BANK OF ISRAEL

Financial Stability Report

Jerusalem, December 2018

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Financial Stability Report
for the Second Half of 2018

The Bank of Israel's Financial Stability Report is published twice a year. In this report, Bank of Israel economists assess exposures to the main risks to the financial system, analyze the main exposures, outline potential stress scenarios, and assess the probability of their occurrence. The assessments and analyses are based on a survey of the developments in the reviewed period, an examination of structural changes, use of analytical models, and an assessment of the background conditions in the global and domestic economies. The report outlines the effect of the realization of the stress scenarios in the short and medium terms, with the objective of increasing awareness among policymakers and the public, and suitably addressing focal points of risk and exposures in the economy.

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1. Introduction and highlights

The Financial Stability Report for the second half of 2018 evaluates the stability of the domestic financial system based on an analysis of the environment in which the system operates (the Monitor), which includes the macroeconomic environment, the asset markets, credit and the liquidity of the markets. This evaluation provides an indication of the various risks faced by the economy as a result of domestic and foreign shocks. Given the exposure of the economy to these risks, we will describe the focal points of the main vulnerabilities, as they reflect the threats to ongoing economic activity. On the basis of the data, the models, and the analysis, we formulate a subjective evaluation of the probability of realization of stress scenarios that could lead to a systemic crisis.

Table 1 summarizes the risks in the environment in which the financial system operates (the Monitor) using a heat map. This type of map presents the intensity of the risks during the reviewed period and relative to previous periods.

Following are the main developments during reviewed period:

- The country's credit risk has declined in accordance with the continuing growth in economic activity and the continued downward trend in the government debt to GDP ratio. However the existence of a structural deficit limits the possibility of managing an anticyclical fiscal policy and could adversely affect the main factors behind the decline in credit risk.
- The developments in the global environment indicate an increase of risk in the global economy, including Israel's. The main risks are the weakness in the global debt market, and the trade war between the US and China, as well as the monetary tightening (primarily in the US) which is liable to exacerbate these risks.
- The price of housing in Israel declined somewhat and this strengthens the assessment that the upward trend has been halted. The rate of housing starts reacted quickly to this development and as a result declined during the reviewed period. It appears not to be higher than the rate of increase dictated by demographic growth.
- Corporate bond spreads remain relatively narrow and home prices are still at historical highs.
- The growth rate of credit in the economy rose during the reviewed period, led primarily by the business sector, alongside the continuing upward trend in the growth rate of household credit. Credit risk is liable to grow in coming years since the supply of credit is likely to expand as a result of the numerous reforms introduced to encourage competition in the credit market and due to the change in the legal environment of credit suppliers in Israel.
- Stock exchange trading volume in Israel is low in international terms and the liquidity risks are apt to rise as a result of the increase in passive investments and the widespread activity of algorithmic trading in the stock exchange.

Table 2 summarizes the main exposures of the economy and the stress scenarios. With respect to domestic exposures, we find that during the reviewed period the risks were mainly focused on asset prices, both housing and financial asset prices, and in particular corporate bond prices. As monetary accommodation is being scaled back, and policy tightened, worldwide, and as it is expected that Europe and Israel will join this trend, the risk of a sharp decline in asset prices has increased, particularly among financial assets that are more sensitive to the interest rate environment. Some of this risk has been realized starting from October 2018, as US government bond yields rose, and there were sharp declines in share prices in most of the stock exchanges worldwide, accompanied by high volatility. As a result of the major increase in the exposure of the public to bonds by way of mutual funds in recent years—in accordance with the growth in passive investment and the effect of algorithmic trading on the stock exchange, developments that negatively impact liquidity when uncertainty increases—we point to an increase in the probability of a financial

crisis as a result of a shock to the prices of financial assets. With respect to Israel's housing market, developments have strengthened the view that during the reviewed period the probability of a sharp drop in housing prices has declined. Although the exposures of the financial system—both the banks and the financial institutions—continue to grow, the scope of housing starts relative to the needs of the population has not increased, based on the government plans for the period 2017–20, and the trend in home prices and rents no longer indicates explosive behavior.

Another domestic exposure that is continuing to grow is related to nonhousing credit. The changes in the legal environment in which credit providers operate and the fact that nonbank credit providers continue to increase their share of total household credit are liable to increase the credit risk of households in the event of deterioration in financial conditions, such as a scaling back of accommodative monetary policy.

With respect to foreign exposures, we find that the risk has increased during the reviewed period, primarily as a result of the many weaknesses that have emerged in the global debt market since the financial crisis. The risk originating from them could be realized due to monetary tightening, a process that has gathered momentum.

In this report we focus on four issues and describe them in four separate boxes:

Box 1: The effect of Israel's improved credit rating on its economy – This box presents preliminary findings that the capital markets in Israel responded positively at the time of the improved outlook for the country's credit rating and when its credit rating was actually raised. These findings are consistent with the global research literature. Due to the strong connection between the timing of an announced increase in credit rating and of positive economic developments—and in particular the strength of the shekel—the box shows that the improvement in Israel's credit rating has the potential to contribute to economic growth.

Box 2: Analysis of the financial stability of the public companies in the commercial real estate market – In this box, we focus on analyzing the risks inherent in the activity of commercial real estate companies in Israel. Global experience indicates that this market is more sensitive to the business cycle than the residential housing market. The activity in Israel is in line with activity in Europe; the financial profile of these companies has improved; and during the last decade the prices of commercial properties rose less than residential housing prices. However, the financial system is more exposed to this industry than to any other in the economy.

Box 3: The effect of algorithmic trading on the trading quality – In this box, we show that some of the strategies used in algorithmic trading (robotrading) adversely affect the quality of trading in the stock exchange. Accordingly, we recommend adopting regulatory measures similar to those adopted in many stock exchanges world wide, in order to reduce the risks of sharp and rapid fluctuations in asset prices, as they increase liquidity risk and ultimately reduce the depth of the market.

Box 4: The risks arising from the growth of passive investment – The scope of passive investment in Israel, as in the rest of the world, has increased dramatically in the last decide. This type of investment has many advantages for small investors, but there are also disadvantages that are becoming increasingly relevant as passive investment expands among such investors. These disadvantages are manifested in increased price volatility, in the vulnerability of the market and in liquidity risk. We recommend an examination of the overall effect of the growing scope of passive investment on the stock exchange and verification that the increase in the number of tradable asset price indices—which leads to the creation of additional tracking instruments—is not increasing liquidity risk in the stock market.

Table 1
The environment in which the financial system operates (the Monitor)—summary

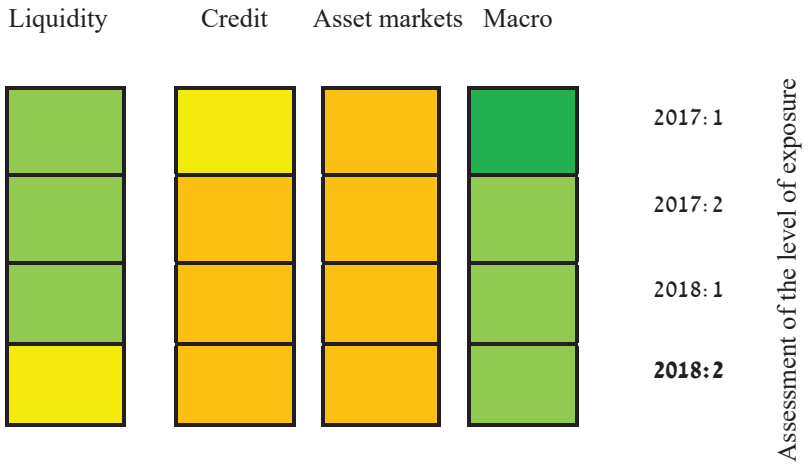


Table 2
The economy's main exposures, the stress scenarios, and the probability of their realization—summary

		The change during the reviewed period in the probability of realization	Main reasons for the change
Main focal points of vulnerability and stress scenarios	The housing market – a sharp and rapid decline in home prices.	Probability decreased	Home prices in the past 12 months continued to decline somewhat; the trend in housing prices does not seem to be explosive behavior; investments in the housing sector have declined, with a particularly large decline in housing starts.
	The financial asset markets – a sharp decline in bond prices	Probability increased	The pricing of corporate bonds remained at a high level and the public is holding its large share of bonds by means of mutual funds; liquidity risk in the economy has increased; following a long period of particularly low interest rates, accommodative monetary policy is being scaled back.
	Household debt – severe deterioration in financial conditions	No change	There has been a slight slowdown in the expansion of credit, particularly nonhousing credit, although the nonbank institutions have increased their share of credit activity.
	The global environment – the main risks will trickle down to the Israeli economy.	Probability increased	The combination of a huge amount of global debt and the scaling back of accommodative monetary policy.

2. The environment in which the financial system operates

In this section, we analyze the environment in which the financial system operates (the Monitor) based on four main sources of risk: the macroeconomic and the global environments; the developments in the asset markets (financial and housing); credit (business and household); and liquidity.

2.1 Macroeconomic activity

	2018:1	2018:2
The domestic environment: Real activity, monetary policy, fiscal policy, and country risk		
The global environment		

We estimate that the macro risk overall remained unchanged during the reviewed period as risks originating abroad rose somewhat while domestic risks declined.

2.1.1 The domestic environment

During the period being surveyed, the economy continued to grow by a relatively high rate in line with the potential growth rate, the economy is around full employment, and the inflation rate has converged to the target range. Growth was observed in all the uses except for investment in construction, although it is also seen in exports which have increased rapidly during the reviewed period. Growth during the reviewed period continued the trend during the last three years and can also be seen in the Companies Survey.[1] The survey is based on the reports of nonfinancial companies submitted to the Bank of Israel and shows growth at a rate similar to the potential rate.

The labor market continues to reflect a high level of activity and is characterized by a high level of demand for new workers and a limited supply. This can clearly be seen from the Companies Survey in which firms reported that in 2018 there was increasingly difficulty in recruiting workers. The full employment environment is also reflected in wages, whose rate of increase rose to 4 percent in 2018.

The inflation environment increased during the period being surveyed and reached the lower bound of the target range and even entered the range, following three years in which it remained below it and for most of the time was even negative. The 12-month inflation expectations based on the various sources forecast that inflation will continue to fluctuate near the lower bound of the target range while longer-term expectations are located in the middle of the target range. There are also expectations that the monetary rate of interest will continue to rise in 2019.

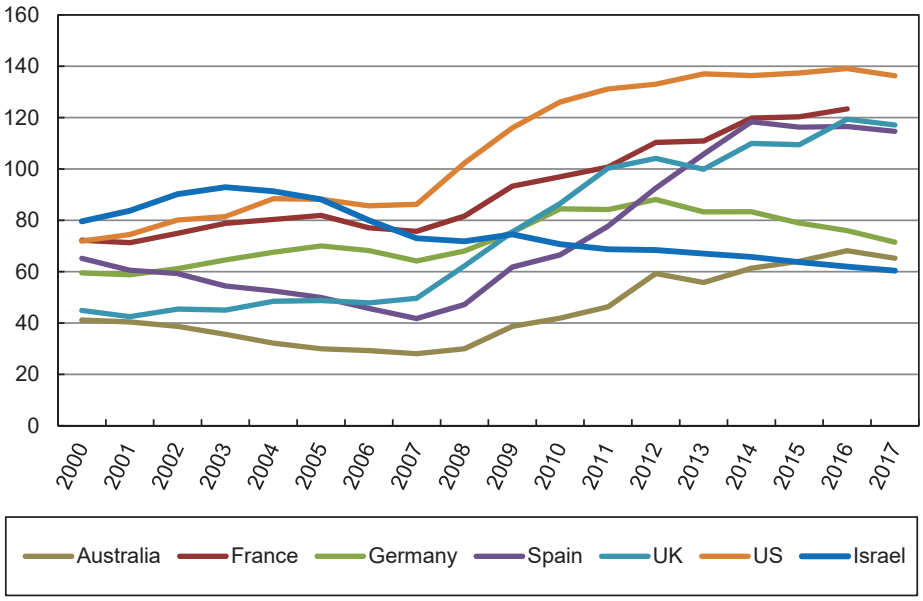
From the beginning of the year until the beginning of December, the shekel weakened by about 1 percent in nominal effective terms. However, until mid-September it in fact appreciated markedly due to the major weakening in the currencies of some of Israel's main trading partners and in particular the Turkish lira. We note that the nominal effective exchange rate of the shekel reached its highest value ever recorded, although from mid-September onward it weakened somewhat.

The economic boom that has prevailed in recent years, together with numerous one-off tax revenues, reduced the budget deficit and lowered the ratio of government debt to GDP in 2017 to about 60 percent, which is lower than many of the OECD countries (Figure 1). These developments supported the reduction of the interest rate on government debt and constituted an important factor in the raising of Israel's credit rating to AA- by S&P in August. Although the move was expected, it nonetheless served as additional proof of the improvement in the financial situation of the

[1] Similar findings were also obtained from the Business Tendency Survey carried out by the CBS.

The government debt to GDP ratio in Israel is lower than in leading OECD countries.

Figure 1
The Government Debt to GDP Ratio, Selected Countries, 2000–2017 (percent)



SOURCE: Based on OECD.

Israeli economy. Moody's also improved its assessment of Israel's debt risk and the outlook for Israel's credit rating turned positive in July. The improvement in the credit rating has positive effects on the Israeli economy and Box 1 describes them in detail.

Nonetheless, and even though the economy has continued to grow rapidly, the deficit grew in 2018, particularly during the reviewed period, and even exceeded 3 percent of GDP. The low interest rates on government debt and the restraint in defense expenditure have allowed fiscal policy makers to increase civilian expenditure in recent years, but this, together with the tax cuts in recent years, has expanded the structural deficit. This reduces the capability to manage an anti-cyclical fiscal policy and could adversely impact the main factors that are behind the improvement in the economy's credit rating.

2.1.2 The global environment

The IMF estimates that during the last six months the global rate of growth has slowed but only slightly and that the inflation environment has increased.[2] Its report states that the risks to the growth forecast currently tend to the downside, while in the previous report the risks were balanced.

According to the IMF economists' assessment, the main change in global growth is that it is no longer balanced. The US continues to grow at a robust pace, primarily due to the tax reform, while other important economies, including Europe and most of the emerging economies, have lost momentum.

There has also been decoupling from the perspective of financial conditions. Financial conditions and investor sentiment in the US remained calm until mid-September, while the rest of the world experienced significant deterioration—yields increased sharply, and currencies depreciated for many emerging economies. These phenomena were especially notable in emerging economies that suffer from structural weaknesses and are in need of external financing.

2 IMF, World Economic Outlook, October 2018.

During the last two months, after the IMF published its Global Financial Stability Report, there was significant deterioration in the US financial markets as well and economic momentum there slowed. That is, the decoupling between the US and the rest of the world weakened, as expected. As a result, the Fed moderated its tone in the forecast of interest rate increases.

This moderating trend, together with the moderation in energy prices, reduces the probability that the US will continue to rapidly raise the interest rate, and this is reflected in the sharp drop in the pricing of the expectations of interest rate hikes which is implied in the market. However, if the US nonetheless continues to raise the interest rate, it will exacerbate the financing difficulties being experienced by weaker American companies and the situation of weak companies and economies that hold foreign currency denominated debt. This could lead to a rapid change in the pricing of the risks inherent in financial assets and could moderate the global rate of growth.

Although the rate of growth in world trade has slowed somewhat in recent months, the volume of trade has dropped relatively little and in October it even grew slightly. This was because many importers in fact increased the scope of their orders so as to avoid the price increases expected in November after the US imposed tariffs of $200 billion on Chinese goods. Nonetheless, analysts lowered their forecasts of trade growth and they are increasingly warning of the potential damage to the global economy due to the trade war and protectionism. To illustrate, at the end of the G30 conference, the Governor of the People's Bank of China said that they are still calling for a constructive resolution to the tension between the countries, although at the same time they are preparing for a long and difficult trade war and it should be emphasized that such a development will create major risks to trade and growth. Similar warnings are being voiced by other governors and they focus primarily on the expected adverse impact to emerging economies. IMF Managing Director Christine Lagarde summed up the conference by stating that "all of us are sending out a clear message: the tension between the countries should be lowered".

As Israel's economy is small and open, it is particularly exposed to lower growth in world trade. Although trade with China and the US is not expected to be directly harmed by escalation in the trade war between the US and China, in the long run a trade war is expected to harm the global and domestic economies.

Global trade and growth are liable to be adversely affected also by the increase in oil prices. From the beginning of 2017 until October of this year, the price of oil almost doubled—to more than $80 for a barrel of Brent crude in October—which contributed to the increase in inflation and the reduction in global demand. The price has dropped sharply since October, but since both the ups and downs have primarily been the result of geopolitical events,[3] fears of negative impact on global growth have increased.

From the beginning of May until October 10th, the dollar strengthened against most major currencies worldwide.[4] Particularly notable was the weakness of the emerging economies, primarily those that suffer from major structural weaknesses. Some of them have reached a crisis situation, especially Argentina and Turkey. The Argentinian peso has weakened by 45 percent against the dollar and the Turkish lira has weakened by more than 30 percent against the dollar. However, the South African rand, the Chilean peso and the Indian rupee have also weakened significantly (by about 10 percent). The dollar has strengthened during this period by about 3.5 percent against a basket of currencies[5] and by more than 4 percent against the euro, against the background of weakening economic momentum in Europe, the lack of political certainty following the decision by the Italian government to significantly increase its government deficit and the difficulties encountered in the negotiations over Brexit. As stated by the IMF in the chapter on global risk, the weakening of the currencies of emerging economies, together with the rise in yields in the US, will make it difficult for companies and countries to service debt that is denominated in foreign currency—debt that has grown dramatically since the global financial crisis.

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3 The rise in prices was primarily the result of fears that sanctions would be reimposed on Iran and that the oil industry in Venezuela would collapse. The drop in prices was primarily the result of US agreement to moderate the boycott of Iranian oil and the fact that Saudi Arabia agreed to the US request to increase the supply of oil.

4 Only the Swiss franc and the Hong Kong dollar have strengthened against the US dollar and even they strengthened only marginally during the period.

5 DXY – a global index of the exchange rate of the dollar.

2.2 The asset markets in Israel

	2018:1	2018:2
Financial assets: equities and corporate bonds		
Housing		

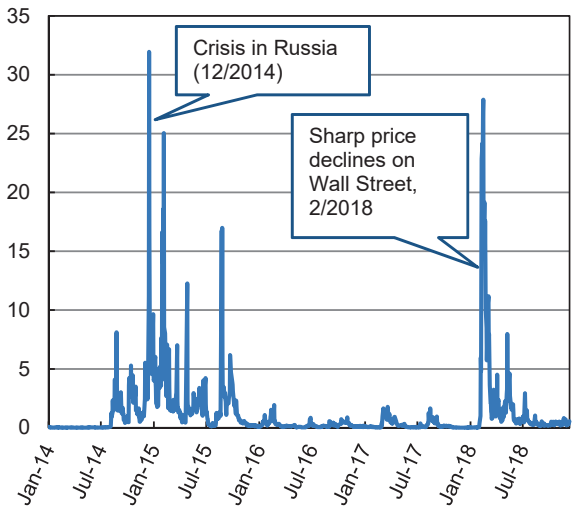
During the second half of 2018, US government bond yields rose, and in most countries equity prices fell sharply while risk indices rose; Israel was affected to a moderate extent. Real estate prices declined slightly, providing further evidence that the upward trend had been halted. However, corporate bond spreads were still relatively low and home prices remained high in historical terms. Based on the range of considerations, we assess that the risks in the asset markets remain at an intermediate level without significant change.

2.2.1 Financial assets

During the reviewed period, global financial markets, and in particular US markets, were characterized by price volatility and in October their risk indices increased sharply. However, the markets in Israel were less influenced by global developments and their risk indices increased to a lesser extent. Early in the period, share prices in global markets continued to rise, especially in the US. However, later on, with the raising of the US interest rate, the rate of increase in yields to maturity on government bonds rose and yields reached historically high levels. Thus, the yield on 10-year notes rose to more than 3.2 percent and the yields on two-year notes were near 3 percent. In this respect, and as a result of increased concern regarding the trade war led by the US, share prices fell in October with high volatility. Nonetheless, markets in Israel were impacted more moderately and asset prices did not decline significantly. This could be seen from the stress index that the Bank of Israel calculates on the basis of movements in the prices of numerous financial assets in Israel (see Figure 2).[6]

Even though there were volatile periods in the markets in the second half of 2018, the financial stress index remained low.

Figure 2
Financial Stress Index,
January 2014–December 2018



SOURCE: Bank of Israel calculations.

The equity market

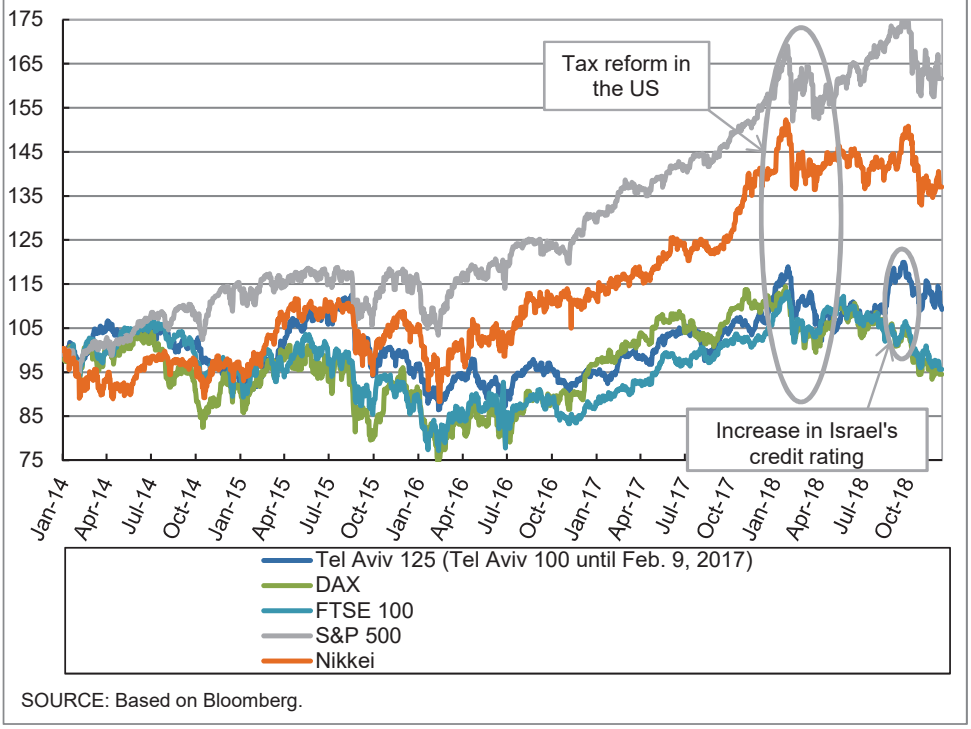
In the middle of 2017, equity prices in Israel fell, impacted by pharmaceutical stocks, and then were stable. However, following the increase in Israel's credit rating in August prices rose appreciably and even more than equity prices in US markets. This increase stands out even more in view of the continuing declines in Europe's equity markets (see Figure 3). The expansion of the gap between the US and the rest of the world reflects the main development that occurred during the reviewed period in global stock markets;

6 See Saadon, Y. and M. Graham (2013), "A Composite Index for Tracking Financial Markets in Israel," Discussion Paper 2013.01, Bank of Israel Research Department.

the gap can be seen not only in stock prices but also in interest rates and yields.
During October, negative sentiment strengthened, led by US markets, and markets worldwide suffered sharp declines

The Tel Aviv 125 index continued to underperform, but from August, when Israel's credit rating was raised, it reacted by outperforming.

Figure 3
International Comparison of Equity Indices, January 2014–December 2018
(dollars, January 2014=100)



SOURCE: Based on Bloomberg.

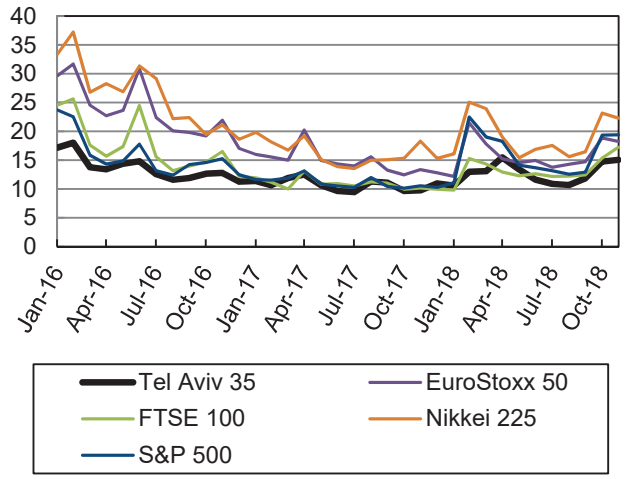
and increased volatility (see Section 2.1.2). For the fourth quarter overall, equity indices worldwide remained volatile and their levels remained about 15 percent lower than the record levels of the end of the third quarter.
Equity market volatility indicates the uncertainty among investors, and the implied volatility measures it.[7] As can be seen in Figure 4, the implied volatility in the Tel Aviv 35 Index was lower than that of share indices in various countries. It can clearly be seen that at the beginning of 2018 as well as in October 2018 these estimators rose worldwide while in Israel they rose only somewhat.
The P/E ratio[8] of companies included in the Tel Aviv 125 index exhibited high volatility at the beginning of the year, as a result of losses reported by Teva and the reorganization it underwent as a result. The P/E ratio of public companies included in the Tel Aviv 90 Index remained stable at a relatively low level also during the reviewed period. This ratio did not increase in August either, even though there were solid increases in stock prices that month, because profits rose by a similar rate (the companies reported on the second quarter during this period) (see Figure 5).
The volume of share issues in Israel remained low during the reviewed period because the cost of credit to the

7 Implied volatility is calculated on the basis of the prices of options on equity indices and it constitutes an estimator for the short-term volatility that investors anticipate in the index.

8 The Price to Earnings Ratio.

The implied volatility of the Tel Aviv 125 remained low compared with the implied volatility of the leading equity indices.

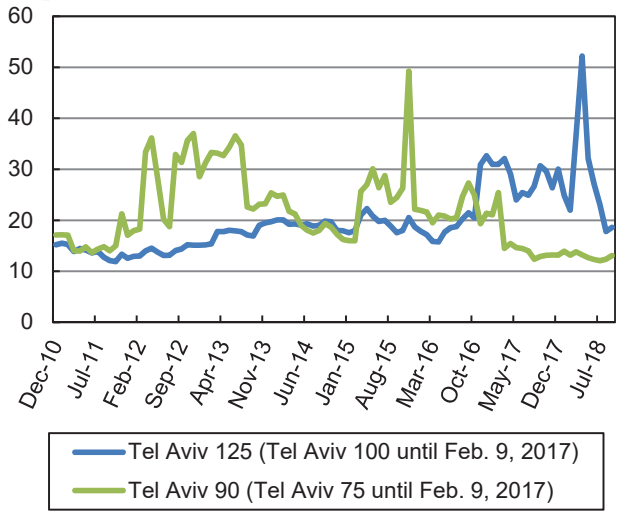
Figure 4
The Implied Volatility Derived from Options on the Equity Indices of Various Countries[a] (VIX), January 2016–December 2018 (monthly average)



[a] The standard deviation shown relates to indices in domestic currency terms.
SOURCE: Bank of Israel calculations.

The P/E ratio of the companies in the Tel Aviv 125 Index were volatile during 2018, while the ratio of companies in the Tel Aviv 90 Index remained stable at relatively low levels.

Figure 5
The P/E Ratio of Companies in the Main Indices on the Tel Aviv Stock Exchange, December 2010–September 2018



SOURCE: Based on Tel Aviv Stock Exchange.

business sector remains low and share prices in Israel underperformed. These factors reduce the attractiveness of raising equity. Like the P/E ratio, the low equity issues also indicate that stock prices have not deviated from their fundamental values.

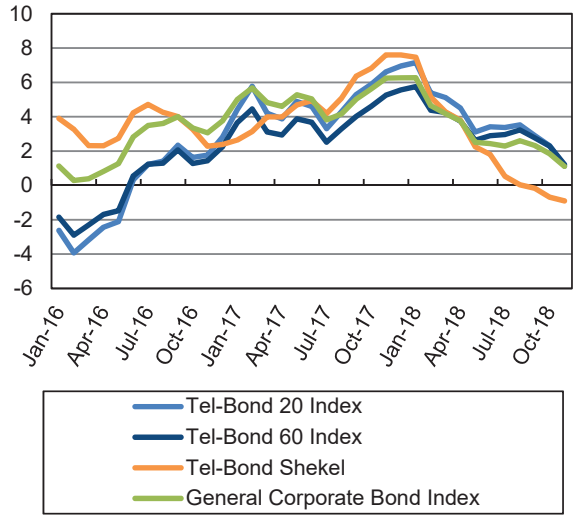
The corporate bond market

During the reviewed period, corporate bond indices continued to increase, although at a lower rate than in 2017. Unindexed-bond prices—which currently account for about one-half of total tradable bonds—rose by an even lower rate and in recent months they even fell, while the prices of CPI-indexed corporate bonds rose at a slow pace. These differences are the result of the increase in inflation, as during the reviewed period the CPI rose and the rate of inflation reached the lower bound of the target range (see Section 2.1.1).

The yield spread between corporate and government bonds tended to rise during the period being surveyed, as investors apparently believed that credit risk of companies had increased. However, this was true mainly with respect to companies with low-rated bonds. An examination of spreads by credit rating indicates that there was a relatively steep rise in the spreads of BBB-rated bonds. It is important to note that the prices of these bonds tend to be more volatile, due to, among other things, the lack of their market depth relative to that of higher-rated bonds. An analysis of the spreads by industry clearly shows that they rose in all industries during the reviewed period apart from insurance and the banks. In those two industries, credit risk is relatively limited since they are subject to financial regulation by supervisory bodies. In this context, note that the spread among insurance companies has fallen somewhat in recent years, after the Capital Market, Insurance and Saving Authority implemented Solvency II, and the spread between them and the banks continues to narrow.

Corporate bond prices continued to increase in the second half of 2018, but they increased at lower rates.

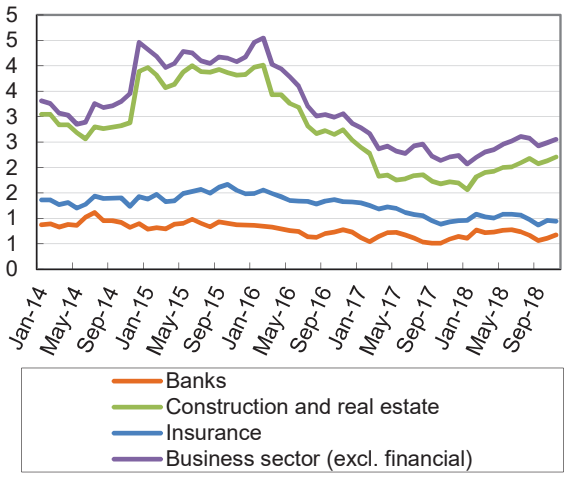
Figure 6
Annual Rate of Change of Corporate Bond Indices, January 2016–November 2018 (percent)



SOURCE: Based on Tel Aviv Stock Exchange.

The average spreads of indexed bonds in the construction and real estate industry and in the entire business sector (excluding financial companies) have been in an upward trend since the beginning of 2018.

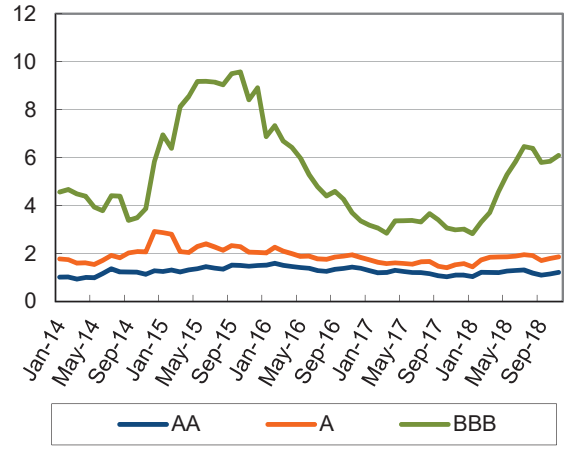
Figure 7
Weighted Average of Spreads Between Yields on CPI-Indexed Corporate Bonds[a] and Yields on Parallel Government Bonds, by Industry, January 2014–November 2018 (percentage points)



[a] Excluding structured and convertable.
SOURCE: Bank of Israel.

The average spread of CPI-indexed bonds rated BBB has increased since the beginning of 2018.

Figure 8
Weighted Average of Spreads Between Yields on CPI-Indexed Corporate Bonds[a] and Yields on Parallel Government Bonds, by Rating, January 2014–November 2018 (monthly averages, percentage points)

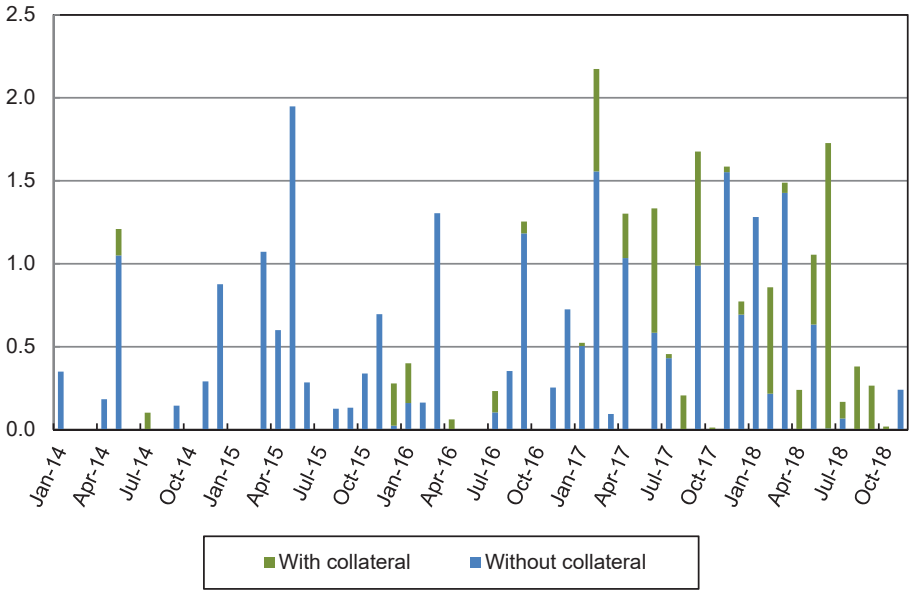


[a] Excluding structured and convertable.
SOURCE: Bank of Israel.

TASE-traded foreign companies (in the real estate and financial industries) continued to issue bonds during the reviewed period; although the extent of the issues contracted relative to 2017 and the first half of 2018 (Figure 9). In contrast to most of the issues in recent years and up to the first quarter of the year, most of the issues in recent months have included collateral, thereby reducing the risk of high rates of loss due to bankruptcy of the companies that issued these series. It is possible that among investors, and particularly institutional investors, there was increasing awareness of the legal problems that creditors experience when a foreign company issues bonds without a specific collateral and goes bankrupt. There are two additional manifestations of the concern among Israeli investors of large losses from bonds issued by foreign companies. First, their yields rose appreciably toward the end of the reviewed period; and second, the estimated value of these bond series totals approximately NIS 30 billion and at the end of the reviewed period, after the drop in prices, they were trading at pricing that reflects an expected recovery rate of only 85 percent.

In the second half of 2018, foreign companies reduced their bond issuances and significantly increased the rate of issuances that include collateral.

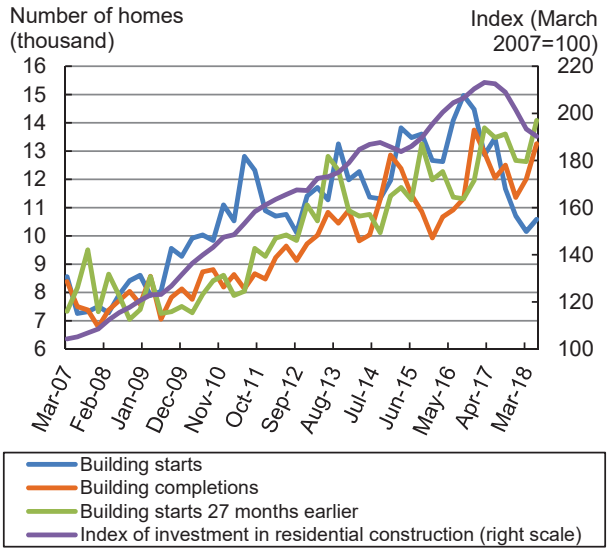
Figure 9
Bonds (excluding convertibles) Issued by Foreign Companies, by Collateral Group, January 2014–November 2018 (NIS billion)



SOURCE: Bank of Israel calculations.

Investment in residential construction continued to decline, and building starts remained lower than in recent years.

Figure 10
Residential Building Starts and Completions, March 2007–June 2018



SOURCE: Based on Central Bureau of Statistics.

The housing market

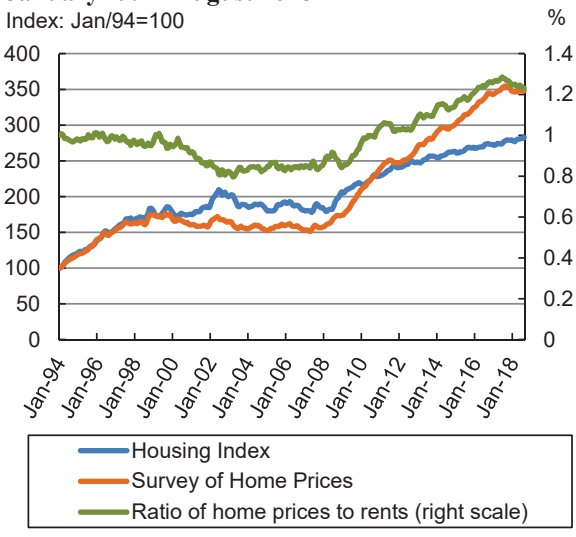
National Accounts data indicate that residential construction investment declined during the third quarter by 0.5 percent, following six quarters of notable and consistent decline. The decline was well reflected in housing starts, which continued to decrease during the first two quarters of 2018 and reached the lowest level observed since 2012 (Figure 10). Although the drop in housing starts was halted in the third quarter and they even rose slightly relative to the previous quarter, their level remained low. However, due to previous housing starts, the number of building completions rose at a high annual rate and in the second quarter the number of building completions rose. According to these measures, the number of completions is expected to increase over their current number, but only in coming months.[9]

After having increased for a decade, home prices declined somewhat between August 2017 and September 2018 (by 2.1 percent). During the past 12 months, home prices fell by about 1.8 percent, similar to the annual rate of decrease during the last three months.

The rate of annual increase in the Housing Index, which is based largely on rent and constitutes part of the CPI, rose again to the level prevailing at the beginning of 2016 and stood at more than 2 percent, while in mid-2017 it stood at 1.5 percent. Although rents are continuing to rise, the increase in home prices has been halted and as noted they have even fallen somewhat. This combination of developments is indicative of a decrease in the pricing of a home as an investment asset (see explanations and further details in Box 3 of the Financial Stability Report for December 2017) and therefore there are signs of a reduction in the likelihood of explosive behavior in the housing market (Figure 11).[10] Another indication of this turnaround is obtained from the ratio between the average price of a home

The increase in home prices has been halted, and the increase in rents continues.

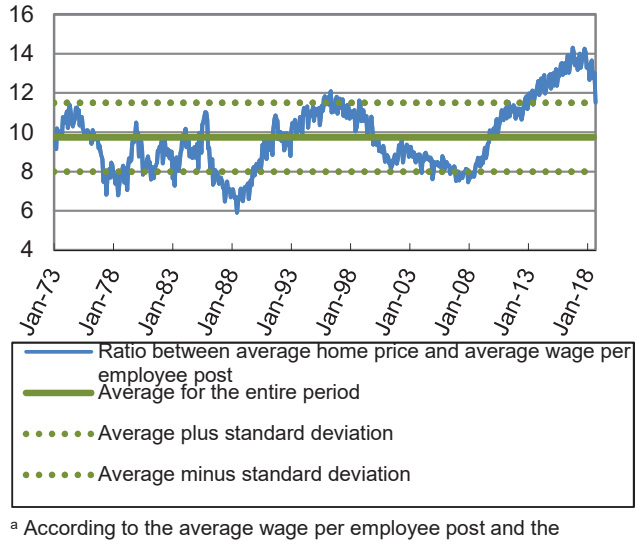
Figure 11
Survey of Home Prices, Housing Index (rents), and the Ratio of Home Prices to Rents, January 1994–August 2018



SOURCE: Bank of Israel calculations.

During 2018, the average number of wage years necessary to purchase an apartment declined.

Figure 12
Number of Wage Years Necessary to Purchase a Home[a], January 1973–June 2018



[a] According to the average wage per employee post and the average home price.

SOURCE: Bank of Israel calculations.

[9] The Research Department at the Bank of Israel found that building completions in the present reflect construction that began about 27 months previously. The correlation coefficient between the variables is 84 percent.

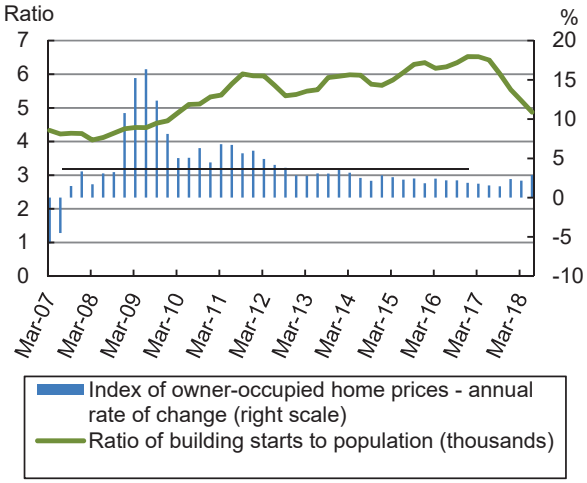
[10] This indicator is based on the ratio between home prices and the Housing Index (rent). See Caspi, I. (2015), "Testing for a Housing Bubble at the National and Regional Levels: The Case of Israel," Discussion Paper 2015.05, Bank of Israel.

and the average wage in the economy, which reflects the number of years of earnings required to purchase it, which fell during 2018. As of the end of September, it had fallen by 13 percent after at the end of 2017 it had reached its highest level since the 1970s (see Figure 12).[11]

Furthermore, the rates of construction and of new home sales in recent years indicate that the supply of new homes is not keeping up with the increase in demand in the long term. The large projects that the government is promoting as part of the "Buyer's Price" program are not adding to actual construction and are mainly channeling demand to homes in the subsidized market (see the Bank of Israel Annual Report for 2017). The ratio of active residential construction in terms of meterage to the population[12] shows that toward the end of 2016 it began to fall and this trend continued also during the reviewed period (Figure 13). According to the government's strategic plan, the extent of construction during the period 2017–20 is meant to be 104,000 housing units per year. In 2016 there were about 50,000 housing starts while in 2017 and 2018 this figure not only did not rise in line with the plan, but it actually fell. These developments are significantly reducing the probability of a sharp decline in housing prices in the short and intermediate terms.

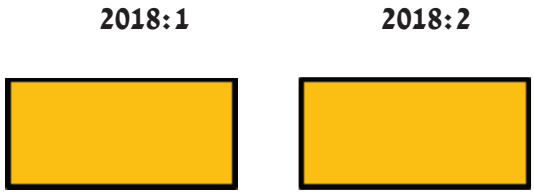
The ratio of building starts to population has been in a downward trend since the beginning of 2017.

Figure 13
Ratio of Building Starts (sum of past 4 quarters) to Population ('000), and the Index of Owner-Occupied Home Prices, March 2007–June 2018



SOURCE: Based on Central Bureau of Statistics.

The business sector
The households sector



2.3 Credit[13]

The rate of expansion of credit in the economy rose during the reviewed period, led primarily by the business sector (see Figure 14). This was in addition to the continuing upward trend in the rate of growth in household credit. The debt to GDP ratio has risen since the beginning of the year by 4 percentage points to 182 percent

[11] We note that the ratio of the average price of a home to net household income rose, but at a more modern rate as a result of the reduction in income tax rates and the increase in the labor force participation rate in Israel.

[12] This ratio measures housing starts according to meterage rather than housing units. In view of the growth in the size of homes built in recent years, measuring according to housing units can be expected to provide an even lower result than that pictured in the graph.

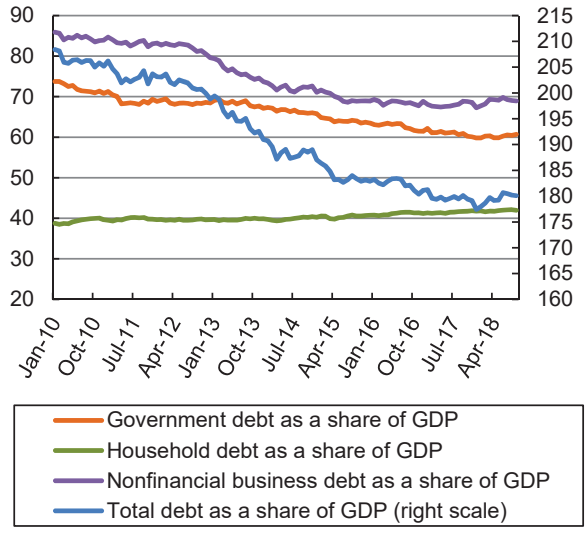
[13] Following are the definitions of the Bank of Israel for the estimators of debt and credit:
Debt – reflects the point of view of borrowers in the economy: it represents the estimate of debt in each of the three main sectors of borrowers in the economy. From their point of view, the value of debt is not dependent on its market value or its value in the lenders' books. Therefore, the bond balances are presented in it at adjusted par value and the balances of total bonds are presented before the deduction of credit loss allowances in the books of the lenders (such as the allowance for doubtful/problematic debts in the banks' balance sheets).
Credit – reflects the point of view of the lenders in the economy. It represents an estimate of credit in each of the main sectors of lenders in the economy. From their perspective, the value of credit is dependent on its value in the market or in the books. Therefore, total tradable bonds is presented according to market value, total nontradable bonds is presented according to fair value (an estimator of their market value) and total credit is presented after the deduction of credit loss allowances in the books of lenders.

of GDP, which ended the downward trend that characterized it in past years. Although relative to other countries, the debt to GDP ratio—and in particular household debt to GDP—remained low, the increase in credit is concentrated in the construction and real estate industry. This increases the likelihood that if the industry experiences a crisis, it will influence the economy as a whole.
Credit risk could rise in the long term, with changes in the legal environment in which credit providers operate and following the numerous reforms to encourage competition in the credit market.

Most of the credit in the economy is provided by the banks and institutional investors. However, in recent years an increase in the activity of nonbank credit providers can be seen, as a result of, among other things, the reforms that were intended to encourage competition in the financial system. As the Capital Market, Insurance and Saving Authority has not finished gathering data on their activity, it is not possible to know how much credit they provide nor is it possible to track all of the credit risk that is developing in the economy as a result of their activity.

The ratio of debt (and its various breakdowns) to GDP increased in the reviewed period, mainly due to business credit.

Figure 14
Ratio of Total Debt and its Segments to GDP, January 2010–September 2018 (percent)



SOURCE: Bank of Israel calculations.

According to the Control of Financial Services (Regulated Financial Services) Law, 5776–2016, all nonbank credit providers must obtain a license from the Capital Market, Insurance and Saving Authority. Currently there are 110 license holders in the Authority's database and 33 of them have an extended license which allows them to increase the scope of their activity to a total of more than NIS 25 million in credit. Furthermore, there are 1,189 companies in the database that have requested licenses and are waiting for approval, although most of them already supply credit. Of the registered companies, only 9 are public companies that publish financial statements. The total credit they have provided totaled about NIS 4 billion in June 2018 (most of which was provided to the business sector). In addition, we possess data on a private company which is a subsidiary of an insurance company and is involved primarily in loans to households; its total credit amounted to NIS 1.6 billion at that time.
In addition to the data that will be gathered by the Capital Market, Insurance and Saving Authority, the Bank of Israel is creating a centralized system for credit data in Israel, in accordance with the Credit Data Law, 5776–2016. The banks are expected to report to the system already starting in the first quarter of 2019, and when they are joined by the rest of the credit providers it will include information that will help to increase competition in the retail credit market, will expand access to credit, will allow credit providers to expand the information they use to assess a customer's credit risk, will constitute a source for the assessment of credit risk in the economy and will provide the currently lacking information on the activity of nonbank credit providers that have begun to operate in the economy.

2.3.1 Credit to the business sector

Credit to the nonfinancial business sector grew during the last 12 months by 5 percent, somewhat higher than the rate of growth in the corresponding period of the previous year. The construction and real estate industries continued to increase their share in total credit. During the reviewed period, credit to the business sector grew from all sources; nonbank credit from the issue of tradable bonds continued to grow and at a faster rate, although still somewhat

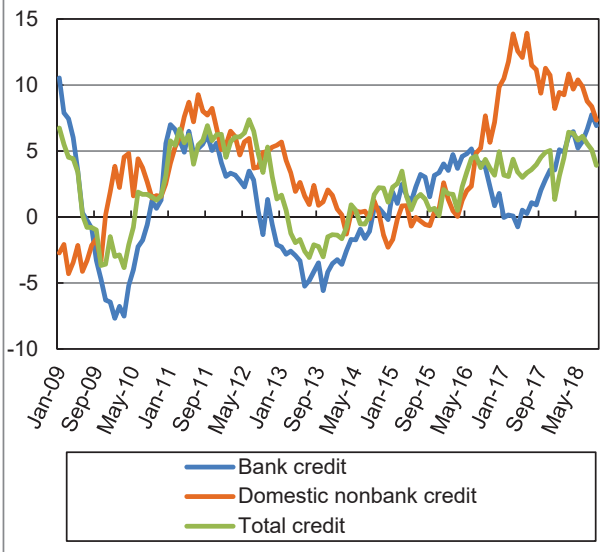
lower than its peak at the end of 2016 and the beginning of 2017 (Figure 15). Note that bonds continue to be a major channel for credit and most of them are issued without specific collateral. Direct loans from financial institutions grew during the reviewed period at a somewhat lower but still high rate; the rate during the last 12 months stood at 10 percent.

However, it is important to emphasize that relative to other countries,[14] Israel has a low ratio of business credit to GDP and in recent years it has been stable at around 65 percent of GDP. When the distribution of credit by industry is analyzed, it is found that construction and real estate, two industries with relatively high levels of leverage, continued to increase their share in total credit and together accounted for 23.1 percent of total credit to the business sector (as of June 2018). This figure is downwardly biased due to the lack of data on credit provided by the financial institutions to these industries.

When the distribution of credit by indexation is analyzed, it is found that unindexed credit continued to increase its share and during the reviewed period reached one-half of total credit; the other half is divided more or less evenly between credit indexed to inflation and credit indexed to the exchange rate. It is important to emphasize that the economy's risks that are the result of this distribution are lower than in previous years, due to a process that began in 2007, when unindexed credit constituted only 30 percent of total credit.

Nonbank credit to the business sector continued to expand rapidly in 2018.

Figure 15
Annual Rates of Change in Credit to the Business Sector, January 2009–September 2018 (percent)



SOURCE: Bank of Israel calculations.

The risk of bankruptcy remains low. In particular, it is the practice to break down the cost of credit to the business sector into two separate terms: (1) the risk-free yields (obtained from the market for government bonds), which tended to increase during the reviewed period; and (2) the credit risk and liquidity risk premium. This premium is composed mainly of the risk implicit in the probability of bankruptcy and inability to repay debt, and it is calculated by the average spread between the yield to maturity on corporate bonds and the yield on government bonds with the same term. This premium also tended to increase during the reviewed period, but it remained at a low level relative to recent years (see Section 2.2.1). Furthermore, the ratio of total problematic debt in the business sector to the balance sheet continued to decline, reaching its lowest level since December 2012 (Figure 16). Finally, the expected default frequency (EDF) also pointed to a low risk of bankruptcy. During the reviewed period, this indicator remained basically unchanged in all industries, apart from trade and services where it tended to rise.

2.3.2 Household credit

Household credit grew at a more moderate rate in the period being surveyed: by 4.6 percent during the last 12 months, compared to 5.2 percent in 2017 and 6.1 percent in 2016. This slow rate of growth was primarily the result of the slowdown in the growth of nonhousing credit, which grew by 1.2 percent during the last year while housing credit grew by 6.5 percent. An examination of the providers of nonhousing credit shows that the slowdown is due to the banks—and in particular the two largest banks—which expanded this type of credit at only a moderate rate, while nonbank institutions are continuing to expand it at a relatively rapid pace and are increasing their share

[14] Relative to selected countries: the US, the UK, Germany, France and Spain.

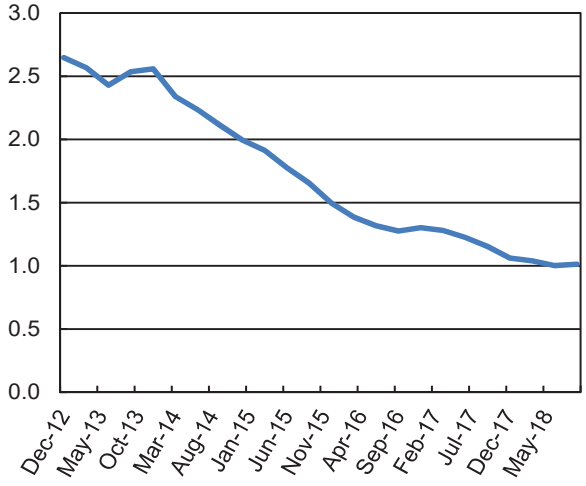
of total credit. However, most of the nonhousing credit still originates from the banks (81 percent; see Figure 17), while the financial institutions provided about 7 percent and the credit card companies about 10 percent. The credit from the financial institutions, including syndication transactions, grew during the last two years by 45 percent on average. Although since the beginning of 2018 it grew by 34 percent, which would indicate a somewhat more moderate trend, this is still considered to be very rapid growth. The rate of growth in credit provided by the credit card companies also moderated somewhat. Thus, since the beginning of the year, it expanded by 11 percent while during the last two years it grew by an average of 17 percent.

Starting from the third quarter of 2017, there was renewed growth in new mortgage volume, though it was still lower than the peak recorded in the second quarter of 2015. The weighted real rate of interest on mortgages stands at 1.7 percent, which is similar to its average for the past two years and therefore it appears that the downward trend that began in February 2017 has levelled off. A similar development can be seen both in the various tracks of the mortgage interest rate and in the yield on CPI-indexed government bonds.

The commonly used measures of the risk inherent in housing credit are obtained from two main ratios: the ratio of monthly repayment to monthly income (Payment to Income – PTI) and the ratio of the amount of a loan to the value of the home (Loan to Value – LTV). The PTI remained stable and as of the end of September 2018 was 25.4 percent. The LTV increased during the reviewed period at a low rate, reaching 51.5 percent. The distribution of LTV shows that during the reviewed period the riskier mortgages (with LTV of 65-70 percent) continued to increase their share at the expense of less risky mortgages (Figure 19). There are several possible explanations for this: first, the progress of the "Buyer's Price" program and the need to make payments added households who were able to borrow with higher leverage to the pool of borrowers: first-home buyers can borrow up to 75 percent of the value of the home, while buyers upgrading their home can only borrow up to 70 percent and investors can borrow at an even lower level of leverage. Furthermore, the share of investors among buyers has been declining since 2016. Second, there may also be a supply effect since at the end of 2014, the

The downward trend in problematic debt as a share of the banks' balance sheet continues.

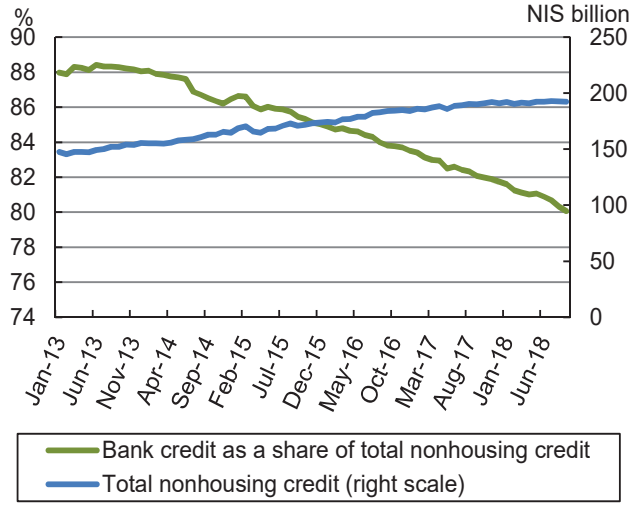
Figure 16
Total Problematic Business Sector Debt[a] as a Share of the Total Balance Sheet, December 2012–September 2018 (percent)



[a] Including borrowing abroad.
SOURCE: Based on Banking Supervision Department.

The downward trend in bank credit as a share of total nonhousing credit to households continues.

Figure 17
Total Nonhousing Credit to Households and the Share of it that is Bank Credit, January 2013–September 2018

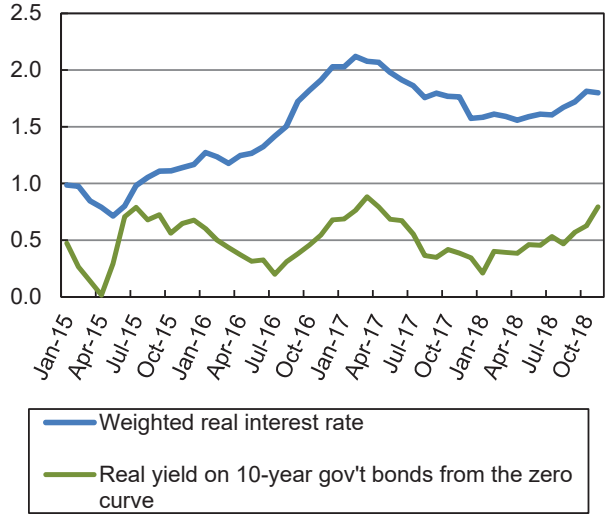


SOURCE: Bank of Israel calculations.

banks were required to allocate another 1 percent of equity against their inventory of mortgages by no later than the beginning of 2017. Since the Banking Supervision Department set a higher price of capital for transactions with leverage of more than 60 percent, the banks reduced them gradually and once they reached their target again started to provide them. In addition, the Banking Supervision Department eased the rules for weighting risk assets in respect of housing loans with high LTV rates (60 to 75 percent).[15]

The weighted real interest rate on new mortgages remained relatively stable.

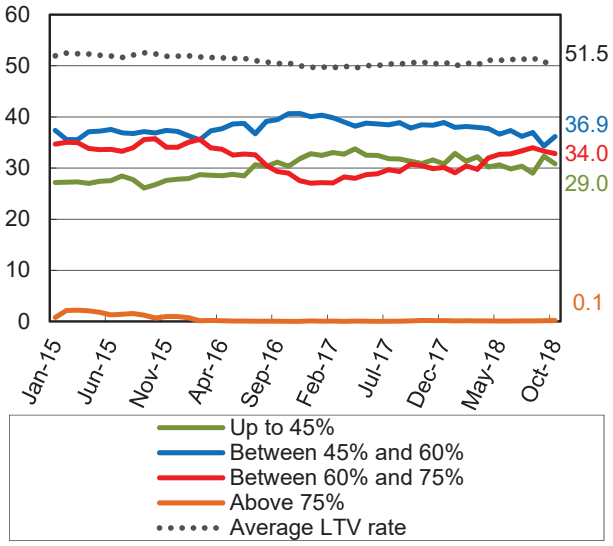
Figure 18
The Weighted Real Interest Rate on Mortgages and the Real Yield on 10-year Government Bonds from the Zero Curve, January 2015–November 2018 (percent)



SOURCE: Bank of Israel calculations.

The share of high LTV mortgages increased, but the average LTV increased only slightly.

Figure 19
Residential Loans by LTV Ratio, Total Banking System, January 2015–October 2018 (percent)



SOURCE: Based on reports to the Banking Supervision Department.

2.3.3 Changes in the legal environment and their effect on credit risk[16]

In recent years, the authorities have advanced several pieces of legislation and administrative changes with the goal of expanding and anchoring the rights of debtors who are in default. Following are the changes related to individual debtors (i.e., not corporations):

a. The Official Receiver reform: This reform is intended to increase the efficiency of the bankruptcy process and at the same to give the debtor the chance to recover. It accomplishes this primarily by setting a limited period for the process, at the end of which the debtor will receive a discharge.[17] The reform went into effect in September 2013.

[15] Until now, these loans received a weight of 75 percent in calculating the capital adequacy ratio and after the easing of the rules received a weight of only 60 percent (Directive 203-72, March 15, 2018).

[16] For further discussion of the increase in risk inherent in the consumer credit portfolio, including as a result of the legislation and reforms in the collection of debt, see the survey published by the Banking Supervision Department in 2016.

[17] Note that the reform relates to requests by the debtor only. There has been a court ruling that the reform does not apply to files opened at the request of creditors, and even if it applies to them it is not to be automatically implemented for every debtor—(TA) 1142-11-14 Tamir v. the Official Receiver, published by Nevo, February 1, 2018.

b. Insolvency and Economic Rehabilitation Law:[18] This is the most significant legal change and is intended to support, to whatever extent possible, the debtor's economic recovery. This is accomplished by, among other things, limiting the period of payments in a bankruptcy proceeding, at the end of which the debtor will receive a discharge.[19] Note that a recent ruling established that although the law has not yet gone into effect, its principles can and should be used in order to interpret the existing legal situation.[20] The law was approved by the Knesset in March 2018 and is expected to go into effect in September 2019.[21]

c. Civil Court Procedure regulations: The abbreviated court procedure, which was frequently used by credit suppliers in order to prosecute debtors, was cancelled. In this procedure, the defendant did not have an automatic right to submit a statement of defense and the right was conditional on receipt of permission. A suit using this procedure provided credit suppliers with a significant advantage over the defendant. The cancellation goes into effect in September 2019.

d. Proper Conduct of Banking Business Directive 450 published by the Banking Supervision Department: The directive is intended to enhance the fairness and transparency in proceedings by the banks to collect debts from debtors. Among other things, the directive states that the bank will have a position holder who is responsible for debt collection and that he can, among other things, make decisions regarding debt collection, negotiate in order to reach a compromise and submit instructions to the banking corporation's representative. In addition, the directive states that the banking corporation will not be able to set the basic interest rate used to determine the interest on arrears. To the extent possible, the bank will provide information to the customers on the possible implications of not making a debt payment with sufficient warning that will allow him to avoid those implications and will also send him a letter when a loan payment becomes late. The directive went into effect in February 2017; it was amended in January 2018. In recent years, the law and regulations have therefore emphasized the need to rehabilitate the debtor[22] and in coming years the credit providers will be facing a changed legal system in which to collect their debts.

How might the legal changes affect the financial system?

The easing of the burden on a debtor in bankruptcy involves several advantages. First, it increases the likelihood that a person in debt will complete the process quickly and will return to a productive routine. Second, entrepreneurial activity involves many financial and operational risks and if it is possible to complete bankruptcy proceedings quickly this will encourage entrepreneurship.

However, the easing of this burden also creates moral hazard among debtors. In particular, if the ability of credit providers to collect debts is weakened, this could incentivize borrowers to take excessive risks, even if they are increasing the likelihood of bankruptcy or of avoiding the payment of a debt. Such a change in the behavior of borrowers is expected to increase the loan losses of the financial institutions and in particular the losses resulting from consumer credit that is not secured by collateral.

In order to examine the trend in losses on nonhousing credit (which is in general provided without collateral), we focused on credit provided by the credit card companies. We assume that this credit is generally given to borrowers who have exhausted their ability to obtain credit from the banks and therefore it is characterized by a higher level of credit risk than bank credit. It is reasonable to assume therefore that if the changes in the legal environment affect the realization of credit risk, the effect will be greater on this type of credit.[23]

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[18] This law replaces previous legislation and cancels the Bankruptcy Ordinance (new version), 5740-1980.

[19] Debtors with particularly low repayment ability will benefit from an even shorter period.

[20] Civil appeal 8263/16 – Or City Real Estate of the Inbal Or Group Ltd. v. Attorney Eitan Erez, file (1)2018, 11191 (March 19, 2018).

[21] When debtors requested that the law be applied in currently ongoing processes, their request was rejected.

[22] See also Bankruptcy (Tel Aviv) 48960-05-18 Garuso Ziv v. the Official Receiver (published in Takdin, August 24, 2018), ruling 11.

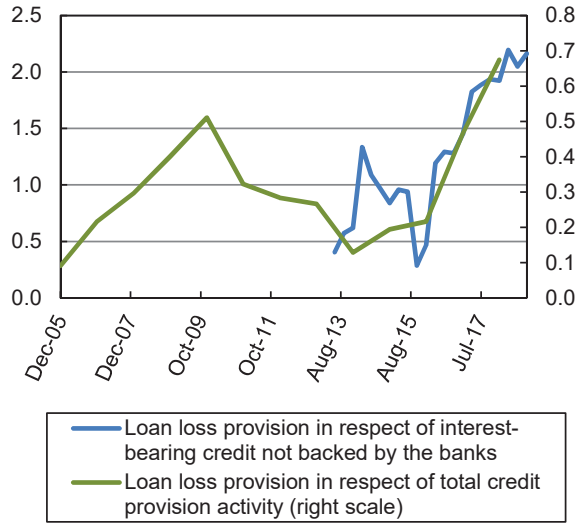
[23] The Annual Survey of the Banking Supervision Department for 2016 related to the fact that the changes in the legal environment contributed to the increased rate of loan losses in the banking system.

Figure 20 shows the annual rate of loan losses absorbed by the credit card companies (a) from 2005 onward due to their activity as credit providers and (b) from 2013 onward due to interest-bearing loans that are not accompanied by a bank guarantee. The graph shows that since 2015 there has been a significant increase in the share of loan losses within total non-housing credit, rising from 1 percent in June 2015 to more than 2 percent in September 2018.[24] It may be that this increase and the fact that the rate of losses reached an even higher level than that recorded in 2008–09 (the years of the global crisis) were the result of, among other things, changes in the legal environment and in particular the Official Receiver reform, given the fact that it went into effect at the end of 2013.[25]

Assuming that other variables remain unchanged, the increase in loan losses reduces the profitability of financial companies and is likely to incentivize them to raise the credit risk premium. In other words, the increase in default risk could increase the cost of credit.

There is an upward trend in the credit card companies' loan loss provisions, with values higher than at the end of 2008.

Figure 20
Loan Loss Provisions at the Credit Card Companies, December 2005–September 2018
(percent)



SOURCE: Bank of Israel calculations.

2.4 Liquidity

	2018:1	2018:2
Liquidity in financial markets		
Liquidity in foreign exchange		

The level of liquidity risk in the economy is gradually rising as a result of the growth in passive investment and the extensive scale of algorithmic trading on the secondary markets.

2.4.1 Liquidity in the equity market

In order to analyze the liquidity in the markets and carry out an international comparison, we will examine two liquidity indices that are based on aggregate data: market depth and trading volume. As can be seen from Figures

[24] Note that there is a high correlation between the rate of loan losses due to interest-bearing credit without a bank guarantee (a quarterly series that starts in the second quarter of 2013) and the loan losses due to overall credit activity (an annual series that starts in 2005).

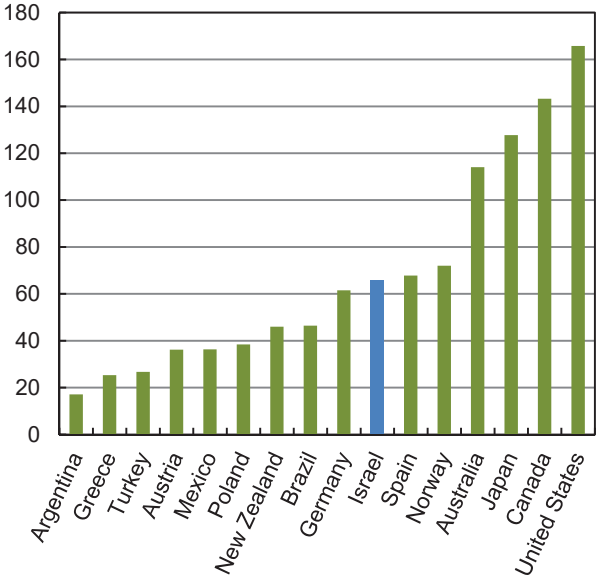
[25] The Isracard company wrote in its 2017 financial statement that the growth in loan losses is a result of the growth in credit in recent years and the changes in the bankruptcy procedure. See: https://docisolation.prod.fire.glass/?guid=3bb6bf75-ce7f-413c-5938-984a42c4d3b1

21 and 22, as of 2017 trading in the equity market in Israel is still at low levels in comparison to other countries, although market depth is not particularly low. As such, based on this comparison, in Israel there is not a considerable possibility of buying and selling financial assets in large quantities at market prices and therefore liquidity risk in Israel is relatively high. Since there was no major change in stock trading volume between 2017 and 2018, it can be said that this estimator of liquidity risk remains unchanged (Figure 23). According to various risk indices for asset prices, the low level of liquidity in Israel is not currently raising actual volatility or expected volatility (Section 2.2.1).

However, it is important to emphasize that low liquidity creates a channel through which external and internal shocks are liable to develop into a financial crisis, since low liquidity could contract very quickly under uncertainty (liquidity risk[26]) and this will make it even more difficult for the financial sector to maintain its day-to-day activity. Since investor awareness of liquidity risk increased after share prices collapsed during the last financial crisis, liquidity risk is reducing the value of financial assets. In this report, we describe two developments that are increasing liquidity risk in Israel. The first is the marked increase in passive investment both in Israel and abroad which has affected the fragility of the capital market and which is manifested in increased comovement of asset prices and thus in increased liquidity risk. Second, since the financial crisis, there have several unique cases of sharp and rapid fluctuations in major global asset indices—in other words in a large number of assets simultaneously—which were the result of the growing scale of algorithmic trading[27] in trading activity. (Box 3 provides further details on the effect of algorithmic trading while Box 4 discusses the effect of passive investment on asset prices.) These two notable developments are likely to change the map of liquidity risk in the capital market both in Israel and worldwide.

The ratio of equity market value to GDP in Israel is not excessive by international comparison.

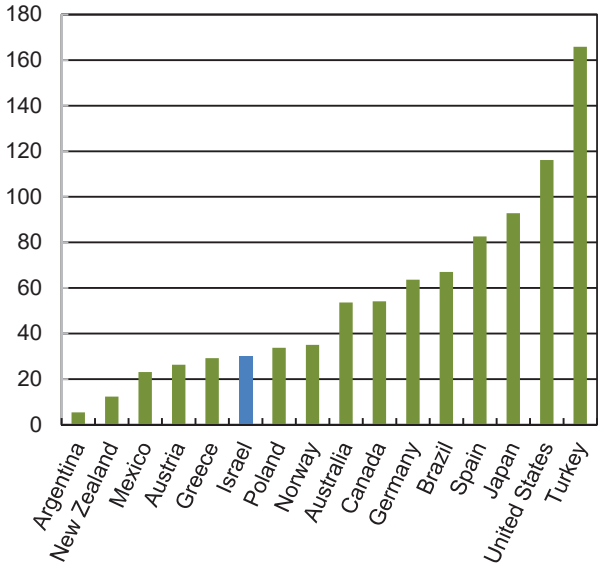
Figure 21
Equity Market Value Relative to GDP, Selected Countries, 2017 (percent)



SOURCE: World Bank data.

The average equity market turnover ratio in Israel is lower than in other advanced economies.

Figure 22
Equity Market Turnover Relative to Capitalization, 2017 (percent)



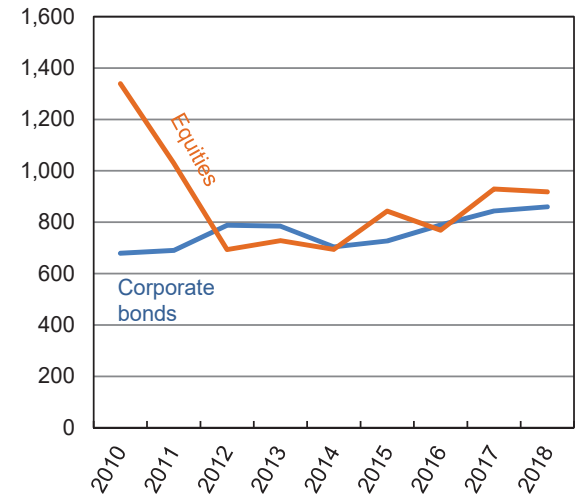
SOURCE: World Bank data.

[26] Which is measured according to the change in the liquidity of financial assets when uncertainty rises due to new information that is a surprise to investors.

[27] In recent years, algorithms have been developed for trading in securities and they enable algorithmic trading without human intervention. These tools have changed the nature of trading and are claimed to have a major effect on the quality of trading. They certainly account for a major proportion of trading volume, including that of the Tel Aviv Stock Exchange.

Trading volume in equities and corporate bonds on the Tel Aviv Stock Exchange remained virtually unchanged in 2018.

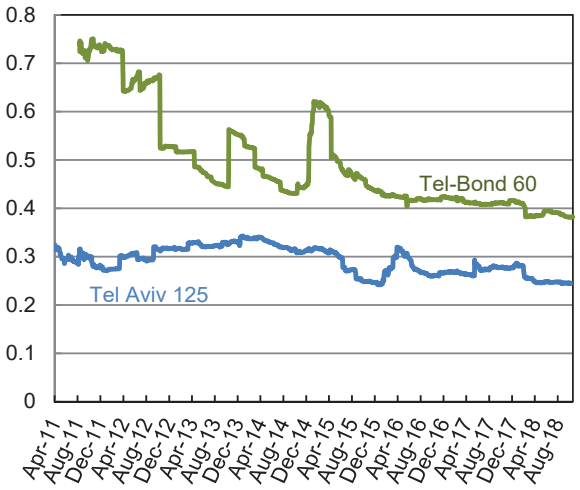
Figure 23
Average Daily Trading Volume in Equities and Corporate Bonds in Israel, 2010–2018 (NIS million)



SOURCE: Based on Tel Aviv Stock Exchange.

The standard deviations of the beta estimator for the securities included in the Tel-Bond 60 and the Tel Aviv 125 are in a downward trend.

Figure 24
Standard Deviations of the Beta Estimator for Securities Included in the Tel-Bond 60 and the Tel Aviv 125, Daily Average, 2011–2018



SOURCE: Bank of Israel calculations.

In order to test the hypothesis that as a result of these two developments the daily changes in asset prices are become increasingly similar (in other words, there is higher comovement between assets), we will estimate the beta. Beta is known from the Capital Asset Pricing Model (CAPM) and reflects the sensitivity of financial asset prices relative to the market portfolio. The closer the beta of a particular asset is to 1, the more similar its variation will be to the variation in the index in which it is included. If the beta estimator is higher (lower) than 1, then it is more (less) volatile than the asset index. If the hypothesis is correct, i.e., if asset price volatility is becoming increasingly similar between assets as passive investment and algorithmic trading grow, then we should find that the betas for all assets included in the same index should be approaching 1 (whether from above or from below) and therefore the standard deviation of the betas should decrease even though the average may remain unchanged.[28] As can be seen from Figure 24, the standard deviation has indeed fallen over time, particularly in the case of assets included in the Tel Bond 60 Index, as a result of algorithmic trading and the growth in investment in ETFs and mutual funds that track the various bond indices. This result indicates that asset prices are increasingly exhibiting comovement, which could increase the fragility of the market and as a result liquidity risk as well.

2.4.2 Liquidity in the foreign exchange market

The trading volumes in the foreign exchange market during the reviewed period were similar to those observed in recent years. Thus, daily trading stood at an average of $1.4 billion while during the previous two years it stood at $1.5 billion. The share of foreign exchange trading by foreign residents was close to 27 percent (as opposed to more than 30 percent in previous years), even though they sold large amounts of foreign currency during this period.

[28] The calculation of each of the beta estimators is based on at least 90 continuous trading days.

3. The exposures of the economy and potential stress scenarios

In Section 2, we analyzed the main risks during the period being surveyed and also from a historical perspective. This section presents the main exposures of the economy to those risks and on the basis of the risks and exposures, it describes the four main focal points of vulnerability that could bring about the realization of stress scenarios, i.e., scenarios that might lead to a systemic crisis. Three of the focal points are the result of domestic risks in the economy, while the fourth is the result of global risks and the economy's exposure to abroad.

3.1 The housing market: The scenario of a sharp and rapid drop in home prices

The risks originating from this market derive primarily from the significant increase in home prices (120 percent in nominal terms); the growth in mortgages; the high leverage of the construction and real estate companies in line with the low level of interest rates; and the rigidity of supply which has prevented it from keeping up with demand despite initiatives adopted by the government to encourage construction activity. These factors are creating imbalance in the housing market and have caused home prices to deviate above the prices dictated by long-term fundamentals. To the extent that the deviation increases, so shall the probability of a sharp correction in prices. In the reviewed period, the deviation contracted to some degree.

During the reviewed period, the banks continued to increase their exposure to mortgages and to the construction and real estate industry, which now accounts for about 50 percent of total banking credit. The financial institutions have also significantly increased their exposure to mortgages and the construction and real estate industry via the credit channel and this credit now accounts for 5.8 percent of the loans they have provided.[29] The exposure of the financial institutions to the housing market is primarily the result of their holdings of bonds issued by construction and real estate companies, most of them without collateral, but also direct loans to these companies and syndication deals based on the inventory of mortgages from the banks' balance sheets.

Therefore, a sharp and rapid decline in home prices will lead to losses in the entire financial system and a credit supply constraint may develop in the economy. The connectedness between the housing market and the financial system is therefore liable to create a systemic crisis and to adversely affect economic activity. Moreover, many nonfinancial companies record real estate they own at market value rather than adjusted value and if home prices drop sharply these companies will find it difficult to meet their obligations. In other words, their risk of bankruptcy will also increase even if they are not directly connected to the construction and real estate industries. This channel will deepen the financial crisis and will spread it quickly to the economy as a whole.

The exposure of households has also grown significantly in the last decade. The proportion of households owning at least two homes has increased from 2.5 percent in 2007 to almost 10 percent (as of 2016 and 2017, according to Central Bureau of Statistics data). Furthermore, the Household Expenditure Survey for 2014–16 shows that the households owning three or more homes have increased their share of total households that own two or more homes. These figures indicate that this period was characterized by high demand for homes as a complement or even a replacement for long-term financial savings, which have been characterized by low interest rates and low yields (see Box 3 in the Financial Stability Report for December 2017). If home prices decline sharply, households are liable to reduce their current consumption, which will constitute an additional channel for the contraction of overall economic activity.[30]

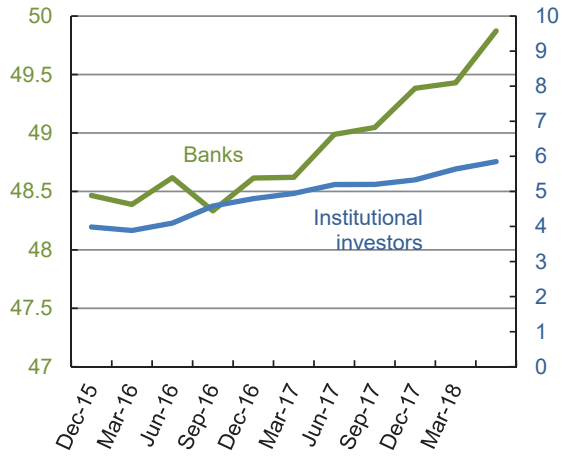
[29] In order to calculate the exposure of the financial institutions through the credit channel, we calculated the ratio between (1) the total housing loans they have extended to households, the syndication portfolios they have acquired and their holding of bonds, both tradable and nontradable, issued by Israeli companies in the construction and real estate industry (according to Central Bureau of Statistics classifications); and (2) the total loans they have provided. This estimate is downwardly biased since the Bank of Israel has no information on direct loans provided by the financial institutions to the construction and real estate industry.

[30] Kahn, M. and S. Ribon (2013), "The Effect of House and Rent Prices on Private Consumption in Israel—A Micro Data Analysis," Discussion Paper 2013.06, Bank of Israel Research Department.

Overall, the indications are that even though the financial system has continued to increase its exposure to the housing market, there is currently less probability of a sharp drop in home prices. This is indicated by the trend in home prices—which do not indicate explosive behavior—and the fact that housing starts have been low relative to the needs of the economy. The commercial real estate market is not showing signs of overvaluation or over-leveraging either and since it usually leads the residential real estate market to some extent (see Box 2), this supports the assessment that the probability of a sharp drop in home prices has moderated to some extent. Nonetheless, the probability is still not low.

The banks and institutional investors continued to increase their exposure to real estate through the credit channel.

Figure 25
Credit to Real Estate as a Share of Total Credit Provided by the Banks and Institutional Investors, December 2015–June 2018



SOURCE: Bank of Israel calculations.

3.2 The financial assets market: The scenario of a sharp decline in bond prices and prices of financial assets in general

The financial asset market and in particular the bond market continues to be the main focal point of vulnerability, which has grown as the US continued to raise the interest rate during the reviewed period, with long-term yields rising to above 3 percent. In October, part of this risk was realized in the US economy, which affected many other economies and demonstrated the risk implicit in the deterioration of global financial conditions. If the rise in long-term yields in the US adversely affects financial conditions and further increases the cost of debt, and in view of the fact that global debt has reached high levels, the risk premium for the possibility of future loan losses could rise, which will interfere with economic growth worldwide, including that of Israel. The risk of such a scenario being realized is increased by the following factors:

1. An overreaction of the markets to a sharper than expected scaling back of accommodative monetary policy in Israel and worldwide.
2. A reevaluation of credit risk worldwide in reaction to a deterioration in macroeconomic conditions.

At the end of the reviewed period, the Bank of Israel raised the monetary rate of interest; however, it is still low, since the rate of inflation during the period rose only to the vicinity of the lower bound of the target range. The low yield and interest rate environment in Israel is causing an increase in the prices of financial assets, primarily those of bonds at this stage, due to the search for higher yield and the accompanying increase in risk appetite. As long as interest rates continue to remain low, the effect on financial asset prices is amplified, thus increasing the likelihood of a shock in the case that the interest rate environment and yields rise appreciably. The realization of a scenario that reverses the trend in bond prices, and in particular those of corporate bonds, will also bring down stock prices. As the interest rate environment in Israel has been low for an extended period and since during the reviewed period the negative gap between Israel and the US in yield-to-maturity on government bonds has widened, the probability has increased of a sharp decline in bond prices in Israel, and with them the prices of other financial assets. The realization of such a scenario will weigh on private consumption and will increase costs of production and the financing of current activity in the business sector. In this way, the drop in financial asset prices will spread to the economy as a whole.

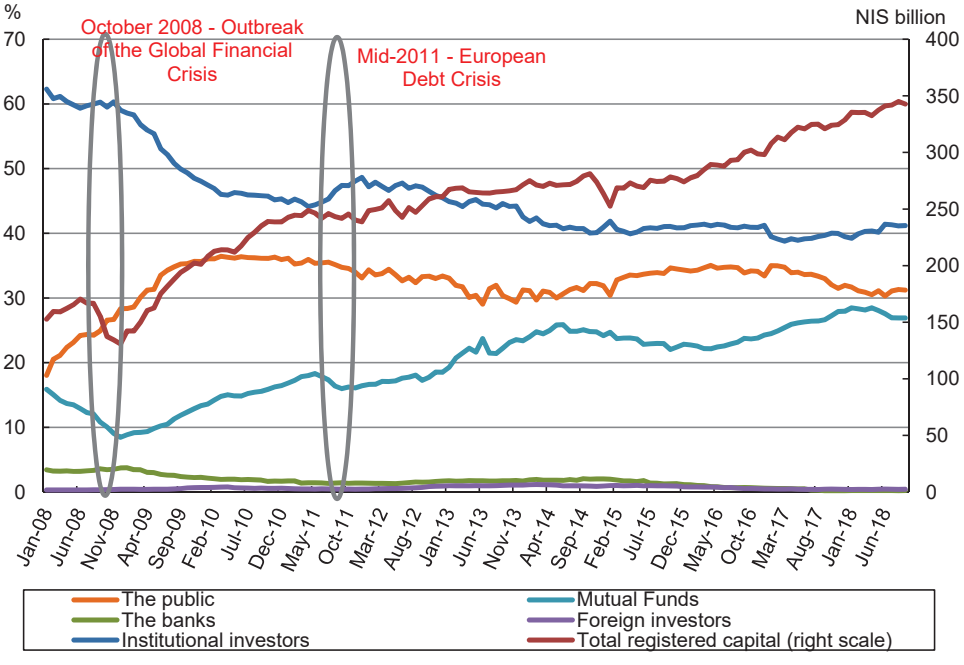
The US already began a scaling back of accommodative monetary policy three years ago, but it was only this year, when the monetary rate of interest reached 2 percent, that bond yields started to reach a level of more than 3 percent,

for the first time in many years. Europe is expected to end its quantitative easing (purchase of bonds in the secondary market) at the end of the reviewed period and to raise the interest rate in the second half of 2019 and therefore it is also approaching the start of a scaling-back period. This process is expected to have a major effect on financial conditions in Israel as well and increases the probability that a stress scenario in which asset prices drop sharply in Israel will be realized.

In view of the higher likelihood of a shock in financial asset prices, and in particular those of corporate bonds, it is important to examine the distribution of holdings of various investors in these bonds. In particular, it is important to examine the extent of the public's holdings, both directly and indirectly through mutual funds, since it is characterized by relatively high volatility when uncertainty increases. The corporate bond market value continued to grow during the reviewed period to about NIS 310 billion and at the same time the public has increased its corporate bond holdings, whether through ETFs or mutual funds. In Figure 26, it can be seen that mutual funds increased their holdings in corporate bonds from 10 percent of their total value in late 2008 (around the time of the global financial crisis) to 27 percent in mid-2018. It is important to emphasize that during the two crises that included a sharp decline in financial asset prices—in late 2008 and mid-2011—the public significantly reduced their holdings by way of mutual funds while long-term institutional investors wisely bought up these assets and moderated the effect of the fire sale. However, during the reviewed period, holdings by way of mutual funds reached historically high levels and

The mutual funds increased their holdings of tradable corporate bonds, which are now historically high as a share of total bonds registered for trading.

Figure 26
Distribution of Tradable Corporate Bond Holdings, 2008–2018



SOURCE: Bank of Israel calculations.

therefore there is a higher probability that a similar shock will lead to larger price fluctuations.

Furthermore, since the public in Israel has increasingly moved to passive investments and since the activity of algorithmic trading has grown, there are liable to be more accentuated price declines and a reinforcement of the shock (see Box 3 and 4).

The overall range of considerations indicates that since the public is highly exposed to corporate bonds, and since there is an expectation in Israel and worldwide that the scaling back of accommodative monetary policy will continue, there is now greater vulnerability to a shock in financial asset prices. As a result of the structural and technological changes in the characteristics of investments, liquidity risk has increased and the shock is liable to lead to a more severe realization of the stress scenario involving a sharp drop in financial asset prices. Therefore, the probability of a realization of the scenario has increased to a medium to high level.

3.3 Household debt: The scenario of a decline in financial conditions

This focus of vulnerability is the result of two factors: the low interest rate in the economy and the reforms initiated by the government to increase competition in the household credit market. These factors have increased the pace of credit issued and during the reviewed period credit continued to grow, reaching 23 percent of average income in the economy and 42 percent of GDP. To the extent that households will find it difficult to meet their obligations—whether due to an increase in interest rates on the credit they hold or due to the increase in the unemployment rate as the result of moderation in economic activity—the consequences will be seen first and foremost in the domain of nonhousing credit (since it is provided without any collateral). However, in such a case, households will have difficulty meeting all their obligations and in the realization of a stress scenario this could create pressure to sell mortgaged homes in order to repay the loans. Such an event will have a major effect on the housing market and as a result the shock will affect the entire economy.

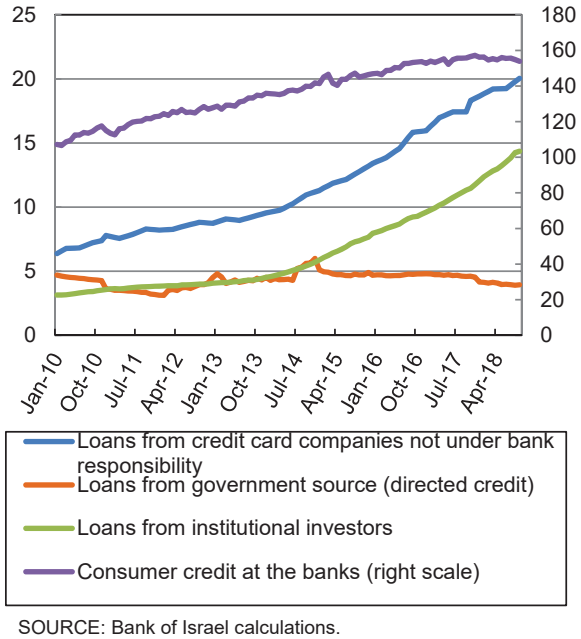
It is important to emphasize that the ratio of household debt to GDP has not increased at a high rate and is at a low level relative to other countries. However, due to the reforms and the appearance of new credit providers in recent years, and because they have expanded the financing options for households, it is possible that aggregate risks do not fully reflect the variety of risks that are currently developing.

The measures of risk inherent in housing debt have risen slightly during the reviewed period, although they are still relatively low, particularly in comparison to other countries. LTV levels (loan to value of the home) show that starting in the first quarter of 2017 the proportion of riskier mortgages (with an LTV of 60 to 75 percent) rose somewhat and this moderate trend continued during the reviewed period.

Overall, there are indications that exposure to household credit remains basically unchanged, that is, it is still at an intermediate level, despite the somewhat slower rate of increase in nonhousing credit. It is important to mention that this exposure could increase if nonbank credit continues to grow at a rapid pace, particularly if it is channeled to the lower income deciles. Moreover, the changes in the legal environment in which credit providers operate, i.e., the changes with respect to debt collection, and primarily collection of debt without collateral, are liable to increase the risks taken by households and increase the potential for credit losses among lenders.

The credit card companies and the institutional investors are continuing to expand the volume of nonhousing credit to households, while the banks are moderating their increase in volume.

Figure 27
Development of Nonhousing Credit by Various Sources, January 2010 to September 2018
(NIS billion)



SOURCE: Bank of Israel calculations.

3.4 The main risks to the Israeli economy from abroad: The scenarios of a wave of bankruptcies following a tightening of financial conditions and the repercussions of a trade war

The IMF has identified the main structural weakness of the global economy as the large increase in leverage and this issue has received attention from other economic organizations as well.[31] This type of risk has increased, despite tighter supervision of the banks since the global crisis that led to an improvement in their capital ratios and reduced the risk derived from them, but at the same time it led to riskier loans now being provided by entities that are not sufficiently supervised. This exact point was made by Janet Yellen, the outgoing Chair of the Fed, who stated in an interview that regulators should inform Congress and the public that there are worrying developments in the debt market and that they do not have the tools to deal with them. Similarly, the members of the Financial Policy Committee of the Bank of England warned in their most recent report that the level of debt and the rate of growth are reminiscent of the sub-prime market in the US prior to the crisis and that they we are particularly concerned by the rapid pace of growth in leveraged loans.[32]

In its latest quarterly report, the Bank for International Settlements (BIS) described another phenomenon related to low interest rates and leverage in a chapter devoted to "zombies",[33] namely companies that still exist only thanks to the negligible interest rates that have prevailed globally for many years. The fact that these companies have survived for so many years has adversely affected the allocation of capital, productivity and the rates of growth in recent years. The increase in yields that occurred this year and the deterioration in investor sentiment are expected to hamper the ability of these companies to recycle their debt and may lead to the reevaluation of the risks inherent in debt assets, which could trigger a crisis.

Another manifestation of global credit risk and the risk of a financial crisis is the very large share of investment-grade debt issued by BBB-rated companies. In a crisis, the credit rating of numerous weak companies could be downgraded. The high concentration of companies at the bottom of the investment rating scale and the fact that many of them are characterized by particularly high leverage is expected to create many "fallen angels", namely companies that drop from an investment grade rating to a high yield rating. This in turn is likely to adversely affect bonds with a speculative rating and the prices of bonds in general due to a deterioration in sentiment.

In view of the aforementioned, it appears that the huge increase in global leverage constitutes a major focus of risk and instability and is liable to exacerbate the next crisis, no matter how it is triggered.

The potential for contagion by way of the financial markets remains the main risk for Israel. It is expected that this effect would be initiated primarily by way of the financial markets and a decline in the willingness to take financial risk. Although the Israeli economy and Israeli financial institutions are not directly exposed to the focal points of risk to any great extent, the high correlation between the capital markets will create a significant effect on the prices of financial assets in Israel.

As reported by the IMF, the main risk to global financial stability stems from the situation of the emerging economies and primarily those that are characterized by structural weakness and need to recycle a large of amount of debt denominated in foreign currency. Israel has relatively low exposure to the debt of the emerging economies and to debt denominated in foreign currency and furthermore the exchange rate of the shekel against the basket of currencies has hardly moved so far. However, a major downturn in the prices of the debt assets of the emerging economies is expected to produce negative sentiments in the global markets, which will also affect Israel.

The risk stemming from the emerging trade war between the US and China and between the US and other countries

[31] The main emphasis has been on the level of fiscal debt in advanced economies and the level of corporate debt in the emerging economies. However, corporate debt in the advanced countries has also risen to high levels and furthermore its quality has deteriorated.

[32] FPC, October 2018.

[33] Older companies that have consistently been unable to service their debt from profits (interest cover ratio<1).

currently centers around China and the emerging economies which are dependent on China. Israel is exposed to these economies to a relatively limited extent. However, the trade war is expected to negatively impact advanced economies as well. Accordingly, the IMF has lowered its recent forecast of growth in world trade. Israel, whose economy is small and open, is exposed to world trade and global growth and therefore it is expected that Israel will be affected to some extent by these developments.[34]

Box 1: The effect of Israel's improved credit rating

- Israel's credit risk, according to the assessment of the credit rating agencies, has declined and in August 2018 its international credit rating was raised to "AA-".
- The empirical literature has found a positive link between credit rating and economic activity, and in particular investment. In this box, we will describe the possibility that as a result of Israel's higher credit rating there was an inflow of foreign investment into the economy, equity prices rose and the shekel continued to strengthen.
- The effect of Israel's improved credit rating is dependent on good performance over time, which requires economic leaders to continually look ahead, including in the government accounts.

1. Background

Credit risk ratings reflect the rating agencies' assessment of the ability and willingness of countries and companies that issue tradable debt to meet their obligations fully and on time.[1] Therefore, a country's credit rating is considered to be a major indictor of its economic risk. Although a country's credit rating relates to the bonds issued by a government, it also has a major effect on the credit rating of private sector entities in the country and sets an upper bound to their rating. The ratings are used by many investors in Israel and worldwide in their investment decisions,[2] which makes them so important.

The increase in Israel's credit rating, which was published by the Standard and Poor's credit rating agency in August of 2018, was expected, in view of its announcement that it had raised Israel's rating outlook to "positive" a year ago. This move indicated a high probability that the credit rating would be raised during the subsequent 18 months. The main factor cited in the announcement was the continuing decline in the ratio of public debt to GDP in recent years to a level of 60 percent, which is lower than most of the OECD countries (Figures 1 and 2). Moody's also improved its assessment of the Israeli government's debt in July and therefore its outlook for a change in Israel's credit rating became positive.

It is important to state that the announcement of an improved credit rating does not necessarily reflect the timing with which new and surprising information was published. It can also be claimed that the announcement is essentially unimportant since all of the economic information on which it is based is in the public domain and therefore should already have been reflected in prices.[3] In contrast, it can be claimed that the announcement serves as official confirmation of existing information and essentially allows the investment committees of supervised financial bodies to rely on it, based on, among other things, considerations that are dictated by regulatory instructions and the need for transparency in their investment policy. Moreover, the announcement

1 There are three main companies that rate a country's credit risk: Moody's, Standard and Poor's and Fitch. Using various calculation methods, these companies examine a large number of macroeconomic parameters and political and regional risks and base their assessment on the ability of a government to redeem its debt.

2 This is in spite of the severe criticism directed at the credit rating agencies a decade ago after they lowered ratings only after the fact.

3 Moreover, because the criticism of the delayed response of the credit rating companies during the global financial crisis and the European debt crisis damaged their reputation, it is possible that the announcements lack any significance in the eyes of investors.

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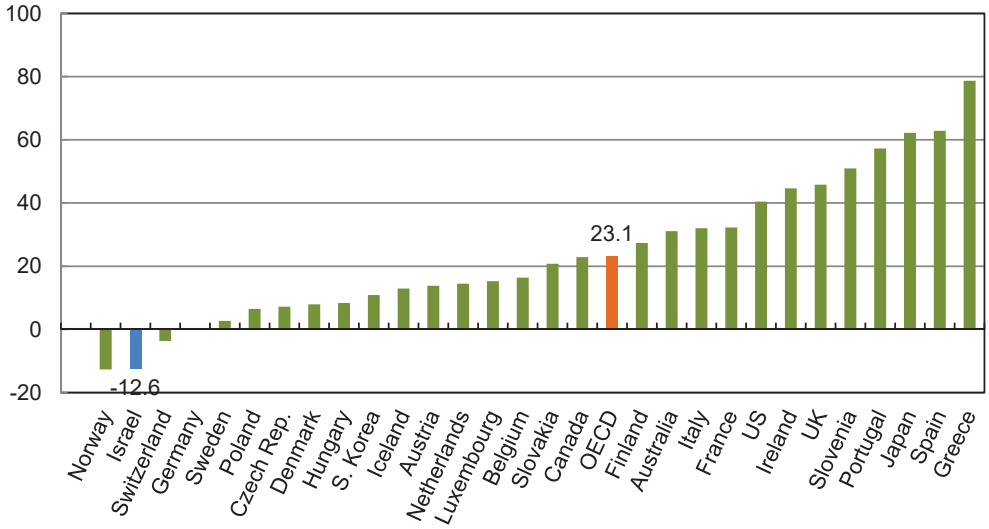
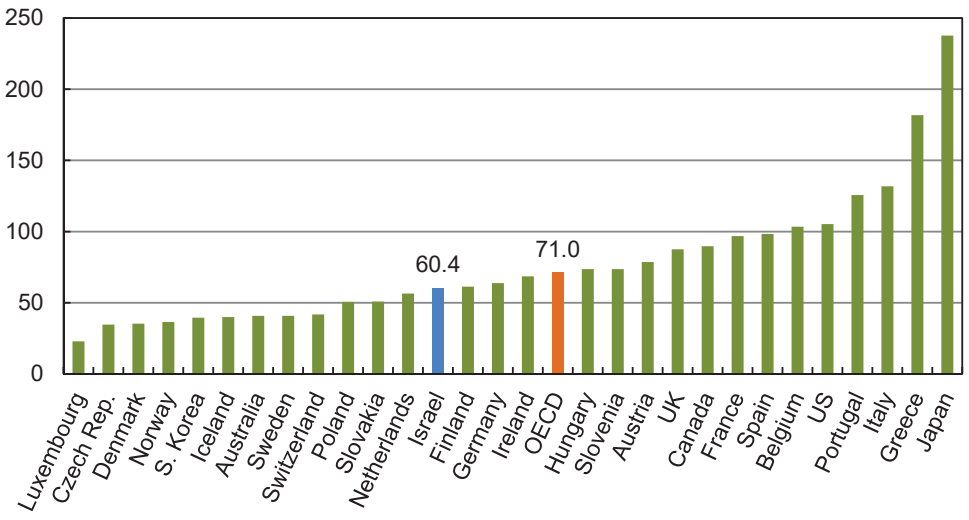
can create media attention and thus motivate investors to reevaluate the country's economy and its financial markets. Therefore, we would expect positive effects on financial markets and on the economy in general as a result of the raising of Israel's credit rating on August 3rd, 2018, the announcement of the raising of the credit rating forecast on August 4, 2017 and Moody's announcement of its improved outlook on July 20, 2018. It is too early to estimate the effect of this on real economic activity in Israel but it is nonetheless possible to examine the initial effect on financial asset prices.

Figure 1
Change in the Public Debt to GDP Ratio between 2007 and 2017 Compared to Other Advanced Economies (percentage points)



SOURCE: Based on International Monetary Fund.

Figure 2
Public Debt to GDP Ratio Compared to Other Advanced Economies, 2017
(percent)



SOURCE: Based on International Monetary Fund.

2. The expected effect on the economy and a review of the literature

The raising of a country's credit rating is expected to directly contribute to economic activity, primarily by way of a reduction in the government's credit risk premium and in turn also that of the business sector and the economy as a whole. This is assuming that the raising of the credit rating indeed reflects information beyond the decrease in risk itself. Accordingly, we would expect to find an effect on the cost of debt for all companies in the economy, on the exchange rate, on investments and on stock prices and in particularly those of companies that consume credit. Furthermore, the raising of the credit rating is expected to directly affect the banking system, by way of its effect on the quality of assets in their balance sheets, on their profitability and on their risk-adjusted allocation of capital. Another contribution to economic activity may be manifested in the investment decisions of institutional investors.

The empirical literature that has examined the effect of changes in a country's credit rating has found a strong and statistically significant effect on the country's cost of debt and a clear secondary impact on the private sector.[4] Effects were also found on the leveraging of companies in the economy, on share prices, on real investments and on economic growth.

A country's credit rating constitutes a ceiling for the rating of companies and financial entities operating in the country and therefore, an improvement in credit rating can dislodge the upper bound, if there is one, and in this way can raise the credit rating of the economy's companies.[5] According to the literature that has examined the secondary impact on the banking system, the change in a country's credit rating has a statistically significant effect on the rating of the banks operating within it.[6] In particular, it was found that in emerging markets an increase in the country's rating is accompanied by an increase in the rating of the banks by each of the rating agencies.[7]

It has been found in the literature that a change in a country's rating has a clear effect on the prices of bank shares,[8] an effect that was statistically significant when the rating was lowered and less so when the rating was raised. The extent of the effect on banks is not uniform and depends on various parameters, including their extent of reliance on deposits or on non-interest revenue and also the public's assessment regarding the government's willingness to assist the banks in the case of a crisis.[9]

An increase in a country's risk can also affect the banks' fund-raising costs, particularly by way of the capital market and wholesale deposits. According to BIS figures, a country's risk, as measured by the CDS and the country's rating, usually explains about 30 percent of the spreads on the banks' bonds. In countries whose financial situation is of concern to investors, this proportion can reach up to 50 percent (see CGFS, 2011).[10]

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4 See: Almeida, Cunha, Ferreira and Restrepo (forthcoming), "The Real Effects of Credit Ratings: The Sovereign Ceiling Channel", forthcoming in Journal of Finance.

5 See: Durbin and Ng (2005), "The Sovereign Ceiling and Emerging Market Corporate Bond Spreads", Journal of International Money and Finance, 24.

6 See: Gwion Williams, Rasha Alsakka, Owain ap Gwilym, (2013) "The Impact of Sovereign Rating Actions on Bank Rating in Emerging Markets", Journal of Banking & Finance, 37.

7 Ibid.

8 See: Kaminsky and Schmukler (2002), "Emerging Market Instabilities: Do Sovereign Ratings Affect Country Risk and Stock Return?", The World Economic Review, 16.
Ismailescu and Kazemi (2010), "The Reaction of Emerging Market Credit Default Swap Spreads to Sovereign Credit Rating Changes", Journal of Banking and Finance, 34.

9 See: Correa, Lee, Sapriza, and Suarez (2014), "Sovereign Credit Risk, Banks' Government Support, and Bank Stock Returns around the World", Journal of Money, Credit and Banking, 46.

10 See: Committee on Global Financial System, 2011 (CFGS), "The Impact of Sovereign Credit Risk on Bank Funding Conditions".

With regard to the quality of the bank's assets, banks worldwide, including those in Israel, hold a significant proportion of their assets in government bonds, primarily those of their own government, such that an increase in the credit rating of that country is expected to be reflected in the level of risk and the quality of assets in their balance sheets (see CGFS, 2011). The effect on the balance sheets of the banks can be divided into two time dimensions: the short-term effect will be reflected in an increase in the value of assets since there has been a reduction in estimated risk, resulting in increased profit from the bond portfolios in the banks' balance sheets; and, in contrast, the long-term effect will be reflected in a decline in profitability of those assets once the reduction in risk has been internalized, although the banks are likely to reallocate assets in order to lessen the long-term effect on the level of risk and the level of profitability.

A rating announcement that shifts a country's debt from a speculative (high yield) rating (HY) to investment grade (IG) and vice versa has a major effect since entities with a conservative investment policy, such as central banks and pension funds, follow investment rules that allow them to invest only in investment grade assets.[11] For that same reason, most of the articles written about this phenomenon have in fact focused on the effect of rating announcements on emerging economies, which have a speculative or near-speculative rating.

In summary, the most significant findings in the literature include the following:

1. Rating announcements significantly affect a country's bond yields and its CDS, an effect which carries over to the yields on the bonds of corporations operating in that country.
2. A change in a country's rating has been found to significantly affect the rating of banks operating in that country.
3. There is an observed effect at the time of both an announcement of a change in a country's credit rating and of a change in its rating outlook, and in some cases is notable several days after the announcements. In some of the research, it was found there was already some effect during the two weeks preceding the announcements.
4. A negative rating announcement has a greater effect than a positive one, although there are studies which also found a significant effect for a rating increase as well. We assess that in empirical testing there is greater ability to identify the effect of a negative announcement, primarily because the effect is more quickly felt due to the media noise that accompanies the announcement.

3. Examining the effect of Israel's improved credit rating

The effect of a rating announcement on a country's risk premium is generally examined using the yield on government bonds and the CDS.[12] Nonetheless, the proportion of tradable bonds held by nonresident investors within their financial investments in Israel is not at all high and in recent years it has tended to decline (to about 13 percent). Therefore, a strong effect on the yields of these bonds is not expected to be found.[13] Due to the difficulty in estimating the effect on the cost of government debt, we did not test the spillover of the effect to all companies operating in the economy, which was found to be significant in the literature. Since the number of nonbank companies in the economy that have an international rating is very small, there is not

[11] In some cases, the investment committee is required to invest only in assets one rating above this level, so as not to fall into the "fallen angels" trap, in which bonds are unexpectedly reclassified from Investment Grade to High Yield.

[12] The proportion of government debt denominated in foreign currency out of total government debt stood at about 14 percent in the second half of 2018 and it is influenced directly by an announcement that raises the credit rating since the cost of government debt is reduced. At the same time, the liquidity of these bonds series is very low and therefore there is only a weak ability to identify the effect.

[13] The identification of this effect is almost impossible without a broader empirical analysis that will examine a number of rating changes (as in studies that test many rating changes in a number of countries).

expected to be a direct effect on the rating of companies. Nonetheless, it is possible that the raising of the country's rating will increase the incentive of some companies in the economy to acquire an international credit rating from the rating agencies, if in their opinion this will reduce the cost of their debt. In such a case, the raising of the credit rating will have an additional positive effect on economic activity.

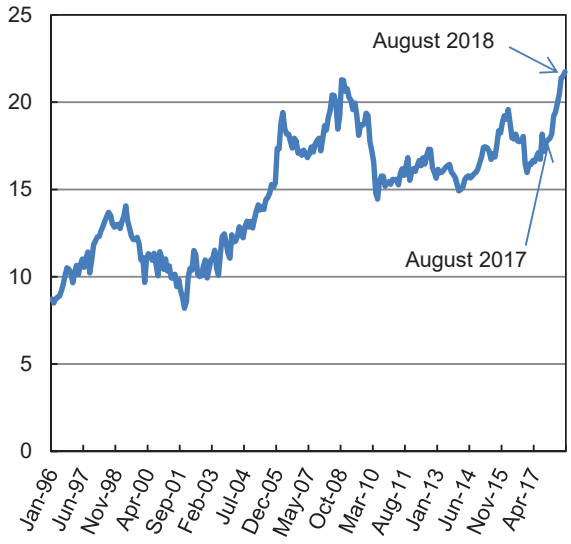
As the announcement of Israel's improved credit rating raised the rating of government bonds denominated in foreign currency from "A+" to "AA-", both of which are within the Investment Grade range, the effect is not expected to be as strong as that found in the literature. Furthermore, the identification of the effect as part of an estimation equation is not a simple task, particularly in view of the sharp increase in yields to maturity on US government bonds, which had an effect on the pricing of all global debt. Another reason for the difficulty in identification is related to the lack of clarity regarding the timing of the expected effect, namely whether it occurs following the announcement of the improved outlook, following the announcement that the rating is being raised, during the long window between them or even several months after the announcement. Therefore, in what follows we will describe the developments in the main factors that were investigated in the empirical literature near the time of the announcements and their possible effects on the financial markets. However, recall that it can also be claimed that the strong performance that led to a favorable rating change is also what led to stronger performance in the financial markets.

3.1 Nonresident investors and the exchange rate

Since equities account for more than 70 percent of the foreign investment in financial assets in Israel, we would expect to see the main impact of an announcement regarding an increased rating in the level of nonresidents' holdings of equities, in stock prices in Israel and also in the exchange rate of the shekel, since an investment in stocks is generally not hedged.

Nonresident investors significantly increased their investment in equities in Israel since the raising of Israel's rating outlook. As can be seen from Figure 3, this proportion rose from about 17 percent at the beginning of 2017 to about 22 percent in September of this year.[14] The trend began at the beginning of 2017, as a result of the positive momentum in the global financial markets, although it accelerated after August 2017 and was not influenced by the deterioration in investor sentiment that occurred in February 2018, which led to significant price declines in the global financial markets.

Figure 3
Share of Foreign Investments in Israeli Equities, 1996–2017 (percent)



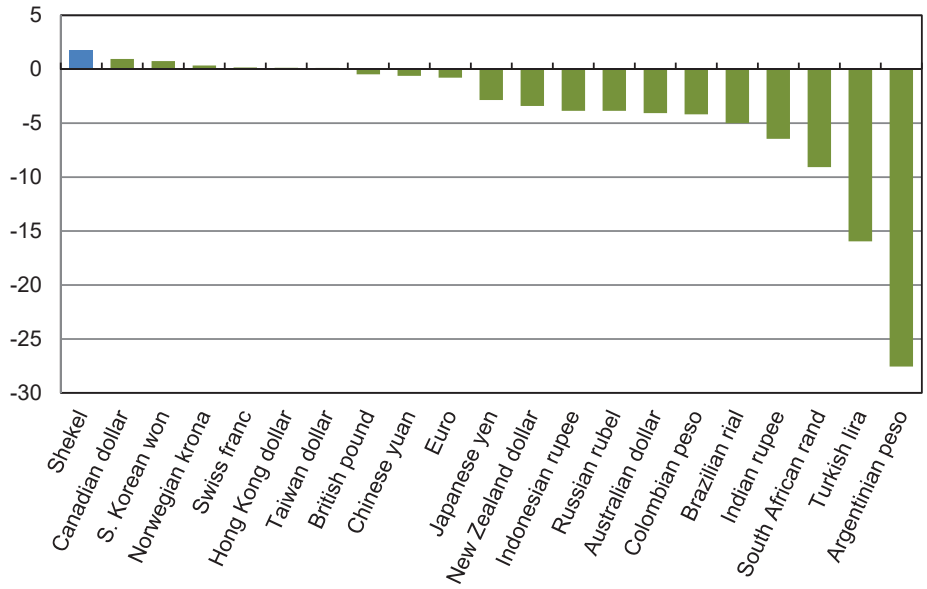
SOURCE: Bank of Israel calculations.

Nonresident investors acquire equities in the Israeli market without hedging the effect of the exchange rate.[15] In this way, they have contributed to the strengthening of the shekel and during the two months following the rating announcement the shekel was the strongest of the major currencies (Figure 4).

[14] In October of this year, foreign holdings declined due to the purchase of a company by nonresident investors and its delisting from the Tel Aviv Stock Exchange.

[15] Nonetheless, it should be mentioned that an investment in stocks generally is not hedged since the volatility of exchange rates is lower than that in the stock market.

Figure 4
Performance of the Major Currencies Against the US Dollar, Aug. 3 to Oct. 3, 2018 (percent)



SOURCE: Bank of Israel calculations.

3.2 Equity markets

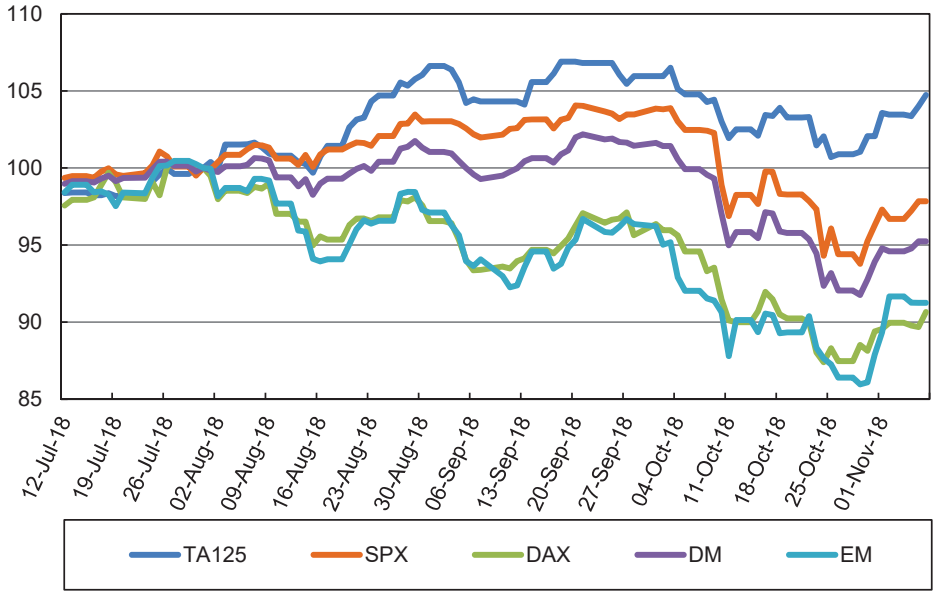
According to the hypothesis, which was found to have support in the literature, an improvement in a country's level of risk reduces the cost of financing for all companies in the business sector and in particular in the financial sector. In this way, it accelerates the demand for new credit, economic activity will grow accordingly, and stock prices will tend to rise. Indeed, as can be seen in Figure 5, the increase in stock prices in Israel near the time of the rating announcement was larger than in other countries.

The data indicate that in contrast to the period from the global crisis until July of this year, during which stock prices in Israel significantly underperformed relative to the equity indices in the advanced economies, since August of this year the stock indices in Israel have outperformed those in all of the other countries in the comparison.

An examination of indices of bank stocks and of financial companies stocks show particularly large increases relative to the Tel Aviv 125 Index, which includes the large companies in the economy, during the window between the beginning of August 2017 and the end of August 2018, with the Bank Shares Index rising by 10 percent more than the Tel Aviv 125. We note that on the trading day after the announcement of the improved rating forecast in August 2017, the Bank Shares Index rose by 2.2 percent more than the Tel Aviv 125. Since the end of August 2018, the trend in the Bank Shares Index was aligned with the trend of the Tel Aviv 125 and preserved the outperformance that was achieved. These findings are supported by the empirical literature, according to which the effect of a change in rating on banks shares is expected to be stronger than for other shares.[16]

[16] The outperformance of the banks shares in Israel is especially noteworthy in view of the negative sentiments toward bank shares worldwide, and primarily in Europe, where banks shares fell by about 25 percent during this period.

Figure 5
Selected Equity Indices in Israel and Abroad, July 12 to Nov. 1, 2018



SOURCE: Bank of Israel calculations.

3.3 The banks' allocation of capital[17]

The effect of an improved credit rating on the banks' allocation of capital is likely to positively affect the weights of credit risk, the government of Israel's foreign currency debts, the debts of public sector entities (as they are defined in the Proper Conduct of Banking Business Directive) and also debts to other banks in Israel. This is because the weight attributed to these debts is derived from the State's risk and an improvement in the State's rating is expected to reduce the weight of risk and the allocation of capital that is required against this type of debt. Nonetheless, since the banks' exposure in Israeli currency to the government is weighted with a risk weight of 0 percent even without the improvement in the rating, and the share of exposure in foreign currency to the government of Israel, to entities in the public sector and other banks in Israel is small, the effect on the banks' capital allocation against that debt is not expected to be significant. With regard to the exposures of the banks to corporations with an international rating, their effect on the capital allocation will be manifested only if the State's rating indeed influences the ratings of these corporations to the extent that will lead to their reclassification to a group with a lower risk weight. Currently, the number of Israeli corporations with an international rating is not significant and therefore it is reasonable to assume that the improvement in rating will not have a noticeable effect on the allocation of capital, at least not in the short term. With respect to the exposure of the banks to corporations that do not have an international rating, the risk weight will remain

[17] According to the Proper Conduct of Banking Business Directive no. 203 regarding the Capital Adequacy and Measurement, the Standardized Approach – Credit Risk.

unchanged at 100 percent.[18]

4. Conclusion

This box presents the preliminary findings regarding the possible positive effects of Israel's improved credit rating forecast and the actual improvement of the credit rating on the capital market in Israel. In view of the strong connection between the timing of the announcement of the rating improvement and that of positive developments in the financial markets in Israel relative to the developments in the global financial markets, and particularly in view of the pronounced strength of the shekel following the announcement, this box shows that an improvement in the credit rating is likely to make a positive contribution to the economy.

It is important to recall that the improvement in the credit rating occurred at a particular point in time, but its effect on economic performance and in particular on investment is dependent on performance over time, which requires a forward-looking perspective, including in the government accounts. The credit rating agencies attribute particular importance to the trend in public debt, which is dependent on future economic decisions.

[18] It is important to note that at this time, since only one rating company has raised the State's credit rating, the effect of this change is not reflected in all the banks, since according to the directives of the Banking Supervision Department the banks cannot cherry-pick the ratings from among those provided by the various external credit rating companies. The banks must determine which external credit rating company or companies they wish to work with and are required to use its ratings, for each type of debt, for the purpose of both risk weighting and risk management. If the debt has been given a rating only by the rating agency chosen by the bank, this rating will be used for the determination of the debt's risk weight. But if two different ratings have been provided by two different credit agencies which were both selected by the bank, the higher risk weight, i.e., the lower rating, is to be chosen. The same applies if there are three or more ratings, in which case the bank will relate to the two best ratings and will apply the risk weight according to the lower of the two.

Box 2: Commercial real estate in Israel

- The financial system in Israel is more exposed to the commercial real estate industry than any other industry in the economy. In our estimation, the total credit provided to the industry stands at NIS 140 billion, which constitutes about 16 percent of total credit to the business sector. About NIS 100 billion of that was provided to public companies whose financial stability we analyze, and most of this amount was provided as tradable corporate bonds (which constitute 35 percent of the corporate bonds in Israel, excluding banks and insurance companies).
- The total square meterage of commercial assets grew by about 3 percent annually, on average, from 2009 to 2017 and that growth was concentrated in assets used for offices and retail. At the same time, the fair value of commercial property grew significantly although this increase was more moderate than that in the value of residential real estate. Retail properties constitute a significant share of the fair value of total commercial property, also in comparison to other countries.
- The profitability of the public companies in the commercial real estate industry is based to a large extent on revaluation profits. They accounted for about 46 percent of the pre-tax profit of all the companies according to the annual average during the period 2010–17.
- Between 2009 and 2017, the commercial real estate companies improved their financial profile. Since 2011, there has been no major change in their total financial debt, even though cumulative revaluations grew over time.
- Between 2009 and 2017, the commercial real estate companies that were delisted had an inferior financial profile relative to companies that remained listed on the TASE. Of 19 companies that were delisted, the reason in the case of 10 of them was debt restructuring proceedings.
- Between 2009 and 2017, investment in commercial property abroad dropped significantly, although it became more geographically dispersed. The significant drop in holdings in advanced economies partially offset the growth in holdings in less developed regions.
- Since the financial system is exposed to commercial real estate and since the industry has played a significant part in various financial crises, it should be monitored. However, since there is a shortage of data (such as property prices, the vacancy rate and rent per square meter), the trends in the industry can only be analyzed after the fact and on the basis of financial statements. This hinders the effort to identify emerging systemic risk in a timely manner.

1. Introduction

The public discourse surrounding real estate in Israel has focused in recent years on the increasing price of residential real estate, in view of its importance from the point of view of both stability risks and social welfare. In contrast, the discussion of non-residential real estate was been somewhat neglected, although there are major risks originating from this industry that are also important. The long-term increase in the prices of commercial real estate, alongside the recording of revaluation profits, is likely to create new stability risks for the economy.

The commercial real estate industry in Israel is described in the chart in Appendix A and primarily includes properties for offices, retail and industrial use. In many countries, commercial real estate also includes hotels and residences (including subsidized housing, sheltered housing and senior citizens' homes). However, in Israel it has only recently been expanded to include some of these categories—primarily sheltered housing and to a negligible extent also the residential sector. The main activity in the industry involves investors (such as

business entities, REITs[1] and financial institutions) who usually buy properties in order to rent them to other business entities.

In this box, we will first present the risks inherent in the commercial real estate industry and the motivation for the analysis. In Section 2, we will describe the data and the method of analysis. In Section 3, we will describe the commercial real estate industry in Israel at the current time (end of 2017), according to various breakdowns, in comparison to other countries and in comparison to an earlier point in time (end of 2009). In Section 4, we will discuss the changes that have occurred over time in the financial stability of the commercial real estate companies in Israel. In conclusion, we will relate to proposed macroprudential steps in the commercial real estate industry and the need to take similar steps in Israel.

1.1 The exposures of the financial system to the commercial real estate industry

The financial system in Israel is more exposed to the commercial real estate industry than any other industry in the economy:

- In our estimation, credit provided to the industry in Israel stands at NIS 140 billion, which accounts for about 10 percent of the credit in the economy and about 16 percent of credit to the business sector. About NIS 100 billion of that was provided to public companies whose financial stability is analyzed in Section 4. Most of this amount (about NIS 74 billion) is in the form of tradable corporate bonds (which account for 35 percent of the corporate bonds in Israel, excluding banks and insurance companies).
- The public companies in the industry account for a large share of the market value—16 percent of the total value of traded corporations in the economy, excluding banks and insurance companies.
- The five largest banks have extended credit to the industry (mainly to commercial property) in the amount of NIS 59 billion, which constitutes 14 percent of their balance-sheet credit to the business sector and 6.6 percent of the banking activity in Israel
- The public companies in the industry own about 65 percent of the commercial properties in the economy (estimated; see Appendix B, [1]).
- In our estimation, financial institutions own about 12 percent of the commercial properties in the economy (direct investment in commercial real estate). In addition, they indirectly invest in the industry by way of stocks, bonds and direct loans.

1.2 The risk factors and the motivation for the analysis

The literature[2] worldwide indicates that the commercial real estate industry is characterized by three main risk factors: (1) cyclicity that leads to high volatility in property prices; (2) the character of its revenues which increases dependency on the business cycle in the economy; and (3) high leverage. These three risk factors, whether on their own or in synergy with one another, amplify the procyclicity of the industry and the risk that a crisis in the industry will spread to the economy as a whole.

The volatility in the industry affects the financial system also due to the characteristics of the loans provided to it (Ellis and Naughtin, 2010), particularly in comparison to the loans provided in the residential real estate market. Investors in commercial real estate usually incorporate as a separate legal entity (whose losses are limited to the amount of equity they have invested) while housing loans from the banks in Israel are considered to be full recourse. Therefore, in commercial real estate a borrower has a much smaller incentive to avoid default. Moreover, the loans to the commercial real estate industry are viewed as riskier, which is seen in the share of problematic debt in the loans provided by the large banks to the various real estate industries: real

1 Real Estate Investment Trust.

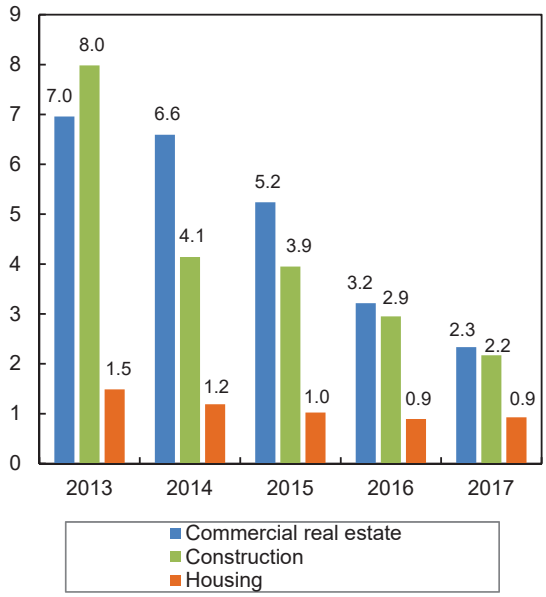
2 See Ellis and Naughtin (2010), Benford and Burrows (2013), Olszewski (2013), ESRB (December, 2015).

estate activity, construction and housing loans (Figure 1).

It is emphasized in the literature that although the last financial crisis began with a bubble in residential housing prices, the commercial real estate industry played a major role in the crisis. In most countries, it was responsible for greater losses to the banks and credit providers than residential real estate, which can be seen in the fact that commercial real estate prices in a variety of countries fell more than residential real estate prices during the crisis. Also in the cases of economic crises in the Scandinavian countries, Ireland and Britain, commercial real estate was a major factor in amplifying the crisis (Olszewski, 2013).

There is therefore a real possibility that a crisis in the commercial real estate industry will spread to the balance sheets of the banks and credit providers. As the financial system has a large exposure to it and in view of the risks described above, such a crisis can lead to a financial crisis in the entire economy. Moreover, the relevant literature also links the commercial real estate industry to the economy's financial stability. This provides the motivation for analyzing the industry in Israel.

Figure 1
Problematic Debt as a Share of Credit to the Construction and Real Estate Industry, the Five Large Banks, 2013–17 (percent)



SOURCE: Based on published financial statements.

2. The data and methodology

One of the main challenges in the study of commercial real estate in Israel arises from the lack of relevant data in order to carry out a sufficient and high-quality analysis. In many other countries, there is accessible information that can be used to analyze the industry (property prices, vacancy rates, rental per square meter, capitalization rates, etc.); however, in Israel there is low accessibility to such data and in some cases none at all. Therefore, we primarily made use of the financial statements published by public companies and to some extent also those of financial institutions. We also used the data published periodically by the Chief Government Appraiser.

Due to the paucity of data, we emphasize that although the public companies and financial institutions hold a high proportion of commercial property (about 75 to 80 percent in our estimation), the analysis does not cover the entire industry in Israel. Furthermore, since the beginning of the period being analyzed, the number of listed companies has declined, particularly commercial real estate companies, and therefore the comparison between 2009 and 2017 focuses only on companies that reported to the TASE in both those years.

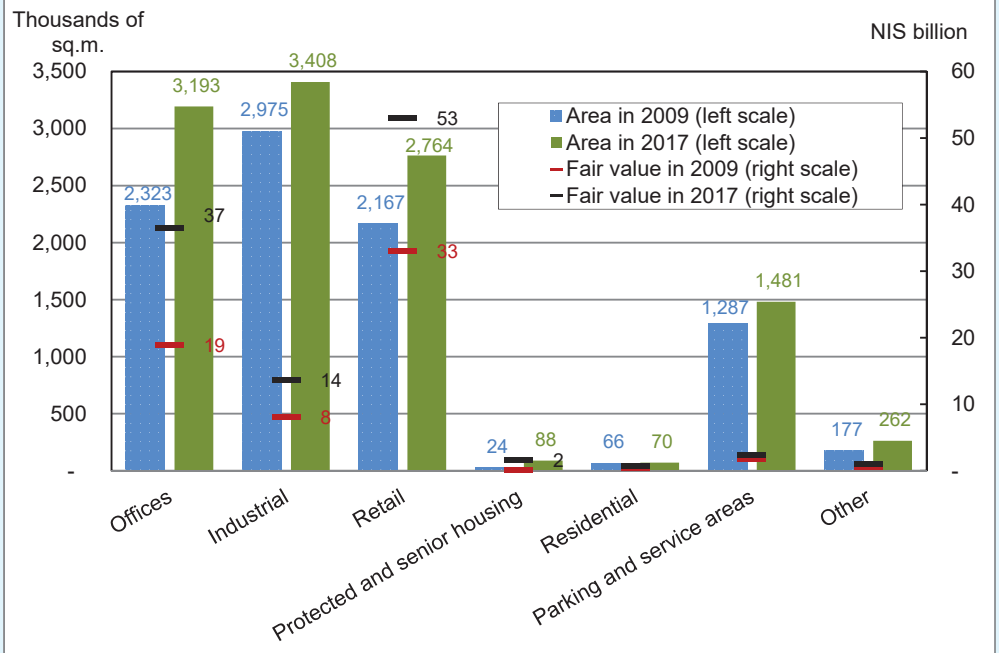
Appendix B describes in detail the collection of the data and our calculations.

3. Commercial real estate in Israel

The commercial real estate meterage held by public companies expanded by about 25 percent (3 percent annually on average) from 2009 to 2017, from 9,020 thousand square meters at the end of 2009 to 11,267 thousand square meters at the end of 2017. The growth during this period was primarily a result of the growth

in office and retail space (which reached about 1,467 thousand square meters). There was also an increase in industrial meterage, though at a slower rate (Figure 2).
In terms of fair value, the trends are even more pronounced. The fair value of commercial real estate meterage grew during this period by about 73 percent (about NIS 46 billion), from NIS 63 billion at the end of 2009 to NIS 109 billion at the end of 2017, and in some of the categories the growth was significant (Figure 2).

Figure 2
Commercial Real Estate Area and Its Fair Value, 2009 and 2017



SOURCE: Based on published financial statements.

An analysis in terms of fair value clearly shows the extent to which commercial real estate companies and financial institutions are exposed to the retail sector. In order to further investigate this point, we examined the share of meterage and the share of fair value for the three main categories: industrial, retail and offices. As can be seen in Figure 3, retail accounts for the smallest share in terms of meterage and the largest share in terms of fair value (more than 50 percent). Figure 3 reveals another trend in which the meterage of offices and retail has grown at the expense of meterage for industry.

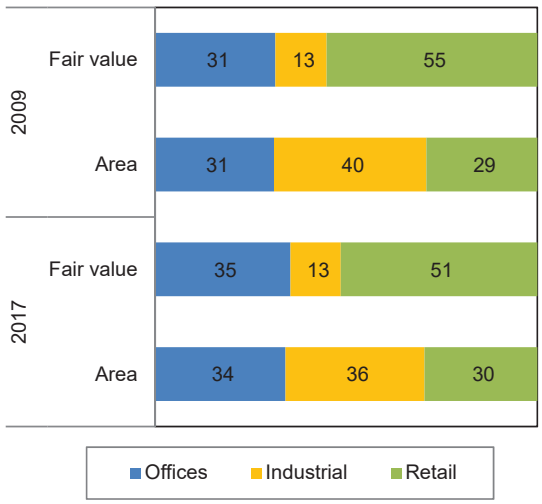
3.1 The increase in the value of commercial assets

The most interesting trend during the period is the increase in fair value and property prices. In order to examine this trend, we calculated the fair value (in shekels) per square meter for each type of commercial property in 2009 and in 2017 (see Appendix B [2]) and in this way estimated the rate of increase in their prices during the period (Table 1).
As can be seen from Table 1, the fair value per square meter of retail properties is at the top of the ranking, although the rate of increase (27.4 percent) is low relative to the office and industrial spaces (40.4 percent and 46.1 percent, respectively). It is possible that this is the result of supply and demand trends that arose in response

to recent phenomena, such as the significant growth in demand for office space and technological parks as a result of the expansion in the high-tech industry[3] and, in contrast, the moderation in demand for retail space, following many years of growth, as well as the growth in the demand for logistics and storage space (classified as part of "industrial") due to the technological revolution led by consumers in e-commerce.

A comparison of the increase in nonresidential real estate prices to the increase in residential real estate prices, despite the differences in property characteristics, shows that the former was more moderate. Central Bureau of Statistics data show that from 2009 until 2017 the index of owner-occupied dwelling prices rose by 84 percent.

Figure 3
Area as a Share of Total Area, and Fair Value as a share of Total Value, Office, Industrial and Retail Properties, 2009 and 2017 (percent)



SOURCE: Based on published financial statements.

Table 1
Fair value per square meter, 2009 and 2017

	Fair value (NIS) per sq.m.		Rate of change in value (percent)
	2009	2017	
Offices	8,044	11,296	40.4
Industrial	2,722	3,977	46.1
Retail	14,578	18,574	27.4
Protected and seniors' housing	11,072	13,659	23.4
Residential	6,310	11,691	85.3
Parking and service areas	1,404	1,637	16.6

SOURCE: Based on published financial statements.

3.2 The yields on commercial properties

The mirror image of the increase in fair value of commercial properties is obtained when we look at their yields.[4] The analysis is based on semiannual data published by the Chief Government Appraiser.[5]

As can be seen in Figure 4, the yields on all types of properties have declined over the years and it is reasonable to assume that this was because their fair value rose in parallel with the decline in interest rates in the economy

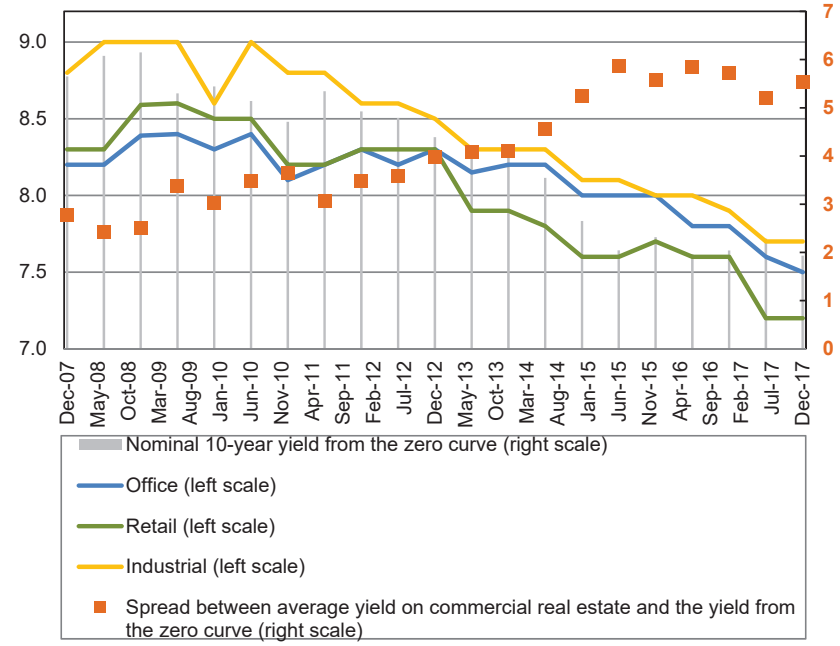
[3] See the S&P Maalot rating company's survey of commercial real estate in Israel (May 2017 and July 2018).

[4] The yield is equal to the ratio of rent earned from the property (usually Net Operating Income—NOI—is used) to fair value. It is also known as "capital growth".

[5] The data are based on a sample of property appraisals. To illustrate, during the second half of 2017 data was gathered on commercial properties in 35 cities throughout the country.

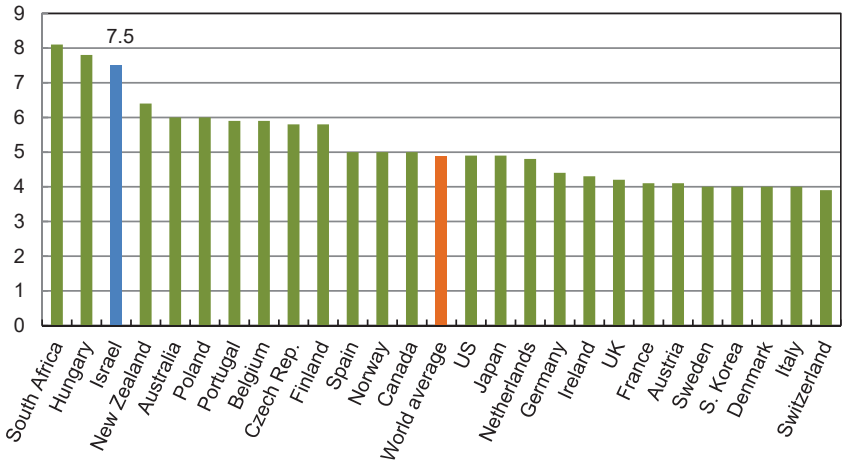
(as evidenced by the decline in the 10-year nominal risk-free rate). In contrast, the spread between the yield on commercial properties and the 10-year nominal risk-free rate almost doubled. The graph also shows that during the period yields on industrial properties were higher than for retail and office properties. This can be attributed to industrial properties being characterized by a higher level of risk (due to, for example, the fact that the population of renters is smaller; because it is difficult to change the usage of these properties; and

Figure 4
Yield on Commercial Real Estate and Nominal 10-Year Yield from the Zero Curve, 2007–17 (percent)



SOURCE: Chief Government Assessor and Bank of Israel.

Figure 5
Yield on Commercial Real Estate in Domestic Currency, by Country[a], 2017
(percent)



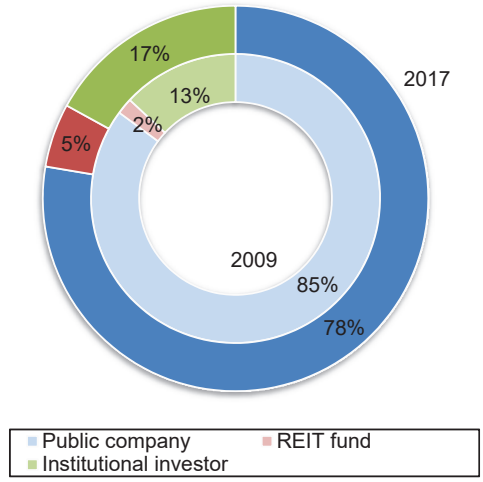
[a] The figure on Israel is the simple average of the three types of commercial properties in Figure 4.
SOURCE: MSCI, KTI.

because their geographic location—on the urban periphery—leads to lower demand).
It should be noted that although yields fell, they are still high relative to other countries (Figure 5), which many indicate that rents in Israel are relatively high.

3.3 Commercial real estate investors

The analysis so far has mainly focused on corporations that report to the TASE (public companies and listed REIT funds). However, institutional investors also invest directly in commercial real estate. In comparison to 2009, it appears that the share of the financial institutions and the REIT funds in the industry has grown while that of the public companies has declined (Figure 6). The behavior of the financial institutions is apparently connected to the search for higher yield since the period being examined was characterized by low interest rates. The growth trend among REIT funds is more related to legislative developments. These include the REIT Funds Law which was passed in 2005 and which provides the REIT funds with certain tax breaks. In January 2016, an amendment to the Income Tax Ordinance was passed which offers tax breaks to REIT funds that invest in rental housing. Currently, there are four REIT funds, one of which was founded in 2016 for the purpose of activity in commercial real estate for residential purposes.[6]

Figure 6
Investors in Commercial Real Estate as a Share of Fair Value, 2009 and 2017



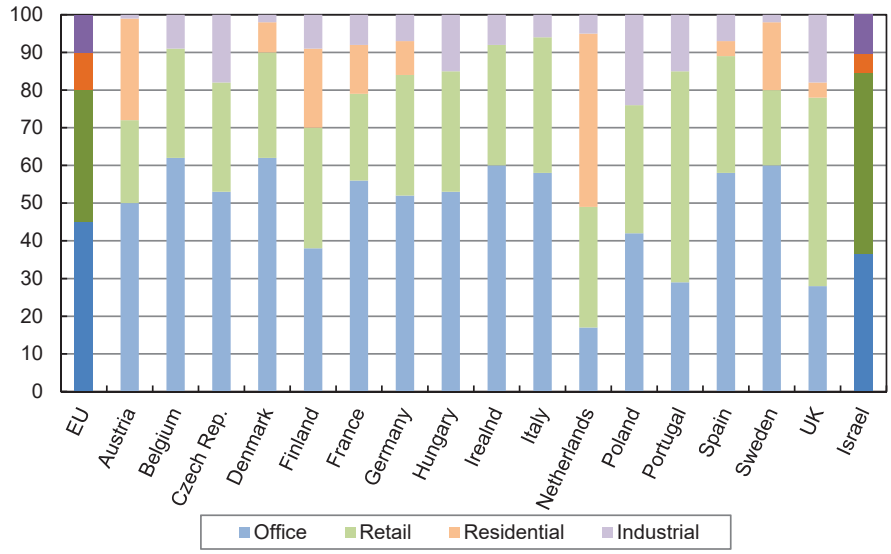
SOURCE: Based on published financial statements.

3.4 Comparison to the European countries

We analyzed the distribution of investment in terms of fair value by commercial property type, and compared it to the distribution in Europe (Appendix B, [3]). As Figure 7 indicates, retail accounts for a larger share of commercial real estate in Israel than in Europe; offices' share is smaller; and the share of industrial is similar. With respect to commercial real estate for housing, it appears that, as in Israel, in many European countries there is only negligible investment in commercial real estate for residential purposes (although this similarity may be due to the lack of accessible information in both Israel and Europe).
When we examine the value of commercial real estate in terms of percent of GDP (Figure 8), it is found that the ratio for Israel is lower than the average for Europe but similar to the ratio for many countries and therefore it is possible that Israel is not an outlier in this respect. With regard to Israel, note that in 2017 the fair value of commercial real estate constituted about 14 percent of nominal GDP (in current prices), while in 2009 it constituted about 11 percent (see Appendix B, [4]).

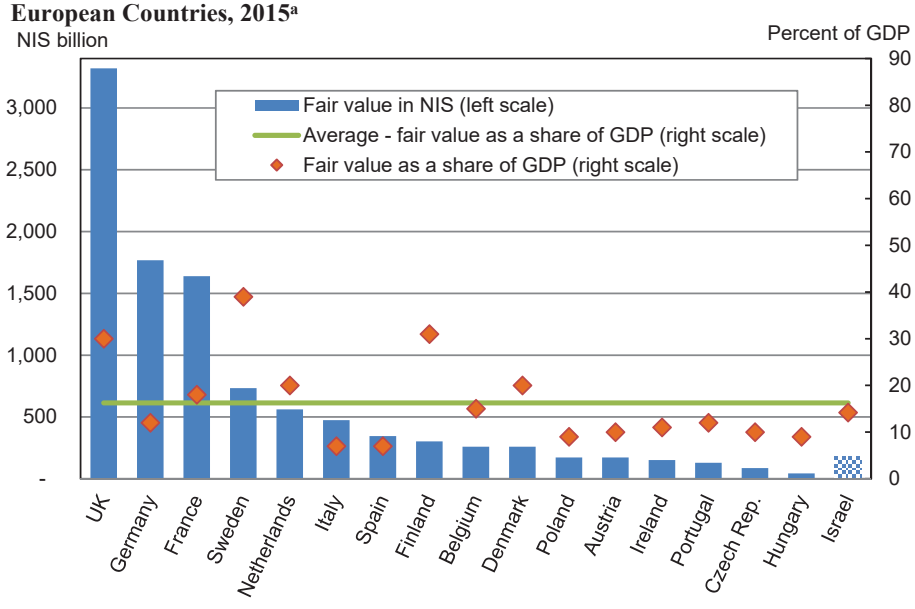
[6] However, there is insufficient disclosure in the fund's financial statements as to the properties of the commercial real estate that it owns and therefore we did not take its data into account.

Figure 7
Distribution of Investments in Commercial Real Estate, Israel and European Countries, 2014[a] (share of fair value)



[a] Data on Israel are for 2017.
SOURCE: Report on Commercial Real Estate and Financial Stability in the EU (ESRB), December 2015.

Figure 8
Fair Value of Commercial Real Estate (NIS and Percent of GDP), Israel and European Countries, 2015[a]



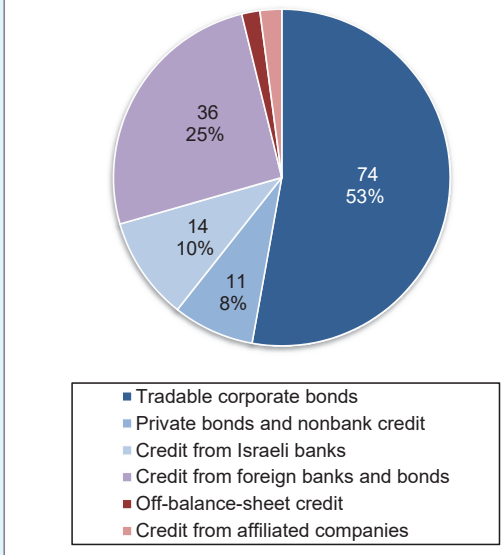
[a] Data on Israel are for 2017.
SOURCE: MSCI/PDI.

4. The financial stability of the commercial real estate companies in Israel

4.1 The liabilities of the public commercial real estate companies

As of the end of 2017, the financial debt of the public commercial real estate companies totaled NIS 135 billion and the credit from related companies and non-balance-sheet sources totaled about NIS 5 billion (Figure 9). About NIS 36 billion of the financial debt is from foreign sources and the rest (about NIS 100 billion) is from domestic sources. More than half of the credit is in the form of bonds held by the public in Israel (NIS 74 billion) and this amount constitutes about 35 percent of total corporate bonds in Israel, excluding banks and the insurance companies. The calculations can be found in Appendix B [5].

Figure 9
Liabilities of Commercial Real Estate Companies, by Lending Facility, 2017 (NIS billion)



SOURCE: Based on published financial statements.

The amount of credit from the banks in Israel is not particularly large (about NIS 14 billion) and it can be hypothesized that the traded companies prefer to use tradable bonds since they constitute a cheaper source of financing than bank loans and because the supply of credit from the banks is limited due to their per-industry indebtedness limits. With regard to the maturities of the liabilities, it appears that commercial real estate companies' debt is longer term than for the rest of the traded companies. As such, they will redeem only 36 percent of their liabilities in the next three years (2018–20), while other traded companies will redeem 47 percent. It can be concluded therefore that the expected interest rate hikes during this period will affect the commercial real estate companies less than other traded companies.

4.2 Characterization of the companies

We segmented the public companies in the industry into five groups according to the nature of their activity, since some of them are also active in commercial real estate abroad[7] and/or construction. Table 2 presents selected figures for the companies as of December 31, 2017, including the share of each group in market value and in total corporate bonds. The characterization of the companies shows the risk to the Israeli economy originating from each group and to the commercial real estate industry in Israel. To illustrate, the more active a company is in commercial real estate abroad the greater the chance that foreign crises in the industry will spread to Israel. Moreover, when companies are involved in construction, the projects are usually carried out using bank credit and therefore the lending bank monitors the company more closely.

7 We classified companies as being active abroad if their foreign activity accounts for at least 10 percent of their total activity.

Table 2

Selected data on commercial real estate companies in Israel, by nature of activity, Dec. 31, 2017

	Commercial in Israel	Commercial abroad	Commercial in Israel and abroad	Commercial in Israel + construction and development	Commercial in Israel and abroad + construction and development	Total	Adjustments to financial statement data in respect of consolidated companies[c]	Total
Number of companies	24	7	13	7	6	57		
Total market value (NIS billion)	47.9	1.9	23.6	12.9	9.7	96.0		
Share of market value[a] (percent)	7.9	0.3	3.9	2.1	1.6	15.9		
Total tradable bonds on the Tel Aviv Stock Exchange (NIS billion)	27.0	2.2	22.7	9.1	13.2	74.2		
Share of tradable corporate bonds in Israel[b] (percent)	12.8	1.1	10.7	4.3	6.2	35.1		
Total financial debt in the financial statements (NIS billion)	37.5	9.3	61.0	12.8	29.3	149.9	-14.8	135.1
Total investment real estate in the financial statements (NIS billion)	75.8	16.9	74.4	24.1	38.2	229.4	-26.5	202.9
Average leverage	0.56	0.56	0.63	0.55	0.72	0.61		

[a] As a share of total market value of public companies (periodic average), excluding banks and insurance companies.

[b] As a share of total corporate bonds in Israel, excluding banks and insurance companies.

[c] This adjustment is made because there are 6 companies whose data are consolidated by the parent companies, and these are also included in the table.

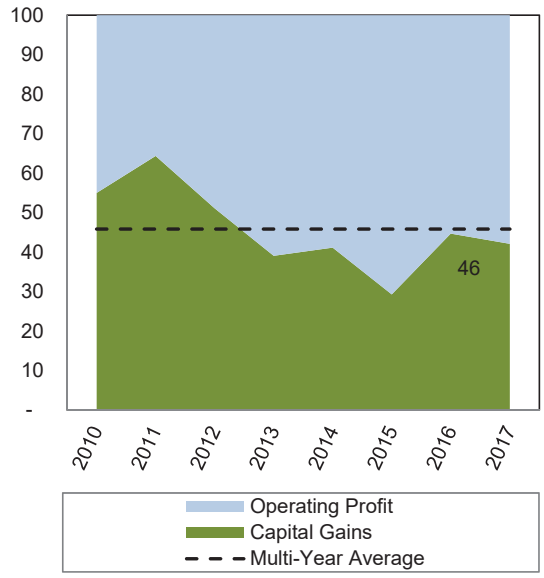
SOURCE: Based on published financial statements.

4.3 Revaluation profits

One of the most relevant developments to the commercial real estate industry is related to the fact that traded Israeli companies implemented the International Financial Reporting Standards (IFRS) a decade ago. The implementation enabled real estate companies to record assets in their books according to fair value. In each period, the companies record a profit or loss in their financial statements according to the changes in the value of investment real estate. Figure 10 shows that this accounts for a significant share of the companies' profitability, such that the average during the period of the analysis stood at about 46 percent of aggregate pre-tax profit.

The accumulation of revaluation profits over time is likely to create risk from several directions. In a 2017 paper, researchers showed that the distribution of dividends from revaluation profits significantly increases (by threefold) a company's default risk.[8] In addition, the recording of revaluation profits due to an increase in the value of

Figure 10
Distribution of Aggregate Pre-Tax Profit of Commercial Real Estate Companies, 2010–17
(percent)

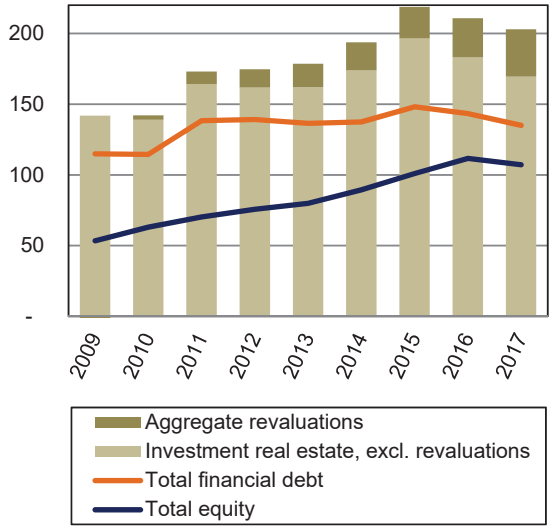


SOURCE: Based on published financial statements.

[8] Chen, Gavius, and Steinberg (2017), "Dividends from Unrealized Earnings and Default Risk."

properties increases the exposure to price declines in the industry; and, importantly, the accumulation of profits could cause the companies to raise additional debt against the reevaluated real estate properties or to present a reduction in leverage, and thus camouflage riskier leveraged activity. In order to examine if this is indeed the case, we broke down real estate investment properties in the books into two components: accumulated revaluations and the value of investment real estate excluding revaluations (see Appendix B, [6]). Figure 11 shows that the value of the financial debt does not necessarily rise in line with real estate revaluations. Thus, since 2011 it remained relatively unchanged at about NIS 140 billion on average and did not change substantially, even though the cumulative revaluations increased over time. We therefore conclude that the recording of revaluations did not worsen the companies' financial profile.

Figure 11
Aggregate Investment Real Estate, Equity, and Financial Debt of Commercial Real Estate Companies, 2009–17 (NIS billion)



SOURCE: Based on published financial statements.

4.4 Financial ratios

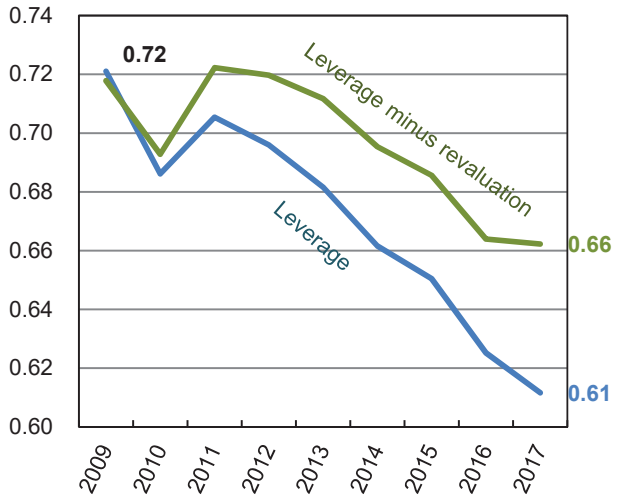
To analyze the financial stability of the commercial real estate companies, we looked at three financial ratios: leverage, repayment ability and liquidity (Appendix B, [7]). If it was relevant, we calculated the ratios net of revaluations. As shown in Figure 12 to 14, since 2009 there has been an improvement in the companies' financial ratios, even when revaluations are netted out. The average leverage and immediate liquidity ratios show positive trends and the coverage ratio in 2017 is three times what it was in 2009.[9] The improvement in the coverage ratio can be attributed to both the increase in the company's operating profitability and the decline in financing expenses (the financial debt did not change markedly even though the commercial real estate companies energetically raised capital in the bond market, which indicates that they were primarily exchanging expensive debt for lower-cost debt due to the low interest rate, and thus were able to reduce their financing expenses). The improvement in the financial ratios is statistically significant (95 percent) using a nonparametric test, except for the leverage ratio net of revaluations.

With regard to the reduction in leverage, it is important to note that this is part of a global trend. As shown in Figure 15, leverage grew in many regions of the world up until the crisis and subsequently declined. With regard to Israel, it can be seen that from 2009 onward leverage declined (although not continuously) and reached the lowest level observed in the regions that were examined.[10]

[9] We omitted an outlying observation from the coverage ratio net of reevaluation for 2009 which involved one company that recorded large negative reevaluations as a result of activity abroad due to the financial crisis. If the observation had been left in, the ratio net of reevaluations would have been 3.81.

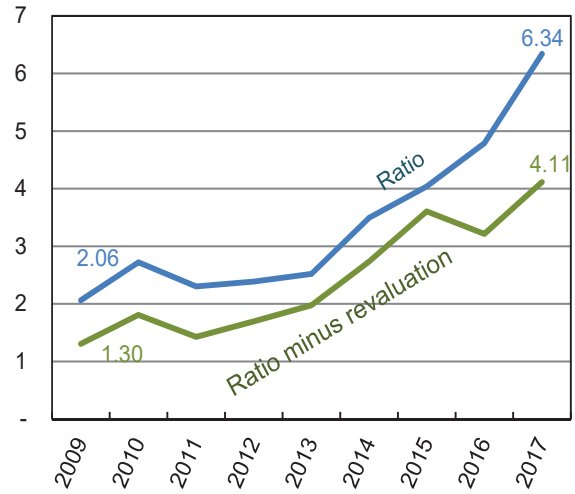
[10] In order to carry out a valid comparison, we calculated the debt as a percentage of properties for the commercial real estate companies in Israel only.

Figure 12
Leverage of Commercial Real Estate Companies, 2009–17 (Weighted average by assets)



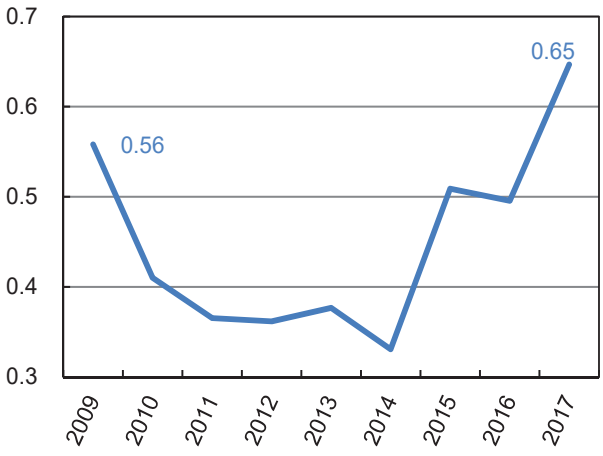
SOURCE: Based on published financial statements.

Figure 13
Interest Rate Coverage Ratio, Commercial Real Estate Companies, 2009–17 (Weighted average by assets)



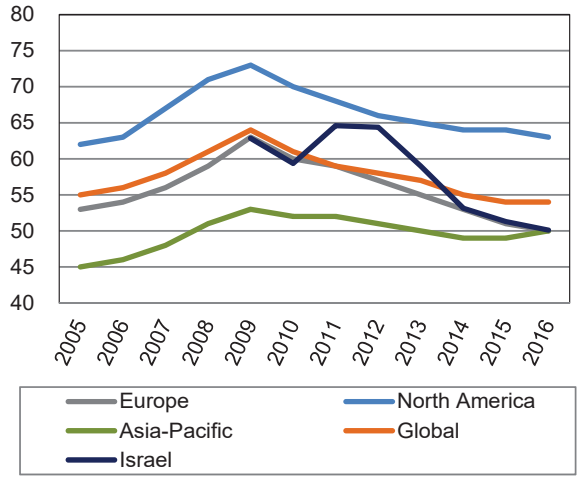
SOURCE: Based on published financial statements.

Figure 14
Immediate Liquidity Ratio, Commercial Real Estate Companies, 2009–17 (Weighted average by assets)



SOURCE: Based on published financial statements.

Figure 15
Financial Debt as a Share of Property Inventory, World Regions, 2005–16 (percent)



SOURCE: Cushman and Wakefield, "Money Into Property", 2018.

4.5 Delisting of traded companies

Since 2009, we have seen a reduction in the number of companies traded on the TASE, particularly commercial real estate companies. Currently, there are 57 companies of this type, whereas at the end of 2009 there were 73. In the interim, 19 delisted, 3 were merged into other companies, and only 6 were added. We calculated the three aforementioned financial ratios (as of the end of 2009) for all of the companies traded on the TASE in 2009 and also for a group of companies that were traded then but not today. As shown in Table 3, the financial profile of the latter companies is inferior to that of the companies traded in 2009 and still traded today. In other words, in the years since 2009, commercial real estate companies with a financial profile inferior to that of companies that continued to be traded, were delisted. This is also reflected in the reasons for delisting: of 19 delisted companies, 10 were delisted following a debt restructuring proceeding (8 were liquidated or became inactive and 2 became private).

Table 3
Selected financial ratios (weighted average by assets), Dec. 31, 2009

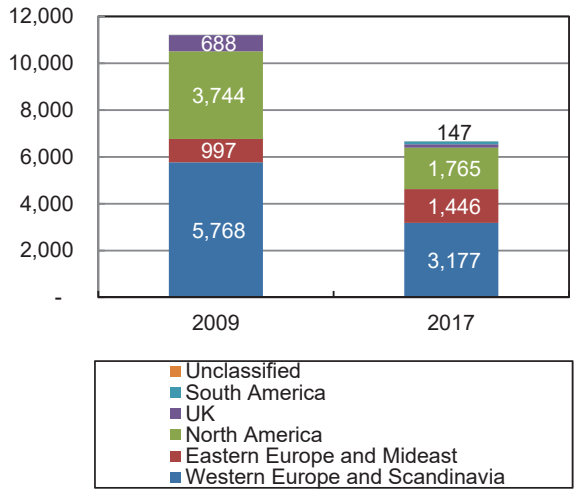
	Leverage	Interest coverage ratio	Liquidity ratio
Companies traded in 2009 and in 2017	0.72	2.06	0.56
All companies traded in 2009	0.75	1.85	0.50
Companies traded in 2009 but not in 2017	0.85	1.06	0.24

SOURCE: Based on published financial statements.

4.6 Exposure to foreign commercial assets

A comparison between 2009 and 2017 shows that investment in commercial assets abroad declined markedly during this period. This was the result of the decline in real estate holdings in advanced economies, while in less developed regions there was in fact an increase (Figure 16). Companies active in commercial real estate (which were analyzed in Section 3) owned 6,664 thousand square meters abroad at the end of 2017, compared to the end of 2009 when they owned 11,216 thousand square meters (a decrease of almost 41 percent). In terms of fair value,[11] the investment totaled about NIS 60.4 billion in 2017 as compared to about NIS 79.7 billion at the end of 2009 (a decrease of about 24 percent). Therefore the reduction in holdings of foreign commercial properties was partially offset by the rise in fair value.

Figure 16
Area of Commercial Real Estate Held Abroad by Public Companies, 2009 and 2017 (Thousands of sq.m.)



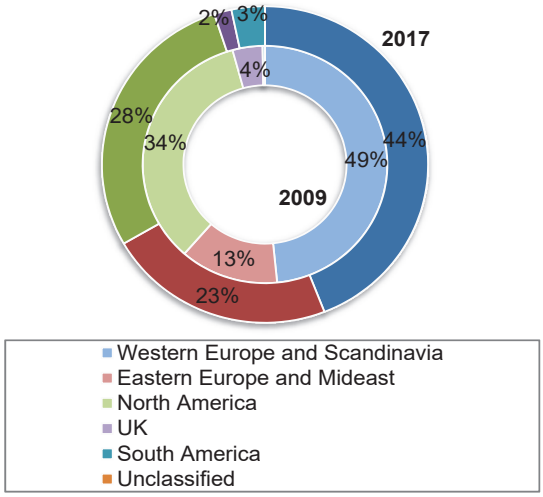
SOURCE: Based on published financial statements.

[11] It should be noted that in 2017 the fair value figures include real estate abroad that the financial institutions owned directly; however, this is not a large amount since most of the financial institutions invest in foreign real estate by means of nontraded subsidiaries.

Foreign exposure among companies that were traded in both 2009 and 2017[12] – At the end of 2017, these companies owned 6,285 thousand square meters as compared to 9,035 thousand square meters at the end of 2009. The largest decline (about 49 percent) occurred in the holdings located in North America. In the Western European countries and Scandinavia, there was also a decline although at a lesser rate (about 32 percent). An increase was recorded in Eastern Europe and the Middle East. In other words, it appears that in parallel to the reduction in total investment abroad, there was an increase in its geographical dispersion (Figure 17).

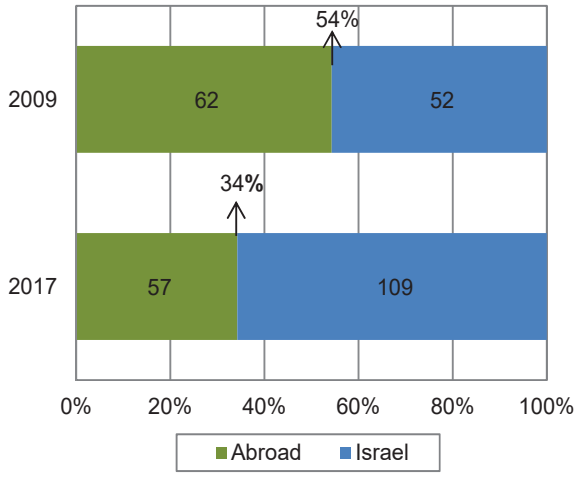
As shown in Figure 18, there was not a major change in foreign exposure in terms of fair value, with NIS 57 billion at the end of 2017 as compared to NIS 62 billion at the end of 2009 (a drop of 9 percent). However, there was a notable change in the asset allocation: in 2009, the companies allocated 54 percent of fair value to foreign commercial properties (and 46 percent to commercial properties in Israel) while in 2017 they allocated only 34 percent to foreign commercial properties (and 66 percent in Israel).

Figure 17
Geographic Distribution of Assets[a] Held by Commercial Real Estate Companies, 2009 and 2017



[a] As a share of the fair value of all assets.
SOURCE: Based on published financial statements.

Figure 18
Distribution of Assets between Israel and Abroad, Commercial Real Estate Companies, 2009 and 2017 (NIS billion)



SOURCE: Based on published financial statements.

5. Conclusion

The commercial real estate industry in Israel has gone through many changes during the period 2009–17, which were driven by a number of factors: technological developments that led to online commerce, a low interest environment, changes in accounting standards, global economic and financial crises, legislative changes, etc.

Our analysis has arrived at several conclusions. First, there was a significant increase during this period in property prices in all categories (office space, manufacturing facilities and retail), although it was more moderate than the increase in prices of residential real estate.

[12] We focused on them because there are companies that were delisted during the period and also because there are companies that were not analyzed in this section since their main activity is not commercial real estate.

Second, there was an increase in the meterage of commercial property, primarily offices and retail. The meterage for offices and technological parks grew faster than meterage for retail, in view of the growing demand on the part of high-tech companies and service providers. Meterage for manufacturing also grew but at a more moderate rate. An examination of properties under construction that are held by public companies indicates that the supply of commercial properties for logistics use (within the category of "manufacturing") will not expand to any great extent in coming years. This fact is likely to create a gap between demand and supply since the real estate industry is characterized by inelastic supply while demand for warehousing and logistic space is likely to grow as consumers shift to online commerce and as additional retail chains open in Israel.

In parallel, the demand for retail space is likely to decline as a result of the growth in online shopping (the "Amazon effect"), a process that is taking place in several regions of the world[13] and recently also in Israel and following the collapse of several fashion chains.[14] The implications for commercial real estate companies may be reflected in increased vacancy rates and a drop in rents (note that contracts are usually fixed and therefore the effect on commercial real estate companies is not being felt at this stage). This trend could cause a drop in the price of commercial real estate for retail use and an adverse impact on cash flow. This in turn will have repercussions on numerous companies due to their large-scale exposure to the retail sector (in terms of fair value and even in comparison to Europe). However, the companies have the possibility of converting retail space to logistics space and thus reduce the potential damage.

Third, commercial real estate companies in Israel have improved their financial profile—financial ratios indicate a positive trend, the operating profitability of the commercial real estate companies has grown on the aggregate level, and the current operations of the companies are less leveraged today than in the past and are based more on equity. Moreover, the companies have recycled their debt over the years, in view of the low level of interest rates, and in this way have reduced their financing costs. In parallel to the improvement in financial health, there has been quite a significant reduction in the foreign exposure of commercial real estate companies while its geographic dispersion has expanded. However, the companies' reduced foreign exposures and their increased domestic exposure could lead to problems in the case of a crisis in the industry that originates in Israel.

It should be emphasized that a collapse of the commercial real estate industry has played a significant role in financial crises in various parts of the world; although in Israel there is no evidence of a similar phenomenon. It is possible that the explanation for this is related to the increasing demand for commercial real estate, primarily for retail and offices, low vacancy rates, economic growth and high population growth.

However, it is possible that the improvement in financial robustness and high real estate prices reflects the procyclicity of the commercial real estate industry. Overall economic trends, such as an increase in vacancy rates, a drop in rents, or alternatively an increase in the capitalization rates, may lead to sharp declines in the prices of assets and a drop in revenues. These in turn will lead to deterioration in the leverage, repayment ability and liquidity ratios. Moreover, the positive trends that contributed to the growth in commercial real estate and its financial resilience, due to the convenient financial conditions, may experience a reversal that will lead to a crisis. Therefore, the industry needs to be monitored, at least to the same extent as residential real estate. The only-partial figures that are available for the industry and their low accessibility and the lack of information (such as property prices, rent per square meter, vacancy rates, etc.) mean that it is almost

[13] MSCI (Feb, 2018), Retail Apocalypse: Should Mall Owners Be Worried?

[14] Further details can be found in the Financial Stability Report for June 2018, under the title "The Resilience of the Business Sector."

impossible to monitor this industry in Israel.
Based on previous crises, Olszewski (2013) describes measures that can assist the central banks in formulating macroprudential policy in order to deal with the cyclicity in the commercial real estate industry. These measures include, among others, the tracking of commercial property prices, the adoption of an appropriate method for the revaluation of property prices and the creation of a database that will make it possible to investigate the connection between the business cycle and the price cycle. Allen and Rogoff (2011) also propose a series of steps, some of which have to do with various tax aspects of the issue. Benford and Burrows (2013) describe the steps taken by the Financial Stability Committee in the UK with respect to the banks and the investment companies, such as the adjustment of capital requirements according to the specific type of exposure, including commercial real estate.
In Israel, the banks are subject to a per-industry indebtedness limit and therefore their exposure to the commercial real estate industry is limited to some extent. Nonetheless, there is a need for closer tracking and analysis of the industry and property prices, with the goal of assisting the central bank and policy makers in identifying the booms and busts in the industry. Such an analysis will make it possible to suggest, if needed, additional macroprudential steps to deal with these situations.

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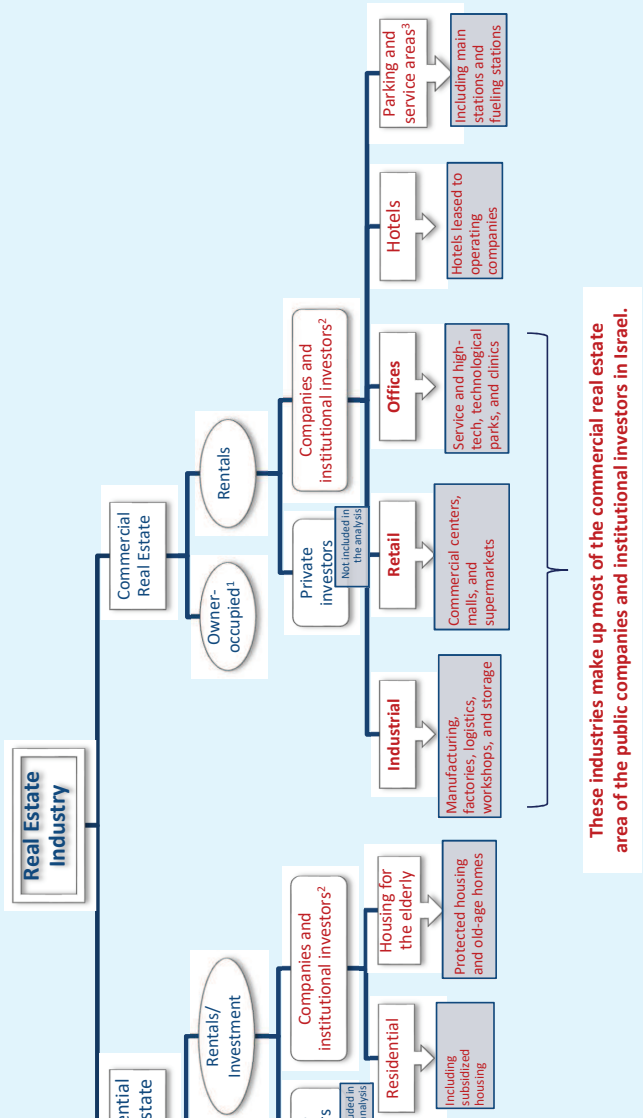
Appendix A

Appendix A
Chart of the Real Estate Industry



[1] Used by commercial companies—mainly factories or owned offices; and by private individuals—mainly single stores.
[2] As of the end of 2017, the public companies had an estimated market segment of 65 percent, and the institutional investors had an estimated market segment of 12 percent.
[3] May also be included under "commercial".

Appendix B: Data sources and methodology

In order to analyze the industry, we primarily used the business description for all corporations reporting to the TASE (including REIT funds) that are active in commercial real estate in Israel (some of which are involved in other activities such as construction, hotels, etc.) and belong to the construction and real estate industry according to the TASE classification and/or the real estate sector according to the 2011 Central Bureau of Statistics classification. To avoid duplication, we used the disclosure provided for the "share of the corporation" rather than the "consolidated" and if necessary we subtracted out the data for subsidiary companies from the parent company's data, according to the rate of holding in the subsidiary.

For Section 3, we gathered data on public companies for two points in time: 2017 (69 companies and 2009 (83 companies). It should be noted that the decrease in the number of companies is primarily the result of the delisting of companies from the TASE, the merger of companies and changes in their activity (discussed in Section 2). Due to this decrease, we only compared companies that were traded at both points in time. In the cross-sectional analysis and the international comparison, we used figures on all the companies for which data was gathered.

The financial institutions also invest in commercial property and therefore they served as an additional source of information. However, their disclosure is on a rudimentary level. The reports of institutional holdings enabled us to gather only fair value data for investment real estate and on the basis of the relevant note in the financial statements we were able to break it down.[15] Thus in 2017, there was usually a differentiation made between the types of real estate (retail or offices) and investment either in Israel or abroad; however, in 2009, there was in general no disclosure and therefore we categorized all of the investment real estate as commercial real estate in Israel.[16]

Since there is no detailed information on private investors in residential real estate, we did not include them in the definition of commercial real estate. However, we took into account business entities that buy property for residential rentals.

In order to compare 2009 and 2017, we gathered and compiled data by category: offices—including high tech, technological parks and health clinics; manufacturing—including manufacturing space, logistics, workshops and warehousing; retail—retail space, retail centers, malls and supermarkets; sheltered housing and old age homes; residential—including subsidized housing; parking lots and service space—including central bus stations and gas stations; other—including mainly hotels (negligible in Israel), server farms, nursing homes, agricultural property and empty lots.

For Section 4, the analysis of financial stability (in 2017) was based on 57 public companies (including REIT funds) whose main operations are in commercial real estate (excluding foreign or dual-traded companies). We omitted 12 companies that were discussed in Section 3 since the main part of their operations (more than 50 percent) is not in commercial real estate. These 12 companies are important for the discussion in Section 3 in order to paint a reliable picture of the commercial real estate meterage in Israel, though they are not particularly relevant to the industry's financial stability.

[15] In certain cases, we assumed that the figures on commercial real estate owned by pension funds and provident funds (data gathered from reports of financial institutions) can be broken down between the various types of real estate in a manner similar to that in which data for commercial real estate owned for nostro/yield-dependent contracts is broken down. This breakdown appears in the notes to the financial statements of the company on the level of the controlling corporation.

[16] Since the financial institutions in general hold foreign commercial real estate by means of associate companies and present it in their financial statements as an investment in nontraded subsidiaries.

Methodology

[1] Estimating market share – We used credit data to estimate the share of public companies in the commercial real estate industry. The financial debt of the companies analyzed in Section 4 raised from domestic sources is approximately NIS 100 billion while total credit to the commercial real estate industry is about NIS 140 billion. That is, they account for about 71 percent of the credit to the industry. The market share of the 12 companies that are not analyzed in Section 4 was estimated by means of the meterage of the commercial properties to be about 3 percent. All of the public companies together therefore account for 74 percent of the market. The value of the commercial properties they own is NIS 117 billion and therefore it can be estimated that the total value of the commercial property of all businesses (public and private companies) stands at NIS 158 billion (117 billion divided by 74 percent, based on the assumption that non-traded companies have identical rates of leverage). The value of properties owned by the financial institutions is about NIS 22 billion. In other words, we estimate that the total value of commercial properties in Israel is about NIS 180 billion. Therefore, it is possible to derive the market share of the public companies (117/180 = 65 percent) and of the financial institutions (11/180 = 12 percent).

[2] We divided the total fair value of commercial properties (in shekels) by their total meterage in each category (retail, offices, etc.). We carried out the calculation on the basis of the figures for the public companies only, since there is no information available on the meterage of real estate owned by the financial institutions.

[3] We added the fair value of the parking lots and the service areas to the fair value of the retail space and added the fair value of the sheltered housing and of senior citizens' homes to that of residential areas. In this way, we created four types of properties: offices, retail, residential and manufacturing.

[4] We used the estimate of fair value from paragraph [1] (about NIS 180 billion) in order to calculate its ratio to nominal GDP in 2017. In order to find this ratio for 2009, we carried out a similar calculation, except that we took into account that the public commercial real estate companies accounted for a larger market share (about 86 percent of the total for businesses, i.e., the 74 percent estimate for 2017 together with the 12 percent for companies that were delisted).

[5] According to the inventory of liabilities of the analyzed companies, their financial debt on an unconsolidated level is about NIS 87 billion (there is a higher level of detail for unconsolidated data and it can be broken down by lender). In addition, they acquired about NIS 48 billion by way of consolidated companies,[17] although in this case there is no detailed information on the types of lenders. Therefore, we estimated the breakdown of the consolidated companies' credit based on the data of the largest companies in the industry. Thus, about NIS 35 billion was provided by foreign credit providers and about NIS 13 billion by banks and financial institutions in Israel (about NIS 6.5 billion from each one). In this way, we broke down the inventory of liabilities on the consolidated level.

It should be noted that credit for real estate activity provided by the five largest banks totals NIS 59 billion and the main part of that was provided for commercial real estate. NIS 14 billion was provided to the companies analyzed on the consolidated level (NIS 6.5 billion to the consolidated companies and another NIS 7.5 billion to the companies on an unconsolidated basis) and on the reasonable assumption that another about NIS 5 billion was not provided as credit for commercial real estate, it can be assumed that the banks provided NIS 40 billion to companies active in commercial real estate that are not analyzed in this box.

[6] The cumulative revaluations are revaluation profits that are recorded for all of the previous reporting periods (we calculated the revaluations for each year). Total investment in real estate, without revaluations, is equal to the difference between the value of investment on the books and the cumulative revaluations. The accumulated revaluation profits are based on the assumption that the profits recorded during a particular period were not

[17] Companies that are not traded in Israel (otherwise their data would appear on the unconsolidated level), but might be traded abroad.

realized in subsequent periods (in other words, the commercial properties were not sold during the period). This reservation is relevant primarily if the properties were sold to companies that are not analyzed in Section 2.

[7] Leverage is equal to the ratio of total liabilities to total assets. Leverage less revaluations is calculated in a similar manner, although we subtracted out all of the accumulated revaluation profits in each period from the assets. The reservation regarding the sale of properties is also relevant here. Similarly, we assumed that the corporate income tax rate is 25 percent (which was necessary since a liability for deferred taxes is recorded against profits from an increase in the value of real estate). The interest coverage ratio is equal to the ratio of operating profit to financing expenses. The interest coverage ratio less revaluations is calculated in the same way although we subtracted the profit from the increase in value from operating profit. Immediate liquidity is

Box 3: Algorithmic trading in Israel and its impact on securities trading

- Algorithmic traders that operate on the TASE account for a major share of trading.
- Algorithmic traders implement various investment strategies and our research found that some of them are either detrimental to the quality of trading or they create risk:
  - The algorithmic traders that operate as market makers provide liquidity for trading without being subject to the obligations of official market makers. It was found that they reduce their activity on volatile trading days and therefore it is possible that they create only phantom liquidity, that is, they provide less liquidity on days when it is needed the most.
  - There is a positive and statistically significant correlation among the activity of algorithmic traders that operate using similar strategies and this could reinforce the fragility of the secondary market and also systemic financial risk.
- Policy makers and financial professionals believe that algorithmic traders contribute to liquidity and the improvement of efficiency in the process of price disclosure. However, it is important to place restrictions on their activity similar to those imposed in many stock markets worldwide, even if that involves a certain decline in some liquidity measures, since these restrictions will contribute to reducing the risks and manipulations.
- It is important to maintain close supervision of algorithmic trading activity that will monitor it in real time using innovative methods.

1. Background

Algorithmic trading is carried out by means of a continuum of predefined actions and makes it possible to trade in the capital market without human intervention. This robot trading makes use of a computer's ability to collect data, analyze the market within fractions of a second and identify a trend; decide automatically whether to buy or sell a security; and then carry out trades in the financial market at lightning speed. The use of high-frequency trading has grown rapidly in recent years, both in Israel and worldwide. In Israel, it is responsible for more than 90 percent of the orders both in stock trading and bond trading, which is high relative to other markets, although the proportion of transactions actually executed by algorithmic traders is substantially lower than other global markets.

The computers that generate orders use a variety of trading strategies, some of which are meant to produce profits during the trading day while others are used by investors to carry out adjustments in the asset portfolios they manage. There are numerous strategies of the former type, some of which identify patterns in the trend of asset prices (technical analysis) and others which try to be the first to identify irregular events and to exploit the information in the trading of the relevant financial assets. These strategies exploit the advantage of speed and create potential profit for their operators before the rest of the investors can react.

The algorithmic traders contribute to the improvement of liquidity and the increased efficiency of trading as, among other things, they work to take advantage of intraday profits, and this activity minimizes the development of trading inefficiencies. In addition, they contribute to reducing the costs of a trade, due to the reduction in manpower needed and the increased competition to make the best price offer. Investors, policy makers and academic researchers attribute a number of benefits to algorithmic trading related to the liquidity of trading in financial assets. They claim that the increase in liquidity reduces transaction costs and increases turnover and in turn increases the speed at which information about an asset's price flows. These effects reduce the uncertainty regarding the true price and therefore also the standard deviation of price changes.

However, algorithmic trading also has drawbacks. Their speed provides them with "exclusivity" for a short

time over new information released into the market and therefore they enjoy a significant advantage over conventional traders.[1] This increases the negative selection among conventional traders and they are liable to exit the market due to the uncertainty and lack of confidence in the trading system. It is important to note that differences in speed between traders have always existed and they do not negate the advantages of algorithmic trading; however, as long as algorithmic traders and conventional traders operate in parallel, the latter will continue to pay the price of the introduction of the new technology.

There is another major disadvantage not cancelled out by the advantages of progress, namely the volatility and disruptions that algorithmic trading is liable to generate. When a significant major event becomes known and uncertainty rises in the markets, the algorithmic traders are liable to automatically transmit sell orders which will exacerbate the initial response and will cause sharp swings in the financial markets. The following examples illustrate this and they have increased the public's awareness of algorithmic trading effects:

- On May 6, 2010, the Dow Jones dropped by about 1,000 points, losing about 9 percent of its value in 20 minutes. This event is referred to as the Flash Crash and the investigation by the SEC concluded that it was the result of algorithmic trading.[2]
- On October 15, 2014, in less than one hour, there was a particularly large swing in the prices of 10-year US Treasury Notes, which took place in the highest-liquidity market in the world. A joint committee[3] examined the reasons for the event using trading data on types of investors. Their report was published on July 15, 2015, and stated that algorithmic trading had operated with excessive intensity, for no discernable reason, and had caused a major imbalance in the order book. This led to the exceptionally large swing in trading.[4]
- On January 15, 2015, there was a major move in the Swiss franc—an appreciation of 30 percent within 20 minutes—after the central bank unexpectedly withdrew its support for the exchange rate floor against the euro. This fluctuation was the result of the algorithmic trading activity during those 20 minutes. Subsequently, the activity of the algorithmic traders was halted and a major shortage of liquidity was created. This event illustrates the fragility of the current market structure, particularly when new and relevant information is released, since there are various algorithmic traders operating in the market and their activity is unknown.[5]

Events of this type are liable to generate panic and chaos and to give traders a feeling of uncertainty with regard to the actual stability of traded assets. This could increase liquidity risk, the liquidity risk premium and thus, the financing costs of traded companies.

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1 The information can come from new reviews in the mass media and also from the monitoring of orders and transactions in the markets at any given moment.

2 The inquiry found that algorithmic traders transmitted a flood of sell orders after one of them sent a single order to sell futures contracts on the E-mini S&P 500 index. The selling pressure spread from the futures contracts market to the share market, causing a sharp drop in the prices of numerous shares. This finally led to the collapse of the Dow Jones index for approximately 20 minutes.

3 The members of the Joint Staff Report: U.S. Department of the Treasury; Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York; U.S. Securities and Exchange Commission; U.S. Commodity Futures Trading Commission.

4 Harris, Larry (2013). "What to do about High-Frequency Trading", Financial Analysts Journal, 69.2.

5 See the Bank of England's survey of financial stability:
http://www.bankofengland.co.uk/publications/Documents/fsr/fsrboxes/1512box4.pdf,
And also (Breedon, et al. (2018)
www.bankofengland.co.uk/publications/Documents/fsr/2015/fsrfull1507.pdf.

2. Algorithmic trading in Israel

A comparison of algorithmic trading in various stock exchanges around the world shows that their activity in Israel is unique in that it is relatively dominant in terms of the order book but limited in the number of transactions (see Kaz and Stein, 2018).[6] The algorithmic traders that trade in NASDAQ shares account for about 74 percent of the order book and 43.7 percent of total transactions.[7] On the Japanese stock exchange, as well, algorithmic traders account for 70 percent of the order book and 50 percent of transactions.[8] The algorithmic activity on the Canadian stock exchange accounts for up to 94 percent of the order book but only 36 percent of transactions.[9] The activity of algorithmic traders on the TASE accounts for an even higher proportion of the order book than on the Canadian stock exchange, but they account for a lower proportion of transactions.

A study carried out for the years 2014–15 shows that algorithmic trading activity continued to increase during this period:

- Total orders by algorithmic traders grew by more than threefold while the number of transactions they carried out grew only moderately.
- The number of orders grew both as a result of the increase in the number of accounts and in the average number of orders per account.
- There was a drop in the number of accounts of conventional traders, primarily among those that trade in mid- and small-cap stocks and the average number of orders per conventional trading account fell.
- Algorithmic traders increased the volume of their order cancelations, which reached a level of more than 99 percent. Among conventional traders, cancelations account for less than 50 percent of orders.
- The number of transactions carried out by algorithmic traders grew for all types of assets and primarily in transactions with conventional traders. This indicates that the effect of negative selection grew during the sample period.

It is possible that the increase in the number of algorithmic trader accounts in Israel increases the sophistication of the market as it expands the activity of the fastest and most efficient traders. In contrast, it could be that the parallel reduction in the number of accounts of conventional traders creates less market heterogeneity and a more vulnerable market, which may adversely impact trading quality.

Our research found that algorithmic trading in Israel has a significant effect on the quality of trading in securities on the TASE. Table 1 presents the 100 most active accounts in the order book, indicating the substantial differences between conventional trading accounts and algorithmic trading accounts. Particularly noteworthy are the trading accounts of balanced algorithmic traders,[10] as they are responsible for the lion's share of orders and transactions. We found that most of them operate as market makers, although they include accounts that operate with different strategies. The balanced algorithmic traders that do not operate as market makers are characterized by a large volume of activity and therefore they have a major effect on the quality of trading and are liable to adversely impact it.

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6 See Kaz, O. and R. Stein (2018), "The Strategies Employed by Algorithmic Traders on the Tel Aviv Stock Exchange and the Connection between Them and Indicators of Trading Quality," Discussion Paper Series, Research Department, Bank of Israel.

7 See Zhang and Riordan (2011).

8 Explanatory document dated April 19, 2016 issued by the FSA:
http://www.fsa.go.jp/en/newsletter/weekly2016/193.html

9 Survey of the Investment Industry Regulatory Organization of Canada (IIROC).

10 These are robotic day traders. They are meant to buy low and sell high by identifying intraday trends reflected in price variance. These algorithmic traders do not vary their daily position on any day or for any asset.

Table 1

Traders' activity in the 100 largest accounts, in all assets included in the five indices chosen, and for every period

	Number of accounts	Number of transactions per account, per day	Number of orders per account, per day	Ratio of transactions to orders
Regular accounts	66	161	393	41%
Algorithmic traders	34	551	23,155	2.40%
Of which: Market makers	9	619	43,688	1.40%
Arbitragers	5	414	423	98%
Others	20	555	19,599	2.80%
Balanced	15	809	40,810	2.00%
Not balanced	19	347	9,217	3.80%

a The largest trading accounts were chosen based on the number of orders in the entire sample period.

With regard to strategies, the following are the main findings of the research:

1. The algorithmic traders that operate as market makers improve liquidity and their activity is correlated with a reduction in spreads and in intraday volatility and with an increase in price disclosure. However, they reduce their activity on high volatility days[11] and therefore it may be that they provide only phantom liquidity, that is, less liquidity on days when it is needed the most.
2. In the examination of balanced algorithmic traders that do not operate as market makers, we found that their activity is correlated with lower measures of trading quality.
3. Unlike the algorithmic traders that operate using the rest of the strategies, the balanced market makers are characterized by a positive and statistically significant correlation among themselves, which could amplify the fragility of the secondary market and in turn systemic financial risk.

3. Regulation in other countries

In view of the problematic nature of algorithmic trading, regulatory measures have been adopted worldwide. These can be divided into two types: the first involves various mechanisms for the identification of algorithmic trading activity and the prevention, ex ante, of possible negative impacts. The second focuses on mechanisms that will be used in the market ex post or in other words, after a negative impact has already appeared, in order to limit its extent.

In 2012, the SEC began to build a huge database called MIDAS.[12] It contains all of the orders submitted in all of the national trading venues, including orders that were cancelled or changed, and all of the transactions carried out on the stock exchanges or outside them. This unique database contributes both to the understanding of the processes and changes that are occurring in the structure of the financial market and to the ability of the SEC to monitor traders, especially robots, and regulate them. In addition, the SEC calculates risk indices with the goal of identifying algorithms whose activity is liable to exacerbate volatility and risk in the markets.[13]

[11] Trading days on which the intraday move in the price of an asset is relatively large for it.

[12] Market Information Data Analytics System.

[13] Walter, E. (February, 2013), "Harnessing Tomorrow's Technology for Today's Investors and Markets," Speech presented at The American University School of Law, Washington, D.C.

IOSCO[14] works to establish uniform international policies and tools for its member organizations, which consist of 203 financial regulatory authorities and securities markets from more than 100 countries. In 2012, it published a report[15] in which it recommended regulatory steps to improve the efficiency of markets and minimize the adverse effects of algorithmic trading. Their recommendations are meant to help regulators identify the effects of technological developments, to encourage a uniform approach and to reduce risk.

Miller and Shorter wrote a report for the US Congress that describes in detail the algorithmic trading of shares and derivatives and surveys the steps taken by regulators. The report was published in 2016 and emphasized that although algorithmic traders had significantly increased liquidity and markedly reduced trading costs, some of them operate using aggressive strategies that are meant to confuse other traders (spoofing), such as parasitic strategies that are meant to hinder other traders but which do not produce any added value for trading. Already in 2016, the report motivated the SEC to impose heavy fines on financial entities involved in this detrimental type of activity.

As in the US markets, the European markets are also characterized by large-scale algorithmic trading. The regulation of algorithmic trading in Europe is embodied primarily in the second version of the Markets in Financial Instruments Directive (MiFID)[16] which are regulations established by the European Securities and Markets Authority and which went into effect at the beginning of 2018. The regulations include restrictions on high-frequency trading companies and on stock exchanges and trading venues in which those companies operate. In particular, the companies are required to report the trading strategies they use. The venues are themselves required to monitor excessive price movements in order to minimize them and also to limit the ratio of the number of orders to the daily number of transactions of each trader in each asset. It was decided that this ratio should be lower (less trading orders) in stock markets with relatively low liquidity. All of the stock exchanges in Europe have adopted this restriction and at the beginning of 2018 it was made more stringent by switching from a monthly average to a daily one and in addition a limit was placed on both the volume of orders and their number, so as to prevent situations in which orders are being submitted in large numbers but transactions are being carried out in only small numbers.[17] These restrictions were meant to reduce the damage caused by algorithmic traders and at the same time to preserve their positive effect on liquidity. On the basis of these regulations, the various venues have imposed a tax on excessive trading.

4. Regulation in Israel

The Tel Aviv Stock Exchange (TASE) has taken some steps that apply to algorithmic traders in order to protect the communication networks and to prevent harm to the integrity of trading. In January 2014, the TASE began to require traders to report on their algorithmic trading. In addition, it limited algorithmic trading in Maof options by means of a ceiling on the ratio of orders (including changes and cancellations) to volume[18], although in recent years it has instituted several exemptions to this limit—the last in March 2017—in response to requests from market players and on the assumption that increasing the ratio would improve liquidity.

[14] International Organization of Securities Commissions.

[15] "Regulatory Issues Raised by the Impact of Technological Changes on Market Integrity and Efficiency"

[16] See also: Financial Conduct Authority (February 2018), "Algorithmic Trading Compliance in Wholesale Markets."

[17] The Deutsche Börse decided to supervise algorithmic trading already in May 2013 and in April 2014 it began imposing fines on traders in the case of a high ratio of orders (including changes and cancelations) to trades.
http://deutsche-boerse.com/dbg-en/regulation/regulatorytopics/reg-topic-hft

[18] Already in 2006 the TASE decided to regulate algorithmic trading in derivatives in order to prevent a situation in which the orders flood the communications systems and create a risk to orderly trading. Within this framework, a limitation was established on the ratio between orders and volume.

5. Conclusions and policy recommendations

The research on algorithmic trading in Israel has found that it occurs on a large scale relative to other countries only with regard to orders; some of the strategies used are negatively correlated with indices of trading quality; and some strategies are correlated with one another (homogeneous), which increases systemic risk in the market.

Therefore it is important to consider limiting the activity of algorithmic traders in all traded financial assets, even if this involves some reduction in some of the liquidity measures, with the goal of reducing the risk of failures and manipulation. Such limitations have been imposed on stock markets worldwide at the initiative of supervisory bodies, and the TASE should consider adopting the European regulations and limiting the ratio of orders to trades. It is also important to establish circuit breakers, similar to those used in other equity markets, in order to create the ability to halt the activity of algorithmic traders when an outlier situation is identified that might harm the integrity of trading.

It is also worthwhile considering two additional steps. The first relates to unofficial market makers. Stock markets all over the word are focused on making a profit and since the source of that profit is the commission on each trade, they allow entities that are not market makers to act like market makers without having to meet the accompanying obligations. If high-frequency traders are required to meet the obligations of official market makers this is likely to reduce the probability of excessive price moves. The second step relates to commissions. The TASE charges a fixed commission on trades from both sides, regardless of who supplied liquidity and who consumed it. It may be worthwhile to collect a lower commission from the supplier of liquidity in order to encourage that activity.

It is important to remember that each of the aforementioned regulatory measures has advantages and disadvantages and consideration should be given not only to their effect on average daily volume but also on the quality of trading.

Box 4: The risks implicit in the growth of passive investment

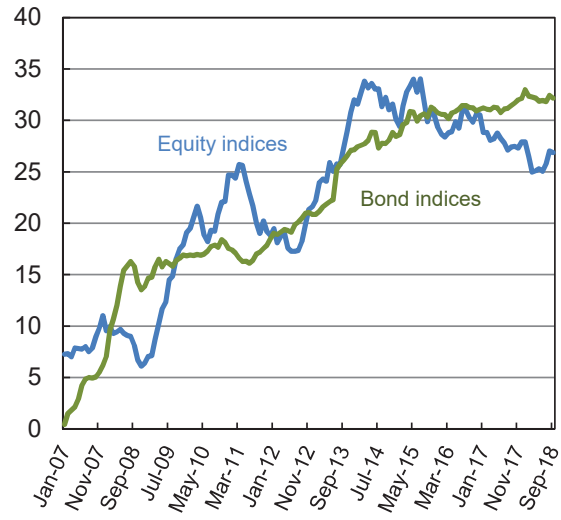
Background

Passive investment is carried out through the purchase of index-tracking mutual funds and ETN's,[1] financial instruments that track various indexes of financial asset prices. In such an investment, the performance of the portfolio is almost identical to that of the relevant index. To illustrate, in the case of an investment in an ETN that tracks the Tel Aviv 125 Index, the investment generates profits (or losses) in line with the performance of the assets included in the index during the period of the investment.

Passive investment has many advantages. First, it does not require management of the investment portfolio on an ongoing basis, since it is not based on asset selection and there is no need to analyze the companies that have issued the assets included in the index. Therefore, passive management involves much lower costs than active management. Second, as portfolio managers have trouble beating the market over time—which has been demonstrated in many empirical studies—investors have an incentive to use passive channels in the form of index-tracking products. Finally, passive investment makes it possible to diversify away portfolio risk more easily. Therefore, many economists[2] feel that this is an optimal strategy for the private investor.

However, passive investment also has drawbacks that are becoming increasingly relevant as it becomes more common among small investors. During the past decade, passive investment has grown appreciably in Israel, as it has in other countries, in terms of the amount of funds invested and the number of tracked assets and therefore it is worthwhile discussing its disadvantages. We will first deal with ETN's (a passive investment instrument similar to an ETF) and after that we will focus on index-tracking mutual funds.

Figure 1
Value of ETNs Traded on the Tel Aviv Stock Exchange, 2007–18 (NIS billion)



SOURCE: Based on Tel Aviv Stock Exchange.

ETNs

The first ETN was issued in Israel in 2000 and since then the industry has grown rapidly. Currently a total of more than NIS 110 billion is managed in this industry and ETNs that track indices of bonds traded in Israel constitute almost 30 percent of the total value of ETNs traded in Israel (Figure 1). In February 2018, the TASE introduced six new Tel Bond indices (four by rating and two by industry). On the basis of these indices, numerous bond-tracking ETNs were added to those already traded on the TASE. Calculation of the new indices that track groups of assets and their

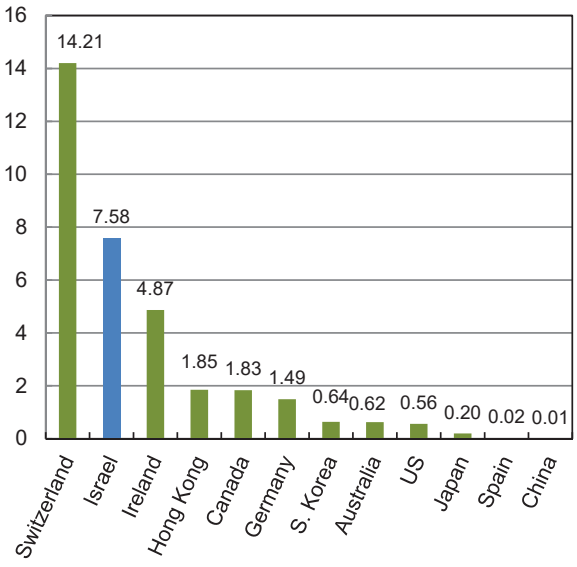
[1] In view of the stability risk created by ETNs and based on a desire to minimize the differences between local passive investment instruments and parallel instruments abroad, the Israel Securities Authority initiated Amendment 28 to the Joint Investments in Trust Law. In practice, the amendment is meant to align the regulation that applies to ETNs to the regulation that applies to mutual funds and to transform ETNs into a type of mutual fund, known as ETFs. The main challenge in implementing the amendment was the fact that it changes the characteristics of existing financial instruments, i.e., ETNs (see the box in the Financial Stability Report for July 2014). Amendment 28 went into effect in October 2018, but ETNs will become ETFs gradually, a process that will be complete in December 2018. It is important to emphasize that this change does not alter the character of instruments that track price indexes.

[2] Including Willian Sharpe and Robert Shiller, winners of the Nobel Prize in Economics.

adoption by the public in theory make it possible to expand passive investment and to increase its dispersion; however, in addition and as we will see below, the growth in the number of indices when the number of assets remains unchanged increases liquidity risk.

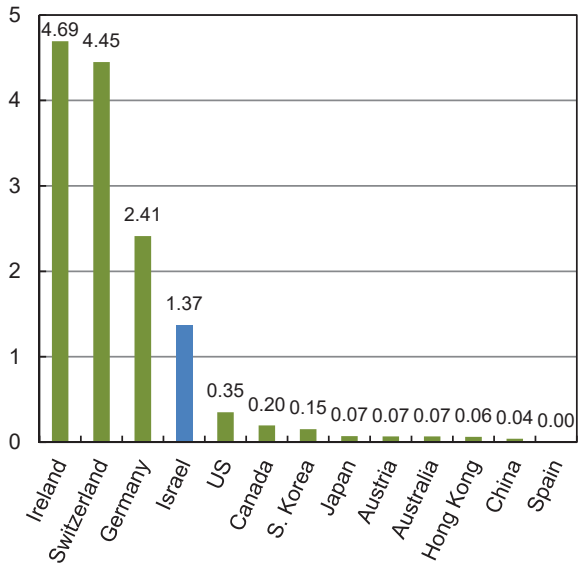
Figures 2–4 present an international comparison for ETNs and ETFs. It can be seen that Israel is among the leading countries with respect to investment by means of these instruments, particularly with respect to the ratio of their trading volume to the trading volume of shares. This finding indicates that Israel has a high ratio between the popularity of investment in passive instruments and the market value of the shares included in the indexes, which could create larger market distortions.

Figure 2
Number of Index Products per 100,000 people, International Comparison, 2017



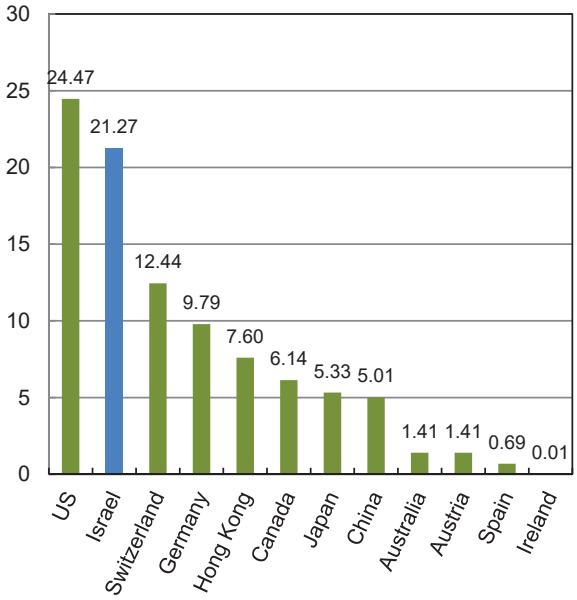
SOURCE: World Federation of Exchanges and Tel Aviv Stock Exchange.

Figure 3
Number of Index Products as a Share of Number of Traded Firms, International Comparison, 2017



SOURCE: World Federation of Exchanges and Tel Aviv Stock Exchange.

Figure 4
Trading Volume in Index Products as a Share of Trading Volume in Equities, 2017 (percent)



SOURCE: World Federation of Exchanges and Tel Aviv Stock Exchange.

Mutual Funds

Mutual funds have also seen major changes in recent years and the index-tracking funds (passive funds) have seen their share of the industry grow substantially. Table 1 summarizes the developments during the last decade. It is interesting to see that since 2014 there has been no change in the number of non-tracking funds (active funds) nor in their total value, while tracking funds have doubled in number and in value and they now account for one-quarter of the funds in Israel.

An examination of the tracking funds according to area of investment shows that the ones that track foreign indices (bonds and shares) account for the lion's share (40 percent) and during the reviewed period that proportion rose significantly. This development is an indication that, among other things, investors prefer to purchase foreign financial assets by means of tracking indices.[3]

Table 1
Nontracking and tracking mutual funds, 2008–18

	Nontracking mutual funds		Tracking mutual funds	
	Number	Value (NIS billion)	Number	Value (NIS billion)
January 2008	1117	113.9	15	0.8
January 2010	1135	132.4	57	2.4
January 2012	1177	142.2	75	3.5
January 2014	1124	221	129	15.5
January 2016	1156	193.1	239	28.5
January 2018	1120	217.5	316	31.2
September 2018	1118	208.1	360	35

The effects on market stability

As mentioned, passive investment has many advantages, although it also has disadvantages, which are becoming increasingly relevant as small investors switch to passive investment. The disadvantages can be summarized as follows:[4]

1. Investment in a financial asset only because they are included in an index regardless of its fundamentals reduces the information embodied in asset prices and could cause market distortions.[5]

2. Passive trading increases the comovement of asset prices and therefore the price changes become similar to one another. This increases the fragility of the market during periods of uncertainty. Moreover, studies have shown that among tracking funds the correlations between inflows and outflows are larger than among active funds. This finding is an indication that volatility in the financial markets will increase as the result of a shock and therefore the depth of the market could be more adversely affected.

As a result, regulators worldwide need to examine the map of risks in a changing market due to the rapid development of passive investment channels. In this box, we have looked at how passive management influences

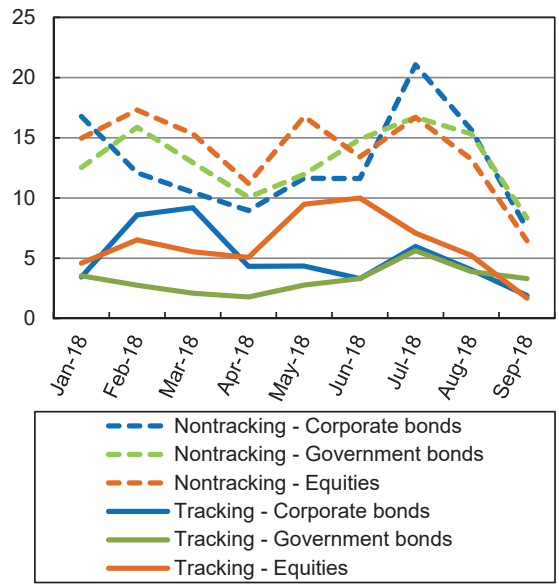
[3] It may be assumed that nonresident investors generally disperse their investments across various countries, including Israel, by means of tracking instruments.

[4] See: Sushko, V. and G. Turner (2018), "The Implication of Passive Investing for Securities Markets," BIS Quarterly Review, March 2018. Anadu, K., M. Kruttli, P. McCabe, E. Osambela and C. Shin (2018), "The Shift from Active Investing: Potential Risks to Financial Stability?" Working Paper Federal Reserve Bank of Boston, August 2018.

[5] A good example is Yahoo whose shares rose by 24 percent in one day after it became included in the S&P 500 in December 1999.

comovement by comparing passive and active mutual funds, based on monthly data and according to asset type, i.e., corporate bonds, government bonds and equities. As in similar analyses in other countries, we found that the activity of investors in tracking funds is more homogenous and the level of monthly redemptions is more uniform in each asset type (see Figure 5). Homogenous activity increases the volatility in asset prices and reduces the depth of the market in uncertain conditions. To illustrate, if new and substantial information is released into the market—such as an estimate of GDP that differs from previous forecasts—there might be a bigger price swing and the quality of trade will be adversely affected.

Figure 5
Standard Deviation of Monthly Redemptions from Mutual Funds by Specialization, Tracking and Nontracking Funds, Jan. to Sept. 2018



SOURCE: Based on Tel Aviv Stock Exchange.

Conclusion

In Israel, as in other countries, passive investment is accounting for an increasing share of trading on the stock exchange and the growing number of indices is creating fertile ground for this phenomenon. However, since the indexes are calculated on a given number of assets, there appears to be an increase in the comovement of prices. This increase could increase the fragility of the market, exacerbate price volatility and accordingly increase the probability that the economy will experience a systemic crisis.

Therefore, passive investment is starting to gain attention from regulators. At the end of 2017, IOSCO started an in-depth examination of how tracking instruments influence trading in the secondary market, in view of the increasing concern that they undermine the global capital market. It believes that following four years of massive inflow of funds into passive instruments, regulators worldwide must take a closer look at the structural changes that have taken place in trading and in particular whether the capital markets can deal with pricing and liquidity shocks, especially now that monetary policy stimulus is being scaled back. The Central Bank of Ireland published a discussion paper in May 2017 which presented a number of questions regarding the need to expand regulation of trading in tracking instruments, in view of the fact that Irish citizens had significantly increased their investment in them. This has led to concern with respect to, among other things, their liquidity when uncertainty increases.

We recommend continued analysis of the effect of passive trading on the fragility of the market and if the findings strengthen the conclusions reached in this box, then regulation of the market should be amended so as to ensure that passive investment does not exacerbate liquidity risk or adversely affect trading quality.