



Monetary Policy and Currency Substitution in the Emerging Markets

Organized by the Croatian National Bank

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**Dollarization and Indexation in Israel's Inflation and
Disinflation: "There's more than one way to skin a cat"**



Preliminary;
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Dollarization and Indexation in Israel's Inflation and Disinflation:

“There's more than one way to skin a cat”

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1. Introduction

Israel's experience with dollarization and currency substitution has been different from these phenomena in most developing and emerging market economies. Israel's long experience with chronic, moderate inflation, along with a shorter period of high inflation, has generated the development of a variety of substitutes for domestic, unindexed assets. Most of these substitutes have been of the home-made variety, rather than imported, so that Israel has not experienced the kind of massive and damaging currency substitution and dollarization that has occurred in a number of emerging market and transition economies. The Israeli government has collaborated actively in the development of indexation and foreign exchange linkage but Israel never adopted a policy of official dollarization. But some conventional dollarization has occurred in Israel. For example, cash dollars did circulate in place of local currency as means of payment and were stuffed in mattresses in place of local currency deposits and other financial assets as a store of value, but these phenomena were quite limited in scope and in duration. They took place mainly in the first half of the 1980s when inflation reached triple digit levels and a serious financial crisis loomed.

Milder forms of currency substitution have prevailed throughout most of Israel's economic history and are the type of phenomenon that continue to this day, even though Israel's inflation rate has been at single digit levels for nearly seven years now. These include some holding of assets abroad but the predominant form of currency substitution—and the feature that makes the Israeli case of considerable interest—is the variety of “home made” substitutes for domestic, nominally denominated assets that have been developed over the years. These include extensive indexation of assets and other contracts to the CPI and some other price indexes, as well as linkage of domestic assets to some exchange rate, mostly, but not exclusively, to the US dollar rate. The willingness of the Israeli public to hold these home made substitutes for domestic, unindexed assets suggests that the main issue of concern was uncertainty about future returns, including inflation, real interest and the real exchange rate, while the possibility of outright expropriation by taxation or hyperinflation was, in general, not a major concern.

The main analytical point of the present paper is that currency substitution in Israel is best thought about as being motivated by the public's desire to diversify their asset portfolio

in the face of the aforementioned uncertainty about relative returns. The type of models in the economist's tool box that best deals with this issue is the portfolio allocation and asset pricing models from finance that focus on the trade-off between risk and return. This is in contrast with more conventional approaches to currency substitution and dollarization that emphasize money demand, i.e., they focus on some non-pecuniary return, embodied in the means of payment function, that is provided more efficiently by a more stable currency than the local one. This latter approach would appear to be more useful for the more extreme forms of currency substitution, including cash dollarization, rather than for the Israeli case.

The present paper focuses on this milder form of currency substitution and on the issues it raises for macroeconomic analysis and monetary policy. The paper is organized as follows: section 2 briefly elaborates on some of the conceptual distinctions mentioned above; section 3 provides some history of Israel's experience with inflation and disinflation and with related features of financial repression and liberalization, including some detail on indexation and forex linkage arrangements in various sectors of the economy; section 4 presents an example of economic analysis related to the portfolio diversification aspect of currency substitution, with implications for monetary policy analysis that are discussed in section 5. The final section concludes with an explanation of the sub-title of this paper.

2. Terminology

Adjectives used to describe various ranges of inflation rates, or inflationary environments include "low", "moderate", "high", "extreme" and "hyper-". We will use the following terminology for the Israeli case: "low" refers to low single-digit levels, below 5 percent; "moderate" refers to high single-digit to low double-digit levels, above 5 percent and up to about 40 percent, a range that is somewhat broader than in the literature (eg, Dornbusch and Fischer (1993), where the 15 to 30 percent range is used); we will use the term "high" to refer to rates above about 40 percent, which have all been triple digit outcomes in the Israeli case. I refrain from using the terms "extreme" and "hyper-" due to my impression that Israel's inflationary experience did not involve a breakdown of societal norms.

The terms "dollarization", "currency substitution" and "indexation" refer to classes of activity with a broadly common purpose, namely to protect parties who enter into contracts with deferred payments, in particular, asset holders, from possible losses due to instability of the value of the domestic currency. Such losses may result from a variety of forms of

expropriation including taxation, freezing of assets, outright partial or total default, erosion due to inflation or devaluation and the like. The wide range of such losses naturally leads to attempts to categorize them.

There is no broad consensus in the literature on specific definitions of “currency substitution” and “dollarization”. The widely cited survey by Calvo and Vegh (1992) defines currency substitution as “the use in a given country of multiple currencies as *media of exchange*” and dollarization “to indicate that a foreign currency serves as a *unit of account* or as a *store of value*.” Calvo and Vegh also describe a typical sequence in the substitution of foreign for domestic currency as an initial stage of dollarization followed by currency substitution. The use of foreign currency as a medium of exchange is usually the last stage in the declining role for the domestic currency. Marquez (1992), in the New Palgrave Dictionary of Money and Finance defines currency substitution as “the propensity of residents of one country to vary their holdings of domestic and foreign money in response to changes in the associated opportunity costs” (p. 565). He uses the term “international capital mobility” to refer to changes in the currency composition of the “bond portfolio”, presumably a catch-all phrase for a broader concept of financial asset holdings that includes both fixed income instruments and equities.

A more recent strand in the literature, following the proliferation (perhaps temporary) of currency board arrangements discusses the phenomenon of “official dollarization”. Again, a number of varieties exist but I ignore this use of the term “dollarization” due to its irrelevance for the Israeli case. Indeed, while ideas about full dollarization have come up in Israel from time to time, it has never been considered seriously. The one brief brush with full, official dollarization was occurred in 1983: A proposal by then Finance Minister Yoram Aridor was immediately deemed completely unacceptable by popular acclaim and Aridor resigned the very same day that he made a formal proposal to dollarize.

For Israel’s case, the aforementioned distinctions are not too useful since currency substitution in the Calvo and Vegh sense has been very limited. The use of foreign currency as a means of payment and as a store of value occurred to a significant, yet quite partial, extent only during the period of high inflation in the first half of the 1980s. In this paper, I focus on the more extensive and long-lived phenomena of indexation and dollarization as elements in portfolio diversification, with the objective of maintaining a store of value that purports to meet efficiency criteria proposed in the finance literature. I therefore adopt the following terminology:

Indexation refers to the denomination of financial assets in terms of purchasing power adjusted units with the CPI or some other specified price index serving as the basis for indexation.

Currency substitution and dollarization are used interchangeably to refer to the denomination of assets in terms of some foreign currency unit, either directly or by linkage to the exchange rate. Distinctions between the latter two possibilities are made where relevant and otherwise references are to both of them.

The term “unindexed” refers to domestic currency assets denominated in nominal units, ie, not indexed or linked to anything.

Finally, for ease of exposition, I refer to Israel’s local currency as “shekel” or New Israeli Shekel (NIS), interchangeably and for Israel’s entire history. Actually, the Israeli currency was called lira or pound from independence in 1948 until 1981, when the currency units were rebased by a factor of 10 and the currency was re-named the shekel. The name New Israeli Shekel was adopted in September 1985, when the success of the Economic Stabilization Program was reasonably clear and the units were rebased by a factor of 1000.

3. A Brief History of Inflation, Indexation and Currency Substitution in Israel

This section provides background on Israel’s inflation history and institutional detail on indexation and currency substitution in Israel. The review here is selective, focusing on the issues to be developed below¹.

Annual inflation rates in Israel from 1958 to 2001 are presented in Figure 1, along with depreciation of the shekel vis-à-vis the United States dollar. The obvious split in the full sample period is in 1985 when a heterodox Economic Stabilization Program (ESP) was implemented with the aim of ending a six-year period of triple digit inflation.

A. The Upward Trend: 1960 – July 1985

Throughout the 1960s and, especially, the 1970s inflation had trended upward. From single digit levels during most of the 1960s, inflation rose to low double-digits from 1969 through 1972. Severe deterioration in the current account of Israel’s balance of payments due to the oil price shock of 1973 and the need to restock the military after the Yom Kippur War generated heavy pressure for devaluation and inflation reached an annual average rate of about 40 percent from 1974 through 1978. In 1975, Israel introduced a pre-announced crawling peg exchange rate regime (a type of tablita). This was one among a number of

signals of willingness to accommodate inflation, rather than taking serious steps to fight it, another being indexation of tax brackets, also implemented in 1975.

Severe mismanagement in both macro policy and banking led to inflation's take-off to the triple digit range from 1979 through mid-1985. Inflation exceeded 100 percent for the first time during calendar 1979, plateaued at just over this figure through 1982 and accelerated to higher triple digit figures from the second quarter of 1983 until the second quarter of 1985. Without going into detail, two features of the macroeconomic mismanagement may be noted: First, the public sector budget deficit, defined as the operational deficit (IMF terminology that indicates exclusion from the deficit of components of nominal interest payments that represent compensation for inflation, either expected in the case of nominal bonds or actual uplifts on indexed bonds), averaged 13 percent of output from 1970 through 1984. Second, as a means of circumventing a reduction in the degree of monetary expansion in 1979 and 1980, the commercial banks began to manipulate the prices of their shares of common stock, attempting to raise loanable funds by issuing equity, rather than raising deposits; this led to a financial bubble that burst only in October 1983 and was dealt with by the government in the form of a bank share (not deposits!) bailout program whose fiscal cost is estimated at roughly 10 percent of GDP.²

The development of significant indexation in Israel predated the development of significant inflation but the gradual acceleration of inflation was accompanied by a process of gradual extensions of the degree of indexation and of currency substitution. While the government did not act coercively to implement indexation and currency substitution, it played an active role in this expansion.

The earliest venue for indexation was the labor market, where a wide variety of COLA arrangements have been adopted starting as early as 1939. The details of these arrangements changed frequently and included various degrees of indexation, different types of floors and ceilings on all types of wage parameters, discretionary suspensions during attempted stabilizations and the like. Two features of these arrangements are worth noting: First, formal, broad-based COLA arrangements have never involved linkage to the foreign exchange even though denomination of wages in foreign currency is not uncommon and even prevalent in some occupations. Second, broad COLA arrangements generally did not provide full compensation for inflationary erosion of wages. It has been suggested that the labor unions avoided 100% wage indexation in order to enhance their *raison d'être*.

One feature of the Israeli economic environment that is common to countries with a history of moderate inflation or worse has been the reduction of the role of the local currency as a unit of account. Particularly noteworthy is the development of traditions in certain sectors of the economy, but not in others, of quoting various prices in foreign currency, especially the US dollar. These traditions have weakened somewhat as inflation was curbed in recent years but they are surprisingly stubborn in many areas, including some highly non-traded items such as housing.

I turn now to the financial markets, the area of greatest interest in the present paper. Since the development of financial indexation also predates significant acceleration of inflation, it is worthwhile to review the roots of indexation in this sphere of economic activity. From the establishment of the State of Israel until the ESP, the Israeli government pursued a development strategy of financial repression. Simply put, the government monopolized all aspects of financial intermediation and capital formation. It determined the terms of various forms of savings instruments, including eligibility, rates of return, indexation provisions, and, of course, taxation provisions. The government also monopolized the uses of the funds raised in similar manner, mainly loans for housing and physical capital formation and, of course, funding budgetary shortfalls due to the government's activity other than financial intermediation. Banks and a small number of other financial intermediaries served primarily as agents who handled the distribution and bookkeeping functions of financial intermediation on behalf of the government. From time to time, the government allowed for very limited amounts of traditional intermediation, which often served as vehicles for price discrimination and for rent-seeking activity by the financial intermediaries. For example, the specific terms of non-regulated loans were sometimes related to the borrower's eligibility for regulated, preferred loans.

Liviatan (2002) has argued recently that the use of financial repression to promote economic development was based on fairly conventional, world-wide wisdom that prevailed among development strategists in the first three decades after World War II. The argument was that developing countries did not have the commercial and societal infrastructure (legal systems, business and social norms, etc.) needed to ensure the smooth functioning of a capitalist economy, noting that it had taken hundreds of years of development in the industrialized countries to attain the present systems that enabled high productivity levels and the accumulation of vast material wealth. In order to promote real growth in the absence of well-functioning capital markets, the government was called upon to function as financial intermediary, thus leading to a policy that repressed the development of financial

intermediation in the private sector. Furthermore, with a relatively high share of non-market activity, and in the absence of well-functioning collection systems for the types of taxes prevalent in industrialized countries, the inflation tax was viewed as sort of a necessary evil, with the object of necessity being real investment finance. He cites a well-known article by Mundell (1965) in support of this approach.³ But imposing this tax required capital controls to prevent, or at least limit, capital outflow, ie, currency substitution. All the features of financial repression were present in Israel from independence in 1948 and, for the most part, until the ESP in 1985 and beyond. The government effectively monopolized financial intermediation and imposed stringent foreign currency control on the capital account and, for many years, also on the current account⁴.

Most Western trained economists under the age of, say, forty would regard these policies as a sure-fire prescription for stagnation and growing poverty, leading possibly to social unrest and political turmoil. They would surely be surprised to learn that the opposite was in fact true during most of the first twenty-five years following Israel's independence in 1948. In fact, Israel was an economic tiger for two decades, from 1952 through 1972, with average annual real growth just under 10 percent.

In any event, in addition to the “sticks” associated with the financial repression, the government provided a “carrot” to the private sector in the form of indexed bonds. As early as 1951, the government began to issue tradable bonds and non-tradable earmarked savings bonds, both linked to the dollar. In the mid-1950s, the government and the Electric Company began to issue CPI indexed bonds and the government began to index its loans, both mortgages and development loans. Indexation continued to dominate government finance on both sides of its balance sheet but the extent of indexation and various institutional features varied from time to time. For example, following a 67 percent devaluation in November 1962, the government rescinded linkage on dollar denominated mortgages; the degree of indexation on government bonds was altered a number of times. While a share of government bonds has always been tradable, the lion's share has not been, with their holding being determined by some institutional arrangement or another, either direct earmarking for institutional pension and long-term savings arrangements, or tax breaks that effectively converted tradable bonds to non-traded ones.

The initial development of indexation in Israel, during the 1950s and '60s, was not the outcome of prolonged high, or even moderate, inflation. Albeit inflation was 66 percent in 1952 and 19 percent in 1953, but this was the outcome of “special factors”, namely the removal of price control and massive commodity rationing that had been implemented

during Israel's War of Independence and continued during the absorption of a massive wave of immigration. So this episode of price rises is best viewed as a one-time shock, rather than the beginning of an inflationary process. From 1954 inflation was brought under relative control. Throughout the period from 1954 to 1969, inflation was below 10 percent (except 1962, the year of the 67 percent devaluation, when it was 10.2 percent) and often it was in the low single digit range. It is, therefore, hard to believe that the establishment of a significant indexation infrastructure was prompted mainly by an inflationary mentality generated over only a few years of moderately high inflation.

What, then might account for the adoption of so much indexation in the early and mid-1950s? A full answer to this question is well beyond the scope of the present paper, but some consideration of possible answers is insightful in thinking about currency substitution and dollarization. The economic, political and social condition of Israel shortly after independence was quite fragile and fraught with uncertainty. The country had just fought a major war for independence against the armies of five countries, after which it had absorbed a massive wave of immigrants that nearly doubled the population in four years. The regime of financial repression surely contributed to the uncertain atmosphere. On the other hand, nothing in actual experience suggested that there would be extreme mismanagement that could lead to high or hyper inflation, drastic taxation, renunciation of public sector debt and the like. In these circumstances, the public wanted possibilities to protect itself against likely moderate changes in relative returns due to possibly moderate inflation or depreciation. Home made instruments to diversify asset portfolios, especially bonds indexed to the CPI or to the exchange rate, were an adequate solution that enabled the public to live with the financial repression without having to seek insurance abroad, at least not to a significant extent. The willingness of the public to absorb the home-made substitutes for unlinked domestic currency assets points to the importance of distinguishing between extremely fragile conditions, where expropriation and the like is quite likely, and more moderate fragility, where increased inflation is certainly possible but outright expropriation is very unlikely. Different approaches to policy and to analysis are required in each case.

Inflation began to drift up in the early 1970s and ratcheted up a notch to a clearly moderate range following the Yom Kippur War. During this period, indexation was extended in a number of directions. Various social insurance payments were indexed to the average wage, rather than the CPI, in a number of stages and tax brackets were indexed in 1975. But the main boost to indexation came in 1977, when exchange-rate linked bank deposits were introduced. These deposits, known by their Hebrew acronym - PATAM,

came in a number of varieties including time deposits of maturities varying from a week to a year or more and demand deposits. These did not provide check writing facilities but they could be converted to shekels on demand and, of course, shekel checks could then be written on the converted balances. At that time, all foreign currency transactions were conducted at the rates set by the Bank of Israel, at most once each business day. So there was no intra-day exchange rate risk. Also, during most of the period between 1977 and 1985, the exchange rate regime was some sort of adjustable or pre-announced crawling peg, so the exchange rate could move but, in general, not unexpectedly from day to day. So the PATAM deposits were highly liquid and, arguably, served as a good substitute for means of payment but at no time did they serve as actual means of payment. During the late 1970s and early 1980s the government increased the degree of indexation on the loans it extended to various preferred groups in the economy, mainly mortgages to young couples and new immigrants and investment loans.

In 1982, the government adopted a Law on Adjustments Under Inflationary Conditions that included an inflation-adjusted accounting procedure as the mandatory standard for the preparation of financial statements by firms. This law had very significant implications for Israeli business practice, in general, and for taxation, in particular. In terms of accounting practice, the inflation-adjusted standard is, of course, very different from common practice in the industrialized countries, introducing difficulty into business dealings between Israel and the rest of the world. Regarding taxation, the law implied that only real interest income is taxable, with compensation for inflation being regarded as a capital uplift that should not be taxed. Perhaps in part due to this feature of Israeli business practice, income from capital is largely untaxed altogether. Proposals to extend the limited amount of taxation on income from capital is often rejected on the grounds that the proceeds would anyway be minimal due to exemption of income attributable to compensation for inflationary erosion. So, a system that is seemingly very sound on the basis of economic theory, helps to perpetuate other distortions.

From the end of 1983 until the ESP of July 1985 inflation accelerated further, reaching nearly 450 percent during calendar year 1984 and about 300 percent on an annualized basis in the first half of 1985. It is interesting to note that indexation continued to be improved as evidenced, for example, by the government's adding a provision to its bonds for retroactive compensation of bond holders for the one (monthly) price index they lost at redemption. (Bonds were indexed to the last known CPI value, published on the 15th of each month for the average price level of the previous month; with redemptions always at

month end, investors lost a month and a half of price increases at redemption). Proposals to publish the CPI twice a month, or even weekly, were voiced but not acted upon.

During this period, concerns began to arise that the government might have to resort to more severe expropriation tactics in order to fund its budget deficits that had exceeded 10 percent of GDP for over a decade. Ideas for such tactics included extraordinary taxation of real and financial assets or outright default on government debt in one way or another. For this reason, individuals began to invest some part of their savings in foreign cash, held in safe deposit boxes, mattresses, under floor boards, etc., that is in the usual hiding places. The locals sarcastically referred to this additional store of value as “PATAM balata”, the first word recalling the exchange-rate-linked bank deposits and the second word being the vernacular for floor tile. Obviously, there is no direct measurement of the magnitude of the PATAM balata. (Note to discussant: I seem to recall some estimates of the stock reaching as much as 5 percent of GDP; I still have to check if I can find any documentation.) This is the only period during which currency substitution resembled similar phenomena in emerging and transition economies that also suffered from high inflation and financial repression.

B. The Downward Trend: July 1985 – 2001

Triple-digit inflation was brought to an abrupt halt in the summer of 1985 by a heterodox Economic Stabilization Program. The program consisted of orthodox components – fiscal and monetary tightening – and non-orthodox measures, including price controls, a partial wage freeze and introduction of a fixed exchange rate regime. Inflation came down from 445 percent in 1984 to a low, moderate range, 15 – 21 percent between 1986 and 1991. Between 1992 and 2001 a further gradual reduction of inflation was achieved, to a high single digit range from 1992 to 1996 and essential price stability from mid-1997 to the end of 2001 (with the exception of the last quarter of 1998 when the world-wide financial crisis precipitated a sharp depreciation of the shekel and a temporary deviation from price stability). This phase of Israel’s disinflation was marked by significant ups and downs, related to directly to stop and go policy in the mid-90s (see insert in Figure 1). In spite of the success of monetary policy, under the inflation targeting regime in the 1990s, at reducing inflation to low single-digit levels since mid-1997, price stability is still extremely fragile and the credibility of policy-makers in the eyes of the public is still limited. The first half of 2002 is an excellent, if sobering, case in point: a combination of fiscal laxity and steadily loosening monetary policy has brought about a 17 percent

depreciation of the shekel since mid-December 2001 and the CPI increase from January through May has cumulated to 4.9 percent (not in annual terms), well above the 2 to 3 percent target range for the entire year. In reaction to this actual and perceived “inflation scare”⁵, the Bank of Israel has increased its key lending rate by 2.5 percent in June to stand at 7.1 percent.

The disinflation process was accompanied by gradual reduction in the nature and extent of indexation⁶. I will refer to the process as disindexation but it is important to emphasize that the government did not pursue an active, coercive program to limit indexation. For example, there have been no laws passed that prohibit indexed contracts in the private sector, although from time to time there have been proposals, eg, to require all housing rental contracts to be in shekels. The government has implemented over the years a number of measures to promote the use of shekels, mainly as a store of value and, to some extent, also as a unit of account. These measures include the following:

- 1) As early as 1984, the government began to issue Treasury bills, ie, unindexed short-term, tradable, securities. This was part of a program to encourage the public to hold more unindexed domestic currency, a program known as “shekelization”. It was not very successful. After the ESP and the decline of inflation, the Bank of Israel began a gradual program to nurture the development of this security. It is now a monetary instrument in the senses that the Bank of Israel determines the amount of issue and it does not finance the budget deficit. Proceeds of sale of these bills are frozen and may be used only to redeem maturing bills.
- 2) As part of the ESP (July 1985), dollar-linked PATAM deposits with maturities less than one year were “closed”, ie, new deposits to such accounts were prohibited but existing funds could be withdrawn with full linkage and interest according to the original terms of the deposit. Balances in these deposits declined gradually over a number of years and they were eliminated. Currently, the public can hold a slightly different, less liquid type of dollar linked deposit, but the balance in these accounts is small and most foreign currency linkage is done via deposits in actual foreign currency or in mutual funds that invest in dollar denominated securities, either domestically issued linked bonds or foreign bonds.
- 3) Starting in 1989, the government began issuing a series of unindexed bonds that do finance budget deficits. The first type of bond was for six years,

unindexed in the first year and fully indexed thereafter. This was pretty complicated. In 1992, floating rate bonds were issued, the first one for two years with semi-annual coupons determined by T-bill rates prior to each coupon period. The government continues to issue such floating rate bonds though details have been changed from time to time.

- 4) In 1995 the government began issuing fixed rate, unindexed bonds, initially with two-year maturity. In 1996, maturities were extended to three years, in 1998 to 5 years, in 2000 to 7 years and in 2001 to 10 years. Currently the government issues 5 and 10-year benchmark, fixed rate bonds along with 10 and 20 year indexed bonds and floating rate, unindexed bonds. Each stage of increasing maturities was introduced with no term premium of any significance.
- 5) In labor markets, COLA agreements have steadily become more flexible, with indexation provisions that do not follow CPI movements as closely as they did in the high inflation period.

During the period following the ESP, the Israeli economy underwent significant, though as yet incomplete, structural change motivated by disenchantment with the highly excessive degree of government intervention in the economy, in both non-financial and financial areas. The government changed its policy of supporting SOEs and enterprises owned by the national labor federation (Histadrut), even when they encountered economic or financial distress. A number of SOEs were privatized and some ministerial functions were spun off in the form of government corporations, with more economically sound governance provisions. In the area of finance, the government severely curtailed its repressive activities on each side of the balance sheet. Reserve requirements on bank deposits were cut drastically so banks could devote a far greater share of their endeavors to classical banking, rather than to administration of government programs. Similarly, constraints on most institutional investors (usually called NBFIs but in Israel most of them are bank subsidiaries so that term is a misnomer) were relaxed drastically so they also received great freedom in choosing how to raise funds and how to invest them. Finally, foreign currency control was relaxed and ultimately eliminated during the 1990s. By the end of the millennium, Israel had a fairly liberalized financial system with a number of major exceptions, most notably the major pension systems, where no significant reform has occurred as yet.

C. The Extent of Indexation Today

While the degree of indexation in the Israeli economy has fallen considerably, it remains quite high.

- 1) The share of unindexed, shekel bonds in the stock of outstanding government debt remains low, at 7 percent of the total government debt. This is in spite of the fact that the majority of new issues of tradable debt instruments are unindexed. There are two key reasons for this situation: (a) Pension funds and some life insurance policies are still eligible to receive earmarked, CPI-indexed bonds at favorable real interest rates; the government establishes conditions for eligibility for these bonds and then has no effective control over the amounts invested in them and, (b) compared with tradable indexed bonds, the unindexed debt instruments are of relatively short maturity, so they have to be re-financed with greater frequency, and even a high concentration of new issues in unindexed bonds does little to boost their share in the stock.
- 2) Many institutional and habitual forms of indexation persist in Israel, in both the private and public sector. A glaring example is the housing sector: While housing is, of course, a classic non-tradable good (with the possible exception of vacation homes), both purchase prices and rental fees, continue to be quoted, almost exclusively in dollars. Various services are regularly denominated in dollars and are contracted in dollars, such as catering services for weddings and other celebrations, auto maintenance fees, home improvement services, etc. Prices for public sector services also exhibit indexation inertia. For example, entrance fees to national parks, airport taxes, postal fees and port fees are all subject to legislated indexation provisions of one sort or another (see Sokoler, 2000).
- 3) Financial intermediaries provide a wide variety of indexed and exchange rate indexed products, in addition to facilities to place funds in foreign currency.

D. The Composition of the Public's Financial Asset Portfolio

To complete this section, Figure 2 and Table 1 present information on the development of the Israeli public's financial asset portfolio, where the public is defined to include households and non-financial profit and non-profit enterprises. The earliest date that reasonably comprehensive data are available with a reliable breakdown by type of indexation is 1970, when inflation was just beginning to accelerate. At that time, just over a half of the portfolio was indexed to the CPI, just under 30 percent was indexed and about 20 percent was linked to the exchange rate. Due to the regime of financial repression in place at the time, most of this portfolio was generated by some institutional form of savings, including contractual savings plans for pension and other medium and long terms, usually organized in the work place, reparations payments from Germany for Holocaust victims, etc.

By 1980, inflation had reached triple digit levels and the share of unindexed assets plunged to under 5 percent of the portfolio, with over 70 percent indexed to the CPI and the share of exchange rate linked assets relatively stable at 23 percent. The unindexed shekel assets consisted almost exclusively of M1, though there was a very small amount of short-term certificates of deposit. The unindexed asset share bottomed out at the height of the inflation in 1984; the share of foreign currency linked assets had risen due to actual and expected real depreciation.

The share of unindexed assets began to rise immediately following the ESP, albeit slowly at first but in a steady trend, reaching 7 percent at the end of 1985, 6 months following the ESP. Recall that the very popular dollar-linked PATAM accounts had been converted to "withdrawal only" instruments. There was a strong incentive to withdraw, since the exchange rate was fixed as part of the ESP but non-negligible, residual inflation remained. However, the restriction on depositing funds in PATAM accounts for less than a year provided a good reason to keep the existing balances liquid. So withdrawal was gradual.

Maintenance of inflation at historically low levels throughout the period since the ESP and the efforts since the mid-90s to attain Western levels of inflation in Israel using conventional, restrictive interest rate policy have led to an increasing share of unindexed shekel assets. Their share reached nearly 40 percent of the portfolio by the end of 2001. The increase has been almost exclusively in the interest-bearing component of this segment of the portfolio and not in M1. Furthermore, the variety of investment opportunities in interest-bearing, unindexed shekel assets has increased

steadily, most notably in the form of money-market mutual funds that do not provide direct access to checking facilities.

The main point to be gleaned from this broadly painted overview is that the store of value function of financial assets generally, rather than the means of payment function of money, provides the main rationale for shifts in the “currency” (including indexation) composition of the asset portfolio in Israel. This feature has implications for both the type of analysis that would seem to be the most useful framework for explaining currency substitution, dollarization and indexation in Israel and for policy conclusions derived from this analysis.

4. Analysis

A. General considerations

In order to begin thinking about how to analyze the phenomena of currency substitution and dollarization in Israel, it is useful to summarize the historical description of the previous section in the form of a few key stylized facts about the development and partial demise of currency substitution and indexation in Israel:

- 1) Significant indexation and currency substitution predated significant inflation.
- 2) The development of indexation and currency substitution was the outgrowth of financial repression during Israel’s early developmental stage and the government’s willingness to provide home-made vehicles to the public to diversify their asset portfolios. This may have been a reaction to risk of potential inflation but many other factors may drive a desire to diversify portfolios, as well.
- 3) Indexation and currency substitution expanded as inflation accelerated and facilitated further acceleration of inflation.
- 4) Foreign cash replaced domestic narrow money as means of payment only for a limited period and a limited extent.

All of the academic literature on dollarization and currency substitution analyzes these phenomena from the point of view of money demand, rather than the approach taken in the finance literature on portfolio analysis. The distinguishing feature of money demand is the assumption that money provides some sort of non-pecuniary service or

utility, beyond serving by its nature as a store of value. In this sense, money is more like a house or a refrigerator than like bonds. There is a long history in the literature that analyzes the nature of money's non-pecuniary service: Patinkin (1965, chapter V and its appendix) develops the direct money-in-the-utility function approach. Various authors, including Chetty (1969), Offenbacher (1979) and Goodfriend and McCallum (1987) emphasize the role of money as an input in a transactions technology, where transacting takes time and money reduces the amount of time required for transacting, allowing more time to be spent working or at leisure.

An important implication of the money demand approach to dollarization and currency substitution is that empirical money demand functions for domestic, unindexed money are likely to exhibit instability or pathological behavior that is not consistent with the well-developed theory of money demand. By and large, this is not the case for the Israeli experience. Both the Bank of Israel and academic economists in Israel have produced a fairly large amount of empirical work on the demand for M1 in Israel during various episodes. A number of studies conducted during the period of high inflation were gathered in a single issue of the Bank of Israel *Economic Review* (original Hebrew version published in 1985, English translation in 1988). In all of the studies, income and interest elasticities of M1 demand have the correct signs and reasonable magnitude by theoretical criteria and do not exhibit the kind of pathological instability typical of M1 demand in many Western economies and some emerging and developing ones. In cases where some instability was detected, it could generally be accounted for (*ex post*, of course) by some related variable such as the number of automatic teller machines or the expansion of overdraft facilities. Not surprisingly, the overall fit of these estimated equations was not as good as the fits obtained during the "good years" in Western countries, ie, the 1950s, '60s and early '70s. But the greater amount of noise was just that – noise. A few years after the ESP, economists in the Bank of Israel began estimating M1 equations for the period beginning in 1986, generally obtaining parameter estimates consistent with economic theory and equations whose fit was somewhat better than during the high inflation years. Accordingly, M1 served as an important indicator for monetary policy during the 1990s, even though it never approached the status of an intermediate target. The formal adoption of an inflation targeting regime at the end of 1991 and its increasing degree of seriousness in the mid-1990s, along with the use of the short-term interest rate as the monetary policy instrument, has rendered M1 a completely demand determined variable. In other words, the monetary disequilibrium transmission

channel (eg, Friedman 1970), is inoperative. During most of this period, estimated money demand equations have been especially well-behaved (see, for example, Elkayam, 2001).

Conversely, numerous attempts to estimate empirical demand functions for broader unlinked shekel aggregates, eg, M1 plus interest-bearing deposits or that aggregate plus T-bills, have met with complete failure. Parameter estimates are generally unreasonable and empirical performance in and out of sample is dismal. The same is true for attempts to estimate equations for the non-M1 component of these aggregates.⁷

The upshot of the discussion of empirical money demand equations is that the relative demand for monies approach to analyzing currency substitution and dollarization is unlikely to provide useful insights to understanding the latter phenomena in moderate cases like Israel's. Neither is it likely to provide useful policy implications. So I turn now to consider my suggested alternative, the portfolio diversification approach of the finance literature.

A key implication of the money demand literature is that differences in return on alternative monetary assets can persist due to imperfect substitutability in providing a non-pecuniary return in the form of the means of payment service that is unique to monetary assets. The portfolio diversification approach ignores the existence of any such non-pecuniary service and, hence, is not appropriate for analyzing money demand. According to this approach, financial assets are held only for their store of value function, to transfer purchasing power from the present to the future. In this set up, it is the presence of uncertainty that allows for differences in expected (and, of course, actual) returns between assets. The well-known capital asset pricing model provides a quantifiable explanation for these differences in asset returns when only the store of value motive is present. This explanation is the risk that is associated with uncertain returns. More specifically, differences in expected returns among assets are associated with the contributions of each asset to the variance of a portfolio's return. The remainder of the paper will present some empirical work that adopts this approach for the Israeli case and illustrate its policy implications.

Before turning to that work it is worth noting the idea of combining the two approaches. In theory, at least, one can consider decomposing return differentials into two latent components, a part due to non-pecuniary, liquidity services and a part due to compensation for risk. Perhaps surprisingly (at least to me) is that very little work has been done on this problem. The pathbreaking work is a number of papers by Barnett and

co-authors [see section 3.3 in the edited volume by Barnett and Serletis (2000) and Barnett, et. al. (2001)], which adopt the consumption-oriented CAPM framework to attempt such a decomposition. This approach has not been implemented on Israeli data.

C. The Portfolio Analysis Approach to Currency Substitution and Indexation: An Application to the Financial Asset Portfolio in Israel

To introduce this sub-section, it may be of interest to note that portfolio diversification has been a normative recommendation in Jewish legal sources as far back as the Babylonian Talmud (ca 500 AD):

A person should always divide his funds in three parts -- one part land, one part chattel and one part liquid assets.

[Baba Metziya (The Middle Gate), folio 42a].

Jumping directly to the end of the 20th century, I summarize briefly work by Roy Stein on portfolio analysis of the financial asset portfolio of the Israeli public. The main objective of this work was policy-oriented – the calculation of the risk premium included in nominal versus indexed interest differentials. In the context of monetary policy analysis in Israel, these interest differentials are interpreted as inflation expectations and they are a very important indicator for monetary policy in Israel's inflation targeting regime. The present discussion outlines the work; policy implications are in the next section.

Stein estimates a time-varying version of the standard capital asset pricing model (CAPM) as developed by Jagannathan and Wang (1996). The data set is a vector of monthly returns on a group of thirty-three selected asset portfolios including 12 common stock indexes grouped by industry, three groups of unindexed government bonds, Treasury bills, 10 groups of CPI-indexed government bonds, 3 groups of dollar-linked government bonds and three American stock price indexes. The sample period is 1994 – 2000. The weighted average return on the entire portfolio of assets included in the study serves as a proxy for the return on the true market portfolio. The model is estimated in two stages. In the first stage, time series data on the returns on the market portfolio and the selected sub-portfolios are used to estimate the CAPM betas for each asset group. Unlike the standard CAPM, where one beta is estimated for each asset relating the return

on the sub-portfolio to the return on the market portfolio, the time-varying CAPM involves estimation of an additional beta parameter for each sub-portfolio that relates its return to a measure of macro-economic performance. The measure of macro-economic performance is the slope of the government bond yield curve as measured by the difference between the 10-year real rate on CPI-indexed bonds and the one-year rate. The betas are calculated conventionally, according to the following formulas:

$$\beta_p = \text{Cov}(R_p, R_m) / \text{Var}(R_m)$$

$$\beta_p^y = \text{Cov}(R_p^*, YC_{-1}) / \text{Var}(YC_{-1})$$

where R_p^* = return to sub-portfolio p

R_m = proxy for market return

R_p = excess return to sub-portfolio p after allowing for standard risk effect =

$$R_p - R_m \times \beta_p$$

YC_{-1} = slope of CPI – indexed government bond yield curve in previous month

Detailed estimates are provided in Stein’s work. The main feature worth noting is that all of the betas are positive with the returns on various common stock indexes having high betas, in the range of 2 to 5 and betas for returns on fixed- income instruments generally in the range from zero to 1.

In the second stage, the pooled sub-group returns are regressed on the estimated betas and a macro effect term, according to the following formula:

$$R_{p,t} = \lambda_0 + \lambda_1 \beta_p + \lambda_2 (\beta_p^y \times YC_{t-1})$$

where λ_0 = estimate of “risk-free” rate, i.e., return on portfolio uncorrelated with market return

λ_1 = price of market risk

λ_2 = additional return required for unit of macro risk

Key results are the following:

- 1) The estimated risk-free rate is 3.4 percent, quite intuitively plausible for an economy with high growth potential.
- 2) “Required returns” on selected sub-portfolios are presented in table 2; they also seem quite plausible on an intuitive basis. Clearly, since the overall common

- stock index has far greater “beta-risk” than the more “solid” government bonds, they require a far greater return. Nominal bonds require a higher return than CPI-indexed bonds or dollar-linked bonds but the premium over the risk-free rate does not seem large.
- 3) Figure 2 presents the set of efficient portfolios for four principal asset indexes, common stock, unindexed assets, CPI-indexed assets and exchange-rate linked assets. As is often found in this type of exercise, the market portfolio does not lie on the efficient set. In the present case, there is considerable over-investment in indexed bonds. There are a few possible explanations for this finding. The first, and potentially most damaging, is that the data used for estimation are, of course, realized real returns, while investors choose their portfolio weights based on *ex ante*, anticipated returns. This is a problem for all the work in empirical asset pricing and the present work is no exception. For the present case, the parameters are estimated for a period of significant disinflation, part of it almost surely unanticipated. Thus, it is likely that the *ex post* returns on unindexed assets were considerably higher than their *ex ante* counterparts. Furthermore, there are a number of institutional arrangements in Israel that favor investment in indexed bonds rather than unindexed ones.
 - 4) Figure 3 adds to figure 2 the realized risk-return combinations for the four principal asset price indexes for the period January 1999 to April 2002. They are represented by the brown dots in the diagram. It is clear that the average market portfolio for the 1994 – 2000 sample period would be much closer to an efficient frontier based on the more recent data sample.

As noted above, the literature that analyzes currency substitution and dollarization focuses on the money demand approach, not portfolio diversification. There is, however, an important strand of the international finance literature that does adopt the latter approach. This is the literature on home bias, namely the phenomenon that investors have a very strong preference for home country assets, in spite of the opportunity to improve the risk-return nexus by investing abroad. This literature has been surveyed recently by Lewis (1999), from which Figure 4 in this paper is taken. This figure demonstrates the home bias phenomenon in a very striking way. The actual US portfolio is represented by point A in the figure. So we can see that the lack of efficiency of this portfolio, relative to the investment possibilities allowed for by

Lewis, is even greater than the inefficiency of the Israeli portfolio relative to the asset set considered by Stein. In any event, the present discussion is not intended to focus on relative market inefficiencies; on the contrary, I wish to emphasize that there may be considerable payoff to analyzing currency substitution using the tools adopted in the home bias literature.

5. Implications for Policy and Policy Analysis

The conventional approach to analyzing currency substitution and dollarization has policy implications that are related primarily to the demand for domestic money, or more precisely, for the diminution of this demand. For example, since the replacement of domestic money by foreign currency occurs with magnitude and frequency that are hard to predict, domestic money demand is likely to become pathologically unstable and is not able to function as a useful indicator for monetary policy. In addition, currency substitution leads to a loss of seignorage revenues, so there is a fiscal issue that must be addressed.

The money demand approach is particularly unappealing for policy analysis in inflation targeting regimes since, as noted above, the monetary disequilibrium transmission channel is inoperative, at least as a theoretical matter. For inflation targeting regimes, the inflation forecast may justifiably be viewed as the intermediate target of monetary policy. In this regard, the empirical analysis reported above is particularly useful.

One of the key policy indicators of monetary policy in Israel is market-based inflation expectations, calculated (roughly) as the difference between the nominal yield on an unindexed bond and the real *ex ante* yield on an indexed bond, both with the same term to maturity and, presumably, identical features in all other respects. Since bonds of both types are available in Israel and are actively traded, the calculation of these differences is certainly feasible. Typically, there are a number of problems with interpreting the yield differentials as a market-based inflation forecast, including differences in tax treatment, limited liquidity, and slight differences in terms to maturity. Another key problem is that the interest differential does not only reflect expected inflation, i.e., the first moment of the inflation forecast, in general, it will also reflect a risk premium on one of the two securities, presumably (but not necessarily) the nominal one. In order to disentangle the two components, the interest differential must be supplemented by some additional work that gets at the second-moment component. For the present case, Roy Stein's work provides a

market-based estimate of the relevant risk premium. The sample average risk premium is 0.4 percentage points and a time-varying premium, related to the slope of the yield curve, can also be calculated.

This is one example of the use of portfolio allocation models based on the risk-return trade-off for policy analysis in inflation targeting regimes.

6. Conclusion

Instead of summarizing the paper, I will devote the concluding section to an explanation of the sub-title that I have chosen for this paper, “There is more than one way to skin a cat”. In fact, there is a dual connotation to this phrase in the present context. First, concerning currency substitution and dollarization themselves, the Israeli experience shows that these phenomena need not involve the use of actual foreign currency or foreign accounts to an especially large extent. It is possible to generate a home-made version of currency substitution via the provision, or at least tolerance, of indexation and exchange rate linkage. A key requirement for the feasibility of a home made version is a degree of policy credibility that macroeconomic mismanagement will not be so bad as to require outright expropriation of domestic assets. Milder attacks of mismanagement, that lead to moderate to high inflation, but not hyper-inflation, and significant currency depreciation can be dealt with by home-made remedies, rather than (or along with) imported ones. Second, concerning the analysis of currency substitution in cases of less-than-apocalyptic macroeconomic mismanagement, the portfolio diversification approach may well provide superior insight and policy implications than the relative money demand approach.

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Endnotes

- ¹ The history of inflation and disinflation in Israel is well documented. The papers in Leiderman (1999) provide a recent survey. The authoritative reference on Israel's Economic Stabilization is Bruno (1993).
- ² It is still not possible to assess the full fiscal cost, even the financial part, since the government has not yet completed the privatization of all the banks it acquired in the 1983 bailout.
- ³ This is one of the papers that described the Mundell-Tobin effect.
- ⁴ I cannot refrain from adding a personal note on this: I have served in a number of capacities as consultant in transition economies and I have no doubt that my experience, albeit limited, with financial repression in Israel stood me in very good stead as I attempted to understand the nature of transition problems.
- ⁵ The term is borrowed from Goodfriend (1992).
- ⁶ Shiffer (1999) provides a recent, comprehensive and insightful review of indexation in Israel over the years. Many of the institutional details in the present paper are taken from Shiffer's chronology of indexation and disindexation in Appendix 1 to that paper.
- ⁷ It is useful to relate this finding to the academic literature on the portfolio balance approach to money demand. The famous article by Tobin (1958) on Liquidity Preference as Behavior Towards Risk was written as a theoretical paper on money demand but it did not serve as the basis of much empirical work on money demand. As a store of value, narrow money is "dominated", in the sense of finance, by interest-bearing time deposits. So are refrigerators, automobiles and any other durable goods that provide some service beyond being a store of value. Narrow money pays little or no interest so this aggregate is negatively related to the overall level of interest rates, a feature that is needed for the traditional monetary disequilibrium channel of monetary policy to work. Short-term, interest-bearing unindexed assets are generally found to be positively related to the overall level of interest rates and it is often difficult to find a relevant alternative asset that consistently has a higher yield in order to provide an estimate of the opportunity cost of these assets. Some large macro models tried to incorporate extensive portfolio balance blocks of the type presented in a relatively

well-known paper by Backus, et. al. (1980) but this strand in the literature has not proven very successful. So it is not at all surprising that the seminal work by Tobin is remembered more for its contribution to the finance literature than for its contribution to the field of money demand. The portfolio balance approach to money demand is, I guess, one of the favored approaches used in the currency substitution literature. A good example of this work is Filosa (1995). While the estimated broad money demand functions in that paper have quite reasonable properties, I have serious reservations about whether this type of work could be a useful basis for conducting monetary policy. The principal components of these aggregates are likely to move unpredictably and in different directions in response to changes in expected interest rate and exchange rate movements. Therefore, even if the demand functions themselves remain stable when, say, inflation rises to moderate levels (a dubious assumption in my assessment), it is unlikely that there will be a stable relationship between such aggregates and policy instruments.