are automatically compensated through the system.

The first of these four differences is illustrative of the main problem of wage indexation. As stressed in Section I of this paper, indexation can substitute for only that part of the market mechanism which adjusts nominal wages to changes in the price level. Other mechanisms are still

required to regulate the general level of the real wage and the relative wages of different industries and occupational groups. In Israel, these mechanisms are the same as those that would operate in the absence of inflation: a centralized collective bargaining process, which determines the percentage increase in the real wage (on which the COLA will later be paid), and changes in individuals' wages through "wage drift." By contrast, the Brazilian wage formula is burdened with the two completely different tasks performed in Israel by the COLA system on the one hand and collective bargaining on the other. It may, of course, be questioned whether a complete separation of the various labor market mechanisms is, in fact, possible. In particular, it has been argued that inflationary expectations are invariably taken into account in collective bargaining, independent of any COLA arrangements. Pure automatic indexation, so runs this argument, must thus cause wage earners to be overcompensated for inflation, with resultant wage-push effects.

The Israeli experience does not validate this argument. In a study of quarterly rates of change in the years 1955 to 1965, changes in the price level were found to affect nominal wages only indirectly, via the COLA. This should not, however, be interpreted to mean that there is no substitution between the various mechanisms: the nominal wage was found to rise by the full COLA, despite the fact that the latter does not cover the whole wage bill.<sup>18</sup>

Whether overcompensation will occur may depend also on the length of the time lag involved in the operation of the indexation mechanism. The two commissions which were at different times asked to suggest improvements in the COLA system in Israel both came out in favor of making the interval between COLA adjustments as short as technically feasible, for this would reduce the pressure for immediate, and ultimately excessive, compensation through parallel mechanisms. The lag with which past inflation is accounted for in the nominal wage is much longer in Brazil than in Israel, because of both the lower frequency of adjustment and the longer lag in the availability of the relevant price indexes.<sup>19</sup> In view of the high rates of inflation in Brazil, the long lag with which indexation operates through the wage formula might be expected to provide more opportunity for overcompensation. Yet the question whether real wages have risen or fallen is the subject of controversy in Brazil despite the very rapid growth of GNP per capita in recent years, suggesting that such overcompensation did not, in fact, occur.<sup>20</sup>

Some of the pressures that the long adjustment interval of the Brazilian system might be expected to call forth may have been offset by the inclusion in the wage formula of the expected rate of inflation. As was stressed in Section I of this paper, ex-ante indexation does not, by itself,



perform any of the functions of indexation proper. But combined with ex-post indexation, it may improve the working of the latter. As the adjustment of wages to the price level cannot be instantaneous, a temporary decrease in real wages, unwarranted by any real phenomena, will occur between successive readjustments of the nominal wage. The inclusion of an element of expected inflation in the nominal wage may thus be regarded as an advance payment on account of indexation differentials due in the future. The ratio of past-experienced to past-expected inflation rates incorporated in the recent Brazilian formula thus represents the final settlement of the monetary correction account. The need for such advance payments becomes more acute the higher the inflation rate, the more rapid its acceleration, and the longer the intervals at which the indexation clause operates. Their absence from the COLA system may be explained by the fact that the adjustment periods are shorter and the inflation rates on the whole lower in Israel than in Brazil. Furthermore, for the last two decades real wages in Israel have been rising at a fairly steady rate of 5 percent per annum. In most of those years, the Israeli worker could therefore expect that his real income would not fall below that received in the preceding year even if COLA payments were delayed (though then it would be lower than what the collective wage agreements had intended him to receive in the absence of inflation). Even so, on one or two occasions when inflation suddenly accelerated, the Histadrut demanded, and received, an advance on the new COLA, at least for low wage earners.

The Brazilian system does not allow for full monetary correction: only half the inflation rate, whether expected or actually experienced, enters the wage formula.<sup>21</sup> The rationale underlying this procedure, as mentioned earlier, is that of restraining inflation through a reduction in the real wage.<sup>22</sup> However, the Israeli experience demonstrates that such imperfect correction may under certain circumstances be quite consistent with "true" indexation. Generally speaking, this will happen when the rise in the price level represents an exogenous fall in the real income of the private sector. A deterioration in the terms of trade through an increase in the price of imports, say, in oil prices, is a case in point. The adjustment of nominal wages to the full extent of the resulting rise in the domestic price index is then equivalent to an attempt on behalf of the employees to shift the whole of the unavoidable decrease in real income onto the employers. The same will be true of price increases due to changes in the rate of exchange, in import tariffs, and, to a lesser extent, in indirect taxation in general. These are all cases where, as mentioned in the introduction, full indexation cannot simultaneously restore the status quo in both real incomes and income distribution.

The treatment of price rises originating from outside the private sector,

particularly from outside the national economy, has been the subject of much discussion in Israel, where imports of goods and services have amounted to between one-third and one-half of GDP. While defense and investment requirements, together with inputs for export production, account for most of total imports, the import component, direct and indirect, in private consumption amounts to over 20 percent.<sup>23</sup> Under the fixed exchange rate regime, the infrequent massive devaluations used to be almost immediately transmitted into the cost-of-living index. The problem could, in principle, be solved by computing the COLA on the basis of an index of domestic prices only.<sup>24</sup> But the construction of such an index, especially one that could be calculated monthly without much delay, proved to be impracticable. Consequently, the (usually partial) exclusion of devaluation effects from COLA computations used to be the subject of ad-hoc negotiations, as when, on one of the occasions referred to earlier, the Histadrut agreed to forgo the allowance due to the imposition of a general import levy in the summer of 1970.

The transition to a system of minidevaluations in 1975 made it impossible to resort to ad-hoc negotiations any longer. Consequently, the COLA agreement has been revised so that in the future the allowance will compensate for only 70 percent of the increase in the CPI. Such a partial compensation cannot be easily justified in the case of Brazil where total imports amount to no more than 7 and 10 percent of GDP. It would, however, be required in the high-trade-share West European countries, though not in the United States.<sup>25</sup>

Another argument, raised both in Brazil and in Israel, in favor of less than full wage indexation refers to the inability of industries the prices of which lag behind the rest, particularly export industries, to raise nominal wages in proportion to the price level.<sup>26</sup> The structural changes reflected in such divergent development of individual prices may actually require the average real wage to fall—for example, when the demand for the output of labor-intensive industries has grown relatively less than the rest. The downward stickiness of wages could then prevent the mechanism entrusted with determining the real wage from downward adjustment to compensate for the operation of a full indexation system. It is worth noting that in 1966 the Histadrut in Israel forwent a COLA payment in view of the then prevailing employment situation, a contributory cause of which had been the wage increases obtained through collective wage agreements. But except in such a case, price divergences simply mean that some plants or industries would expand and others contract. Under full indexation this process will start with layoffs in the contracting industries; under partial indexation, with individual workers being attracted to the expanding ones. As for the export industries argument, it is equivalent simply to asking for the subsidization of exports by the labor producing it. Besides being

indefensible on equity grounds, such subsidization cannot be effected unless labor in export industries is highly specific, with no alternative employment in the rest of the economy.

### Financial Assets

The sum total of indexed instruments issued by the treasury and the financial system in Brazil—ORTNs, housing bonds, and indexed saving deposits—amounted to Cr\$ 41,583 million by the end of 1973. This was equivalent to somewhat less than half the money supply, and somewhat less than one-tenth of GDP. The comparable figure for Israel—consisting of saving deposits and the value of all indexed government bonds—was IL 35,695 million, the equivalent of nearly five times the money supply and as much as nine-tenths of GDP.<sup>27</sup> These ratios are not strictly comparable, of course, because of institutional and other differences between the two countries. These, however, do not all operate in one direction. Thus, for example, Brazilian commercial banks can hold part of their compulsory reserves in adjustable treasury bonds (ORTNs), while Israeli banks cannot.<sup>28</sup> On the other hand, the social security system is a major holder of indexed bonds in Israel, but not in Brazil. Nevertheless, it seems to be a safe conclusion that indexed financial instruments play, quantitatively, a much greater role in Israel's economy than in Brazil's.<sup>29</sup>

The figures quoted above overstate the importance of indexed instruments to the general public. In both countries a considerable portion of indexed government bonds is used to effect transfers between the treasury and various government agencies, or between the monetary authorities and the banking system. It is worth noting that of the Cr\$ 21,000 million of ORTNs outstanding by the end of 1973, only about 18 percent could be regarded as held by the general public. And in Israel, the holdings of National Insurance Institute alone accounted for nearly a quarter of all indexed bonds outstanding.<sup>30</sup>

Table 1 provides data on the portfolio of liquid assets held by the general public in both countries. To make it possible to draw conclusions as to the relative importance of indexed assets despite difficulties of comparability, we present two alternative sets of data for each of the two countries. In both cases alternative B gives a higher estimate of the share of indexed assets in the public portfolio than does alternative A: in Brazil, by excluding acceptances from the nonindexed category; in Israel, by including compulsory loans in the indexed one. Furthermore, the estimates are also biased so as to reduce the differences in the proportion of indexed to nonindexed assets held. In particular, exchange rate-linked deposits and bonds, which in the long run can be regarded as indexed, were excluded

TABLE 1 Liquid Assets Held by the Public, Brazil and Israel: 1973

	—Brazil (A)—		—Brazil (B)—		—Israel (A)—		—Israel (B)—	
	(million Cr\$)	(per cent)	(million Cr\$)	(per cent)	(million IL)	(per cent)	(million IL)	(per cent)
Total	187,281	100	150,707	100	23,320	100	30,660	100
Nonindexed	162,231	87	125,657	83	11,620	50	11,620	38
Means of payment <sup>a</sup>								
Time deposits	93,835	50	93,835	62	7,392	32	7,392	24
Treasury bills (LTNs) <sup>b</sup>	25,879	14			3,838	18	3,838	14
Acceptances <sup>c</sup>	5,943	3	31,822	21	390		390	
	36,574	20						
Indexed	25,050	13	25,050	17	11,700	50	19,040	62
ORTNs <sup>b</sup>	4,411	2						
National housing bonds	6,517	3	10,928	7	8,100	35	8,100	26
Savings deposits	14,122	8	14,122	10				
					3,600	15	3,600	12

SOURCE: Brazil: Banco Central do Brasil, Relatório Anual 1974, Table III.2, VI.3, and VI.6.  
 Israel: Bank of Israel, Annual Report 1974, Table XVI.2; (the figures for holdings of indexed bonds according to revised figures in Bank of Israel Economic Review, No. 44 (May 1976), State Comptroller, Annual Report No. 25 for 1974 (Hebrew), p. 88.

<sup>a</sup> Currency in circulation plus demand deposits.

<sup>b</sup> Held by the public ("nonidentified") and by insurance companies.

<sup>c</sup> Letras de Câmbio.

<sup>d</sup> Total amount outstanding.

<sup>e</sup> Including those held through unit trust funds and provident funds of the self-employed.

in Israel, although their relative volume probably outstrips the similarly excluded holdings of foreign currencies in Brazil.<sup>31</sup>

The data in Table 1 demonstrate that though the differences in the role which indexed assets played in the financial asset portfolio of the public in the two countries were smaller than suggested by the consideration of their total, gross volume, they were nevertheless significant. Indexed assets amounted to between 50 and 60 percent of the portfolio held by the public in Israel but to only between 10 and 20 percent of the Brazilian portfolio. The most striking difference is in the relative importance of indexed bonds. These amounted to no more than 7 percent of the portfolio in Brazil but to more than one-third in Israel, and to as much as one-half if compulsory loans are included.<sup>32</sup>

Associated with the difference in the structure of the public's portfolio of liquid assets are those in its size. In Table 2, the main magnitudes presented above are expressed as ratios to GDP. It is evident that the relative size of the public's total holdings of the assets considered here was smaller in Brazil than in Israel. Part of the difference can probably be ascribed to the higher per capita income of the latter.<sup>33</sup> Operating in the opposite direction, however, should be the greater absolute economic size of Brazil and the presumably greater inequality of incomes there. Indeed, Table 2 shows that the ratio of money balances to income was roughly the same in both countries, and, if anything, slightly higher in Brazil. Practically the whole difference in the overall ratio of liquid assets to income is due to differences in holdings of indexed assets, primarily of indexed bonds. With the latter excluded, the ratio of the remaining assets to GDP is on the same order of magnitude in the two countries: 0.39 in Israel as against 0.30-0.37, depending on the definition used, in Brazil.<sup>34</sup>

The size, relative to GDP, of the public's portfolio of liquid assets may be

**TABLE 2 Ratio of Selected Liquid Assets Held by the Public Relative to GDP, Brazil and Israel: 1973**

	—Brazil—		—Israel—	
	A	B	A	B
Total	0.39	0.32	0.60	0.79
Nonindexed	0.34	0.27	0.30	0.30
Monetary	0.20	0.20	0.19	0.19
Indexed	0.05	0.05	0.30	0.49
Bonds	0.02	0.02	0.21	0.40
Total excluding indexed bonds	0.37	0.30	0.39	0.39

SOURCE: Table 1 and the sources quoted there (for GDP).

regarded as an indicator of the financial system's capability to intermediate in the capital-market.<sup>35</sup> Coupled with the generally much shorter term structure of the unindexed financial instruments, the figures of Table 2 suggest that indexed assets, and indexed bonds in particular, played an important role in capital accumulation in Israel, but almost none in Brazil.

The remarkable difference between the proportion of indexed assets in the liquid portfolios held by the public in the two countries is rather surprising, for Brazil has a long history of sustained inflation at rates considerably exceeding those experienced by Israel before 1973.<sup>36</sup> Admittedly, in that year the 20 percent rate of inflation in Israel exceeded the 16 percent reported for Brazil.<sup>37</sup> And with inflation rising to 40 percent in 1974, the public reacted by raising the share of indexed assets from 50 to 60 percent of its liquid holdings. But already in 1972, with an inflation rate of only 13 percent, this share amounted to 38 percent—more than twice as much as in Brazil. In contrast to the experience in Israel, the Brazilian share does not seem to be correlated with inflation, rising by two discrete steps from about 6 percent in 1966–1967 to 17 percent in 1970–1973.<sup>38</sup> Part of the difference in the propensity to hold indexed assets may be due to the difference in expectations. In Israel, the last few years referred to here were a time of rapidly accelerating inflation. In Brazil, on the other hand, inflation has been decelerating since the mid-1960s. But I would also venture the opinion that at least some of the difference must be due to imperfections in indexation practices in Brazil, on the one hand, and the greater adjustability of nominal interest rates there, on the other.<sup>39</sup> As a result, the attractiveness of indexed bonds (and deposits) relative to unindexed financial assets is smaller in Brazil than in Israel.

Broadly speaking, the Brazilian and Israeli bond indexation practices differ with respect to the price index used, the method of calculating the monetary correction, and the frequency of its payment. No single index can be claimed to be the "correct" one for all indexation purposes, especially if we consider linkage within the private sector as well, and the linkage of transactions referring to the future purchase of a specific commodity (e.g., housing) in particular. Insofar as the public debt is concerned, however, equity and policy considerations have to be taken into account. That the CPI (the index used also in wage linkage) was adopted for this purpose in Israel can be ascribed to the equity consideration, as well as to the fact that it was readily available when the indexation of debt instruments was first introduced. However, unlike the COLA calculation, bond linkage is one-hundred percent mechanical, being subject to neither seasonal or other adjustments nor any ad-hoc interventions. With the acceleration of inflation in the last few years, and particularly since the partial exclusion of devaluation effects on the CPI from the COLA calculations, it has been argued that this favors rentier capital over

labor. The counterargument, justifying differential treatment of capital income and wages, is that once a medium- or long-term capital transaction has been effected, renegotiation is no longer possible, as it is in the case of wages. Thus, while COLA undercompensation can be corrected through the collective bargaining process, no such complementary mechanism exists in the capital market.

As mentioned in the discussion of wage indexation, the inclusion in the index of price changes emanating from outside the private sector restricts the government's freedom in its exchange rate and indirect-tax policies. To illustrate, while private consumption in Israel amounted to about IL 25 billion (at December 1973 prices), the total stock of bonds, compulsory loans, and saving deposits held by the public (on which indexation is ultimately paid for by the government) stood at about IL 19,000 million. Assuming a general consumption sales tax which would be wholly shifted forward, 76 percent of its proceeds would have to be ultimately paid back to the public in the form of indexation differentials. Such a situation could be prevented by using instead the GDP deflator at *factor prices*. But the cost of constructing such an index on a monthly basis and without much delay seems to be prohibitive, since it requires monthly estimates of GDP.

Exchange rate depreciations may be designed only to rectify the effect of inflation on the relative prices of imports and exports, or they may be intended to induce real changes in the structure of the balance of payments. It can be argued that in the first case they should not be excluded from the price index on which linkage is calculated. But this argument, which might apply to Brazil, is of little practical importance there because of the low ratio of trade to GDP. On the other hand, services are excluded from Brazil's wholesale price index (WPI). As some authors have pointed out, "so long as inflation is high, the choice of the index is relatively unimportant."<sup>40</sup> And there is also the development of wages already referred to. In more highly developed economies, however, inflation tends to strengthen the secular rise in the relative price of services. Their exclusion could thus be expected to greatly reduce the attraction of linked bonds.

Inflation does not usually proceed at a constant rate. This raises the question of the index base on which the monetary correction should be calculated for bonds purchased, or redeemed, during the time between publication of the index for two successive measurement periods. For practical reasons, general price indexes are calculated as period averages rather than continuously, and become available with some time lag. Monetary correction, as a rule, is computed by comparing price level averages of equal length and with an equal lag. Perfect indexation can then be attained only if the rate of inflation *during* the measurement and lag period preceding the actual moment of redemption is the same as that

which preceded the actual time of purchase. The divergence between the two cannot be of much importance when the relevant periods are very short. But in Brazil the price levels used to calculate the monetary correction are three-month averages, and are available with a delay of two months.<sup>41</sup> In Israel, these are monthly averages and the delay is only two weeks. Nevertheless, even there, the occurrence of sudden, considerable price rises makes it possible for the lender to link his capital to a lower index base than actually prevailed at the time.<sup>42</sup>

Adjustable treasury bonds (ORTNs) are issued in Brazil for periods of two to five years, and there was even an attempt to issue one-year bonds. In Israel, indexed bonds are issued only for periods of four years and upwards. Basically, the difference is that of the frequency with which monetary correction is paid out. At one extreme, one could think of monetary correction being paid currently, together with, say, a twice-annual interest payment; at the other, of it being cumulated up to maturity.<sup>43</sup> The first corresponds to the view which regards monetary correction as a way of calculating the correct nominal rate of interest; the second, to that which regards it as a way of preserving the real value of the principal. With perfect capital markets, the two systems affect the individual's wealth in the same way.<sup>44</sup> But even then, their monetary effects are different. Unless the public is ready to reinvest periodically the same real amount in government bonds, reliance on short-term indexed loans will result in price increases being, at least in part, accommodated within a short time by the monetary expansion required to pay the monetary correction. A highly concentrated term structure of a long-run indexed debt contracted in an inflationary period, on the other hand, may result in long cyclical swings of monetary expansion. But the effect of such cycles will probably be offset by the growth of real income.

The difference between the term structures of the indexed debt in the two countries could possibly be attributed to the rate of inflation being in the long run much higher in Brazil than in Israel. It is, therefore, worth mentioning that with the recent acceleration of inflation in Israel the public came to regard bonds with short maturity as a close substitute for monetary assets. Consequently, considerable support has been gained for the view that indexation should be confined to long-term bonds, or if possible, granted only to their long-term holders.<sup>45</sup>

A peculiar problem which should be mentioned here is that of "indexation in one country." Under a constant-exchange rate regime it can become extremely profitable for foreigners to purchase the bonds of an indexed country—provided they manage to repatriate their capital before the exchange rate is eventually adjusted in the wake of inflationary pressures. The indexing country can thus find itself borrowing from abroad at effective interest rates considerably exceeding those prevailing there. In



Israel, the scope of such operations was very limited, owing to exchange control regulations. In their absence, however, this external cost of indexation can be considerable. Even if the exchange rate is adjusted very frequently, as under the Brazilian minidevaluation system, the presence of inflation abroad will cause it to lag behind the domestic price level—leaving the purchase of indexed bonds still attractive to foreigners.<sup>46</sup> Part of the increase in the foreign exchange accumulated by Brazil in recent years has indeed been explained by some authorities as due to this factor.<sup>47</sup> The problem would probably be much more severe if indexation were to be introduced by one of the main reserve currency countries.

On the debit side of the public's holdings vis-à-vis the government and the financial system, the vicissitudes of indexation in both countries reflect the presence of political pressures. In view of the considerable divergence between monetary correction as applied to wages and to capital in Brazil, it is perhaps not surprising that the mortgages offered by the National Housing Bank were originally linked to the minimum wage (minus its productivity component) and that the monetary correction on them is still synchronized with changes in it. A very similar demand, to link mortgages to the COLA payments, found much support in Israel.<sup>48</sup> Some such pressure to align mortgage interest and amortization to incomes can probably be expected in any country in which housing is widely considered to be a government responsibility.<sup>49</sup>

It is, perhaps, illustrative of the political element involved that data on the prevalence of full ex-post indexation in credits granted to the public, especially from government sources, are not easily available in either country. As mentioned in the preceding section, linkage of development loans has been abandoned in Israel. The same seems to be true of Brazil, where much of the so-called indexation of loans to the public is only a form of charging higher nominal interest rates, independent of actual inflationary developments during the life of the loan, or else is subject to a ceiling clause which ensures that the monetary correction on it will fall short of the inflation rate.<sup>50</sup> In both countries, the argument for the virtual nonindexing of development loans has been the need to subsidize real investment. But the rate of the subsidy thus granted will depend on the rate of inflation, and not on any real considerations. Furthermore, whenever the inflation rate exceeds that expected at the time the loan was granted, this subsidy contains an element of pure rent, over and above that required by investors. The nonlinkage of development loans, which are ultimately granted from funds mobilized by the government through indexed bonds in both Brazil and Israel, cannot but have considerable redistributive effects in the long run.

Finally, the question must be asked why, in both countries, private firms failed to issue their own indexed obligations. An often proffered explana-

tion is the borrower's fear that the price of his own revenue-producing goods will rise more slowly than the general price level (and that the lag will increase with inflation). This argument implies that the higher the rate of inflation, the more relative prices are expected to vary. But when, in a preliminary examination, the relative annual dispersion in the prices of ten main CPI groups was regressed on the annual rate of inflation, the result for Brazil, for 1962-1970, was

$$\frac{\sigma}{X} = 0.09 + 4.60x^{-1} \quad R^2 = 0.573$$

0.24            1.50

and that for Israel, for 1956-1972, was

$$\frac{\sigma}{X} = 0.37 + 1.25x^{-1} \quad R^2 = 0.653$$

0.11            0.23

where  $x$  denotes the general price increase and the small numerals are the standard errors of the coefficients.<sup>51</sup>

Further investigation of more highly disaggregated data may reverse this finding that relative price dispersion decreases with inflation; furthermore, the fear of direct government interference in the pricing process may have played a greater role in individual price expectations than past experience of broad price aggregates. In both Brazil and Israel, inflation was accompanied by attempts to "suppress" inflation either by direct price controls or by pressure-backed persuasion. And even in more market-oriented economies, it is precisely the big, multiproduct corporation able to command a market for its indexed bonds which will also be the object of government price-freezing "guidelines." But in any event, in both Brazil and Israel, the abstention of firms from issuing indexed obligations (other than against holdings of indexed government bonds) is probably due primarily to the government domination of the capital markets. The availability of cheap unlinked development loans, on the one hand, and tax concessions on government bonds, on the other, made private long-term borrowing both unnecessary and excessively expensive.

### Taxes

In the first part of this paper indexation was defined as the more or less automatic adjustment of nominal values to changes in the price level. In the case of taxes this means preventing inflation from changing the tax burden imposed on a given real value. In practical terms, it requires deflating by the price index all revenues and property values subject to a flat tax rate and the income brackets to which given rates of a progressive tax apply. The former has, in fact, been done in Brazil, by allowing continuous revaluation of both depreciable assets and working capital. In

Israel, such revaluation has been allowed on only a few occasions, usually in the wake of big, discrete exchange rate devaluations. As a substitute for continuous adjustments the government, as we have seen in the preceding section, relied on various offsetting measures, such as tax concessions and quick depreciation write-offs.

While indexation of income brackets for income tax purposes was not practiced in Israel until recently, it is thought to have been applied by the Brazilian tax authorities. This impression, however, seems to be due in part to the term as interpreted in Brazil, which differs from the one underlying the present discussion. There, indexation has come to mean any adjustment which takes into account changes in the general price level. Thus, the development of the price index is considered for the purpose of income bracket revaluations. But they do not seem to be carried out automatically according to a generally available set of rules.<sup>52</sup>

The Israeli government's long-standing refusal to index taxes may be explained in part by the lower inflation rates experienced in Israel. For a long time, the rapid growth of real incomes, on the one hand, and the various partial remedies applied, on the other, mitigated the erosion of the tax system by inflation. But over and above the conditions which facilitated it, the government's behavior was also determined by considerations of economic management and equity. "Fiscal drag" has long been believed to be an important automatic stabilizer. It is generally conceded that inflationary pressures in Israel were, in most periods, generated by the expansion of the public sector. Coupled with easy money policies aimed at encouraging growth, this left the revenue side of the budget as the main, if not the only, instrument of combating inflation. The "natural" elasticity of progressive taxation with respect to inflation was thus regarded as an alternative to raising the tax rates themselves. That the two were not perfect substitutes is evident from the other beneficial role which tax authorities ascribed to inflation: that of reducing income inequality.

In fact, neither object was accomplished to any satisfactory degree. Because the marginal income tax rate is subject to an upper limit, inflation resulted in narrowing the real income range to which tax progression applied, moving an increasing number of taxpayers into the range of the constant marginal rate. Thus, inflation had the effect of reducing inequality only within the low- and medium-income groups. Furthermore, with very high tax rates applying to successively lower real incomes, tax loopholing and avoidance (of the types mentioned in the preceding section) came to assume ever-growing proportions. This also grossly reduced any anti-inflationary effects the fiscal drag might in principle have had.

The Israeli experience in the absence of tax indexation, as well as the fact that Brazil had to introduce some measure of it (as did Israel, eventually), point out the limitations of reliance on automatic stabilizers, at least

on the revenue side. It seems that neither income equalization nor an increase in the real tax burden can be achieved by default to any significant degree. Inflation-induced movements in these directions may be possible as long as they are small and therefore of little importance. But under rapid inflation, the magnitudes they assume in themselves prevent them from being fulfilled. The Israeli government was able to enjoy the stabilizing effects of an unindexed tax system only because (and only as long as) inflation was rather mild. In Brazil, where the high inflation rates made such stabilizers much more desirable, they had to be abandoned—by allowing some degree of tax indexation—for precisely the same reason for which they were required. If one of the arguments against indexation is the reduction of automatic fiscal stabilization, it seems to be much weakened by the present evidence.

In one rather important respect, especially in developing countries, tax linkage can provide the stabilizing effect supposedly lost through indexation. The reference is to tax arrears. The more rapid the decline in the purchasing power of money, the greater the incentive to delay tax payments, even if arrears are subject to some nominal interest. Besides its fiscal destabilizing effect, the accumulation of unlinked tax debt also affects income distribution, for employees can exploit it to a much lesser degree than can the self-employed and corporations. Both the Israeli experience and that of Brazil before the indexation of tax arrears was introduced underline the importance of this phenomenon.

Finally, there is the question of how indexation affects the tax aspect of inflation itself. By reducing the real value of the government's and the monetary authority's internal debt, inflation transfers purchasing power from the private to the public sector.<sup>53</sup> If the public debt were contracted exclusively in the financing of public consumption, the inflation tax would be identical with the reduction in the real value of the outstanding stock of unindexed outside-money and government bonds. However, the heavy government involvement in the capital market in both Brazil and Israel means that the public sector is a creditor, and not only a debtor, of the private sector. It is therefore the *net* internal position of the public sector which determines the magnitude, and even the sign, of the inflation tax.

The evaluation of the government's position as creditor poses some difficulty, for in both countries much of its lending is done through agencies and financial institutions enjoying varying degrees of independence. In particular, it is practically impossible to ascertain the extent to which government carries the losses caused to banks and financial institutions by the nonindexation of loans granted at its recommendation. The estimates of the inflation tax base presented in Table 3 are therefore only rough indicators. Nevertheless, they suggest that, in both countries, inflation can no longer be regarded as an instrument for transferring resources from the

**TABLE 3 The Net Inflation Tax Base, Brazil and Israel:  
1973**

	Brazil (Cr\$ million)	Israel (IL million)
1. Currency held by public	16,427	2,700
2. Nonindexed liquid assets of private commercial banks <sup>a</sup>	11,161	3,600
3. Nonindexed government bonds held by public <sup>b</sup>	6,356	400
3a. Subtotal (1 through 3)	33,944	6,700
4. Less Net nonindexed public sector loans to the private sector <sup>c</sup>	-26,922	-8,300
5. Net (3a less 4)	6,952	-1,600
6. Net as percent of GDP	1.5	-4.1

SOURCE: Brazil: *Boletim do Banco Central do Brasil*, Vol. XI (No. 12), Table I.2 (line 2); Banco Central do Brasil, *Relatório Anual 1974*, Table III.2 (line 1); Table VI.6 (line 3), and Tables III.6 and III.7 (line 4).

Israel: Bank of Israel, *Annual Report 1974*, Table XVI-2 (line 1), Table XVII-4 (lines 2 and 3), and Tables XX-9 and XX-10 (line 4); State Comptroller, *Annual Report No. 25* (Hebrew), p. 88 (line 4).

<sup>a</sup>Brazil: Cash, nonindexed deposits with the Bank of Brazil, special deposits with monetary authorities, compulsory reserves other than ORTNs, and treasury bills (LTNs) held by private commercial banks. Israel: Liquid assets of commercial banks.

<sup>b</sup>Brazil: LTNs held by the general public and by insurance companies and investment banks. Israel: Outstanding government Short-Term Loan.

<sup>c</sup>Brazil: The balance of the Bank of Brazil's loans to the private sector, Cr\$ 37,970 million, net of the private sector's demand deposits with the Bank of Brazil (exclusive of banking institutions).

Israel: Long-term outstanding credit of the Ministry of Finance (IL 7,500 million) less loans to government agencies (estimated at IL 1,000 million), plus balance of "directed" credit in local currency granted out of the export credit fund, etc., and through Bank of Israel rediscounts and liquidity exemptions.

private to the public sector. Because of institutional differences, the definitions used to estimate net government credit are not the same for the two countries. For Brazil, this was defined as the difference between the Bank of Brazil's loans to, and the deposits held with it by, the private sector. Thus estimated, the inflation tax base amounts to no more than between 1 and 2 percent of GDP. As this assumes all development loans granted by the National Bank for Economic Development (BNDE) to be fully indexed, it probably overstates the size of the tax base. Indeed, in a detailed study of Brazil's inflation it was estimated that over 90 percent of the gross inflation tax revenue in the period 1969-1972 was ultimately rebated to the private sector.<sup>54</sup> For Israel, we took the balance of long-term development loans granted by the treasury and of the short-term credit lent by commercial banks out of deposits held with them with this purpose by the government and the Bank of Israel.<sup>55</sup> Thus estimated, the inflation tax base in Israel is

seen to have been *negative*. In other words, inflation resulted in a transfer of resources away from the government to the private sector!

This outcome is, of course, the obverse of the phenomenon commented upon earlier, that the existence of indexed government bonds results in a return to the public of a great part of the receipts from price-raising taxes via indexation. But, while indexation would, in any case, cause the base of the inflation tax to shrink, it could not by itself eliminate it completely and certainly not turn it negative. Indeed, indexation did not reduce the volume of the unindexed part of the money base in Brazil, which remained more or less constant at 5-6 percent of GDP between 1966 and 1973.<sup>56</sup> It was, thus, the rapid expansion of unindexed loans granted by the public sector that almost wiped out the inflation tax.

#### [IV] CONCLUSIONS

The two countries where indexation has been widely practiced in recent years, Brazil and Israel, differ considerably in their economic development and their social and political structure. Despite this (and perhaps because of it), the similarities and differences in the way in which indexation worked in the two countries may allow us to draw some conclusions regarding its operation in general.

The first, most striking similarity is in the effects of inflation on the capital markets. Some of these, like the charging of high banking commissions, the tying of loans to collateral deposits, and the outflow of funds from bank deposits into the bill brokerage (or, in Brazil, the *letras de cambio*) market, can to a great extent be attributed to the existence in both countries of usury laws restricting the nominal rate of interest. But, given the uncertainty involved, it is most doubtful whether the virtual disappearance of long-term lending and borrowing could have been avoided even in their absence.

The other similar characteristic, less often noted, is that in both countries indexation, of financial instruments at least, did not spread until *after* inflation began to decelerate. Indexed bonds were first issued in Brazil in 1964, the year prices rose by 92 percent. But, quantitatively speaking, they were hardly in evidence before 1966 or 1967, when inflation was already down to 40 and 24 percent per annum, respectively. In Israel, the first issue of indexed bonds appeared on the market in 1955, when inflation was only 6 percent, far below its 58 percent peak of 1952. Casual empiricism would suggest that indexation does not affect the rate of inflation: in the first fifteen years after its introduction in Israel, annual inflation averaged only 5 percent, while in Brazil it decreased from 25 percent per annum in the years 1967-1968 to 16 percent in 1972-1973. Yet in neither country did it

prevent prices, as measured by the cost-of-living index, from rising by more than 40 percent in 1974.

A closer scrutiny reveals that indexation proper was practiced to a much lesser extent than is sometimes suggested. The impression of total indexation in Brazil is partly due to the very broad sense in which the term monetary correction is used there, to cover practically all changes in nominal values in which some official index is used as a guideline—particularly the use of the term to describe payments compensating for expected, as well as experienced, price developments. Furthermore, ex-post indexation is sometimes restricted by ceiling clauses, and discretionary government intervention seems to be frequent. The more automatic type of indexation practiced in Israel, on the other hand, turned out to be politically difficult to maintain, and was in fact abandoned as far as most of the government's debtors are concerned. Thus, it cannot be argued that either of the systems compared here provides a real-life example of a fully indexed economy. Their experience may even indicate that total indexation, whatever its drawbacks or merits, is politically unattainable. It may well be that further research, both theoretical and empirical, should pay more attention to the problems of partial than to those of total indexation.

With respect to the indexed sector itself, there is the question whether indexation should be homogeneous—i.e., with identical conditions and the same index. Differences in the availability of supplementary mechanisms do, on the face of it, justify differential indexation. But the story of mortgage indexation in both countries is illustrative of the social and political considerations that may make uniform procedures, and a single index, preferable to economically more sophisticated methods.

In both countries, the inflation tax base was found to have been almost completely eliminated. However, especially in Israel, this was due not so much to indexation of the public debt as to abstention from it in government credits. It was the result of the belief in state intervention which, for all their political dissimilarity, characterized the governments of both countries. In more market-oriented economies indexation would probably not be accompanied by so much discretionary action. But the potential size of the subsidy that can be granted in this manner may make it difficult to resist even for less intervention-prone governments.

Elimination of the inflation tax has been one of the main arguments against indexation—for this is really what the inflationary feedback ascribed to it amounts to. It has been suggested that inflation tax may be preferable to the alternative taxes considered. But the resulting transfer of purchasing power from the private to the public sector is only a by-product of much greater redistribution within the private sector itself. When this is taken into account, the inflation tax has little to recommend it, at least on equity grounds. Although the tax is the way in which inflation may play

itself out "naturally," the accompanying redistribution effects are precisely the reason why inflation is generally regarded as undesirable.

Finally, it is worthwhile to compare the direction in which indexation has spread in the two countries considered here. In Brazil, indexation was originally restricted to capital. Wages were for a long time completely unindexed, and even the formula employed in recent years does not allow for their monetary correction to the extent allowed for capital. In Israel, on the other hand, wages were indexed many years before financial instruments. Thus, in Israel indexation was introduced primarily for equity considerations, the protection of labor income; in Brazil, it was introduced primarily for allocative considerations, enhancement of capital accumulation and improvement of its allocation. Political attitudes in both countries probably had much to do with the order in which indexation was adopted. (It is perhaps indicative of the Israeli attitude that savings accounts were the last to be indexed.) Yet, under the pressure of economic and social forces, sooner or later both had to move away from their original positions: Israel—toward the indexation of financial assets, Brazil—toward some measure of true, ex-post indexation of wages. It has sometimes been suggested that if more highly developed countries are to introduce indexation, they should do so on equity grounds only, and limit it to the protection of the weaker and more vulnerable members of society; or else that they should restrict it to very long-term debts, extreme misallocations of which are difficult to remedy by other means. The Brazilian and Israeli experiences indicate that such selective indexation may be impossible in practice.

#### NOTES

1. The third is Finland. Until the recent worldwide upsurge in inflationary trends, the experience of these countries hardly merited a mention in the general economic literature, and even now little material on it is accessible to the English-speaking reader. [A description of the Finnish experience has recently become available in S. Mukherjee, *Indexation in an Inflationary Economy, A Case Study of Finland* (London: PEP, 1975)]. It is perhaps a sign of the culture-bound nature of our profession that a pioneering exposition of the subject, the late Amotz Morag's "For an Inflation-proof Economy" [*American Economic Review*, LII (March 1962), 177-185], received little attention at the time.
2. The assumption underlying this result is that individuals consider the dispersion of possible changes in purchasing power to be greater under inflation than under price stability. It may be noted that it is the effects of inflationary expectations which are thus seen to have a real cost attached to them, irrespective of whether or not they ultimately materialize. See Dwight Jaffee and Ephraim Kleiman, "The Welfare Implications of Uneven Inflation," Institute for International Economic Studies Seminar Paper No. 50, Stockholm, University of Stockholm, 1975.
3. For a general survey of price developments in this period, see Don Patinkin, "Monetary and Price Developments in Israel: 1949-53," *Scripta Hierosolymitana*, Vol. III (1956),



- reprinted in that author's *Studies in Monetary Economics* (New York: Harper and Row, 1972).
4. Thus, in answering demands for linkage, the chairman of what was at the time the country's largest bank (which formally ran the issue department) retorted that "if we, whose name appears on the banknotes, lose trust in the currency, how can we expect the public to sustain it."
  5. A precedent may be said to have been set by the National Loan raised by the Jewish Agency in the spring of 1948. But this linkage reflected the monetary interregnum which accompanied the termination of the British Mandate for Palestine and the fact that the loan was guaranteed by the Agency's future dollar receipts.
  6. Nevertheless, some agricultural development loans continued to be granted unlinked. For a description of the early origins of the linkage of financial assets in Israel, see Alex Rubner, "The Abdication of the Israeli Pound as a Standard of Measurement for Medium- and Long-Term Contracts," *Review of Economic Studies*, XXVIII (October 1960), 69-75; and Marshall Sarnat, *The Development of the Securities Market in Israel* (Basel and Tübingen: Kyklos-Verlag and J. C. B. Mohr, 1966).
  7. From the government's point of view, the situation was further complicated by the introduction of a policy of minidevaluations in June 1975.
  8. The Collective Agreements Law of 1957 empowered the Minister of Labor to issue regulations extending the force of the wage indexation agreements to nonsignatories, and this has become regular practice since 1959.
  9. See, for example, Bank of Israel, *Annual Report*, 1963, p. 186.
  10. It was not possible to estimate directly the number of employees whose wages exceed the ceiling or the share of the unindexed wage component. One estimate put the share of the wage bill not covered by COLA at 35 percent in 1962, of which about half represented employees outside the COLA agreement and half represented the excess of actual wages over the ceiling. (See Bank of Israel, *Annual Report*, 1962, pp. 164-165.) It should, however, be pointed out that in 1962 adjustment of the ceiling was long overdue, so that this figure should be regarded as the upper boundary of the estimate of uncompensated wages. Another study revealed that between 1957 and 1969 the average wage actually paid amounted to only between 40 and 60 percent of that calculated on the basis of the ceiling plus the maximum COLA. (See Y. Findling, "The History of the Cost-of-Living Allowance" (unpublished seminar paper, The Hebrew University, 1975: Hebrew).)
  11. The tax reform of July 1975, which provided for the readjustment of tax brackets with changes in the price level, also recommended putting the allowance on a par with all other income for personal tax purposes.
  12. During the period of repressed inflation in 1949-1951 the government even succeeded in obtaining a reduction in COLA in this way. This manipulation of the index seems to be very similar to the Finnish practice of "buying-off index points." See Bruno Suviranta, "A Unique Experiment in Escalated Wages," *Banca Nazionale del Lavoro Quarterly Review*, No. 54 (September 1960), pp. 265-282.
  13. When the weights of the index accurately represent the bundle actually purchased by consumers, and the index and the COLA are calculated from a comparison of average price levels rather than from point estimates, such buying-off lowers the "true" cost of living, and should not be regarded as a manipulation.
  14. For a concise description of the mechanism through which the funds mobilized by financial institutions are directed by the government, see Bank of Israel, *Annual Report*, 1973, Chapter XIV.
  15. This concession applies to all government bonds in Israel, whether indexed or not.
  16. Because of the ceiling on the interest rate imposed by the usury law (then still in force) and because of government restrictions on the volume of credit granted by the banks,

the latter found it more profitable at the time to operate as bill brokers than to attract long-term deposits for the purpose of lending them out.

17. See, for example, Werner Baer and Paul Beckerman, "Inflation without Distortions? An Evaluation of Brazil's Indexing System" and Pedro Cipollari and Roberto B. M. Macedo, "Indexation of Wages: Some Aspects of the Brazilian Experience" (papers presented at the IPE-NBER Seminar on Indexation, São Paulo, February 26-28, 1975).
18. Ephraim Kleiman and Isvi Ophir, "The Determination of Money Wages" (The Hebrew University, 1970; mimeograph).
19. Baer and Beckerman, op. cit.; M. H. Simonsen and R. de Oliveira Campos, *The New Brazilian Economy* (Rio de Janeiro, n.d.) pp. 85-87.
20. Had this been due to purely economic forces, it could have been interpreted as evidence that the mechanisms determining real wages operated in the opposite direction to that of the monetary correction. However, as the reduction of real wages was regarded by the Brazilian authorities as a main instrument of anti-inflationary policy, it cannot be ascribed to the free operation of market forces. (Finance Minister Simonsen [in Simonsen and de Oliveira Campos, op. cit., p. 87] refers to the wage formula as "one of the main props of Brazilian policy for fighting inflation.")
21. Neglecting the productivity growth element and the two-year base of the calculation, the Brazilian formula reduces to

$$W_{n+1} = \frac{1 + 0.5i_n^*}{1 + 0.5i_n} W_n (1 + 0.5i_{n+1})$$

where  $i_n$  is the inflation rate which was expected for period  $n$  and  $i_n^*$  is the one actually experienced. The ratio term is a correction for past under- or overestimation of  $i$ .

22. Simonsen in Simonsen and de Oliveira Campos, op. cit.
23. Bank of Israel, *Annual Reports*, 1969 and 1973, Table IV-2.
24. The statement draws on the more detailed discussion provided in *Report of the Commission of Experts Inquiring into the Cost-of-Living Allowance* (Tel Aviv, 1966; Hebrew).
25. The commission which suggested this recent revision in the COLA did not claim that external effects necessarily account for 30 percent of total price changes, only that this was their share actually excluded from COLA computations in the last years through discretionary action and ad-hoc negotiations. They did, however, stress that, unlike financial linkage, the indexation of wages can always be supplemented by the other mechanisms of the labor market. At the same time, the commission also recommended that the adjustment interval should be shortened to three months; that the ceiling should be gradually abolished; that the full CPI should be taken in computing the COLA; and that its payment should not be subject to ad-hoc negotiations or discretionary action. See *Report of the Commission to Examine the COL Allowance Provisions* (Jerusalem, 1975; Hebrew).
26. See, for example, Cipollari and Macedo, op. cit.
27. For the volume of indexed instruments in Brazil, see Banco Central do Brasil, *Relatório Anual 1974*. It should be pointed out that time deposits in Brazil are not indexed in the sense in which the term is used here. For Israel, see Bank of Israel, *Annual Report*, 1974, for the volume of savings deposits, and Israel, State Comptroller, *Annual Report*, No. 25 for 1974 (Hebrew), for indexed government debt at end of March 1974. The latter figure was deflated for the price rise since December 1973. The corresponding money supply and GDP figures are Cr\$ 93,835 and 477,163 million, respectively, in Brazil, and IL 7,392 and 38,695 million in Israel.
28. Except against indexed savings deposits held with them by the public.
29. Thus, even if we were to include deposits of the social security system in the indexed total for Brazil, the ratio of the total to, say, the money supply would still be about seven times as high in Israel as in Brazil.

30. See Banco Central do Brasil, *op. cit.*, and Israel, State Comptroller, *op. cit.*
31. Also, it has been assumed that all housing bonds, which are indexed, are in Brazil held by the public, while in Israel, the same assumption was made about the unindexed government Short-Term Loan. (However, the figure for indexed bond holdings of the Israeli public includes those held by unit trust funds and by the voluntary pension funds of the self-employed; these were treated as a proxy for direct holdings.)
32. The Israeli compulsory loans should not be compared to the Brazilian forced savings through FGTS, PIS, and PASEP, which are social security funds, whose Israeli counterparts are the National Insurance Institute and the provident funds of the trade unions. Moreover, some of the compulsory loan certificates were already tradable at the time.
33. About five times as high as in Brazil.
34. If liquid balances are related to total resources (as a proxy for the volume of transactions) rather than to income, the difference between the two countries is reversed. Relative to total resources for domestic uses (GDP plus the import surplus), liquid assets exclusive of indexed bonds amounted to 29 percent in Israel, as against 29 to 37 percent, depending on the definition used, in Brazil.
35. See Ronald J. McKinnon, *Money and Capital in Economic Development* (Washington: The Brookings Institution, 1973).
36. By recent world standards, and certainly by those of Brazil in the early 1960s, the period in which debt indexation was practiced in Israel was one of rather mild inflation. It was only in 1971 that, for the first time since 1954, the rise in the CPI exceeded 10 percent.
37. This is the order of magnitude of the increases in the general and wholesale price indexes and their main components. Estimates of the increase in the cost-of-living index (which is the index cited here for Israel) were for the most part considerably higher, though they varied from as little as 13-14 percent in Rio de Janeiro and Belo Horizonte to as much as 21 percent in Porto Alegre, 28 percent in Brasília, and 33 percent in Curitiba.
38. Total exclusive of acceptance (i.e., alternative B of Tables 1 and 2). This increase occurred despite the considerable decline, which persisted until 1973, in the share of ORTNs held by the general public. It is noteworthy that the acceleration of the inflation ratio to about 35 percent in 1974 coincided with a sudden jump in this proportion, which resulted in a 5 to 6 percent increase in the share of indexed assets in the public's liquid holdings.
39. See below for a comparison of indexation practices in the two countries. According to at least one author, it was only in 1974 that "indexed bonds for the first time became more attractive to the private saver than nonindexed paper" (Jack D. Guenther, "Indexing' versus Discretionary Action: Brazil's Fight Against Inflation," *Finance and Development*, XII (No. 3, September 1975), 25-29). That the improved adjustability of nominal rates did, most probably, provide a substitute for indexation is also evident from the near doubling between 1966 and 1973 of the ratio of total unindexed assets to GDP.
40. Albert Fishlow, "Indexing Brazilian Style: Inflation without Tears?" *Brookings Papers on Economic Activity* (No. 1, 1974), p. 263.
41. See, for example, José Roberto Novaes de Almeida, "Indexation of O.R.T.N.'s: Manners of Calculation," *Conjuntura Econômica*, XXVIII (December 1974), 92-95. (English translation presented as background material for the IPE-NBER Seminar on Indexation, São Paulo, February 26-28, 1975.)
42. To offset the delay in the availability of price statistics, the Brazilian government has resorted in recent years to the imputation of the forecast rate of inflation for the two months preceding the month of purchase and the month of redemption. But as no correction is made *ex post* for faulty forecasts, this does not constitute a proper indexation procedure (compare the discussion above of the use of the forecast rate in the wage formula).
43. Monetary correction on Brazilian housing bonds is paid quarterly. In Israel, one eight-

year bond paid cumulated interest and indexation differentials every four years, rather than at maturity.

44. We should note here the argument that monetary correction does not really preserve the individual's wealth, for it is ultimately paid out of extra taxes. See for example Robert J. Barro, "Are Government Bonds Net Wealth?" *Journal of Political Economy*, LXXXII (November/December 1974), 1095-1117, for the application of this argument to the public debt in general. But this view seems to rest on a fallacy of composition: the personal distribution of taxes is not known with certainty in advance, and an individual's decision to purchase a government bond does not necessarily affect his future tax liability.
45. For a change in the public's attitude toward indexed bonds see, e.g., Bank of Israel, *Annual Report, 1974*. I am grateful to Paul Beckerman for pointing out that the development described here may be cited with equal success in support of the opposite view that money balances should be indexed as well, since there is no justification, except that of implementation costs, for levying the inflation tax on cash holdings but not on other financial assets.
46. It is assumed here that interest rates abroad fail to adjust to the milder inflation rates prevailing there—which seems indeed to have been the case in recent years. As it is usually the government which "borrows linked," the influx of foreign funds need not result in a decline in domestic interest rates which would cancel the indexation gains.
47. Baer and Beckerman, *op. cit.* The foreign purchaser of Brazilian CRTNs enjoys in addition a hedge against devaluation through the exchange rate linkage option these bonds offer.
48. For a short period in the mid-1960s new mortgages were in fact linked to the COLA. See A. Cukierman, *Index-Linked Mortgages in Israel* (Foerder Institute Working Paper No. 60; Tel Aviv: Tel-Aviv University, 1974).
49. Compare Ingemar Ståhl, "The Rise and Fall of Index Loans in Sweden," *Skandinaviska Enskilda Banken Quarterly Review* (No. 1, 1975), 14-20.
50. Baer and Beckerman, *op. cit.* For the legal maximum interest rates on certain types of "indexed" credits, see Banco Central do Brasil, *Relatório Anual 1974*, pp. 56-59.
51. See Jaffee and Kleiman, *op. cit.* Similar results were obtained for the other eleven countries examined there. Note, incidentally, that unless it increases with inflation, the lag of the producer's own price behind the general price level should reduce the attractiveness of borrowing in general, but not the relative attractiveness of "borrowing linked."
52. In the early 1960s, income tax brackets were defined in Brazil as multiples of the minimum wage. Later, either the minimum wage or the price level were used in adjusting income tax brackets. But these served as guidelines rather than as automatic rules. See Guenther, *op. cit.*
53. This is accompanied by a considerable transfer of purchasing power within the private sector as well. Here, however, we are interested in the net inflation tax and therefore deduct that part of it internalized by the private banking system.
54. See Afonso C. Pastore et al., "Reflections about the Brazilian Experience on Indexation" (preliminary version, n.d. [1975]).
55. Excluded were credits in foreign currency and those linked to the exchange rate.
56. Estimated as in Table 3, exclusive of unindexed treasury obligations held by the public. The GDP figure for 1966 is inflated by 20 percent, to allow for different definitions in the 1973 estimate.

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