

Measuring Institutional Investors' Exposure to Foreign Exchange and to Foreign Assets

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Abstract

Institutional investors are entities that manage the public's long-term savings. They are therefore important players in the financial system. The Bank of Israel Information and Statistics Department manages a database on institutional investors' assets. The data are important mainly for monitoring the stability of the financial system and for analyzing it, ensuring the proper operation of the financial markets, and contributing to the compilation of the National Financial Accounts. As part of the on-going monitoring, the Department calculates estimates of members' exposure to various risks in the portfolio managed for them by the institutional investors, particularly foreign exchange (exchange rate) risk and the risk inherent in exposure to foreign assets. Data on these exposures are published monthly on the Bank of Israel's website. This work focuses on measuring these two exposures, and includes a description of the database, definitions of the exposures, details of the data sources, and presentation of the main calculations, accompanied by a numerical illustration and an analysis of their significance.

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1. Background and objectives

Institutional investors are entities that manage the public's long-term savings—provident funds compensation funds, advanced training funds, old and new pension funds, and life insurance policies (excluding the nostro portfolio, which they manage for themselves). The public's savings are invested in tradable and nontradable securities and in other instruments, according to each entity's investment regulations. The selection of investments is driven by considerations of yield and risk, based on institutional investors' expectations of future developments and current tracking of the money and capital markets, and in accordance with their members' preferences. The fact that these are the public's long-term savings influences the level of liquidity and risk of the managed assets.

Since 2004, there has been a marked gradual and consistent increase in investments abroad as a share of total assets managed by the institutional investors, due to a historical process that combines economic conditions and regulatory changes that have enabled these investors to expand the volume of their investments abroad. Due to the enactment of compulsory pension arrangements for all workers (2008) and the transition from defined-benefit pensions to defined contribution pensions (2001), the growth of the portfolio managed by the institutional investors accelerated, which pushed them to seek alternatives to their investments in Israel, to diversify their investment portfolio, and to spread the risk. In parallel, the liberalization of the foreign exchange market and the reforms in the pension market gave the institutional investors broad freedom of action in managing their assets and bringing their investment rules into line with those common around the world. The reforms and changes in regulating the industry include the tax 2004 reform, the 2005 Bachar reform, and the consolidation of the investment of pension savings rules in 2012.

The institutional investors are important players in the financial system. For instance, they currently manage assets valued at about NIS 1.4 trillion, about 41 percent of the public's total financial asset portfolio¹. The institutional investors' activity has a significant effect on the stability of the financial system and on the financial markets (the capital market, the credit market and the foreign exchange market), as well as on the financial account in the Balance of Payments vis a vis abroad. Therefore, and in view of the Bank of Israel's roles in maintaining the stability of the financial system, in ensuring the proper functioning of the financial markets, and in contributing to the compilation of the national financial accounts—the need and importance of current monitoring of institutional investors' activity, particularly their share of capital movements to and from the economy and in the foreign exchange market, are clear.

For these needs, the Bank of Israel's Information and Statistics Department maintains a database of institutional investors' assets. The main source for the data is the Capital Market, Insurance and Savings Division at the Ministry of Finance, the supervisor over these entities. The Department processes the data into an overall consistent system that includes data on balance sheet and non-balance-sheet assets, and enables cross-sectioning of institutional investors' assets by various characteristics. These data serve in current monitoring, as part of the Bank of Israel's decision-making process, in building the financial account of the balance of payments, and for research purposes. These data are published on the Bank of Israel's website²

¹ The figure is correct as of December 31, 2016. An analysis of the current developments in the public's asset portfolio is available in Part 1 of this publication

² Link to data on institutional investors on the Bank of Israel website: <http://www.boi.org.il/en/DataAndStatistics/Pages/MainPage.aspx?Level=3&Sid=49&SubjectType=2>

, and are reported to international entities. As part of the current monitoring, the Department calculates estimates of members' exposure to various risks in the portfolio managed for them by the institutional investors, particularly foreign exchange (exchange rate) risk and the risk of exposure to foreign assets. Exposure figures are published monthly on the Bank of Israel's website³.

This article focuses on measuring two exposures in the portfolio managed by the institutional investors—exposure to foreign exchange risk and exposure to foreign assets. In it, the database and the exposure definitions will be described, the data sources will be specified, and the main calculations will be presented, accompanied by numerical illustrations of the data and analysis of their significance.

2. The database and definitions

2.1 Definition of institutional investors and the portfolio managed by them

The institutional investors, which manage the public's long-term savings, include the pension funds (old and new), provident funds and compensation funds, advanced training funds, and life insurance policies. This definition does not include mutual funds, the assets of which are managed by portfolio managers or directly by the public, and most of which are for short or medium terms.

Estimates of exposure to foreign exchange and to foreign assets, which will be described below, reflect the exposure of members, and not of the entities themselves, to various risks in the portfolio managed for them by the institutional investors, particularly to currency risks and to exposure risks to foreign assets. (For convenience, we will in any case use the term "institutional exposure".) Therefore, these estimates do not include the insurance companies' nostro portfolios, which they manage for themselves, or assured-yield insurance policies, where the risk is placed on the companies themselves and not on the members. These plans, where foreign exchange and foreign activity is relatively low, were closed at the end of the 1990s.

2.2 Types of exposure

Institutional exposure can be analyzed from two different aspects—exposure to foreign assets and exposure to foreign exchange.

- **Exposure to foreign assets:** The balance of exposure to foreign assets is defined as the given monetary amount at risk in a case of decline in the value of the assets issued by nonresidents (for the most part assets held abroad). The institutional investors view foreign assets as an additional investment channel and as a means of dispersing risk. However, investment in foreign assets and in foreign economies basically creates exposure to crises that may occur in those economies and to other changes that negatively affect the value of the securities.
- **Exposure to foreign exchange (to the exchange rate):** The balance of exposure to foreign exchange is defined as the given monetary amount at risk in the case of changes in the exchange rate of the shekel vis-à-vis foreign currencies. An Israeli resident is exposed to appreciation of the shekel when he holds surplus foreign exchange assets over liabilities, and is exposed to a depreciation of the shekel when he holds surplus foreign exchange liabilities over assets.

³ Link to data on institutional investors' exposure to foreign assets and to foreign exchange on the Bank of Israel website: <http://www.boi.org.il/en/DataAndStatistics/Pages/MainPage.aspx?Level=3&Sid=49&SubjectType=2>

Members' accumulated holdings in institutional entities, and withdrawals and payments to members, are in shekels. Accordingly, the institutional investors manage members' assets mostly in shekels. When they invest in foreign exchange assets, they are always in a state of surplus foreign exchange assets, and their structural exposure is therefore to appreciation of the shekel. In order to minimize future losses, anchor profits, and assist in reducing members'—and their own—uncertainty and in their stability, institutional investors can reduce their structural exposure to appreciation when the likelihood of appreciation increases. Such reduction of exposure is accomplished by hedging—the future sale of foreign exchange through derivative financial instruments. A hedging strategy—meaning setting the volume and rate of the structural exposure and a dynamic decision on the desired rate of protection through the future sale of foreign exchange—is influenced by expectations of changes in the trend of the exchange rate. The derivative instruments through which hedging can be done are futures contracts (Forward, FX Swap, Currency Swap) and options (tradable and nontradable). The use of derivative financial instruments involves a cost, which must be taken into account when choosing an asset distribution strategy.

Another, partial, segment of the institutional investors' portfolio is “investments abroad”, which are defined as the balance of assets invested outside of Israel.⁴ This definition also includes institutional investors' holdings of securities issued abroad by Israeli companies, but does not include their holdings of foreign assets in Israel⁵.

2.3 Sources of data

The data used in calculating the institutional investors' exposure to foreign assets and foreign exchange comes from their monthly reports to the Ministry of Finance and the Bank of Israel. The Capital Markets, Insurance and Savings Division at the Ministry of Finance, which is the supervisor over these entities, publishes reporting guidelines, and the Bank of Israel contributes to formulating those guidelines. As stated, the Information and Statistics Department at the Bank of Israel manages a designated system for the institutional investors, which contains all the data, processing, and information on these entities.

The data reported by all institutional investors include detailed balances of the portfolio they manage, by instrument and by place of investment. The provident and compensation funds, advanced training funds, and pension funds report on receipts and payments made during the month in each type of asset, which is not the case for the insurance companies.

The data are reported in shekels. For the purpose of calculating exposures, the balances are translated into US dollars at the exchange rate at the end of the reporting month, and transactions (flow) are translated by the monthly average of the shekel/dollar exchange rate.

⁴ According to the Supervision of Financial Services (Provident Funds) (Investment Rules Applying to Institutional Investors) Regulations, 5772–2012, investment outside of Israel is permitted for assets invested in an approved foreign country (a country rated with an investment rating or a country that is a member of the OECD), subject to investment distribution restrictions that apply to any investment in assets in Israel or abroad. This means that there is no quantitative restriction on investment in assets outside of Israel or on exposure to foreign exchange and foreign assets, and these are subject to the institutional entities' discretion.

⁵ In addition to the direct exposure to foreign assets outlined in this article, there is an indirect exposure derived from institutional investments in Israeli public companies that are exposed to developments abroad, particularly to a decline in the value of foreign shares, as a result of their activities in various countries. For more information, see S. Afek and N. Steinberg, “The Foreign Exposure of Public Companies Traded on the Tel Aviv Stock Exchange”, Bank of Israel Research Department, Discussion Paper 2016.10. <http://www.boi.org.il/en/Research/Pages/dp201610h.aspx>

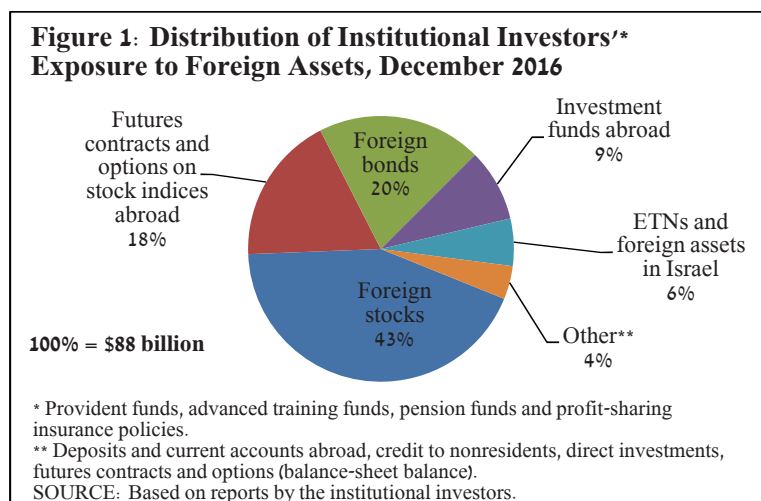
3. Main calculations

The following are details of the calculations made by the Information and Statistics department in order to produce the estimates of the balance of institutional exposure to foreign assets and foreign exchange, and the estimates of net transactions in assets exposed to foreign exchange.

3.1 Balance of exposure to foreign assets

The balance of institutional investors' exposure to foreign assets is calculated as the sum of two balances—the balance of holdings of balance-sheet foreign assets and the balance of holdings of non-balance-sheet foreign assets:

1. The balance of holdings in balance-sheet foreign assets mainly includes investment in foreign stocks and bonds traded abroad, but also investment in foreign assets issued in Israel, most of which are ETNs traded in Israel that track indices abroad.
2. The balance of holdings in non-balance-sheet assets includes holdings of derivative instruments—options and futures contracts on the stock indices of stock exchanges abroad. In practice, the open balance of these derivatives is positive, meaning that the institutional investors hold the position of futures buyers regarding foreign assets. This means that the holdings of these assets are an additional channel of investment that helps diversify their investment portfolio. The entities' reporting on this balance is on the basis of the following calculation:
 - Through futures contracts—The shekel balance of exposure in a futures contract on a stock index expressed in the currency of the stock market represented by that index is derived from the “stock equivalent” in the contract⁶.
 - Through options—The balance is calculated according to the Black&Scholes model in delta terms⁷.

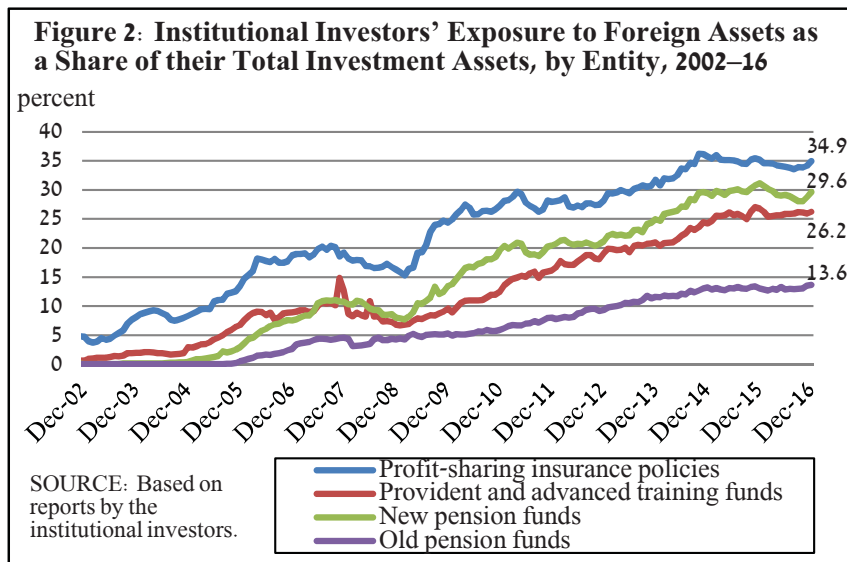


⁶ The weighted average of the shekel amount denoted in the contract is calculated as the current value of the spot rate capitalized by the dividend yield of the index and multiplied by the nominal value of the contract: $AmSe-dFt$, where Am is the nominal value of the contract; S is the spot rate of the index; d is the annual dividend yield of the index; and t is the time remaining until the contract expires, in annual terms.

⁷ How much is the option price affected by a change of one percent in the base asset.

The rate of institutional investors' exposure to foreign assets in December 2016 was about 25 percent, and the balance of exposure to foreign assets totaled about \$88 billion. Figure 1 shows that most of the holdings of foreign assets are through stocks, futures contracts, and options on stock indices abroad (61 percent), and bonds (20 percent).

Figure 2 shows a multi-year trend of increasing exposure to foreign assets for all entities. There is marked variance in the rates of exposure. The highest rate (34.9 percent as of December 2016) is among the insurance companies, due to the lack of taxation restrictions on investments abroad, which applies only to insurance companies with profit-sharing policies. The old pension funds have the lowest exposure rate to foreign assets (13.6 percent as of December 2016), because these fund were closed to new members in the 1990s. It is therefore likely that most of the money they manage is for members nearing retirement age, and the portfolio managed for them in these funds therefore has a low risk profile. About 58 percent of total assets of the old pension funds is invested in nontradable government bonds, including earmarked bonds and other government assistance.



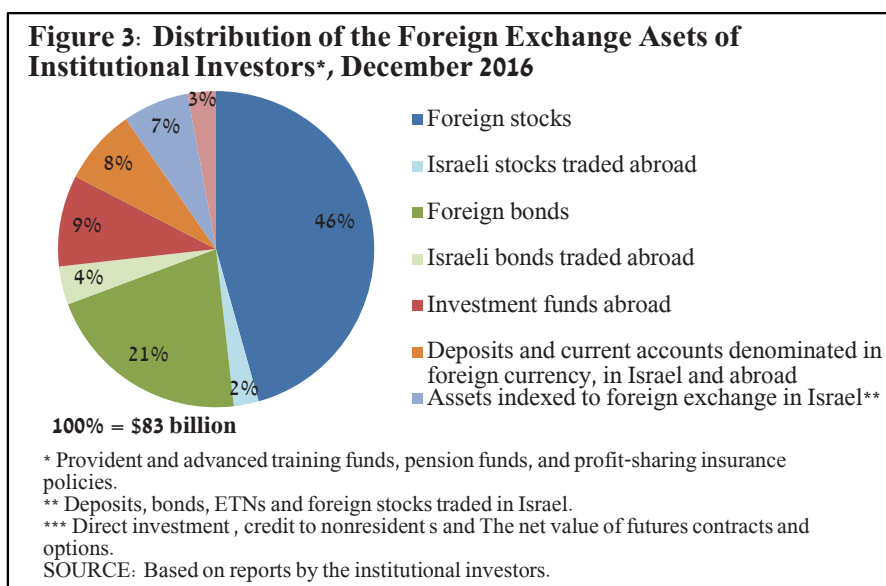
3.2 Balance of exposure to foreign exchange

The balance of institutional investors' exposure to foreign exchange (to changes in the exchange rate of the shekel) is calculated as the sum of two balances: 1. The balance of holdings of balance-sheet assets denominated in foreign currency and of balance-sheet assets indexed to foreign currency (hereinafter "foreign exchange assets"); and 2. The balance of holdings in non-balance-sheet assets.

1. The balance of holdings of foreign exchange assets mainly includes investment—both directly and through investment funds—in stocks and in government and corporate bonds traded abroad, but

also investment in Israeli securities traded abroad, assuming that they create an exposure to foreign exchange due to the place they are traded. The balance also includes foreign currency deposits in Israel and abroad, and investment in securities traded in Israel that are denominated in foreign currency and indexed to foreign exchange.

The balance of institutional investors' foreign exchange assets was about \$83 billion in December 2016, and most of their holdings of foreign exchange assets were in foreign stocks (46 percent) and foreign bonds (21 percent).

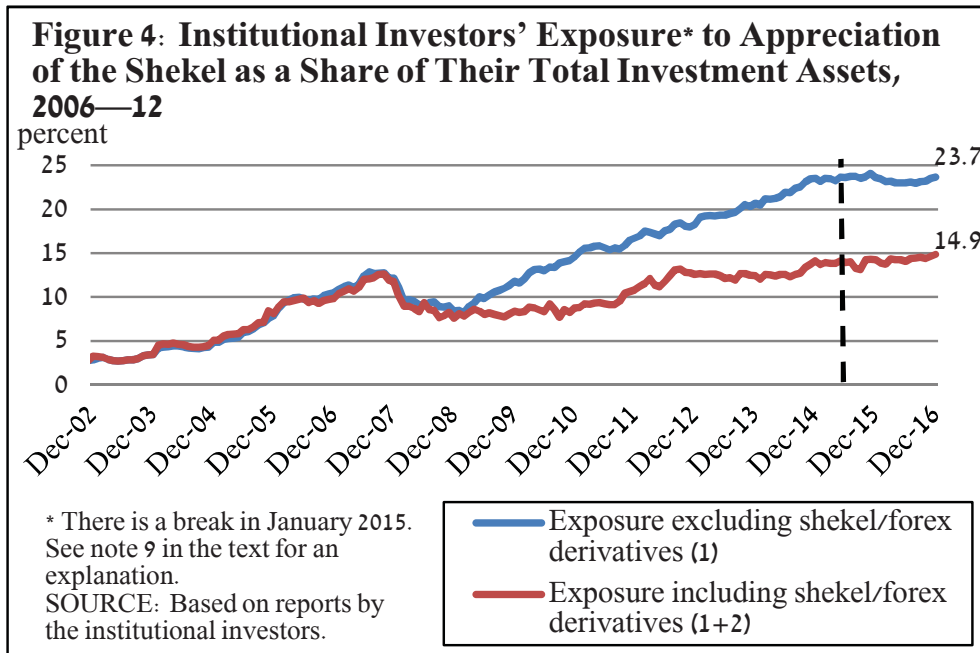


2. The balance of holdings in non-balance-sheet assets is the balance of assets or liabilities in shekel/forex derivative financial instruments—options and futures contracts—in other words, the balance of open transactions in these assets for the sale of foreign exchange against shekels, which reflects hedging activity. The institutional entities' reports on this balance are based on the following calculation:

- Through futures contracts—The balance of shekel exposure in a foreign exchange futures contract (in shekel terms) is derived from the “shekel equivalent” in the transaction⁸.
- Through options—The balance is calculated according to the Black & Scholes model adjusted to foreign exchange in delta terms.

⁸ See Note 6 above for the calculation. In place of “dividend yield of the index” in that note, insert “interest rate on foreign exchange”.

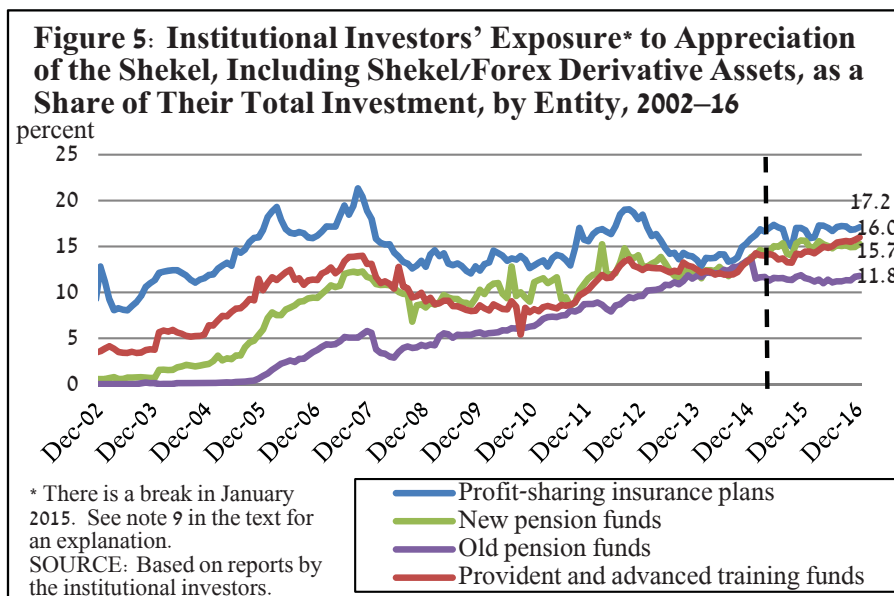
Figures 4 and 5 present institutional investors' exposure to appreciation of the shekel between 2002 and 2016⁹. Figure 4 shows exposure excluding shekel/forex derivative activity, described above as Balance 1, compared with total exposure, which is calculated as the sum of Balances 1 and 2. Figure 5 shows both Balances by institutional investor.



Between 2004 and 2008, institutional investors did not hedge their investments, meaning that each investment in foreign exchange was also an exposure to foreign exchange. Since 2008, when the global financial crisis and the prolonged trend of appreciation of the shekel began, institutional investors began using derivative financial instruments to hedge their exposure to appreciation of the shekel, thereby reducing their exposure to foreign exchange. In December 2016, the rate of exposure to appreciation of the shekel was about 23.7 percent without derivatives, while the rate including derivatives was about 14.9 percent, which reflects hedging of about 9 percentage points.

Figure 5 shows that since 2002, there was a high level of variance in institutional investors' exposure to foreign exchange. In 2008, the various entities began a trend of convergence in their rates of exposure to foreign exchange, which accelerated in mid-2012, as opposed to the rates of exposure to foreign assets shown in Figure 2. Together with this trend, the various institutional investors have different exposure rates to an appreciation of the shekel: Profit-sharing insurance policies have the highest rate of exposure to foreign exchange—about 17 percent at the end of May 2016—while the old pension funds have the lowest rate, at 11.4 percent.

⁹ Since January 2015, some of the reporting entities have adopted a different calculation for the shekel/forex futures/derivatives item. This change does not enable a comparison or calculation of the changes between the balance at the end of January 2015 and the balance for previous periods (Figures 4 and 5).



3.3 Estimate of net transactions in assets exposed to foreign exchange

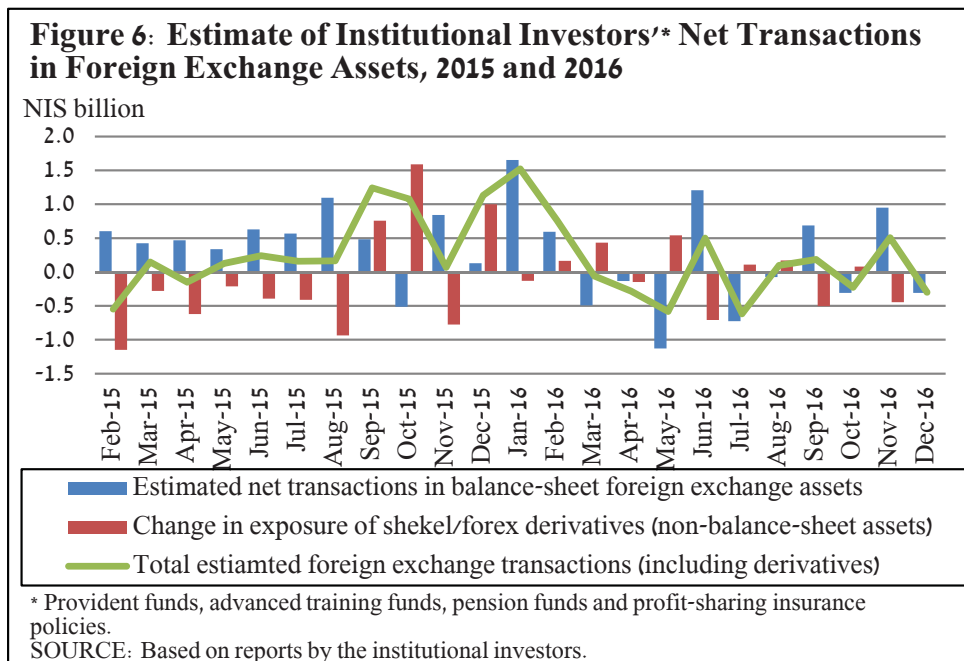
The estimate of net transactions in assets exposed to foreign exchange reflects the institutional investors' economic activity in foreign exchange, which includes two components—net investments and realizations in foreign exchange assets, and net closed and paid transactions in shekel/forex derivative instruments. The estimate of the first component is not the same as the difference between the balance of foreign exchange assets at the end of the period and its balance at the beginning of the period, since there are additional components that explain the difference between the two balances—the price effect and other effects, such as new investment or interest payments. The estimate of net transactions in the second component is identical to the difference in balances in those instruments. The estimate is calculated differently regarding different institutional investors due to availability constraints, which will be detailed below.

3.3.1 The provident funds, pension funds and advanced training funds: In the data sources, these entities report directly on their payments for asset purchases and on their receipts from asset sales. Therefore, the capital movements of these entities are calculated as net transactions (payments minus receipts) made during the reported period. These payments-receipts are each entry of money to the funds or exit from the funds. Therefore, they also include other transactions. For non-balance-sheet assets (such as derivatives) and cash and current account items, the transaction is calculated as the difference in balances.

3.3.2 Insurance: In the data sources, there is no direct reporting on the insurance companies' payments for assets or their receipts from assets. Therefore, the estimate of net transactions in foreign exchange assets is calculated as follows: The difference between the insurance companies' balance of exposure to foreign exchange at the end of the period and the balance at the beginning of the period, minus the estimate of the price effect and other effects. In calculating this estimate, the assumption is that the rate of the price effect on the various assets they hold is similar to the price effect on parallel assets held by the reporting entities. Therefore, estimates of the price effect and other effects during the period are calculated separately,

according to the type of assets held by the reporting entities. These estimates are made on the insurance companies balances, in the following items: foreign and Israeli stocks traded abroad; foreign and Israeli bonds traded abroad; investment funds abroad; bonds indexed to foreign exchange in Israel; foreign ETNs tracking indices abroad that are traded in Israel; and foreign stocks issued in Israel. The net transactions of the other items¹⁰ that comprise the insurance companies' exposure to foreign exchange are calculated as the difference in balances.

Figure 6 shows that, as expected, in most months, the institutional investors invest in balance-sheet foreign exchange assets, while there is a lot of volatility in both directions in derivatives transactions, according to changes in the exchange rate of the shekel. When the shekel appreciates, the institutional investors increase futures transactions in the sale of foreign exchange, thereby hedging most of the marginal movement in foreign exchange assets.



¹⁰Deposits and current accounts denominated in foreign currency and indexed to foreign exchange in Israel and abroad, loans issued to nonresidents, direct investments, shekel assets issued by foreign entities and shekel/forex futures contracts and options.

4. International comparison

Methodology and limitations

The ability to make an international comparison of institutional investor data is more limited and more complex than with other data, because in regard to institutional investor data the differences between countries reflect material differences concerning pension arrangements, taxation, long-term savings and types of institutional investors. In making an international comparison of the data on exposure to foreign exchange and foreign assets, there is an additional practical difficulty: For the most part, data on institutional investors' exposure are not available to the public, and some do not even exist in current form. Yet, there are countries that publish the financial balance sheets of the various institutional investors against countersectors, from which it is possible to estimate the volume of the institutional investors' assets vis-à-vis nonresidents. Basically, many countries view data on the balances of institutional investors' (balance-sheet) assets and liabilities vis-à-vis nonresidents (IIP) as an estimate of their exposure to foreign assets. Additionally, there are countries that calculate exposures to foreign exchange in a non-current manner through surveys that are carried out infrequently. Other than that, exposures that are calculated in those countries rely on all sectors of the economy, and institutional investors are classified as part of "Other Financial Corporations"¹¹.

In comparing Israel's data to those of other countries, we must take into account that in some countries, such as eurozone countries, there is a significant difference between institutional investors' exposure to foreign exchange and their exposure to foreign assets. This is because their investments are concentrated in other eurozone countries, and in such a situation, there is almost no exposure to currency risk, while they are exposed to foreign assets. Therefore, Israel cannot be compared to such countries.

Similar to the custom in other OECD member countries, the Bank of Israel's Information and Statistics Department reports¹² to the OECD every quarter on institutional investors' investments by type of asset. This report also includes information on mutual fund and insurance company nostro assets. In addition, the Ministry of Finance send the OECD reports on pension funds only, which present the development of their assets by various segmentations.

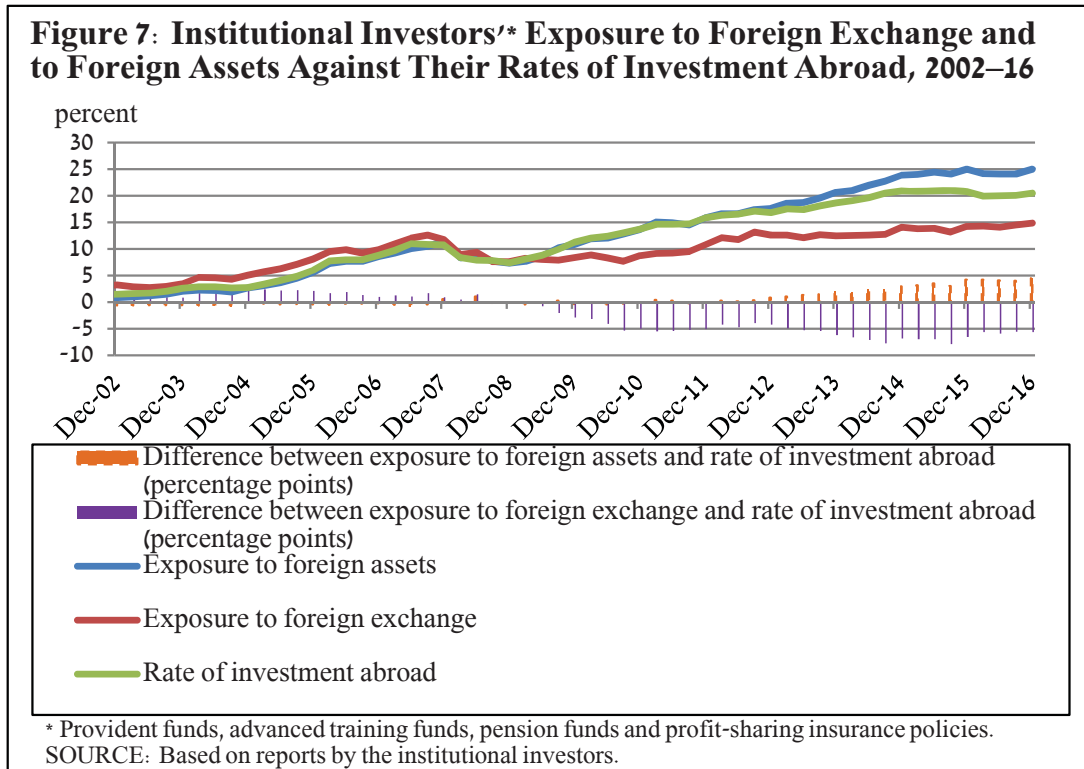
The OECD database contains data only on institutional investors' investments abroad, representing their holdings of balance-sheet assets by their place of trading.

In Israel, as described above, investments abroad are defined differently than exposure to foreign exchange or than exposure to foreign investments. As Figure 7 shows, the differences in definition lead to differences between the actual data. It turns out that between 2002 and 2009, there was a positive gap between the exposure rates to foreign exchange and the rates of investment abroad. Beginning in 2009, this gap has been negative, influenced by the use of derivative financial instruments for hedging and to maintain the target for investment in foreign exchange. This gap was about 6 percentage points in December 2016. In contrast, the gap between the rate of exposure to foreign assets and the rate of investment abroad opened only in 2011, and has remained positive throughout the period, due to the development of additional

¹¹ The reference is to non-bank financial institutions, including pension funds, insurance companies and investment managers, among others.

¹² The Institutional Investors' Assets and Liabilities Questionnaire (Table 7II).

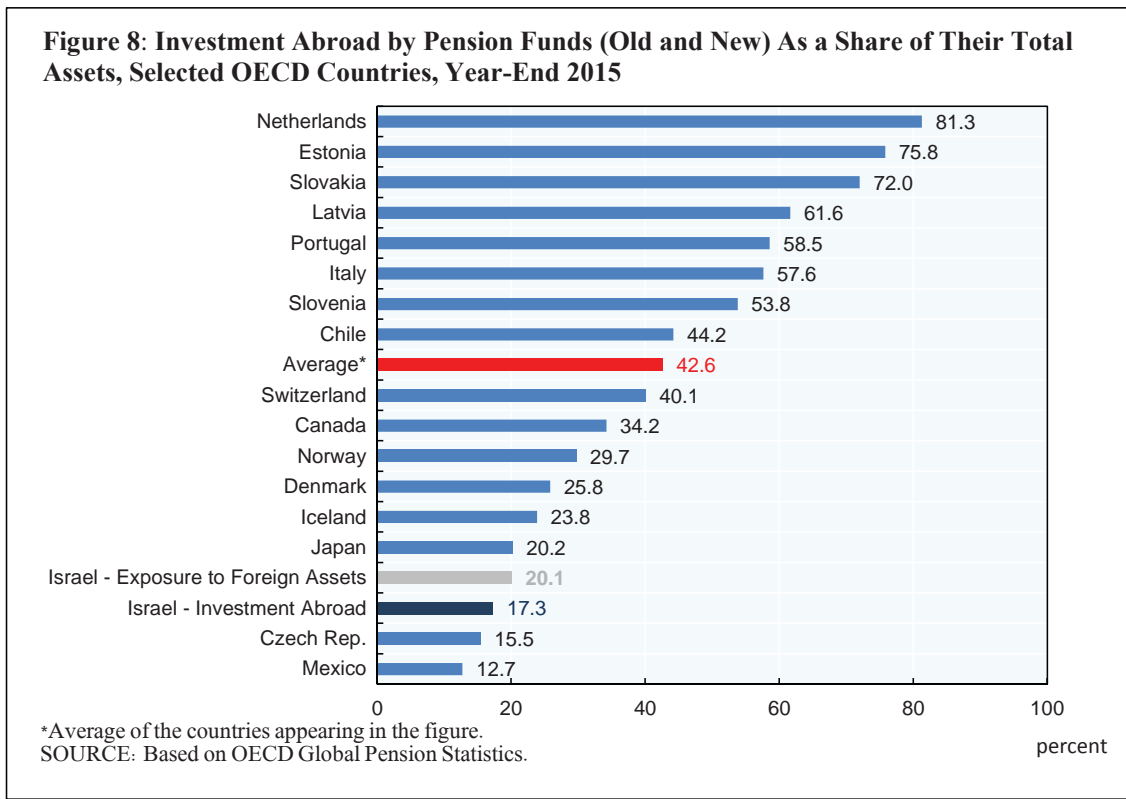
channels of investment—derivatives and ETNs traded in Israel that mimic indices abroad. This gap was about 5 percentage points in December 2016.



Partial data

Due to these limitations, which prevent a proper international comparison of exposure data, we made due with a comparison of the rate of investment abroad at a single point in time in various countries, and this regarding pension funds only. For clarification, we added data on the exposure of the old and new pension funds in Israel to foreign assets. The data source for this comparison is the annual OECD survey¹³, which focuses on the pension fund market. As shown in Figure 8, the rate of Israeli pension funds' investment abroad is lower than the average among the surveyed countries.

¹³ OECD global pension statistics.



We do not have a publication that methodically compares data on the exposure of various countries to foreign exchange and foreign assets similar to the data we have calculated. However, we found one country that does analyze the exposure of its economy to foreign exchange and foreign exchange hedging—Australia. In 2013, the Reserve Bank of Australia published a report¹⁴ based on data from the Australian Bureau of Statistics, which conducts a survey once every four years. The survey focuses on the Australian economy's exposure to foreign exchange by various sectors, including the other financial sector, which includes the institutional investors. This report shows that the Australian other financial sector's rate of exposure to foreign exchange was about 35 percent in December 2013. The rate of exposure of the institutional investors in Israel was much lower—about 12.5 percent in December 2013. (In December 2016 it was about 14.9 percent.)

¹⁴ Foreign Currency Exposure and Hedging in Australia, Bulletin – December Quarter 2013 – RBA. <http://www.rba.gov.au/publications/bulletin/2013/dec/6.html>