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GLOBALIZATION OF CAPITAL MOVEMENTS: POTENTIAL DISADVANTAGES AND THEIR EFFECT ON ISRAEL

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This study examines a number of brief models that demonstrate potential disadvantages in the process of globalization of capital movements. Using Israeli data, we examine the extent to which Israel suffers from these disadvantages. One disadvantage is related to the transfer of negative shocks between countries by means of capital movements, when these result solely from diversification of the asset portfolio among several economies. The second disadvantage involves the currency exposure that could arise due to the utilization of foreign currency loans for financing income-earning projects in the local currency. The third disadvantage is related to the risk inherent in shortening the period of debt contracts, which could be accompanied by foreign investors' entry to the local economy. The conclusion arising from the empirical analysis is that alongside the advantages involved, Israel does indeed suffer from at least part of the negative aspects of the globalization process:

(1) The correlation between capital movements to the economy and capital movements to the emerging markets since 1995 is creating a pass-through mechanism for the import of shocks from abroad to Israel. This mechanism was apparent at the time of the currency crises during the years 1997 and 1998.

(2) The proportion of foreign currency credit to total and restricted credit, in exports and GDP, increased during the second half of the 1990's without borrowers purchasing suitable hedging instruments against depreciation.

(3) However, foreign currency credit was usually a replacement for shekel credit, which is mostly short-term. From this aspect therefore, liberalization processes and globalization did not create a new problem.

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1. INTRODUCTION

It is well known that countries opening up their economies to capital movements as the result of liberalization processes can benefit from these movements. The most striking advantage in this respect is that globalization enables capital to move from the developed countries, in which the return on capital is low, to developing countries in which the average return on capital is high. Capital movements of this type increase world product, and can thereby increase overall welfare. From the viewpoint of a country like Israel, capital movements to the economy can raise the capital ratio per employee, and increase labor productivity.

A different type of advantage connected with unrestricted capital movements is that individuals have the opportunity to diversify their investment risks more effectively. By reducing yield variability, the apportionment of investment between different countries where there is no interconnection between economic shocks enhances the utility of risk-averse individuals. In addition, the diversification of risk between countries enables different countries to specialize in specific areas of production without having to be over-apprehensive of the risk arising from involvement within a narrow field of activity.

However, the currency crises that affected countries such as South Korea, Russia and Brazil during recent years, raised questions as to the cost involved in opening up markets to capital movements. The crises were accompanied by the withdrawal of money from emerging markets, and caused real damage. The fact that the crises occurred within a relatively short period of time in countries between which no relationships were apparent, led to fears that such crises could be contagious as a result of the globalization process. Various models that were developed explain how globalization could lead to such contagion, and thereby demonstrate the risks inherent in globalization. The models explain the globalization process in terms of rational behavior, and provide a contrast to the opinion initially prevailing whereby contagion derived from various psychological processes.

In the first part of the study, we will present three theoretical assertions that demonstrate the potential disadvantages of the globalization of capital movements. The first assertion relates to the potential transfer of negative shocks from different countries to Israel, due solely to investors holding a portfolio diversified between other countries and Israel. The second assertion relates to the risks involved in currency exposure. This exposure, which is sometimes a side effect of an inflow of foreign capital, could lead to a 'bad' equilibrium, with a depreciation of the local currency and an outflow of foreign investment. The third assertion relates to the risks involved in short-term debt contracts. These contracts can lead to a situation in which lenders ask for their money back before the investments that they financed have reached maturity. Short-term debt contracts can result from foreign capital movements, because in many cases these contracts are intended to protect investors from asymmetric information. Each of these three assertions will be presented in the form of a brief model, which is aimed at demonstrating the matter in question.

In the second part of the study, we will present data that demonstrate the negative effects of globalization on capital movements in the Israeli economy: (1) We will examine how the negative shocks that were recorded in the emerging markets during the past decade affected capital movements to the economy, the local interest rate and the exchange rate of the shekel. (2) We will present the growth in foreign currency credit and note the apprehension that this credit is short-term in nature and may expose investors to currency risk.

2. THE THEORETICAL ASPECT

The transfer of negative shocks between countries—contagion

When investors hold a diversified portfolio that includes assets from different countries, an economic shock in one of the countries could affect their behavior in the other countries, and thereby transfer shocks between countries. The literature a presents a number of mechanisms that demonstrate this type of impact. Calvo and Mendoza (2000) developed a model in which the costs of gathering information on the economic situation in different countries are high, and thereby deter investors from obtaining individual information on each country. As a result, once a shock occurs in one country, investors take out their money from other countries due to the fear that these countries will suffer from a similar shock. Kodres and Pritsker (1998) developed a model in which a shock in one country results in investors withdrawing their money from other countries in order to balance their investment portfolio. With this model, investors wish to retain an optimal investment portfolio. In order to do so, they need to reduce their investment in Country A after the value of their investment in Country B has fallen. The models of Allen and Gale (2000) and Lagunoff and Schreft (1999) point to the possibility of contagion as the result of other financial relationships between countries. These relationships can represent mutual insurance or the existence of an external insurer, such as the International Monetary Fund.

We will now provide a more detailed review of one reason for the established contagion—the wealth effect. We have no intention of asserting that this is the principal mechanism in the creation of contagion, and it could well be that different factors operate concurrently in this respect. Our main aim is to demonstrate how one possible mechanism operates, a mechanism that in our opinion is likely to contribute to the creation of contagion.

If we are to establish the existence of a contagion mechanism by means of the wealth effect, we need to assume that investors are risk-averse and that their (absolute) risk aversion decreases with wealth.[1] We will therefore assume that an investor holds an asset in Israel and another asset in a different country, Thailand for example. A negative economic shock in Thailand will lead to a fall in the value of the investor's portfolio, and will increase his risk aversion. This will change the investor's assessment of the Israeli asset (assuming that a risky asset is involved). At the simple level, this will lead to a change in the price of the Israeli asset, and a correlation will therefore be observed between the prices of assets in Thailand and the prices of assets in Israel (even though there is no correlation between economic shocks in the two countries). At a deeper level, this could change the investor's business decisions in Israel and lead to a real effect on the Israeli economy. This will be observed in the correlation between real variables in both economies.

We will now present these effects. First of all, we will see how a change in the prices of assets worldwide could lead to a change in the prices of assets in Israel. Subsequently, by means of a more complex model, we will present the real effect.

[1] It should be noted that this characteristic exists with respect to the majority of standard utility functions, including a logarithmic utility function and a CRRA utility function.

Effects on asset prices

We will assume that investors have a utility function that conforms to decreasing absolute risk aversion. Individuals measure the utility on the basis of wealth at the end of the period, wealth that is comprised of the local asset and the level of external wealth deriving from payoffs from assets abroad. If we also assume that individuals can trade in the local asset as well as risk-free bonds and that all the individuals are identical, the risk premium on the asset will increase as the external wealth declines (based on the risk premium approximation equation of Pratt, 1964). In other words, the price of the asset will fall as external wealth declines. A positive correlation can thereby be obtained between global asset prices and the price of the local asset, despite the complete lack of correlation between economic shocks in the different locations.

The positive correlation between asset prices, which derives from the investment diversification, was discussed extensively (and within the framework of a more broad-ranging model) in the article of Kyle and Xiong (2001). This assertion is capable of explaining the decrease in share prices in Israel that resulted from the world crisis or from the global decrease in share prices. However, the assertion is limited since it does not include any real effect. In the model that we will review below, we will identify such an investment channel. This model, a scaled-down version of the model presented in the article of Goldstein and Pauzner (2004), demonstrates the impact of global shocks on the investment decisions of individuals in the local economy and as a result, on the real variables in that economy.

Real effects

We will assume the existence of a group of investors, each of them holding a single unit of a local asset. The local asset is a long-term asset, with the opportunity for early liquidation. Each of the investors has two options: The first option is to liquidate the asset immediately. In such a case, the investor receives a fixed payment of 1. The second option is to wait for the long term, until the investment reaches maturity, and then to consume it. In this case, the investor receives a payment of $R(\theta, n)$.

Here, θ represents the underlying value of the asset, and its effect on R is positive. Accordingly, an increase in θ implies that a positive shock has occurred in the local market, and the underlying value of the local asset rises. n represents the proportion of investors who decided to liquidate the investment immediately. The assumption is that R decreases in n, that is, the investment adheres to the principle of increasing returns to scale. This is because foreign investments are usually made in young industries, because the return expected in these industries is higher. The assumption that R decreases in n can also express a liquidity constraint (see Diamond and Dybvig, 1983).

The order of events in the model is as follows: In time $t = 0$, each investor holds a single unit of the asset. The value of θ has yet to be determined in that time. We assume that θ is distributed uniformly between 0 and 1. In time $t = 1$, θ is realized. In that time, individuals obtain incomplete information regarding the value of θ. (We will detail the structure of the information subsequently.) On the basis of this information, each individual decides whether to liquidate the asset immediately or to wait. The single investor does not know what the other investors are doing, but formulates an idea of what they might be doing, and uses this idea in order to decide what action to take. Time $t = 2$ represents the long term. In that time, those

investors who did not liquidate their investment in $t = 1$ receive a payment of $R(\theta, n)$. We assume that there are $\underline{\theta}$ and $\overline{\theta}$, $0 < \underline{\theta} < \overline{\theta} < 1$, such that $R(\overline{\theta},1) = R(\underline{\theta},1) = 1$. Accordingly, when an investor knows that $\theta > \overline{\theta}$, the optimal course of action for him is to wait until the long term, regardless of what he believes other investors are thinking. Similarly, an investor who knows that $\theta < \underline{\theta}$ will liquidate his investment at time $t = 1$. However, due to the existence of increasing returns to scale, if the value of θ is between $\underline{\theta}$ and $\overline{\theta}$, the optimal course of action for each investor depends on his assessment of the other investors' actions.

The information structure of the investors is as follows: In time $t = 1$, investor i obtains signal θ_i where $\theta_i = \theta + \varepsilon_i$. In other words, the signal is equal to the real value of θ plus an error. We assume that e_i is distributed uniformly between $-e$ and e, and that the error values of the different individuals are independent. In addition, we will assume that e is very small and very close to zero. As a result, the individuals obtain quite accurate information on the value of θ, although this information is incomplete. In order to understand the extent to which the information is incomplete, it should be noted that the investor is interested not only in the value of θ, but also in the signal value that investors observe, and in the signal value that other investors believe that other investors observe, and so on. This is because the investor is trying to formulate an idea of the action that the other investors are going to take. This information structure enables us to obtain a unique equilibrium, in which the individuals' actions will be determined by the value of θ. This type of equilibrium was first characterized by Carlsson and Van Damme (1993), and since then has been applied in numerous models (see Morris and Shin, 1998; Goldstein, 2005; and Goldstein and Pauzner, 2005).

We assume that the individuals have a utility function from consumption that satisfies decreasing absolute risk aversion. The individuals consume the payment obtained from the local asset, and also consume their external wealth that comes from assets held in other countries, which is denoted by W.

Equilibrium results

As is shown in Goldstein and Pauzner (2004), the result of the equilibrium in the previously mentioned game is as follows: a critical value θ^* exists whereby if $\theta < \theta^*$, all investors will liquidate the local asset at $t = 1$, and if $\theta > \theta^*$, all the investors will wait until the long term ($t = 2$). It is also known that $\underline{\theta} < \theta^* < \overline{\theta}$.

We will now discuss the results of the equilibrium. As can be seen, the equilibrium obtained characterizes the investors' behavior as a function of the economic situation (which is represented by the variable θ). The equilibrium predicts that in cases where $\theta < \theta^*$, all the investors will liquidate the asset in the short term. We will call situations such as these crises situations, because foreign investors withdraw their investments from the country, and the long-term asset does not reach maturity. The crises situations can be divided into two: When $\theta < \underline{\theta}$, the withdrawal of the investments is efficient and justified in view of the fundamentals. But when $\underline{\theta} < \theta^* < \overline{\theta}$, the withdrawal of the investment is not efficient and is made only as the result of self-fulfilling expectations. In these situations, every investor withdraws his money only because he expects the other investors to do so. These situations can be defined as crises situations arising from panic among the investors.

The main issues that we wish to analyze are the probability of a crisis and the factors affecting this probability. Firstly, since we assumed that θ is distributed uniformly between 0

and 1, the probability of a crisis in our case is θ^*. Secondly, as Goldstein and Pauzner show, this probability depends on wealth W. The formal result as reported in the article of Goldstein and Pauzner (2004) is:

The critical value $\theta^*_{(w)}$ decreases relative to W. That is, the probability of a crisis in the local economy decreases when the investors' external wealth increases.

This result takes center place in our analysis in this section of the study. The result demonstrates the strong real effect of individuals' wealth on the local economy. Accordingly, when individuals have more wealth from external sources, the range of parameters within which an investment crisis in the economy occurs will be smaller. In cases such as these, investment in the economy is larger and the value of production is greater.

If we assume that W represents the value of individuals' investments in other countries, the equilibrium results will predict that when the economic situation in the other countries deteriorates, the probability of a crisis in the local economy increases—a crisis that inevitably implies the destruction of productive investments.

It is important to remember that this result is obtained in the absence of any dependence between the basic economic variables in Israel (which are represented here by θ) and the economic variables in other countries (those that affect W). This result is obtained solely due to the fact that investors hold an investment portfolio that is diversified between the local economy and other countries. The mechanism operates via the attitude to risk: A decrease in wealth increases risk aversion and changes investors' actions in equilibrium. In our case, investors tend to withdraw money from productive investments in Israel more rapidly only because such investments are high-risk (their results depend on the action of other investors), and thereby harm the value of production.

There is another interesting implication of the equilibrium result described above. The contagion mechanism that we identified led to a positive correlation between the returns in different countries as the result of investment diversification. However, investments are usually diversified due to their nature as assets that are independent of each other. It can therefore be seen that the investment diversification mechanism has a cost: The mechanism increases the correlation between assets that were not previously correlated, and thereby reduces the opportunities for risk diversification.

Currency positions

A small country that is opening up its markets often encounters a mismatch of currency positions: foreign currency liabilities alongside local currency assets. This situation was typical in many countries that suffered from financial crises during recent years, including countries such as Chile, Mexico and Southeast Asian countries. The data that we present in the second part of the study reveals the existence of an element of currency exposure in Israel as well.

In our opinion, currency risk exposure in small and emerging economies results from a number of factors. Firstly, these countries offer a high return on investment and thereby attract foreign capital, which is invested in local assets. Secondly, the owners of the foreign capital, who wish to obtain a return on their investment in foreign currency, usually transfer their capital in the form of foreign currency denominated loans. Thirdly, in many of the countries

with which we are concerned, the capital and hedging option markets are not well developed, and therefore make it difficult to hedge against currency risks.

The risk inherent in currency positions derives from the possibility of depreciation. When a depreciation occurs, financial institutions or companies that are exposed to currency risks could encounter financial distress. This problem formed the basis for a series of financial crises in South East Asia.[2] The problem is aggravated by the fact that the existence of currency risk exposure led to a crisis resulting from self-fulfilling expectations. As a result, foreign lenders who expect a depreciation will rush to withdraw money from local banks and companies, since they expect them to experience a crisis immediately after the depreciation. The very fact that foreign lenders withdraw money can in itself encourage a depreciation. This is because an outflow of capital from the economy will reduce the supply of foreign currency in that economy, and lead to a rise in exchange rate. Accordingly, the expectation of a depreciation that will lead to a crisis becomes a self-fulfilling expectation. A situation arises in which exposure to currency risk leads to potential multiple equilibria: one equilibrium in which a depreciation and crisis occur, and another in which there is no depreciation and no crisis.

We will now present a simple model that describes a multiple-equilibrium situation deriving from currency risk exposure. In this model, it is the local banks that are exposed to currency risk. The model describes a situation in which the government maintains a fixed exchange rate (such as a situation in which the government maintains the exchange rate at the upper limit of a band), but where an outflow of foreign capital and loss of reserves will compel the government to deviate from this exchange rate. With suitable changes, the model can also be used with respect to a floating exchange rate in which the level of the exchange rate is determined by the foreign-currency market.[3] The model is a simple version of the model described by Goldstein (2005).

We will assume the existence of a group of foreign investors. Each investor holds a deposit at a local bank. Each investor is entitled to the amount of \$1 in the short term or \$ r_2>1 in the long term. The local bank invests in a local asset yielding a return of one peso (the local currency) in the short term or R pesos in the long term. The bank pays its debts to the depositors by liquidating part of the investment, and by exchanging local currency for foreign currency with the government. If the bank does not have enough sources to pay its debts (in the short term or in the long term), it will liquidate the balance of the investment and divide it between the depositors.

The government maintains the exchange rate of the peso against the dollar at a level of 1. This exchange rate constitutes the upper limit of the exchange-rate band. Were the government not to maintain the exchange rate at this level, the exchange rate would rise to a higher level, that is, a depreciation would occur. We will denote this level of the exchange rate (the exchange rate that would be set without government intervention) by *e*. The government maintains the exchange rate at a level of 1 by selling foreign currency at this price to any party demanding

[2] In these countries the banks borrowed foreign currency from external entities and extended credit to local companies. The banks themselves were not directly exposed to exchange-rate risks, because the loans that they gave were also denominated in foreign currency. But since the local companies were exposed, a depreciation of the local currency led to crises among these companies, and impaired their repayment ability. Indirectly, this harmed the local banks and led to the collapse.

[3] This model will be more complicated since it will be necessary to refer to the manner in which the exchange rate is set in the foreign currency market.

it. The government sells foreign currency from a specific amount of reserves. The assumption is that if this amount of reserves falls below a particular threshold, the government will abandon the fixed exchange rate and enable the exchange rate to rise to a level of *e*.

We will assume that if the government loses $1 of reserves (an amount equivalent to the value of the bank's liabilities in the short term), it retreats to below the threshold and decides to abandon the upper limit of the exchange-rate band.

In addition, we will assume that $R > r_2 > 1$ and that $(R/e) < 1 < r_2$. Our objective is to examine the depositors' behavior in equilibrium, and to characterize their decision: to withdraw the money in the short term or in the long term.

After analyzing the potential equilibria, it can be seen that two equilibria exist. In the first equilibrium, all the investors are waiting for the long term, the government does not abandon the upper limit of the band, and the bank's investment is not destroyed. This situation is an equilibrium since in the absence of a depreciation, the best strategy for each investor is to leave the money at the bank. This is because in this situation the bank can pay in the long term $\$ r_2$ to each investor and since $r_2>1$. In addition, in this situation, since the investors leave their money and do not opt out in the short term, the government does not lose reserves and retains the upper limit of the band.[4]

In the second equilibrium, all the investors demand their money in the short term, the government abandons the exchange rate regime, the exchange rate of the local currency depreciates, and the bank's investment is destroyed. This situation is an equilibrium since when a depreciation occurs, an investor who waits until the long term will obtain from the bank $\$ R/e$ instead of $1 in the short term. Accordingly, the best strategy for each investor is to demand the money in the short term. In addition, in a situation where all the investors demand their money in the short term, the government loses $1 of reserves in that time and the local currency depreciates.

To conclude, the brief model described above demonstrates how the local banks' exposure to currency risk could lead to multiple equilibria. The mechanism behind this result derives from foreign investors' ability to cause a depreciation by withdrawing foreign currency from the local economy, as well as the fact that a depreciation exposes the local banks to a crisis situation and speeds up the outflow of capital from them. In the situation presented here, a single foreign investor therefore knows that if the other investors take their money out of the country, a depreciation will result and that he will then be left with a reduced value investment. Accordingly, the investor will prefer to take out his money rapidly, in an attempt to protect himself from the expected depreciation. It should be noted that the risk exposure of local companies (as compared to the banks) and the activity of local (and not only foreign) investors could generate an effect similar to that described above.

Short-term loans

Short-term loans are likely to pose a risk when they are used for financing long-term assets. This fact has been proved in numerous models, and we can cite *inter alia* the article of Diamond and Dybvig (1983). The risk deriving from short-term loans is their potential for causing

[4] We ignore here the possibility of a depreciation in the long term. Such a depreciation, if it occurs, does not affect the events covered by the time frame of the model.

panic equilibrium, in which all lenders demand their money in the short term, merely because they fear that other lenders will do so. Such equilibrium could lead to the destruction of productive investments. We will demonstrate this assertion by means of a brief example.

We will assume the existence of a group of depositors, and that each depositor holds a deposit in the bank. Each depositor can withdraw the amount of 1 in the short term or r_2 in the long term ($r_2 > 1$). The bank holds an asset yielding a return of R(n) in the long term or 1 in the short term. It is assumed that R(n) decreases in n, where n denotes the proportion of the investment that was withdrawn in the short term. We will assume that $R(1) < 1$ and $R(0) > r_2 > 1$.

We are therefore faced with a situation in which the bank holds a profitable asset in the long term. But if parts of the asset are withdrawn before then, the long-term profitability of the asset will decline. This assumption again derives from the existence of an increasing returns to scale or a liquidity shortage. The game between the depositors in the example presented here produces two equilibria. The first equilibrium is a 'good' equilibrium, in which all the depositors hold their money at the bank until the long term. The second equilibrium is a 'bad' equilibrium, in which everyone withdraws their money in the short term and the investment is destroyed. It is apparent that the bad equilibrium could easily have been avoided, if the bank had deprived the depositors of the opportunity of withdrawing their money in the short term. If this had happened, only the good equilibrium would have been possible, the productive investment would have matured, the depositors would have received larger payments and the bank would have profited. The question therefore arises as to why did the bank enable the lenders to withdraw their money in the short term? Why was a long-term loan contract not signed?

The literature identifies various reasons for the existence of short-term loan contracts. Diamond and Dybvig, for example, explained that lenders might need liquid funds in the short term, and their welfare therefore increases due to the existence of loan contracts that make it possible to withdraw money within this term. Goldstein and Pauzner (2005) extended Diamond and Dybvig's model by analyzing the manner in which the optimal loan contract should create a balance between liquidity for individuals in the short term and the reduced probability of panic situations in which profitable investments are destroyed. Other reasons cited in the literature are the lender's desire to monitor the bank in the short term, with respect to the information gaps between borrower and lender, as well as the desire of the borrower (the bank) to provide an indication of its strength by forming short-term contracts. These factors are mentioned in various articles, such as Bolton and Scharfstein (1990), Calomiris and Kahn (1991) and Diamond (1991).

We will now attempt to explain the existence of short-term loan contracts by means of the information gaps between lenders and borrowers, and will try to identify a relationship between this and the issue of globalization. We will return to the example described above. We will assume that the project in which the bank has a holding is one of two: With a high probability (near certainty), a bad project (B) is involved. This project yields 0 in the long term at a relatively high probability, and yields $R_{(n)}$ in the long term at relatively low probability. With low probability however, a good project (G) is involved. This is the project that was described above (that is, yields $R_{(n)}$ in the long term with a probability of 1). In any event, the project yields 1 in the short term.

We will assume that before obtaining finance the bank knows which project is involved. The bank has an interest in raising funds in any event, because if the project yields 0 it does

not lose and does not profit (limited liability), and if the project yields $R_{(n)}$ it is likely to earn a profit. But if Project B is involved (which yields 0 at high probability), the lenders would have preferred not to lend. Since project B is observed with near certainty, if the loan contracts were long-term, the bank would not obtain finance, even if Project G were available to them. (In the absence of information on the nature of the project, the expected return is less than 1.)

We will now assume that the lenders will be able to understand the nature of the project in the short term (when the project is yielding 1). One way to solve the problem of lack of finance is to sign a short-term loan contract, in which individuals are entitled to withdraw an amount of 1 in that time. As a result, lenders will agree to lend money to the bank because they know they can get their money back if the project is Project B.

In the example presented, due to the information gaps between borrowers and lenders, lenders will not be willing to lend money to the bank in a long-term loan contract. The only way of getting them to provide finance is to guarantee them the opportunity of withdrawing their money in the short term. But as we saw previously, this possibility could lead to a crisis, in which everyone withdraws their money in the short term even in the case of a good project. This problem is unavoidable and is the lesser of two evils with respect to our example in which information gaps between the parties exist.

What is the connection between this example and the issue of globalization? We have shown that short-term loan contracts, in which the risk of a crisis is inherent, could be the result of information gaps between borrowers and lenders. These information gaps are more likely to occur when foreign lenders and local borrowers are involved than in the case of local borrowers and local lenders. Accordingly, if we accept the assumption that information gaps are becoming more relevant in the globalization era, then short-term loan contracts, which could lead to a crisis, are also becoming more relevant.

3. THE EFFECT ON ISRAEL

The liberalization of Israel's foreign exchange controls in the second half of the 1980s was an important juncture in the globalization process that the Israeli economy experienced during the 1990s. The liberalization was implemented gradually, and the process lasted for over ten years. Initially, restrictions on long-term capital imports were lifted. Subsequently, restrictions on short-term capital imports were lifted as well, and from 1992 the restrictions on capital exports were abolished. In 1998, the foreign currency control regime was changed. Instead of specifically detailing operations that were permitted, the exchange controls explicitly mentioned the operations that are prohibited. Four years after the change in the regime, the only remaining foreign exchange restrictions relate to institutional investors' holdings abroad[5, 6]

Israeli residents were the first to exploit the liberalization process, and by 1991 had already invested over half a billion dollars abroad, half of it in the form of financial investments via mutual funds. In 1992, the flow of financial investment via the mutual funds amounted to approximately a billion dollars.[7] But this trend reversed as early as 1993. During recent years,

[5] The last remaining restrictions on capital movements are due to be lifted at the beginning of 2003, when the liberalization process will be complete.

[6] See Blecher and Gottlieb (2001) for details of the liberalization process.

[7] In the same period, Israeli residents were only permitted to engage in financial investments abroad via the mutual funds.

the flow of Israelis' financial investments abroad increased again as a direct result of the share swap transactions conducted by companies from abroad. These transactions turn the shareholders of an Israeli company into shareholders of a foreign company whose stocks are traded abroad. From 1992, Israeli residents' direct investments ranged between half a billion and a billion dollars concurrent with low variability.

Israeli residents' investments increased gradually and persistently throughout the 1990s. A particularly large upsurge in investment was recorded in 1995, when foreign residents began to invest in Israel in direct non-real estate investments. The peace process, with the landmark events in the years 1993-1996, together with the wave of mass immigration and the receipt of loan guarantees from the US government, led to an improvement in Israel's risk rating, and were the main local reason for the large growth in foreign investment in Israel. During the second half of the 1990s, with the boom in high-tech industry and the large investments in high tech in developing economies, issues by Israeli companies in foreign stock markets accounted for a large proportion of foreign investment in Israel. At the same time, the growth in foreign investment in emerging markets throughout the 1990s was an external factor supporting investment in Israel.

The flow of investment, direct investment and portfolio investment, into Israel and the emerging markets was a clear manifestation of the globalization process during the last decade, and in itself supported this process. The significance of direct investments is that they bring foreign investors into the local economy by involving them in the management of local companies. Direct investments support the Israeli economy's integration in world trade by improving its competitiveness, by contributing to increased efficiency and by helping to market export goods abroad (via the use of international brand names and the marketing networks of companies that invest in Israel). Portfolio investments (which include investment in shares and marketable bonds) reflect the globalization process because they require investors to exhibit a greater understanding of the local economy than that necessary in granting credit.

Tables 1 and 2 present inflows of investment to the emerging markets by continent and by percentage of GDP. Direct investment flow data show a growth in investment throughout the decade, and as stated, reflect the globalization process that began with the capital movements in the 1990s. Portfolio investments were more volatile, especially in the wake of the currency crises in Mexico at the end of 1994, and in East Asia, Russia and Brazil in 1997-1998.

In the area of foreign currency credit, the foreign exchange liberalization was very clearly reflected by the aftermath of the policy of monetary restraint that the Bank of Israel adopted from the second half of 1994. Due to the rise in the shekel interest rate, Israeli residents replaced shekel credit with foreign currency denominated and indexed credit. This trend continued, at varying degrees of intensity, until the middle of 1997 (Figure 1). The increase in exchange-rate risk and the level of outstanding foreign currency credit helped to stop the growth in the proportion of this credit to total unrestricted credit during the years 1998-2001.[8]

Contagion

The numerous currency crises during the last decade, and especially the currency crises and shocks in the Far East, Russia and Brazil that occurred within a short period of time, contributed

[8] See Djivre and Tsiddon (2001) for a discussion of the development of the monetary aggregate during the years 1987 to 1998.

to the development of empirical literature on the subject of contagion. In this literature, various authors gave different definitions of the concept of contagion, and examined signs of its existence in economies that had suffered from currency crises or exchange rate shocks.

Table 1
Direct Investments in Emerging Markets, by Continents, 1990 to 2000 (annual averages)[a]

	1990–1993		1994–1997		1998–2000	
	% of GDP	$ billion[a]	% of GDP	$ billion[a]	% of GDP	$ billion[a]
Israel	0.7	0.4	1.3	1.2	2.9	3.0
Asia	1.6	21.1	2.6	55.6	2.6	58.7
Latin America	1.0	11.1	2.4	38.8	4.1	72.1
Europe	1.0	3.0	1.5	11.6	2.7	20.0
Africa	0.7	1.3	1.3	3.7	1.0	2.2

[a] Investment data for 5 countries are lacking for 1990, data for 3 countries are lacking for the years 1992 and 1993, and the data for one country are lacking for 1994. For details of investments in different countries see the detailed table in the Appendix.

SOURCE: IMF Balance of Payments Statistics. The definition of direct investments and the method of gathering data differ between the various countries.

Table 2
Portfolio Investments in Emerging Markets, by Continents, 1990 to 2000 (annual averages)[a]

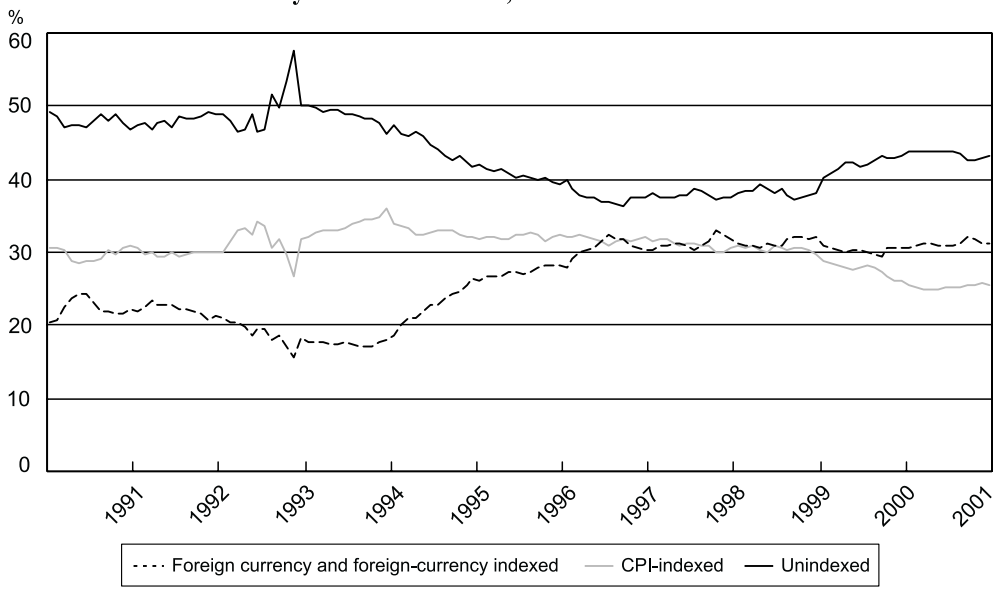
(percent)

	1990–1993		1994–1997		1998–2000	
	Securities portfolio	Of which: shares	Securities portfolio	Of which: shares	Securities portfolio	Of which: shares
Israel	0.8	0.1	3.4[a]	1.3	3.2	1.7
Asia	0.7	0.6	1.4	0.7	0.4	0.6
Latin America	3.7	1.1	2.7	0.7	0.9	–0.1
Europe	2.1	0.4	1.3	0.4	0.6	0.3
Africa	0.7	–0.1[b]	1.9	1.6[b]	3.8	4.4[b]

[a] Including foreign residents' investments in bonds backed by US loan guarantees.
[b] Figure for South Africa.

SOURCE: IMF Balance of Payments Statistics. Percentages of GDP are calculated as the percentages of GDP of the countries for which data are available. For details of investments in different countries see the tables in the Appendices.

Figure 1
Proportion of Unrestricted Credit from the Banking System to Total Unrestricted Credit by Indexation Bases, 1991 to 2001



An accepted but narrow definition of contagion is a growth in the relationship between markets following a shock in one of the economies (for example: Claessens, Dornbush and Park, 2001; Forbes and Rigobon, 1999). In line with this definition, Park and Song (2001) examine the existence of contagion from mid-1997 to mid-1998—the period of the currency crises in the Far East—in eight Far Eastern countries. They calculate the correlation between unexplained changes in exchange rates and share indexes in the different countries during the crises, and conclude that contagion was indeed recorded in a considerable proportion of these economies. Baig and Goldfajn (2001) identify Brazil's contagion as the result of the crisis in Russia, which was reflected by an increased correlation between their equity markets, and the yield spread between bonds in the two countries and US bonds. They also found that economic news from Russia affected the equity market in Brazil and the bond yield spread between Brazil and the USA, supporting the hypothesis that Brazil was "infected" by the crisis in Russia. Bazdrech and Werner (2001) found that Mexico was also affected by the financial crises in 1997 and 1998, although they did not believe that the effect was strong. However, Forbes and Rigobon (1999) claim that the increased correlation between the share indexes in Hong Kong, and South East Asian countries, South America and the OECD countries at the time of the shock in the Hong Kong stock market in 1997 (identified there as the peak of the infection period in the Far East currency crises) derived from the increased variability in the markets, which produced a technical increase in the correlation between them. Exclusive of this effect, there was no increase in the correlation between the share indexes in the different markets. Similar conclusions were obtained when the correlations between the share indexes were examined during the crisis in Mexico at the end of 1994.

Pritsker (2001) gave a more broad-ranging definition of contagion. Under his definition, contagion occurs when a shock from an economy or a group of economies passes to another economy or group of economies. A definition of this type includes shocks that pass from one economy to another via the traditional channels connected with the non-financial markets and via the less traditional channels connected with the financial markets, the banking system and the political system.

Mauro, Sussman and Yafeh's study (2002), which examines the correlation between emerging economies' bond yield spreads during the 1990s compared with the historical period—the end of the nineteenth century and the beginning of the twentieth century, tests a particular aspect of contagion between the markets in accordance with the broad-ranging definition of contagion. According to the findings of the study, contagion between emerging economies is currently stronger than in the past.

For the purpose of discussing the disadvantages of globalization and the question of whether the Israeli economy absorbed a shock as a result of the currency crises in 1997-1998, the more broad-ranging definitions appears to be the most suitable for us. This is because we wish to examine the pass-through between shocks in different economies and the Israeli economy via capital movements, and it is less important for us whether the pass-through is fixed or intensifies at a time of crises.

The extent of foreign residents' capital imports and especially the volume of financial investments expose the economy to the risk of contagion deriving from capital movements. The correlation that emerged between capital movements to Israel and capital movements to other emerging markets is one of the shock pass-through mechanisms from one economy to another. We therefore intend to examine the correlation between different types of capital movements to Israel and to emerging economies. The comparison between foreign investment in Israel and in emerging economies derives from the similar nature of such investments and the similarity between those investing in emerging economies and Israel. Since foreign investors come from the developed countries, their investments in Israel and the emerging markets are regarded as more dangerous than investment in developed countries. From this aspect, their investments match the investments referred to in the contagion models described in the first section of this study.

During a crisis in an emerging economy, the correlation between capital flows into and out of different economies creates pressure for capital outflow, which could produce a series of negative effects. Such a phenomenon is apparent when foreign investments exist in the economy. Otherwise, foreign residents have no motivation to export capital, at least not for the reasons that were mentioned in the theoretical part of the study. The currency crises in South East Asia, South Korea, Russia and Brazil that followed several years of capital imports to the economy were interesting cases for examining the extent of the negative effect of the crises on the exchange rate of the shekel and the shekel interest rate, two variables that are affected by capital movements and whose impact on the economy is considerable.

Correlation in capital movements

We will examine the signs of contagion that were apparent in capital movements immediately after the currency crises during the years 1997-1998 in two ways: (1) an examination of whether a relationship exists between foreign residents' capital movements to Israel and foreign

investment in emerging economies, with an emphasis on the crises' impact on capital movements to Israel; (2) an individual examination of each of the different items comprising foreign investment in the economy, in an attempt to identify material changes in foreign residents' behavior in a crisis period.

The date on foreign investment in Israel that we will use are Israel's balance-of-payments data that are published by the Central Bureau of Statistics and date issued by the Foreign Currency Control Department, which are the basis for these data. The Foreign Currency Control Department's data are particularly important because they are published frequently, every month, and are highly detailed. These data enable us to divide investment in the finance account into several sub-items according to the nature of the investment, and thereby make it possible for us to understand more accurately the effect of crisis situations on the different types of investment. Table 3 details foreign residents' investments in Israel during the years 1994-2001.

Table 3
Foreign Investments in Israel, 1994 to 2001

($ billion)

	1994	1995	1996	1997	1998	1999	2000	2001
Total investments	3.1	3.1	5.2	5.7	4.2	5.6	9.4	3.2
Direct investments	0.4	1.3	1.4	1.6	1.8	2.9	4.4	3.0
Portfolio investments[a]	2.7	1.7	3.8	4.1	2.5	2.7	5.0	0.1
1. Shares for trading	0.5	1.0	1.4	1.7	0.5	1.6	3.3	–0.5
a. On the Tel Aviv Stock Exchange[b]	0.2	0.4	0.3	0.5	0.2	–0.1	-0.4	–0.8
b. Issues abroad	0.1	0.3	0.8	0.8	0.3	2.1	2.8	0.3
c. Other[c]	0.2	0.3	0.3	0.5	0.0	–0.4	0.9	0.0
2. Marketable bonds	2.2	0.8	2.3	2.4	2.0	1.1	1.7	0.6
a. Government[d]	2.5	0.6	1.7	1.4	1.5	0.0	0.2	–0.3
Private sector	–0.3	0.1	0.6	0.9	0.5	1.0	1.5	0.9

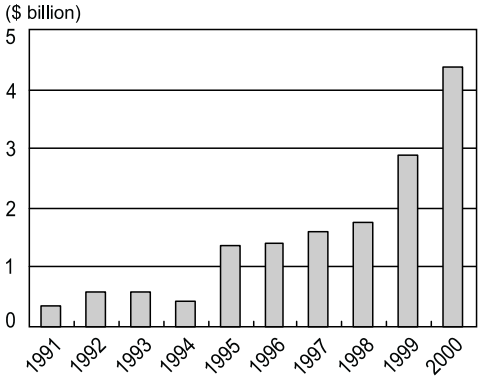
[a] Portfolio investments include investments in shares for trading and marketable bonds.
[b] Including small-scale investments in bonds on the Tel Aviv Stock Exchange.
[c] Including foreign investments in the secondary market abroad (purchase of securities from Israeli residents) and purchase/sale of shares from foreign interested parties to other foreign residents.
[d] Between 1994 and 1998 the Israel Government issued bonds backed by US loan guarantees to the amount of over $7 billion. The data include these issues.

SOURCE: Central Bureau of Statistics and the Bank of Israel.

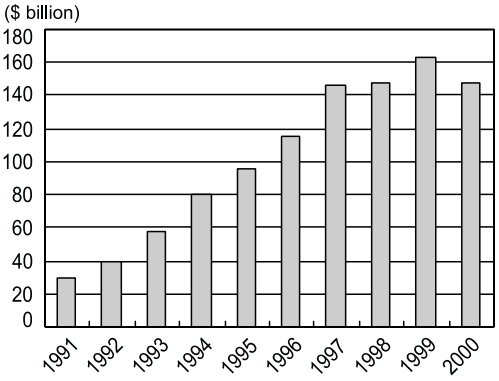
Data on foreign investment in emerging markets are from International Financial Statistics and from the IMF's Balance of Payments Statistics. We selected the emerging markets from the J.P. Morgan investment house's list of emerging markets. The markets selected were Argentina, Brazil, Chile, Columbia, Ecuador, Mexico, Peru, Venezuela, China, India, Indonesia, South Korea, Malaysia, the Philippines, Thailand, Morocco, Nigeria, South Africa, Bulgaria, the Czech Republic, Slovakia, Hungary, Poland, Russia and Turkey. Figures 2 and 3 present direct investment and portfolio investment in the emerging markets against the parallel items in foreign residents' investments in Israel.

Figure 2

Foreign Direct Investment in Israel, 1991–2000



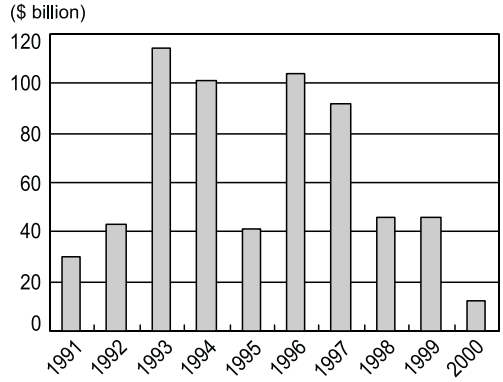
Foreign Direct Investment in Emerging Markets[a]



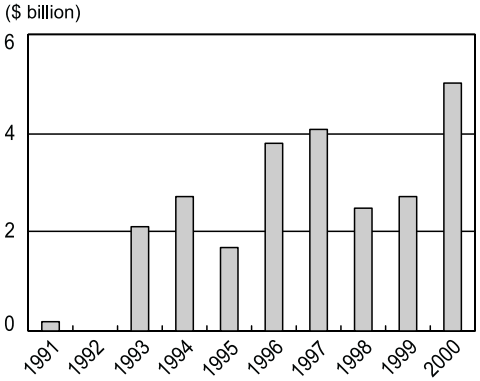
[a] The 25 countries defined as emerging markets according to the J.P. Morgan investment house. Up to 1994 the data do not include investments in Russia, the Czech Republic and Slovakia. Direct investments in China in 2000 totaled $38 billion.

Figure 3

Foreign Portfolio Investment in Emerging Markets,[a] **1991–2000**



Foreign Portfolio investment in Israel,[b] **1991–2000**



[a] The 25 countries defined as emerging markets according to the J.P. Morgan investment house. Data at the beginning of the sample are lacking for Bulgaria, the Czech Republic, Ecuador, Hungary, Peru, Poland, Russia and Slovakia. From 1995 the sample is complete.
[b] Including foreign residents' investments in Israel Government Bonds backed by US loan guarantees.

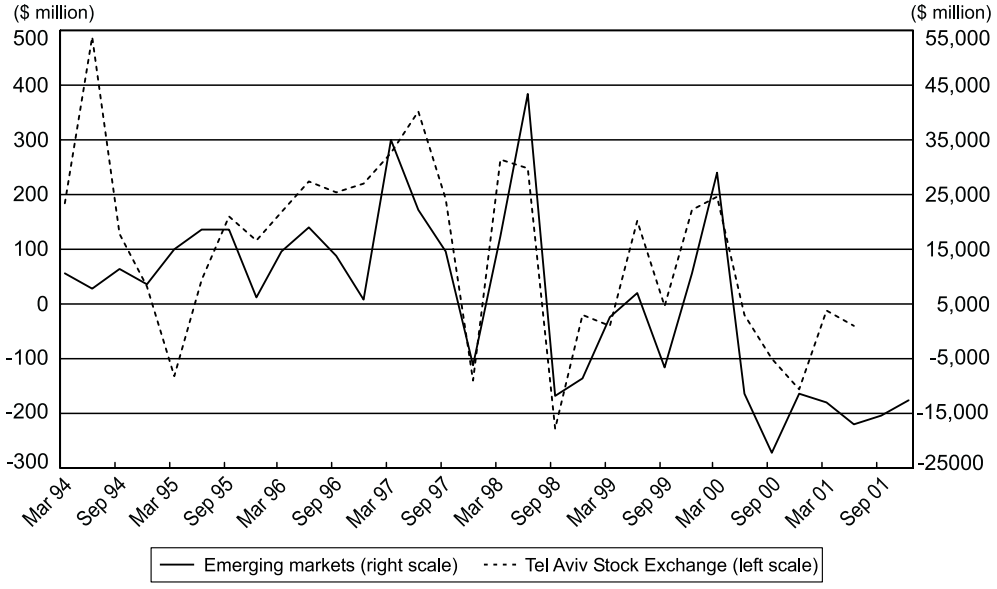
We ran a number of regressions examining the correlation between foreign residents' capital movements to Israel and the emerging markets for the period between 1994 and 2000 at a quarterly frequency. As stated, until 1994 foreign residents' investments in Israel were minor in extent. We therefore saw no reason to run regressions for the period beginning before that

year. Since we cannot reject the hypothesis that the series of direct investments in emerging economies have a unit root, we did not run a regression examining the relationship between foreign residents' direct investments in Israel and in emerging economies. Neither is it possible to reject a similar hypothesis regarding Israeli companies' issues abroad.[9]

According to the regressions, it appears that at least in part of the investment channels in Israel, the country is included in a global portfolio of investments in emerging markets. Investment in Israel will therefore be affected by general considerations such as the level of the risk-free interest rate in the developed countries, the level of income in the emerging markets and the investment risk in these markets. Particularly notable is the explanatory ability provided by a series of portfolio investments in the emerging markets for foreign residents' investments in the Tel Aviv Stock Exchange.

Figure 4 shows a large decrease in investment in the emerging markets in the fourth quarter of 1997—the time of the crisis in South Korea—and in the third quarter of 1998—the time of the crisis in Russia. It is possible to conclude from the diagram and the regression results that the emerging markets (including those that have not experienced a crisis) as well as Israel suffered from a decrease in portfolio investment as a result of the currency crises in different countries, a decrease that can be referred to as the contagion effect.

Figure 4
Foreign Porfolio Investment in Emerging Markets and on the Tel Aviv Stock Exchange, March 1994 to September 2001



[9] For a discussion of the impact of currency crises on foreign residents' direct investments in Israel and on Israeli companies' issues abroad, see the separate discussion on foreign investors' response to currency crises in the next section.

Table 4
Effect of Foreign Investments in Emerging Markets on Their Investments in Israel[a]

Explained variable	Foreign investments on the Tel Aviv Stock Exchange						Foreign portfolio investments in Israel		
Sample period	1994:1 to 2000:4			1995:2[b] to 2000:4			1995:2[b] to 2000		
Constant	–54	–53	–36	–92	–65	–72	533	460	545
	(–1.8)	(–1.5)	(–1.2)	(–3.4)	(–1.6)	(–2.2)	(–2.7)	(–2.3)	(–2.8)
Foreign portfolio investments in emerging markets[c]	0.0060			0.0087			0.02		
	(4.7)			(6.8)			(2.2)		
Foreign investments in shares for trading in emerging markets	0.017			0.019			0.069		
	(3.5)			(3.4)			(2.6)		
Foreign investments in emerging markets (excl. investments in crisis countries[d])	0.012			0.016			0.043		
	(3.9)			(4.8)			(2.2)		
No. of observations	28	28	28	23	23	23	23	23	23
R^2	0.46	0.31	0.37	0.69	0.36	0.53	0.19	0.24	0.18
DW	1.7	1.58	1.52	2.13	1.64	1.66	2.0	2.2	2.0

The statistical *t* is denoted in parentheses.
[a] Portfolio investment does not include China, Ecuador, Malaysia, Morocco, Nigeria and Poland, for which we did not have quarterly data. In addition, investment in shares for trading does not include Bulgaria.
[b] After the crisis in Mexico in December 1994 (see effect of Mexico crisis on capital movements to emerging markets in Figure 4).
[c] Portfolio investments include investments in shares and tradable bonds.
[d] Excluding Thailand, the Philippines, Indonesia, South Korea, Russia and Brazil.

It should be remembered that portfolio investment in Israel includes a large component of private sector stock issues abroad, to an amount of over two billion dollars a year during 1999–2000, mostly by export-oriented high-tech companies. These stock issues are not matched with foreign investment in emerging markets due to the fact that the main source of risk in these investments is sector-specific risk, while the country risk inherent in them is relatively small. This is why the correlation between foreign investment in emerging markets and foreign residents' total portfolio investment in Israel is smaller than that existing with respect to foreign residents' investments in the Tel Aviv Stock Exchange. When government borrowing with the help of US loan guarantees is deducted from portfolio investment in Israel, the relationship between foreign investment in emerging markets and foreign investment in Israel is positive but not significant. This fact is supported by the hypothesis that emerging economies' interest

rates and ability to raise capital in the developed countries (which affected the timing of bond issues backed by US loan guarantees) were a factor behind the correlation in foreign investment in emerging markets, especially in bond investments in these economies.

As stated, foreign investment in emerging markets has had a very strong effect on foreign investment on the Tel Aviv Stock Exchange. This investment amounted to between $200 million and $500 million during the years 1994-1998. Although not large in comparison to total foreign investment in Israel during those years, the impact of these amounts on the share index was significant. An examination of foreign residents' share of trading turnover and the relationship between their investments in Tel Aviv and the share index reveals the effect that foreign residents had on the Tel Aviv 100 index and via this index, on activity in the economy (Figure 5 and Table 5). During the last year and a half, when the variability and balance of foreign residents' investments in the Tel Aviv Stock Exchange declined, the relationship between the share index and foreign investment in the stock market weakened.

The strong relationship between capital movements to emerging markets and capital movements to Israel indicates that the existence of contagion is possible, but does not make it possible to identify the mechanism leading to contagion. Although the mechanism in question may be the mechanism presented in the theoretical part of the study, the more simple mechanism proposed by Calvo and Mendoza may be involved. According to the latter, foreign investors do not gather information on specific markets, and withdraw their investments from all the emerging markets after a shock occurs in one of them. It should be noted that the correlation between the probability of a crisis in different economies that was derived from the model presented in the first section of the study could be translated into a correlation in the capital movements between them on the basis of the following scenario: We will think of a model in which different investors invest in different industries and as the result of a crisis abroad, the probability of crises in the different industries increases. At the empirical level, this will be reflected by an increased outflow of capital from the economy. In any event, the correlation in capital movements reflects Israel's exposure to the risk of contagion.

An examination of the different types of investment

An examination of the different series of foreign investment in Israel at a monthly frequency and with an emphasis on the crisis periods in different countries provides the following conclusions:[10]

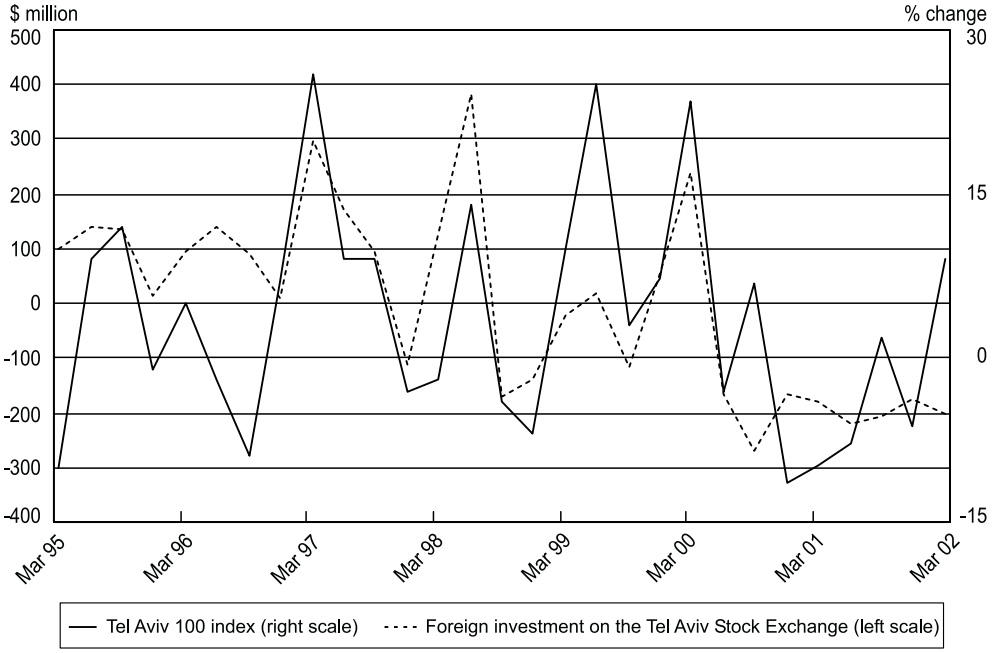
1. *Direct investments*

Direct investments in the economy increased persistently during the years 1995-2000.[11] An examination of these investments at a monthly frequency and at a quarterly frequency reveals high volatility due the nature of this type of investment: Direct investments are highly concentrated, since by their very nature they imply the purchase of a considerable portion of a local firm. It is therefore not possible to discern a clear change in trend in this series within

[10] We are not aware of any successful attempt to explain foreign residents' capital movements to Israel by means of macroeconomic variables.

[11] In 2001, as a result of the crisis in the high-tech industries and the intifada, direct investment decreased to $3.0 billion, slightly more than the level recorded in 1999.

Figure 5
Foreign Investment in the Tel Aviv Stock Exchange and the Changes in the Tel Aviv 100 Index, March 1995 to March 2002
(quarterly data, $ million and percent)



short periods of time. On the basis of the series trend, the effects of currency crises, if there were such effects, were minor relative to the other external factors that contributed to the persistent increase in the flow of direct investments.

2. *Portfolio investments*

a) Investments on the Tel Aviv Stock Exchange—Foreign residents' investments on the Tel Aviv Stock Exchange appear to have been clearly affected by the currency crises. During the months November-December 1997, immediately after the crisis in South Korea when it was feared that economies outside of South East Asia would suffer contagion as a result, nearly $200 million of investments were liquidated. These liquidations were exceptional in view of the fact that during the three years preceding the crisis in South Korea, only three months were recorded in which foreign residents withdrew (net) investments in Tel Aviv, and at amounts of no more than $35 million. In the second half of 1998, foreign residents resumed their investment in the Tel Aviv Stock Exchange. From July of that year and until March 1999 (Russia announced its debt moratorium in August 1998), liquidations totaling $330 million were recorded. In fact, from the time of the crisis in Russia to the present, with the exception of a brief period during the months December 1999 to March 2000, foreign investors did not return to the Tel Aviv Stock Exchange. This may partly have resulted from the substitutability between investments in Tel Aviv and investment in Israeli companies that are traded abroad.

Table 5
Foreign Residents' Share of Turnover and Asset Balance on the Tel Aviv Stock Exchange

	1995	1996	1997	1998	1999	2000	2001
				$ billion			
Trading turnover in stock market (shares, convertibles, bonds and T-bills)	59	61	68	87	92	117	119
Foreign residents' turnover	3.6	3.4	8.9	12.0	13.7	13.0	7.5
				Percent			
Foreign residents' share of turnover[a]	6.1	5.5	13.2	13.8	14.8	11.1	6.3
Foreign residents' shares of balance of shares and convertibles	8.8	9.7	12.1	12.9	11.2	11.4	10.6
Financial investor foreign residents' share of financial investors' total holdings[b]	5.9	8.9	13.5	15.2	14.5	12.3	8.6

[a] Since the majority of foreign residents' activity is in shares and convertible securities, their proportion in turnover excluding bonds is larger.
[b] The term financial investors refers to investors that are not interested parties.

SOURCE: The Tel Aviv Stock Exchange and the Foreign Currency Control Department, Bank of Israel.

b) Stock issues abroad—Foreign residents' investments in Israeli companies' stock issues abroad increased persistently during the years 1995-2000 (except for 1998), and in 2000 totaled nearly three billion dollars. These investments were mainly affected by the state of the stock markets abroad, especially the NASDAQ and the boom in the high-tech industries. Since foreign stock markets were affected by the currency crises, Israeli companies' issues abroad also suffered as a result of the crises. During the years 1997-2000, foreign residents' investments in the stock issues of Israeli companies accounted for approximately a third of their total investments in Israel (with the exception of bond purchases). This clearly explains the serious harm that the currency crises in the Far East and Russia caused to foreign investment in Israel. During the months November 1997 to May 1998, issues abroad averaged less than $20 million a month compared with over a hundred million dollars in the previous six months. Following the crisis in Russia, during the months August 1998 to January 1999, issues abroad were minimal. From February 1999 to September 2000, issues averaged over $200 million a month.
c) Investments in the secondary market abroad—The size of these investments during most of the 1990s was small. The small amounts reflect trades in Israeli shares listed abroad between Israelis and foreign residents. But despite the small amounts, a change in foreign residents' investments can be discerned in this series. During 1995, 1996 and the first half of 1997, investment under this item averaged some $25 million a month. Between October and December 1998, (net) investment realizations of $8 million a month were recorded.

The exchange rate and the interest rate

When discussing the phenomenon of contagion via capital movements, we should remember that the exchange rate in Israel is not fixed. Under a fixed exchange rate regime, the full extent of foreign residents' capital movements is clearly apparent, as when demand surpluses for foreign currency are reflected by a decrease in the foreign exchange reserves at the central bank. But under a floating or partially floating exchange rate regime, part of the demand surpluses are absorbed by changes in the exchange rate. For example, local residents may absorb the demand surpluses for foreign currency that are fed by foreign residents, concurrent with some degree of depreciation in the local currency. In such a case, foreign residents will export capital and a depreciation will occur. When we examine the existence of signs of contagion, we must scrutinize the exchange rate regime and ascertain whether extreme changes in the exchange rate are observed concurrent with the capital movements.

The exchange rate regime practiced in Israel for over a decade is a regime based on an exchange-rate band. Since 1996 the Bank of Israel has only intervened in foreign currency trading when intervention has been necessary in order to protect the limits of the diagonal band. From the mid-1990s, when capital movements to Israel were extensive, the exchange rate moved away from the upper limit of the band. Following the widening of the band in 1997, the upper limit has not constituted an effective limit, and a rapid depreciation can cause a shock in the economy even without breaking above the upper limit of the band.

The rapid pass-through between the exchange rate and prices and the policy of setting short-term inflation targets require the Bank of Israel to closely monitor changes in the exchange rate and to determine an effective band for attaining the inflation target. The inflation target regime effectively presents a limit to the depreciation of the exchange rate. Capital export pressures or an actual depreciation influence the Bank of Israel's interest rate decisions and part of the effect of contagion is absorbed in this manner (assuming that such an effect exists). A good example of a Bank of Israel response was recorded after the depreciation of October-November 1998, when it raised its monetary interest rate by four percentage points.

Another problem encountered when trying to identify signs of contagion in exchange rate and capital movement data is the Bank of Israel's attempt to cope with potential contagion by taking preemptive measures before a depreciation occurs or capital exports are observed. As a result, even if signs of contagion were apparent, these were weakened by the Bank of Israel's reaction to developments. An examination of the Bank of Israel's response to crises in different countries does indeed provide the basis for assuming that the fear of contagion affected interest rate policy and via this policy, the development of capital movements and the exchange rate during the periods in question.

Table 6 presents changes in the Bank of Israel's monetary interest rate in the period between July 1996 and January 1999, two and a half years during which currency crises occurred in South East Asia, South Korea, Russia and Brazil. This period was notable for a downtrend in the interest rate after the Bank of Israel's had reached 17 percent in July 1996, the highest level in that period. We divided the interest rate decisions in those months into four periods: (1) before the crisis in the Far East; (2) the crises in South East Asia and South Korea; (3) between the crises in the Far East and the crisis in Russia; (4) the crisis in Russia and the fears of a crisis in Brazil.

Table 6
The Bank of Israel's Monetary Interest-Rate Decisions, by Sub-Periods[a]

	No. of rate cuts	No. of rate hikes	No. of times rate left unchanged	Total percentage change in rate
(1) July 1996 to June 1997	9	–	3	–4.3
(2) July 1997 to Dec. 1997	–	1	5	+0.7
(3) Jan. 1998 to mid–Aug. 1998	8	–	–	–1.9
(4) Sep. 1998 to Dec. 1998	–	2	3	+4.0
Periods (1) + (3)	17	–	3	–6.2
Periods (2) + (4)	–	3	8	+4.7

[a] Interest rate decisions are usually made towards the end of the month.

A perusal of the Bank of Israel's press releases shows that the currency crises were taken into account in part of its interest rate decisions. An examination of interest rate adjustments during the years in question reveals that in practice, the effect of the currency crises on the interest rate decisions was even stronger than that reported in the press releases.

Since the nominal interest rate that the Bank of Israel sets affects the real interest rate in the economy, a delay in reducing the nominal interest rate exerts an upward pressure on real interest rates.[12] We emphasize that the effect of a delay in reducing the nominal interest rate is not short-term. Due to the Bank of Israel's cautious policy, which is reflected by interest rate cuts in small amounts, a delay in reducing or raising the interest rate affects the level of the interest rate in the economy for a considerable period of time. An example is the Bank of Israel's four percentage point interest rate hike following the depreciation of the shekel in October 1998. Only a year and a half later did the Bank of Israel's monetary interest rate revert to the level prevailing before that crisis. In retrospect, the nominal interest rate throughout that period appears to be have been higher than the rate necessary for attaining the inflation targets in those years.

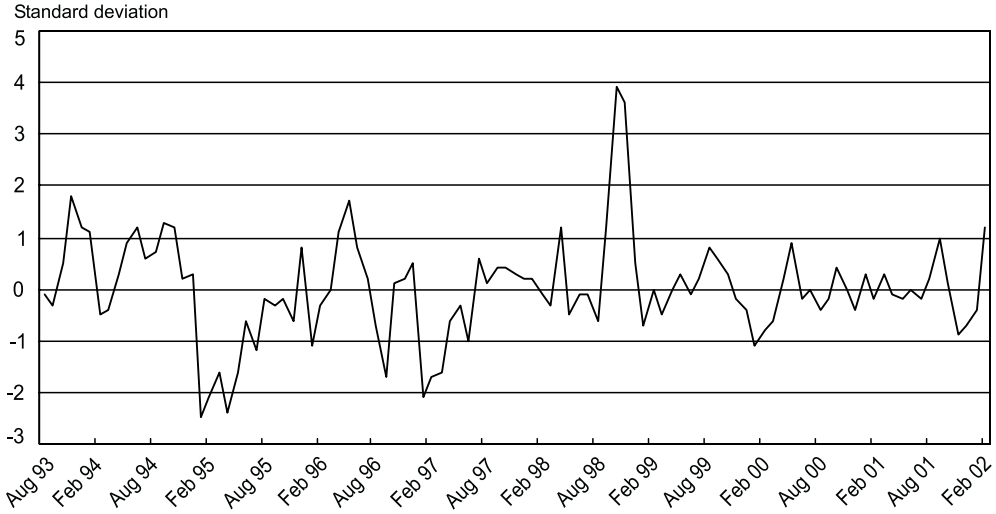
In order to examine whether pressure on the exchange rate in Israel was recorded concurrent with the currency crises in the Far East, South Korea, Russia and Brazil, we used the currency crisis identification index that Eichengreen, Rose and Wyplosz (1995) proposed, and that was recently used by Kaminsky and Reinhart (1999). As stated, pressure on the exchange rate can be reflected in three different ways:

(1) changes in the exchange rate itself; (2) changes in the central bank's interest rate that are intended to offset part of the pressures on the exchange rate: (3) conversions/purchases of foreign currency at the central bank. The proposed index is comprised of the weighted average of the three previously mentioned components. The weights in the index were examined in a manner whereby the variability of each of the index components will be equal throughout the sample. Serious deviations from the index average reflect exceptional developments in one or

[12] A simple regression for the years 1995-1999 shows that a one percentage point increase in the Bank of Israel's monetary interest rate contributes more than a third of a percentage point to the two-year real interest rate in the following month.

more of the three components comprising the index, and are indicative of pressures on the exchange rate. According to Kaminsky and Reinhart, when the index deviates by more than three standard deviations from its average, the event in question is regarded as a crisis.[13, 14] Calculation of the index for Israel clearly shows that during the months October-November 1998, shekel depreciation pressures arose that were crises according to the criteria defined by Eichengreen et al. and Kaminsky and Reinhart (Figure 6). An examination of the index composition shows that the crises resulted both from the exceptional development of the exchange rate and from the exceptional rise in the Bank of Israel's monetary interest rate. It should be noted that the depreciation of the shekel in January 2002 was not recorded as a crisis event. This depreciation came in the wake of the cut in the Bank of Israel's interest rate, which supported a depreciation. From this aspect, the index makes a distinction between the depreciation of the shekel in October 1998, and the depreciation at the end of December 2001 and in January 2002.[15] The identification of one currency crisis alone in a period of ten years, less than two months after the outbreak of the currency crisis in Russia, supports the hypothesis that the crisis in Russia was one of the factors for the emergence of the crisis in Israel.[16] This

Figure 6
NIS Exchange-Rate-Pressure Index, August 1993 to February 2002
(in Monthly Terms)



[13] Both Eichenrgreen *at al.* (1995) and Kaminsky and Reinhart (1999) use the index in identifying currency crises for a large number of countries in a given period. Kaminsky and Reinhart do not take into account changes in the central bank's interest rate due to data limitations.

[14] See the appendix for details on how the index is calculated.

[15] During the two months preceding the depreciation of October 1998, the Bank of Israel cut the interest rate by 1.5 percentage points. From the beginning of August to the beginning of October 1998, the shekel depreciated by 5.3 percentage points. The Bank of Israel reacted to the depreciation in October with two exceptional interest rate hikes amounting to a cumulative increase of 4 percentage points.

[16] According to the index, the crisis pressure before October 1998 occurred in October 1991, before the move to the exchange-rate band.

assertion is supported by the study of Eichengreen, Rose and Wyplosz (1996), which examines currency crises between the years 1959 and 1993 in 20 industrialized countries. According to the authors, a currency crisis in one country increases the probability of a crisis in another country by 8 percent. Kaminsky and Reinhart (2000) also claim that it is possible to conclude that the currency crisis in Russia in 1998 had the effect of increasing the probability of a crisis in Israel. According to those authors, contagion effects are usually regional, with the result that crises in Europe (such as that in Russia) increase the chances of a currency crisis in Israel.[17]

Currency mismatch

The policy of monetary restraint that the Bank of Israel practiced from the beginning of 1995 concurrent with the liberalization process paved the way for major changes in the public's asset and liability portfolio. Although investors' economic considerations undoubtedly prompted these changes, the changes themselves can be credited to the liberalization process. Accordingly, when we present below the problems that could result from the change in the credit portfolio, we do not claim that the liberalization created these problems but note that its existence facilitated these changes, and presents challenges to those managing monetary policy.

An important component of capital imports to Israel during the years 1995-1997 was a key factor behind the change in the public's asset and liability portfolio. This component was the foreign currency credit that Israeli residents took from local banks and converted to shekels. Three factors together acted to create a differential between shekel and foreign currency interest rates and a low level of exchange-rate risk, thereby encouraging the private sector to take foreign currency credit as a substitute for shekel credit:

a) The liberalization process—One of the first components of the liberalization process was a change in the foreign exchange controls, with respect to foreign currency credit in the banking system. The change led to a decrease in the interest rate on this credit and on foreign currency indexed credit. As a result, from the beginning of the 1990s the interest rate on foreign currency credit from local banks behaved in a manner similar to the interest rate on the relevant currency abroad.

b) The policy of monetary restraint that the Bank of Israel practiced from the beginning of 1995—The objective of this policy was to sterilize inflation, which had exceeded its targeted level in 1994, and the policy was reflected by a high shekel interest rate.

c) Low exchange-rate risk—Foreign residents' direct investments in the economy, which exerted pressure towards an appreciation of the shekel, and the relatively narrow exchange-rate band greatly reduced the probability of significant depreciation of the shekel that would have made it less worthwhile to take credit in foreign currency.

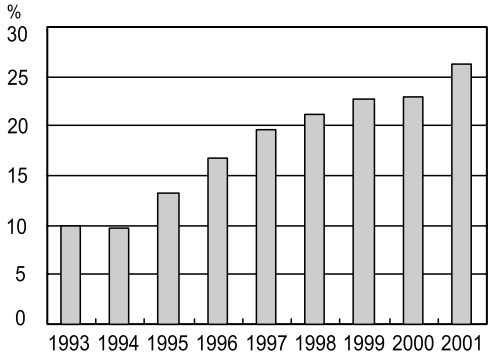
The use of foreign currency credit as leverage for the creation of shekel income-earning assets results in a currency mismatch between a firm's assets and liabilities. Apprehension of a depreciation in such a case could lead to liquidation of the investment (which serves as collateral for the lender) before it has yielded a return, and harm the capital market—in accordance with the model that was presented in the first section. One way to examine whether a currency mismatch between assets and liabilities has actually occurred in the economy is to

[17] Russia together with other East European countries is not included in their sample due to lack of data. Israel, according to the study, is part of Europe.

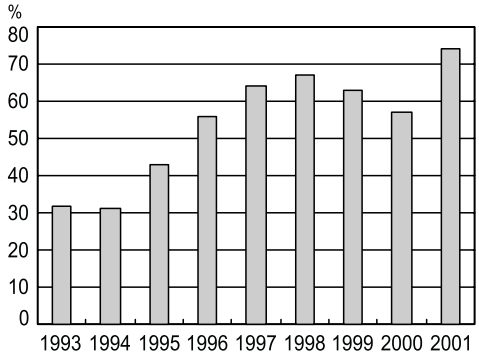
examine the proportion of foreign currency credit to total credit and the proportion of foreign currency as a percentage of GDP. Figure 1 shows a large increase in the proportion of foreign currency credit to total unrestricted credit during the years 1995 to 1997, from an average of 17 percent in 1994 to over 30 percent at the end of the 1990s. During those years, the proportion of unrestricted foreign currency denominated and indexed credit rose to nearly 15 percent of GDP, and its proportion in exports increased by over 30 percentage points (Figure 7). These figures provide a very striking indication of the phenomenon whereby foreign currency credit may have been used to finance local currency income-earning investments.

Figure 7

Unrestricted Foreign-Currency and Foreign-Currency-Indexed Credit as a Percentage of GDP, 1993–2001



Unrestricted Foreign-Currency and Foreign-Currency-Indexed Credit as a Percentage of Exports,[a] 1993–2001

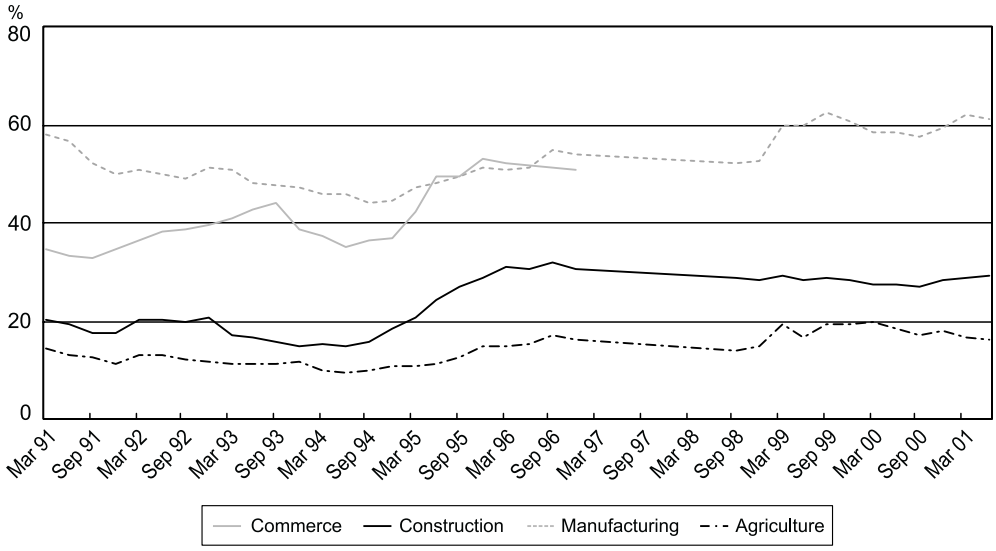


[a] Exports excluding capital-production factor.

An examination of the proportion of foreign currency credit to total credit by principal industries shows that most industries operated under similar lines—a decrease in the proportion of foreign currency credit at the beginning of the 1990s and an increase in its proportion during the years 1995 to 1997 (Figure 8). This behavior derived *inter alia* from the changes in the differential between the shekel and the foreign currency interest rates: a decrease in the differential during 1992 and 1993 and a large increase at the end of 1994. However, the changes in the proportion of foreign currency credit differed between principal industries. The construction industry for example, increased its proportion of foreign currency credit to total credit from 15 percent in the first half of 1994 to over 30 percent in 1996, a level 10 percentage points higher than that at the beginning of the 1990s. It should be noted that the construction industry is a non-marketable industry, and its assets yield income in local currency. The manufacturing sector, over 45 percent of whose output is exported,[18] also reduced its proportion of foreign currency credit to total credit in the first half of the 1990s and increased it from 1995. But in contrast to the construction industry, the proportion of foreign currency credit at the end of the 1990s in this industry was similar to that at the beginning of the decade.

[18] Figure for 1997.

Figure 8
Proportion of Foreign-Currency Credit to Total Credit by Principal Industries



The question arises as to the level of protection against depreciation purchased by firms that took foreign currency credit to finance investment in shekel income-earning assets. The main hedging instruments used by firms taking foreign currency credit are options for the purchase of foreign currency. The exercise price of an option determines the extent of protection against depreciation that the option provides. When the exercise price of the option increases, the hedging factor only becomes meaningful after a larger depreciation, and the losses that a firm absorbs in the event of a depreciation will be larger. Unlike options, futures transactions for the purchase of foreign currency at a price known in advance when taking foreign currency credit provides full protection against depreciation. But the execution of a futures transaction of this type simultaneous with the uptake of foreign currency credit is paramount to taking credit in local currency: The profit derived from the lower interest rate on foreign currency is paid against the execution of the futures transactions. From this aspect it is reasonable to assume that hedging against foreign currency credit risk will usually be purchased by means of options rather than via futures transactions.

The data on options and futures transactions presented below are data on the balance of transactions between the banking system and the public and of the options traded in the stock market. We do not have data on the exercise prices of the options, which is important information for analyzing the extent of the protection that they provide. But it is likely that a firm purchasing an option for hedging against foreign currency risk (or that is required to do so by the party extending the credit) takes into account the potential loss in the event of a depreciation, and it can be assumed that the firm has hedged itself to an adequate extent. We are unable to make a separate examination of the extent of the protection that each firm purchased. At the aggregate level however, when we examine the development of tools that are used for hedging against exchange rate adjustments, it can be said that those tools were not used by those taking foreign currency credit, not at least until the end of 1997.

Figures 9 and 10 present the development of the balance of call options for the purchase of foreign currency in underlying asset terms (dollars) and the balance of purchases and sales of foreign currency in the public's futures transactions with the Israeli banking system (not in the stock market). It can be seen that during the period from the beginning of 1995 and until June 1997, the balance of call options for the purchase of foreign currency ranged between half a billion and a billion dollars. The balance of foreign currency purchases by means of futures transactions remained practically unchanged throughout 1995, rose by one and a half billion dollars in 1996, and fell back down to approximately a billion dollars in the first half of 1997. Trading in options on the dollar exchange rate on the Tel Aviv Stock Exchange, which began in 1994, was very sparse in its initial years. The balance of open positions in call options in 1997 ranged around half a billion dollars (in underlying asset terms).

During the same years (1995 to 1997), outstanding foreign currency credit increased by $12 billion. As a result, even when call options and futures transactions between the public and the banks and the options traded on the Tel Aviv Stock Exchange are taken into account, it is clear that hedging instruments were not purchased for most of the flow of foreign currency credit at the time.

It is difficult to determine the level of foreign currency credit that produces a currency mismatch between assets and liabilities. At a first glance, it would appear that the construction industry and the commerce sector exploited the liberalization process to increase their proportion of foreign currency credit without connection to the asset that they held. But in our opinion, it is not possible to ascertain this. It should be remembered that the liberalization of credit makes it possible for firms to take foreign currency credit when they had previously been unable to use this type of credit to finance their activity (or were restricted in its use). The shekel interest rate hike at the end of 1994 may have increased the number of firms taking foreign currency credit by raising the proportion of this credit in the different industries without seriously impairing the currency match between assets and liabilities.

4. SUMMARY

Alongside the advantages of globalization, we discuss and examine the intensity of the negative effects of globalization on capital movements to the Israeli economy. The theoretical part of the study is based on the literature that evolved around the subject as a result of the numerous currency crises that occurred in the second half of the 1990s, and present three channels via which a negative effect could be exerted on the economy: changes in foreign residents' capital movements deriving from shocks that are not directly related to the economy; the emergence of a currency mismatch between local investors' assets and liabilities; and a timing mismatch between the assets and liabilities of investors in the economy.

The empirical findings indicate that negative shocks in the world's emerging markets were indeed reflected in the Israeli economy as well, with the pass-through acting via capital movements. The high degree of volatility in movements of financial capital (in the securities portfolio) in the emerging markets in the last decade and the growth in foreign residents' financial investments in Israel enabled us to identify a correlation between investment in the emerging markets and Israel. Since total foreign investment in emerging markets was affected to a significant extent by local shocks in those markets, it is evident that the globalization of

Figure 9
The Public's Purchase and Sale of Call Options from the Banking System (not in the Stock Market) in Underlying Asset Terms, January 1994 to January 2002

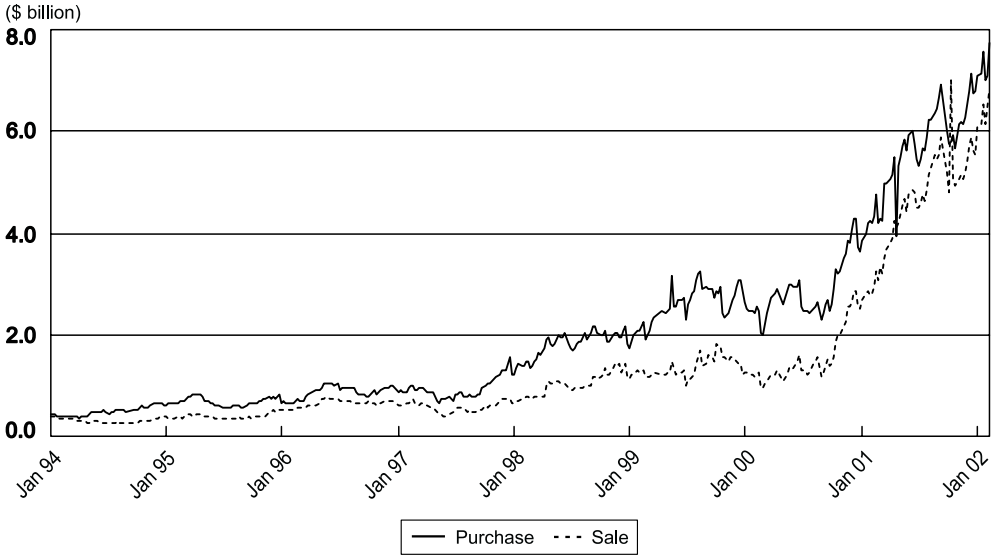
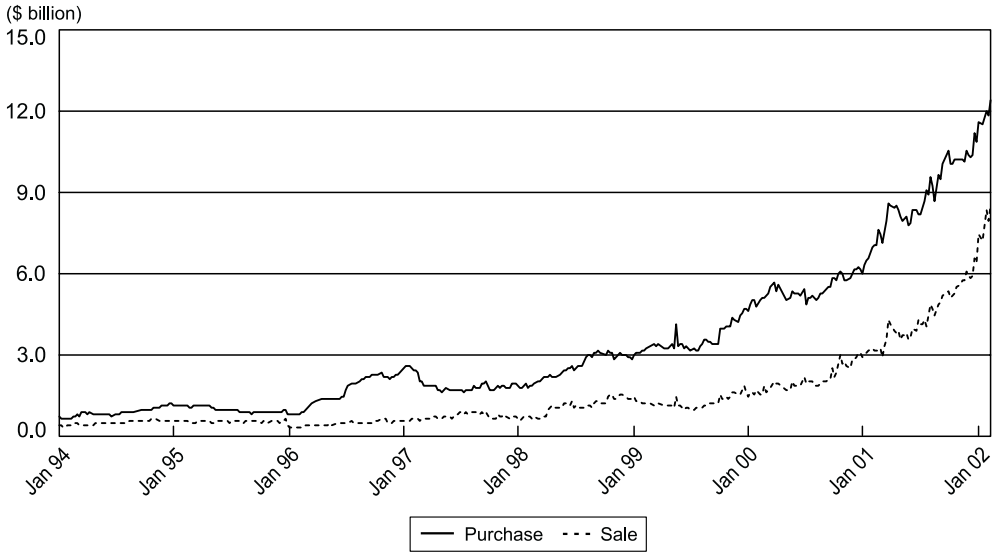


Figure 10
The Public's Purchase and Sale of Foreign Currency in Futures Transactions from the Banking System (not in the Stock Market) in Underlying Asset Terms, January 1994 to January 2002



capital movements strengthened the pass-through between the emerging markets themselves and between those markets and Israel.

This hypothesis (with respect to Israel) is supported by the fact that the crisis in Mexico at the end of 1994 was hardly felt at all in Israel, while the crises in the Far East and Russia affected capital imports to the economy, the Bank of Israel's interest rate decisions and the exchange rate. The differing impact of the crises would appear to result from the timing of Israel's integration into the globalization of capital movements following the crisis in Mexico and before the outbreak of the crises in the Far East and Russia.

Based on the fact that foreign currency credit replaced shekel credit, which is almost entirely short-term, it is possible to conclude that the liberalization process and globalization (which facilitated the growth in foreign currency credit) did not lead to a major change in the terms-to-maturity of credit to the private sector.

The discussion in this study reveals the existence of disadvantages as a direct result of the globalization of capital movements. The conclusion to be drawn from this is not that the globalization of capital movements is harmful to the economy, since globalization has numerous advantages, but that policy-makers need to be aware of the disadvantages inherent in the globalization process and to adopt measures that will minimize the negative effects of these disadvantages. We will detail a number of possible measures: (1) Encouraging private sector entities to protect themselves from the risks related to rapid changes in the exchange rate. In this respect, the retention of a fixed exchange rate could impair the exchange rate insurance market's ability to develop, because by appearing to offer a semblance of insurance on the part of the government, such an exchange rate regime reduces the motivation to purchase instruments for hedging against exchange rate adjustments; (2) Increased supervision and monitoring of banks that are directly or indirectly exposed to currency risk (via firms to which they have extended credit); (3) Increased transparency with respect to firms in which foreign capital has been invested. This transparency will help to weaken the relationship between crises worldwide and crises in Israel, since it will enable foreign investors to base their investment decisions in Israeli companies on economic developments in Israel, and less on the results of crises abroad; (4) Reference to the state of world markets at a time of crises abroad and in particular, caution in adopting an expansionary policy at a time of crises abroad; (5) Encouragement of long-term investment in the economy at the expense of short-term investments. Long-term investments are usually less sensitive to worldwide developments; (6) Encouragement of direct investments rather than portfolio investments, since the former are more difficult to liquidate at a time of crisis

APPENDIX

Index for examining calm in the foreign currency market

The index is the weighted average of the changes in the exchange rate, the changes in the Bank of Israel's interest rate and conversions of foreign currency at the Bank of Israel as a percentage of the reserves:

$$I = \frac{\Delta e}{e} + \frac{\sigma_e}{\sigma_i} \cdot \frac{\Delta i}{i} - \frac{\sigma_e}{\sigma_r} \cdot \frac{\Delta R}{R}$$

where s_e is the standard deviation of the changes in the exchange rate, s_i is the standard deviation of the changes in the Bank of Israel's interest rate and s_R is the standard deviation of foreign currency conversions as a percentage of the foreign exchange reserves. A deviation of the index by two standard deviations was recorded by Eichengreen, Rose and Wyplosz (1995) as a currency crisis. A deviation of the index by three standard deviations from the average was recorded by Kaminsky and Reinhart (1999) as a currency crisis.

The exchange rate that we selected for the construction of the index is the shekel-dollar exchange rate. The construction of the index by means of percentage points (as opposed to percentages), reference to changes in the differential between the Bank of Israel's interest rate and the interest rate of the central bank in the USA (as opposed to changes in the Bank of Israel's interest rate alone) or calculation of the index at a quarterly instead of monthly frequency did not have a qualitative effect on the results.

Appendix Table 1
Direct Investments in Emerging Markets, 1990 to 2000

	1990–1993		1994–1997		1998–2000	
Country	% of GDP	$ billion	% of GDP	$ billion	% of GDP	$ billion
Indonesia	1.2	1.6	2.1	4.3	–2.0	–2.6
Ecuador	1.9	0.2	3.1	0.6	4.8	0.7
Argentina	1.4	2.9	2.3	6.3	5.0	14.3
Bulgaria	0.3	0.0	1.9	0.2	6.4	0.8
Brazil	0.3	1.4	1.4	9.7	4.9	31.1
South Africa	0.0	0.0	1.1	1.6	0.8	1.0
India[a]	0.1	0.3	0.6	2.3	0.5	2.4
Hungary[a]	4.8	1.8	5.7	2.5	4.1	1.9
Venezuela	1.5	0.8	3.2	2.4	3.8	4.1
Turkey	0.5	0.7	0.4	0.8	0.4	0.9
Israel	0.7	0.4	1.3	1.2	2.9	3.0
Malaysia	7.5	4.1	5.1	4.7	4.1	3.3
Mexico	1.3	4.0	2.9	10.6	2.5	12.2
Morocco	1.3	0.3	1.7	0.6	1.3	0.5
Nigeria	2.4	0.9	1.5	1.5	1.2	1.0
China	2.5	11.6	5.2	38.5	4.0	40.3
Slovakia[b]	1.6	0.2	1.4	0.3	4.9	1.0
Poland	0.9	0.7	2.9	3.7	4.9	7.7
Philippines	1.3	0.6	1.9	1.5	2.3	1.6
Peru	0.7	0.2	4.8	2.5	3.1	1.7
Chile	2.3	0.9	5.9	3.8	8.3	5.8
Czech Republic[b]	1.9	0.7	3.0	1.5	9.0	4.9
Columbia	1.5	0.7	2.9	2.8	2.5	2.2
South Korea	0.3	0.8	0.4	1.9	2.0	8.0
Russia	–	–	0.7	2.5	1.2	2.9
Thailand	2.0	2.1	1.5	2.4	4.7	5.6

[a] Data from 1991.
[b] Data from 1993.

SOURCE: IMF Balance of Payments Statistics.

Appendix Table 2
Portfolio Investments in Emerging Markets, 1990 to 2000

	1990–1993		1994–1997		1998–2000	
Country	% of GDP	$ billion	% of GDP	$ billion	% of GDP	$ billion
Indonesia	0.3	0.4	1.3	2.6	–1.4	–1.9
Ecuador[a]	0.0	0.0	8.8	1.6	–3.5	–0.5
Argentina	5.8	11.5	3.5	9.6	0.5	1.5
Bulgaria[b]	–	–	–0.1	0.0	–0.6	–0.1
Brazil	1.9	7.9	3.4	24.1	1.6	10.4
South Africa	0.7	0.9	3.7	5.4	6.5	8.5
India	0.2	0.6	0.9	3.4	0.2	1.1
Hungary[a]	10.2	3.9	1.9	1.5	0.1	0.2
Venezuela	8.9	5.0	0.5	0.3	0.1	0.1
Turkey	1.4	2.3	0.9	1.5	0.1	0.2
Israel	0.8	0.5	3.4	3.1	3.2	3.4
Malaysia	–0.9	–0.5	–0.7	–0.7	–1.4	–1.1
Mexico	4.9	15.8	1.2	4.2	0.6	2.7
Morocco	0.0	0.0	0.3	0.1	0.0	0.0
Nigeria	1.1	0.4	–0.1	–0.1	–0.1	0.0
China	0.3	1.5	0.5	3.7	0.2	2.2
Slovakia[a]	3.7	0.5	0.7	0.1	3.8	0.8
Poland[c]	–	–	0.6	0.8	1.3	2.0
Philippines	0.6	0.3	3.0	2.3	2.5	1.8
Peru[a]	0.7	0.2	2.9	1.6	–0.2	–0.1
Chile	1.2	0.5	2.0	1.3	1.4	1.0
Czech Republic[a]	5.3	1.8	2.2	1.1	1.3	0.7
Columbia	0.4	0.2	1.7	1.6	1.2	1.1
South Korea	1.7	5.1	3.1	14.5	1.8	7.1
Russia[b]	–	–	1.5	5.4	–0.3	–0.7
Thailand	1.5	1.6	2.3	3.7	0.0	0.0

[a] Data from 1991.
[b] Data from 1993.
[c] Data from 1995.

SOURCE: IMF Balance of Payments Statistics.

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