BANK OF ISRAEL

Financial Stability Report

Second half of 2022

JERUSALEM • February 2023

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The Bank of Israel's Financial Stability Report is published twice a year. In the report, the Bank's economists provide their assessments regarding the main risks to the financial system, analyze the main exposures, and assess potential stress scenarios. Once a year the full report is published, which includes an analysis of each of the exposure channels, while describing all the possible risks to the financial system; the short version of the report only updates the most significant developments that occurred in the reviewed period, and via boxes expands on current topics related to the stability of the financial system.

Contributing writers: Roy Stein, Nadav Steinberg, Itay Kedmi, Konstantin Kosenko, Noam Michelson, Maya Haran, Meital Graham-Rosen, Shir Davidovitch, and Ronen Nissim.

Data were compiled by Nadav Caplan and Yasmin Kassie.
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FINANCIAL STABILITY REPORT
Second half of 2022

MAIN FINDINGS

- The risk of a global recession increased during the period being surveyed, against the background of increased geopolitical risks and the acceleration of inflation, and in turn the tightening of monetary policy worldwide. These factors have also led to price declines in the financial markets.
- On the macro level, Israel stands out positively among the OECD countries. Although inflation is higher than the target, it is lower than in other advanced economies; the labor market is tight; and economic growth is relatively strong.
- Credit to businesses and households expanded rapidly in 2022, following a similar expansion in the preceding year. Nonetheless, signs began appearing in April 2022 of a moderation in the rate of growth in credit, in view of the increase in the interest rate and in yields in the economy.
- Equity prices in Israel declined during the second half of 2022, as they did in numerous other countries, while corporate bond spreads in Israel rose moderately. Despite the decline in stock prices, the long-term PE ratio is not low in historical terms.
- Home prices increased during the period being surveyed, a continuation of the upward trend that reappeared in the second half of 2021, and the ratio of home prices to fundamentals reached a record in historical terms.

THE STRUCTURE OF THE REPORT AND ITS GOAL[1]

The Financial Stability Report for the Second Half of 2022 examines the changes that occurred in the financial system during this period according to three main exposure channels: the macroeconomic environment, the asset markets, and credit to households and the business sector. As such, it provides an indicator of the economy's various exposures to shocks originating in Israel and the rest of the world. Based on the survey of developments, the analytical models, and the Financial Stability Monitor, we describe the financial system's channels of exposure and use them to formulate our assessment of the risks to the economy. The report also presents a risk scenario that is based on the financial system's exposures to global markets, a scenario that, should it materialize, is liable to threaten the continuity of economic activity. The appendix to this report provides additional details about the structure of the report and the logic behind it.

1. The challenges to the economy and the main channels of exposure

Economic policy makers are currently dealing with the challenge of restraining inflation, which requires monetary tightening. This is in view of the high level of prices in the housing market; a period of increasing leverage among households and companies operating in the housing market; and an increase in global geopolitical risk.

[1] The assessment of the level of risk for the second half of 2022 is based on data available at the time of the writing of the report.

Table 1
Vulnerability level of the main exposure channels, according to the Financial Stability Monitor

	2020:H1	2020:H2	2021:H1	2021:H2	2022:H1	2022:H2
Macro						
Asset markets						
Credit						

Table 1 presents an assessment of risk in the financial system's main channels of exposure over time. The assessment is based on, among other things, the results obtained from the Financial Monitor (which is described in detail in the Financial Stability Report for the first half of 2020). Since the report for the second half of the year is a short one, we focus on three main channels of exposure: macro, asset markets, and credit.

Macro – Domestic and global economic activity affects the financial system rapidly by way of the capital markets and more slowly by way of the credit markets and foreign trade volume. As the Israeli economy is small and open, it is exposed to shocks in the global markets. The macro risks in the domestic market are low relative to the rest of the world in view of the lower inflation rate in Israel and the monetary response to deal with it, and Israel is enjoying strong economic growth accompanied by a tight labor market. However, the concern of a global recession increased markedly during the reviewed period, due to the continuing conflict between Russia and Ukraine and the rising inflation environment worldwide, which have forced the central banks, including the Bank of Israel, to raise interest rates at a faster pace than previously expected. Therefore, we are raising the macro risk to an intermediate level (yellow).

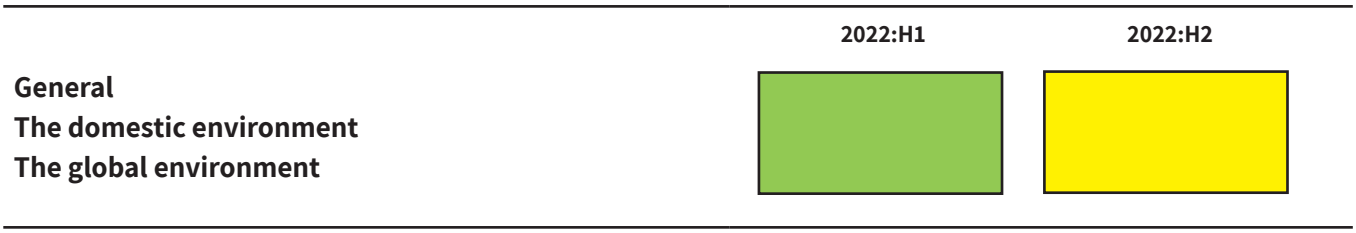
Asset markets – This includes stocks and bonds of large corporations in the economy, residential homes and commercial real estate. The equity market is affected by the expected profitability of large corporations in the economy and it constitutes a leading, though volatile, indicator of the business cycle. Furthermore, sharp price declines in the financial markets are liable to weaken economic activity and thus increase the risk to the financial system. The prices of residential real estate have a major impact on the financial risk of households while the prices of commercial real estate impact the business sector's financial risk. Since the ownership of real estate is accompanied by high rates of leverage relative to other sectors, a sharp decline in real estate prices has implications for the stability of the financial system.

During the course of the year, the prices of financial assets declined both in Israel and worldwide. These declines were apparently the result of the increase in inflation and the monetary policy response, the geopolitical fears arising primarily from the Russian invasion of Ukraine, and high valuations relative to fundamentals (see the

Financial Stability Report for the Second Half of 2021). These declines constitute a partial realization of the risk that was implicit in the high asset prices, and therefore this risk has diminished. However, the prices in the financial asset markets in Israel are not low historically and in view of the possibility of a deterioration in macro conditions, which is liable to affect the profitability of companies, this risk remains relatively high. Furthermore, home prices continued to rise during the period being surveyed and therefore the level of risk originating from the asset markets channel remains relatively high (dark orange).

Credit– The global macroeconomic and financial developments have not, at this stage, led to a debt crisis, but it is important to emphasize that the full effect of the increase in inflation, interest rates, and bond yields has not yet been felt. This is because the private sector is still enjoying the convenient terms on some of the loans they obtained in the past and the date of their maturity or refinancing has not yet arrived. Nonetheless, in recent years the debt of companies and households has grown, in particular mortgages and credit to real estate and construction companies. Therefore, and in view of the rising rates of interest and inflation, we are leaving the assessment of risk in the credit market at a relatively high level (dark orange).

1.1 Macro



Our assessment is that the overall macro risk has increased somewhat during the period being surveyed, with global risks growing and domestic risks remaining moderate.

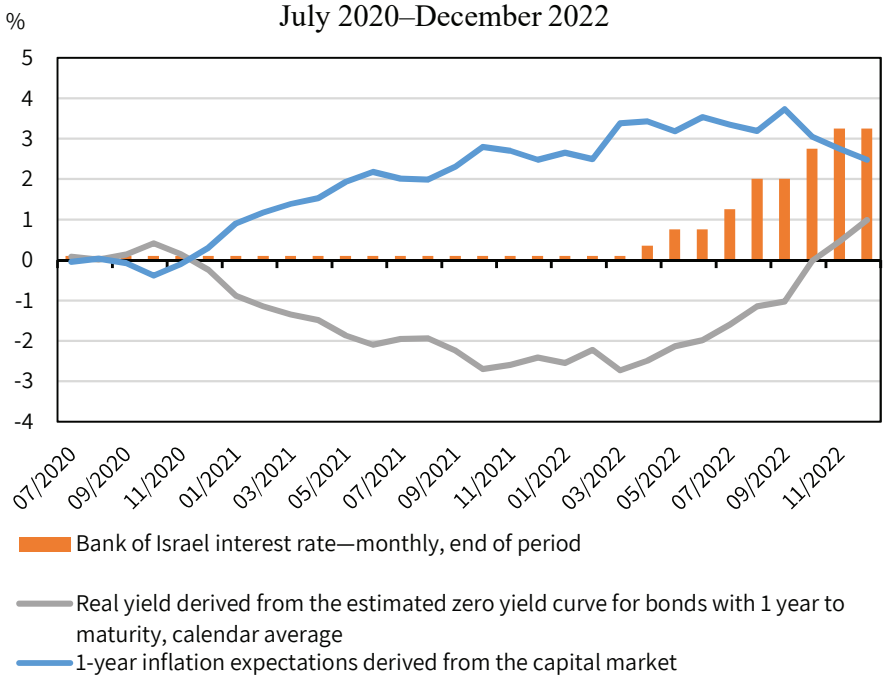
Against the background of the recovery from the COVID-19 pandemic, which began slowly in the second half of 2021, the inflation rate has increased and with it interest rates; however, these developments accelerated during the reviewed period, with the real short-term interest rate in Israel turning positive[2], after the Bank of Israel raised the interest rate in November (Figure 1). According to the IMF Global Financial Stability Report from October 2022, the risks to global financial stability have risen and financial conditions during the second half of the year continued to tighten worldwide, against the background of high inflation relative to recent decades, exceptionally high uncertainty in economic forecasts, highly volatile markets and an increase in geopolitical risk.[3] Thus, for example, the report of the Conference Board[4] staff from the end of September 2022 showed a sharp increase in the risk of a recession in the US occurring by the end of September 2023 to 96 percent.

2 The real short-term interest rate reflects the gap between the nominal one-year interest rate and the expected inflation rate for that same period. At the beginning of 2023, following the hike in the interest rate by the Bank of Israel on January 2, the real yield rose to about 1.75 percent.

3 https://www.imf.org/en/Publications/GFSR/Issues/2022/10/11/global-financial-stability-report-october-2022

4 https://www.conference-board.org/topics/recession/US-recession-probabilities-reach-96-percent

Figure 1
Bank of Israel Interest Rate, Inflation Expectations Derived from the Capital Market, and the Real 1-Year Yield (from the zero curve)
July 2020–December 2022



Source: Bank of Israel.

Economic activity in Israel continued at a high level during the period being surveyed and was close to the potential growth of the economy. This was accompanied by a tight and stable labor market and a low unemployment rate, high demand for workers, and a surplus in the government budget.[5] Thus, the current risk to the financial system is primarily the result of a trickling down of macro risk from abroad to the Israeli economy, as described in detail in the risk scenario presented below.

1.2 Asset markets

	2022:H1	2022:H2
General		
Financial assets: stocks and bonds		
The real estate market		

[5] Although the government deficit for 2022 was significantly under the target for that year, there is uncertainty as to the decisions regarding the size of the 2023 budget and its composition.

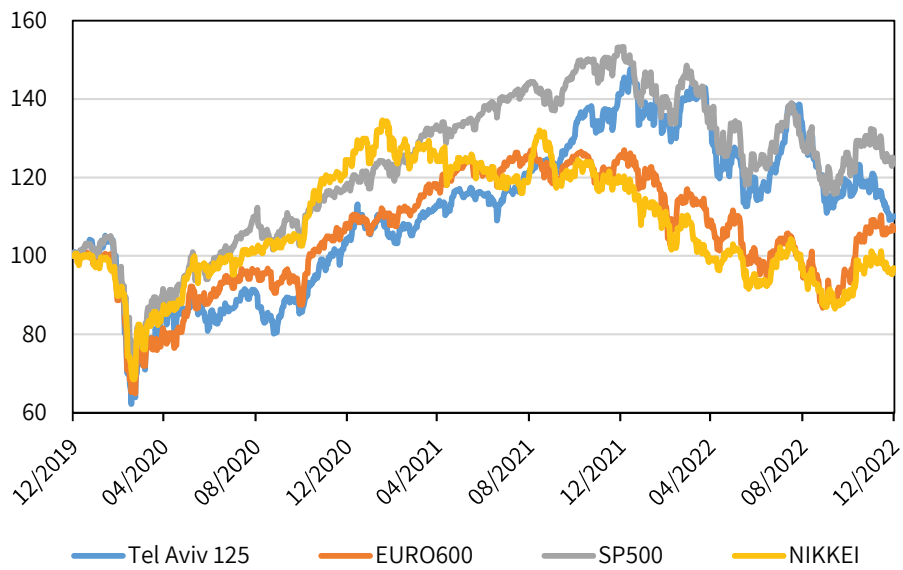
1.2.1 Financial assets

Equity prices, which rose until the end of 2021, declined during the year, and the VIX index (the "fear index") rose somewhat to just above its historical average. In 2022, the Tel Aviv 125 Index declined by about 13 percent, a smaller decrease than equity indices in other countries. However, the decline in this index in dollar terms was similar to those observed worldwide, and toward the end of the year the decline was even stronger than in other markets (Figure 2). Against the background of the deterioration in the macro conditions in many countries, and in particular the US, and the growing fear of a slowdown and even a recession, there was also growing concern that corporate profits, and the prices of financial assets related to them in Israel and worldwide, would be impacted. It is worth mentioning that even after the decline this last year, the long-term PE ratio in Israel remained at a level that was not low in historical terms.[6]

Bond spreads, which reflect the credit risk of public companies in the economy, stabilized during the period being surveyed after increasing during the first half of 2022, while bond spreads in the real estate industry rose to a high level relative to other industries (Figure 3). Nonetheless, the level of spreads is not high relative to their long-term average nor relative to other advanced economies.

The cryptocurrency market suffered a significant decline during the period being surveyed, which included a rapid collapse of several large companies in the industry. The total value of crypto currencies fell from $3 trillion at the beginning of 2022 to less than $1 trillion at the end of 2022. This significant decline did not cause any major negative impact to the financial system in Israel or elsewhere, in view of the low exposure of traditional financial entities to the crypto market.

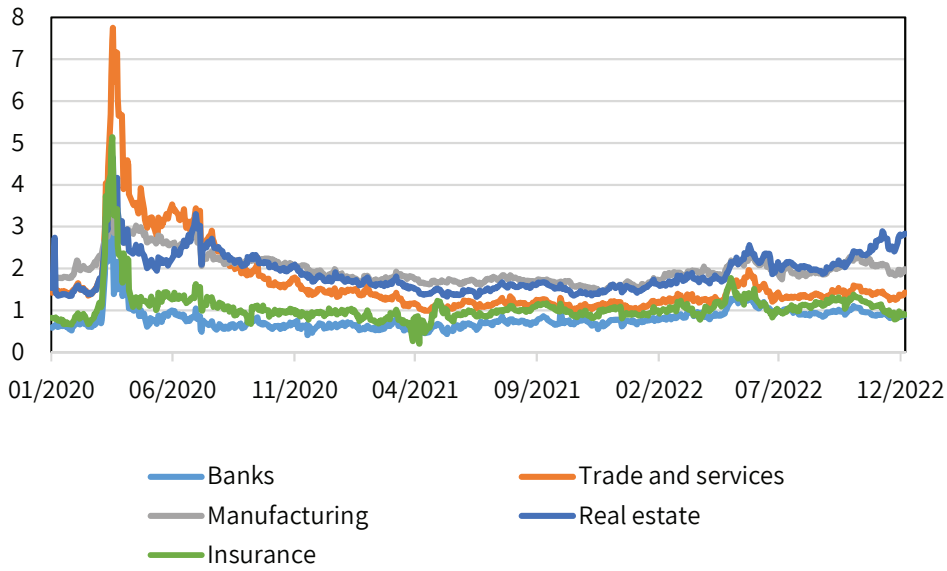
Figure 2
Major Equity Indices, Daily Data in Dollar Terms
100=December 31, 2019
January 2020–December 2022



SOURCE: Based on Bloomberg.

6 The long-term PE ratio is calculated as the ratio of the aggregate market value of public firms to their average aggregate profit during the past 10 years, after adjusting for inflation. For more details, see Campbell and Shiller (Journal of Finance, 1988).

Figure 3
Yield Spreads between CPI-Indexed Corporate Bonds and Government Bonds, by Industry, Daily Data
January 2020–December 2022



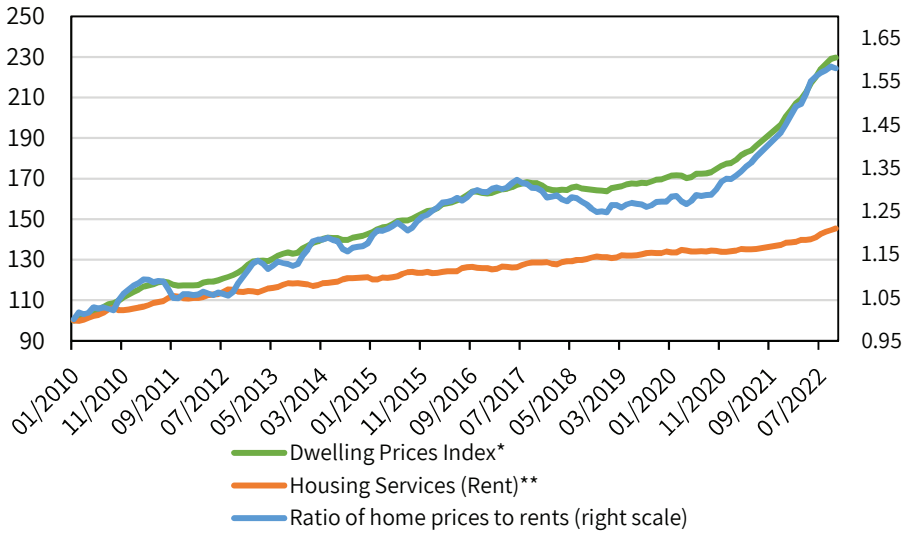
Details: Weighted average by market value, percent excl. structured or convertible bonds; daily data
SOURCE: Based on Tel Aviv Stock Exchange.

1.2.2 The housing market

The upward trend in home prices in Israel continued (as of the October-November CBS Dwelling Prices Index) , in contrast to the global setting where home prices began to drop following a substantial climb. The ratio of home prices to rents continued to increase and reached new records (Figure 4). Therefore—and despite the increase in investment in the construction industry in 2022, which is expected to expand the supply of housing, and the sharp increase in interest payments on mortgages—the gap (that we warned about in previous Financial Stability Reports) between home prices and the fundamentals[7] that explain them continued to widen during the period being surveyed. Toward the end of the year, the increases in the Dwelling Prices index moderated somewhat, perhaps suggesting a halt in the upward trend of the home price to rent ratio. The rapid widening of the gap between home prices and fundamentals in the housing market raises the fear of a divergence of prices from fundamentals. From a forward-looking perspective, and to the extent that the government is able to continue expanding the marketing of land and supporting the upward trend in building starts that characterized the past two years, the supply of housing should increase and prices should decline, thus halting the divergence. Finally, the raising of the interest rate in the economy is expected to continue moderating the demand for housing.

[7] https://www.boi.org.il/media/ugclt1dr/%D7%9E%D7%91%D7%97%D7%9F-%D7%9C%D7%91%D7%95%D7%A2%D7%94-%D7%91%D7%9E%D7%97%D7%99%D7%A8%D7%99-%D7%94%D7%9.E%D7%A0%D7%99%D7%95%D7%AA.pdf

Figure 4
Dwelling Prices Index, Owner-Occupied Housing Services (Rent), and the Ratio between Them
Monthly data, January 2010–October 2022
100=Oct. 31, 2010



Details: *Survey data, owner-occupied homes.
**Housing component of CPI.
SOURCE: Based on Central Bureau of Statistics.

1.3 Credit

	2022:H1	2022:H2
The nonfinancial business sector		
The household sector		

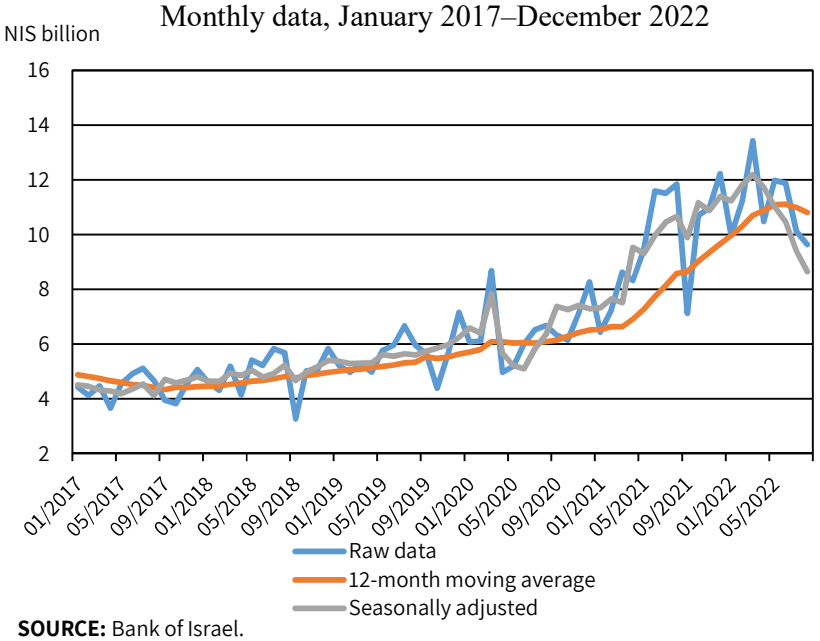
Credit to the business sector grew in the first 10 months of 2022 by 10 percent, which followed an increase of 12.5 percent in 2021. The rapid increase in business credit during 2021–22 was led by the increase in bank credit to the business sector, which rose by almost one-third during this period. Despite the deterioration in the global macro situation and the declines in the financial markets, there is no evidence at this stage of a significant deterioration in the quality of business credit, and the rate of impaired credit and credit in arrears in the banking system remains low.

Credit to the real estate and construction industries constituted 34 percent of total bond issues on the Tel Aviv Stock Exchange in 2022 (which is lower than its share in 2021) and almost 38 percent of the banks' total amount of balance-sheet business credit in November 2022 (which slightly exceeds its share at the end of 2021; for further details on the risks stemming from commercial real estate companies, see Box 2 in this report). Within this exposure, credit to the construction industry reached a record 23 percent of total balance-sheet business credit in 2022, following the loosening of the restriction on the per industry indebtedness limit that applies to the banks. In parallel, according to the financial statements of the nonbank credit companies that are traded on the stock

exchange, total credit provided by these companies to the business sector grew by 50 percent during the past year, reaching NIS 18 billion at the end of the third quarter.[8] A large part of this credit is directed to the real estate industry. We found that the collapse of two nonbank credit companies did not, in the assessment of investors, lead to an increase in the risk of the other companies in the nonbank credit market (for further details, see Box 3). Credit to households increased at the rapid rate of 10.6 percent during the first 10 months of 2022. It was led by the rapid growth in housing credit, as in 2021. Correspondingly, mortgages reached a historically high level (Figure 5). The proportion of relatively high-risk mortgages has risen rapidly since the end of 2021 and stabilized during the final months of 2022 at a historically high level (Figure 6).[9]

As a result of the increase in the Bank of Israel interest rate and in the pricing of credit risk, there was a rapid increase during the period being surveyed in the interest rates charged to businesses and households. Correspondingly, the growth in credit to the business sector slowed from the very high monthly rate of 1.3 percent during the first four months of the year to a monthly rate of 0.7 percent during the subsequent six months. Similarly, the growth in credit to households slowed from the very high monthly rate of 1.3 percent during the first four months of the year to a monthly rate of 0.8 percent during the subsequent six months. This slowdown is also reflected in the pace of new mortgage issues (Figure 5).

Figure 5
New Mortgage Volume in Current Month
Monthly data, January 2017–December 2022

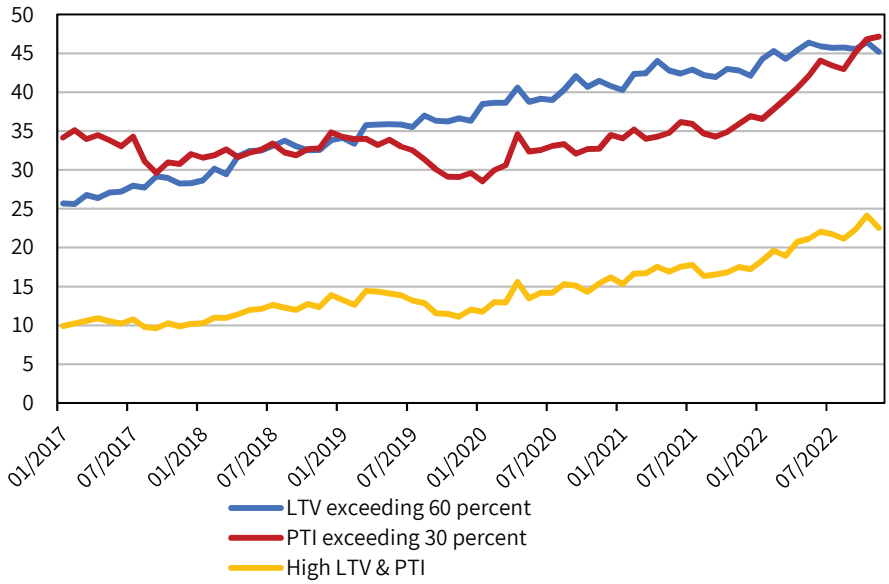


SOURCE: Bank of Israel.
Details: Raw data, Moving average of 12 preceding months, and seasonally adjusted data.

[8] The nonbank credit companies were among the fastest growing source of credit in recent years (for further details, see Box 2 of the Financial Stability Report for the Second Half of 2021).

[9] In Figure 6, we relate to mortgages with a loan-to-value (LTV) ratio of more than 60 percent and/or a payment-to-income (PTI) ratio of more than 30 percent. However, most mortgages with a PTI of more than 30 percent are still under 40 percent, such that even now the proportion of mortgages with PTI of over 40 percent is less than 1 percent.

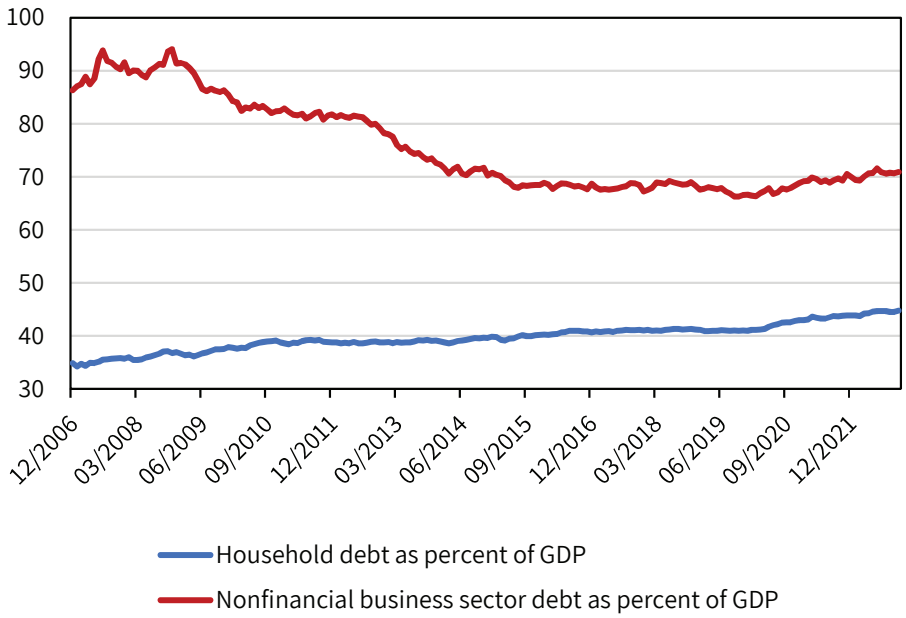
Figure 6
Breakdown of New Mortgages Extended in Current Month, by LTV and PTI
monthly data, January 2017–November 2022



Details: PTI – payment to income ratio; LTV – loan to value ratio.
*Share of new mortgages extended at high LTV (60–75 percent) and high PTI (30–40 percent).
SOURCE: Bank of Israel.

Against the background of the increase in inflation rates and yields in Israel and worldwide, it is important to examine the level of leverage in the private sector. The data show that business sector debt has risen since mid-2020, also relative to GDP; however, this follows a prolonged decline since 2008, such that the ratio of business debt to GDP in Israel is currently 72 percent, which is low both historically and relative to other countries. The ratio of household debt to GDP has risen almost continuously since 2007 and at an even faster pace since 2014. It reached a level of 45 percent in mid-2022, which is a historical record, although again it is not high relative to other countries, and since September 2022 it has even dropped somewhat (Figure 7). With respect to indexation, starting in 2005 there has been a significant decline in the proportion of household debt indexed to the CPI or to a foreign currency, such that the proportion of unindexed debt within total household debt has reached a record level of 67 percent. Similarly, since 2005 there has been a decline in the proportion of business debt that is indexed to a foreign currency and since 2008 this has also been the case for business debt indexed to the CPI, such that the proportion of unindexed debt reached the historically high rate of about 53 percent of total business debt during the period being surveyed. As a result of these trends, the private sector is less exposed than in the past to an increase in the inflation rate or to a depreciation of the shekel.

Figure 7
Nonfinancial Private Sector Debt in Percent of GDP: Households and Business Sector. monthly data
December 2006–November 2022



SOURCE: Bank of Israel.

2. Main risk scenario for the global economy and the risk to the Israeli economy should it materialize

In what follows, we present the main economic risk scenario, the realization of which is liable, in our opinion, to negatively affect the financial system in Israel. The risk scenario presented here was chosen according to its likelihood of materializing and the adverse impact it is likely to cause to the Israeli economy, given its unique characteristics and its being a small and open economy. The selection of the risk scenario was based on surveys and reports by international organizations, such as the IMF, and on the subjective assessment of the Bank of Israel's Financial Stability Division on the basis of economic developments, the economy's fundamentals, the economic background conditions under which the financial system operates, and the scope of the expected negative impact in the event that the risk is realized.

Risk scenario of an increase in inflation significantly beyond the baseline forecast

According to assessments of various international institutions, the increase in inflation rates and the interest rate hikes by central banks in response have increased the cost of debt to both countries and the private sector (businesses and households). The cost of debt for many countries has increased significantly, which followed the growth in the amount of debt in recent years to historically high levels. Moreover, developing countries, which are dealing with higher financing costs and which in many cases have suffered from the strengthening of dollar, are beginning to experience serious financing problems.[10] At the same time, there are many sources of uncertainty

[10] The increase in interest rates, the deterioration in fundamentals and the flight of funds to advanced economies significantly pushed up debt costs for emerging markets. Thus, 20 countries are already in a process of default or their tradable debt is trading at distress levels. https://www.imf.org/en/Publications/GFSR/Issues/2022/10/11/global-financial-stability-report-october-2022

that constitute a challenge to the forecasting ability of economists. For example, following the adverse impact to China's economy during 2022 and the lifting of restrictions set by China at the end of 2022, there are now signs of a rapid recovery. In the UK, the year 2022 was characterized by a rapid increase in inflation, weak growth, and highly expansionary fiscal policy. These combined to bring about an economic-political crisis that forced the central bank to purchase bonds in order to ensure the stability of the pension system. Many countries in Europe fear a rapid increase in energy prices and even a severe shortage of gas, as a result of the limited flow of natural gas from Russia and even its termination. Therefore, the inflation rate that is actually realized may differ from expectations and in certain scenarios it is liable to significantly exceed them.

The effect on Israel of slower global growth as of the end of 2022 appears to be limited. The macro data for Israel that were discussed above are still positive and inflation is lower in Israel than in other advanced economies. As a small and open economy, Israel is nonetheless exposed to the possibility of a global recession, as in previous global crises. The increasing level of inflation worldwide or even its continuation at the same level is liable to bring about a steep increase in inflation also in Israel, which is exposed to global developments through a variety of channels. In particular, an increase in the level of inflation and in turn in the interest rate is liable to have an impact on households, whose outstanding loans have grown significantly in recent years (Figure 7) and whose monthly mortgage repayments have already risen as a result of the increases in inflation and the interest rate in 2022.

The risk of these events occurring is examined as part of the scenarios examined using the "inflation at risk" model, which the Research Department implements using Israeli data. Using this model, it is possible to derive the likelihood of various risk scenarios in which inflation rises beyond the average of the forecasts and accordingly the Bank of Israel interest rate is raised to above the forecast. In these risk scenarios, the rise in inflation and the interest rate will lead to a major increase in debt repayments for all sectors in the economy. At the same time, and as a result of the very conservative directives of the Banking Supervision Department from the viewpoint of the loan-to-value and payment-to-income ratios, there are no major concerns regarding the stability of the financial system.

Appendix: The methodology for analyzing the level of financial stability

Following is an intuitive description of the process to assess and analyze the level of financial stability that is the basis for the Financial Stability Report:

Risks – risk scenarios and unexpected risks	+	Level of vulnerability of exposure channels	.Vs	Resilience – of financial entities, connectedness between them and liquidity	=	Level of financial stability

The level of vulnerability of the exposure channels is given by:

$$Q\_vulnerability_{j,t} = \Pr(Damage_{j,t+1} > C_j | I_{hd,j,t}, I_{si,j,t}, \widetilde{Shock}_{t+1})$$

The level of vulnerability in each of the exposure channels (j) reflects the estimated probability (Pr) that in the event of a significant shock ($Shock_{t+1}$) during the next half a year, that risk channel (j) will experience damage at a level that is liable to adversely impact the financial system as a whole; this is a level that is higher than a threshold unique to that risk channel (C_j), given the information available at the time of the publishing of the report ($I_{j,t}$):

- Hard data (hd) which is based on, among other things, the Financial Monitor, which includes 51 vulnerability indicators.
- Soft information (si) which is based on, among other things, the financial stability reports of international institutions, the surveys of analysts in Israel and other countries, and the assessments of the Bank of Israel Research Department.

The level of vulnerability is translated into a heat map:

$$Q\_Vulnerability \in [1,100]$$

This percentile equation reflects the level of vulnerability relative to the historical level of vulnerability of this risk channel. After deciding on the percentile of vulnerability for each risk channel, we represent these percentiles by means of a heat map, such that each range of percentiles receives a corresponding color: dark green for the lowest vulnerability and red for the highest (see Table 1 in the body of the report). In this report, we focus on three main risk channels: macro, asset markets and credit, i.e.
$j \in \{macro, assets, credit\}$.

Box 1: Measuring the performance of commercial real estate and comparing it to fundamentals

- The commercial real estate industry is an important element in the financial system. The industry's bank debt accounts for about 15 percent of the banks' total business credit. The value of the bonds of publicly traded companies in the industry totals about NIS 108 billion, and the value of their shares totals about NIS 152 billion (about one-quarter of the tradable market excluding banks and insurance companies).
- As of the end of 2021, public companies in Israel managed commercial assets worth about NIS 160 billion, and the value of the assets owned by these companies doubled between 2010 and 2021. Most of the increase (more than 80 percent) was due to increases in the value of the assets, while less than 20 percent was due to the addition of rental space (in square meters).
- An analysis of real estate performance during the reviewed period shows a gradual decline in the income return, although that decline is not uniform across the various asset types. The capital return was volatile in the past three years, and was particularly anomalous in 2021 relative to the past.
- An econometric analysis shows that actual monthly rental fees, one of the most important fundamental factors in assessing value, only partially explain the changes in asset values. In recent years, there has been a marked upward trend in the ratio of asset values to rental fees per area unit.
- These findings raise the possibility that the asset values include expectations of growth and increased real estate values, which are not necessarily reflected in some of the fundamental factors (actual rent receipts). However, a statistical test did not find evidence of bubble-like behavior in commercial real estate values.
- The asset revaluation methodology used by commercial real estate companies led to high reported profitability throughout recent years, in view of the low interest rate environment that was used as the basis for calculating the capitalization rate. With the increase in the interest rate environment, the capitalization rates are expected to gradually return to higher levels, thereby leading to a decline in accounting profits and even the possibility of losses being recorded at some of the companies.
- Since the beginning of 2022, there has been a sharp decline in the equity values of commercial real estate companies relative to the main equity indices. These declines in the capital market apparently reflect expectations that asset values will decline in response to the increase in the interest rate environment.

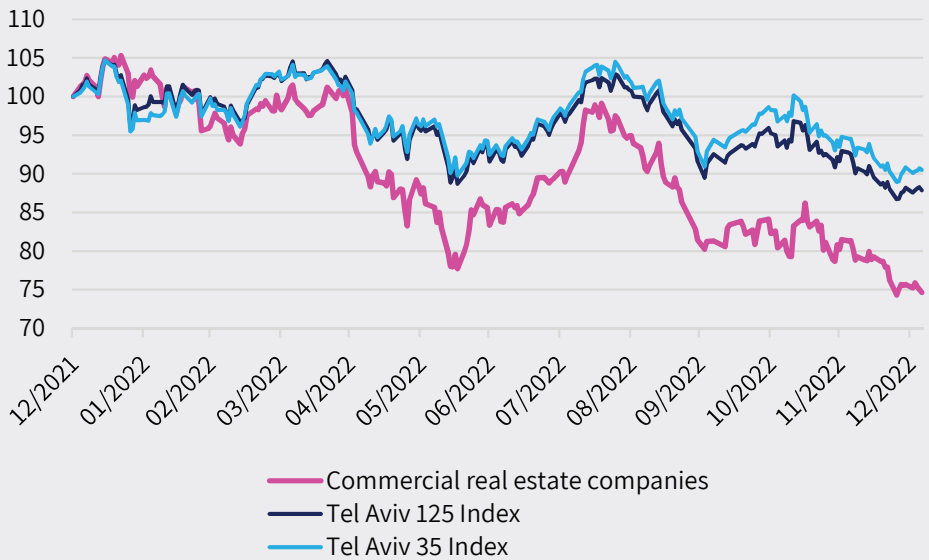
1. Background and motivation

The real estate market can be divided into two main branches: residential real estate and commercial real estate, which is for the most part nonresidential. Recent years have seen exceptionally large price rises in the residential market. In contrast, there is no index that tracks asset prices in the commercial real estate industry (offices, retail and industrial) in Israel,[1] despite its importance to the financial system. For example, the industry's total debt is more than NIS 200 billion (about NIS 100 billion in bank debt, which constitutes about 15 percent of total outstanding business credit provided by the banks). The value of the stocks and

[1] There has recently been a private initiative (by a non-profit organization called the IVS Forum) to increase transparency in commercial real estate. It publishes, among other things, performance indices based on the aggregate data of several public companies. For further details, see / https://www.ivsforum.org.

bonds of commercial real estate companies totals NIS 108 billion and NIS 152 billion, respectively (about one-quarter of the tradable market, not including banks and insurance).[2] And finally, since the beginning of 2022, we have seen a decline of about 25 percent in the total market value of real estate companies, in contrast to the more moderate declines in the leading equity indices (Figure 1).

Figure 1
Aggregate Market Value of Commercial Real Estate Companies Compared to Major Equity Indices, 12/2021–12/2022
(Beginning of period=100)



SOURCE: Based on Tel Aviv Stock Exchange data.

In this review, we will analyze the performance of commercial real estate owned by public companies (Section 2) in order to understand the factors that explain the changes in fair value[3] over time (Section 3) and whether we should be concerned that the sector will experience a bubble in the future (Section 4). In Section 5, we will discuss the capitalization rate following the rise in interest rates. Section 6 concludes.
As of the end of 2021, the public real estate companies managed real estate assets with a total area of 13.7 million square meters which had a total fair value of about NIS 158 billion[4], as compared to approximately 11.7 million square meters which had a value of only about NIS 77.6 billion at the end of 2010. The total

2 As of the end of 2022:Q2.

3 In the financial statements of the public real estate companies, commercial real estate assets usually appear according to their fair value, i.e., the price at which a voluntary transaction would occur between a buyer and a seller. In general, commercial real estate assets are valued each year by an external appraiser. The valuation is usually carried out on the basis of discounted future cash flow (DCF) and in certain cases also by means of a comparison to transactions in similar assets.

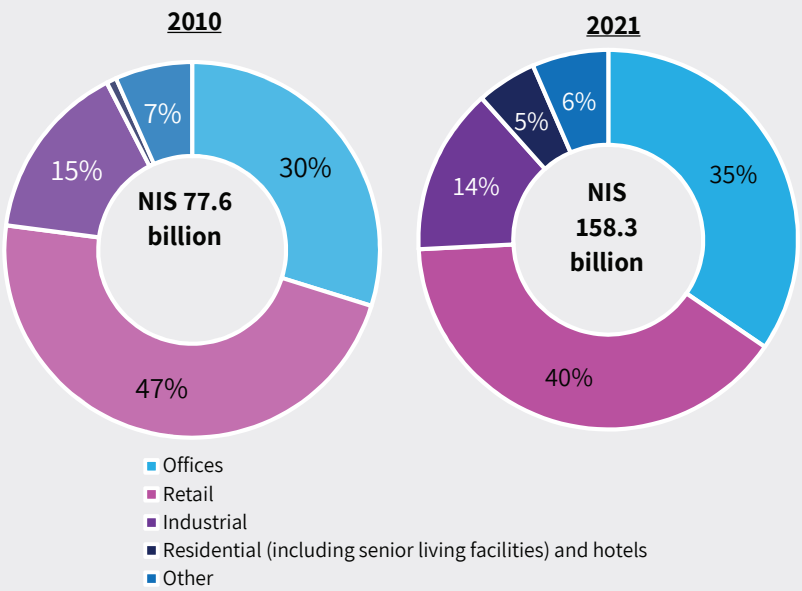
4 According to the share of the corporation as reported in the financial statements and without the "double counting" in the case of listed parent companies.

area increased by less than 20 percent during the decade (which is line with the increase in GDP and in population). The main part of the increase during this period (about 80 percent) stemmed from the increase in asset values. With respect to the distribution of real estate asset value, the majority (about 75 percent) is retail and offices while 14 percent is industrial, 5 percent is residential, and 1 percent is other.[5] Over the years, there have been changes in the distribution of value, particularly in the case of retail use and offices

2. Performance of commercial real estate

In order to analyze the performance of commercial real estate, we focus on public companies that own commercial real estate and for which there is data available for the entire sample period (2010–21).[6] This includes about 40 companies, the balance sheet assets of which at the end of 2021 totaled about NIS 146 billion (about 92 percent of the total assets managed by public companies, as described above) which have a similar distribution to that presented in Figure 2.

Figure 2
Distribution of the Fair Value of Commercial Real Estate Assets, by Asset Type
December 2010, December 2021



SOURCE: Based on published financial statements.

5 Industrial space also includes space for warehousing and logistics. Commercial real estate for residential purposes includes housing, sheltered housing, old age homes and hotels.

6 From the date that detailed information is provided in the annual financial statements (in the section describing the corporation's business).

We divided the performance of commercial real estate into two components: (1) that due to the rental of real estate assets, which is essentially the income return calculated on the basis of Net Operating Income (NOI) in period t, divided by the value of assets at the end of period t-1; and (2) that due to an increase/decrease in value, i.e. the capital return, which is calculated on the basis of the profit or loss from asset valuation in period t, divided by the asset value at the end of period t-1. Adding the two components together gives the Total Return on the assets.[7]

Figure 3 presents the aggregate performance of commercial real estate (by type)[8], according to the two aforementioned components. First, it can be seen that for most of the period (primarily during 2012–18), the total return is relatively constant around the level of 10 percent, on average. There was greater volatility in some years, i.e., prior to the COVID-19 year, during it (2020), and following it, which was the result of changes in fair value. Thus, during 2019 and 2021, there were sharp increases in value (about 6 percent in 2019 and 9 percent in 2021), relative to the more modest returns in previous years. Another prominent feature of the graph is the gradual decline in the income return. Thus, at the beginning of the period, it stood at 8.6 percent while at the end it was about 6.2 percent, a drop of about 2.5 percentage points. This was in parallel to the declines during the period being surveyed in alternative returns (such as that on 10-year government bonds).

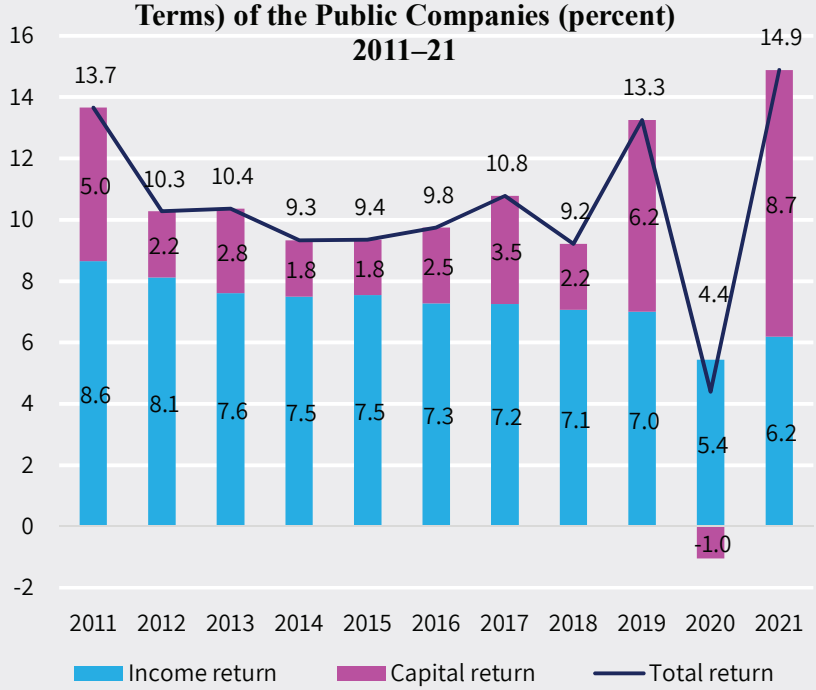
Table 1 presents the performance of commercial real estate by category (offices, retail, and industrial, which includes warehousing and logistics). The total value is about NIS 131 billion which accounts for about 90 percent of the commercial real estate assets analyzed above. The table shows a downward trend in the return on rentals for all asset types, although the trend is not uniform. In real estate for commercial use, the decline was about 3 percentage points, while it was more moderate for assets used for industrial purposes, particularly during the past two years.[9] With respect to the capital return, there is a particularly large jump during the years prior to the COVID-19 pandemic and in the year subsequent to it, particularly in the case of commercial real estate used for offices and industrial purposes.

7 We would mention that the calculation of the return should take into account the net capital investment (the purchases and investment in real estate less sales of real estate, which is known as Capex) during period t. It is conventional to assume that net investment is distributed uniformly over the year (see, for example, the methodological appendix published by the IVS Forum) and therefore Capex is multiplied by 0.5 (i.e. the expected net investment) and the result is added to the value of real estate assets in period t-1. However, Capex is reported only on the aggregate level in the financial statements (in the cash flow report or in the notes that present the flows in real estate investment), without differentiating between the various types of real estate assets or between Israel and abroad. In order to deal with this issue, we examined the total return using net investment. This returns an average over the years that is 0.2 percent less, which is a negligible difference.

8 Performance was calculated on an aggregate level, i.e. the total NOI and the increase in the value of all the companies in the sample, relative to the total value of the companies at the end of the previous period.

9 The Chief Government Appraiser who publishes returns semiannually based on a sample of valuations, also found a non-uniform decline in returns, but which followed a different pattern than that described above. Thus, for industrial real estate there was a decline of about 2 percentage points while in real estate used for commercial purposes the decline was more moderate (1.5 percentage points). For further details, see https://www.gov.il/he/Departments/DynamicCollectors/professional_information?skip=0.

Figure 3
Commercial Real Estate Performance (in Nominal Terms) of the Public Companies (percent) 2011–21



SOURCE: Based on published financial statements.

Table 1: Commercial real estate performance of the public companies (percent), by asset type, 2011-2021

	Income return			Capital return			Total return		
	Offices	Retail	Industrial	Offices	Retail	Industrial	Offices	Retail	Industrial
2011	8.3	9.0	8.0	5.4	5.3	3.6	13.8	14.3	11.6
2012	7.9	8.1	8.4	2.5	1.7	2.4	10.3	9.8	10.8
2013	7.8	7.3	8.1	2.9	2.7	2.6	10.7	10.0	10.7
2014	7.7	7.1	8.1	2.3	1.1	2.7	10.0	8.2	10.8
2015	7.5	7.5	8.0	2.1	1.5	3.3	9.6	8.9	11.3
2016	7.4	7.2	8.1	3.4	1.3	3.9	10.8	8.5	12.0
2017	7.5	7.3	7.7	5.0	1.9	5.1	12.6	9.2	12.8
2018	7.2	7.0	8.1	2.4	0.6	6.0	9.6	7.6	14.1
2019	7.3	6.9	8.0	7.3	4.4	8.4	14.6	11.2	16.4
2020	6.3	4.3	7.0	-0.5	-3.3	3.0	5.8	1.0	10.0
2021	6.4	6.0	7.3	10.2	6.0	13.6	16.6	11.9	20.9
Mean	**7.4**	**7.1**	**7.9**	**3.9**	**2.1**	**5.0**	**11.3**	**9.1**	**12.9**
SD	**0.6**	**1.1**	**0.4**	**2.8**	**2.4**	**3.2**	**2.8**	**3.2**	**3.1**

SOURCE: Based on published financial statements.

3. What explains the changes in the fair value of commercial real estate?

The above analysis of commercial real estate performance shows that the main phenomenon to be explained is the change in fair value: There was a gradual decline in the income return, which is reflected in the increase in real estate asset values, while in contrast, there are years with exceptionally large fluctuations in real estate asset values. It is well known that changes in real estate prices primarily reflect changes and expected changes in supply and demand. The home price index, for example, is based on actual transactions which reflect changes and expectations. In contrast, there is no systematic methodological index for commercial real estate and the value of commercial real estate assets is usually measured using valuations based on the DCF method. Therefore, the changes in fair value should primarily reflect changes in the assets' fundamentals.

In the DCF system, the expected flow of revenue from rentals is discounted. In principle, the expected flow of revenue is the asset's area multiplied by the expected occupancy rate and by the expected rental income per square meter according to the contracts that have been signed (for further discussion, see below). The discounting of the cash flow is carried out by means of a capitalization rate, which is determined during the valuation and is sometimes supported by actual transactions in similar assets. As a result, this method is based primarily on a number of parameters (fundamentals): the space of the asset, the rate of occupancy, the rent from the asset and the capitalization rate. The average rent from an asset is in general determined by the characteristics of the asset and those of the contract,[10] while the capitalization rate reflects the asset's risk premium and the risk-free interest rate, as in the case of financial assets.

Figure 4 presents the fair value per square meter for each type of asset (i.e., the ratio of fair value to area in square meters), where we have normalized the beginning of the period (2010) to 100. It shows a clear upward trend in value per square meter, with the largest increase taking place in assets for industrial use which almost doubled during the sample period. The assets for retail use show a far more moderate increase. Another feature of the graph is the sharp increase in value in 2021, primarily with respect to offices and assets for industrial use.

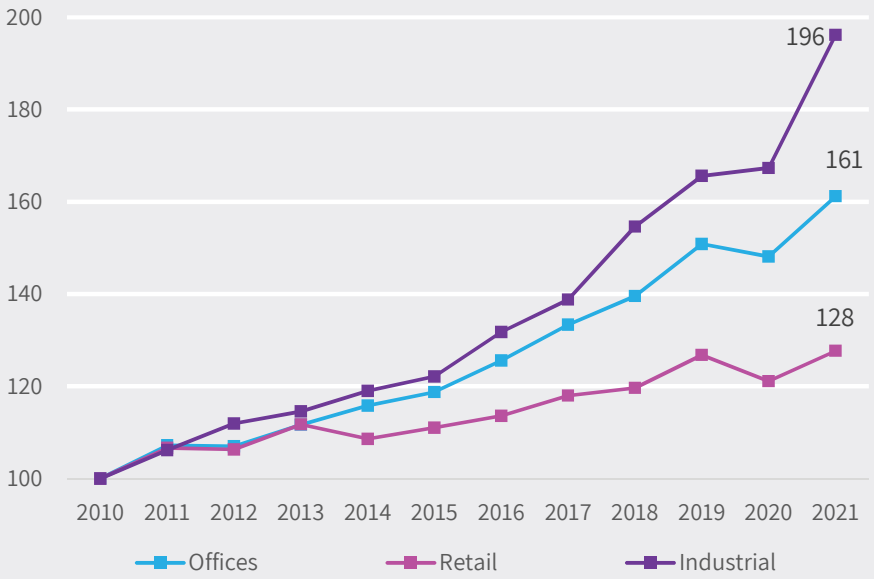
We now turn to an econometric analysis. In order to test the factors that explain fair value, we estimated a regression for rates of change (elasticities) using the following equation:

$$\Delta FairValue_{i,t} = \alpha + \beta_1 \cdot \Delta Area_{i,t} + \beta_2 \cdot \Delta Rent_{i,t} + \beta_3 \cdot \Delta OccupancyRate_{i,t} + \vartheta_t + \varepsilon_{t,i}$$

where for every company i in time t $\Delta FairValue$ is calculated as the change in natural logarithms in fair value (i.e., ln(FairValue$_t$) – ln(FairValue$_{t-1}$); $\Delta Area$ is calculated as the change in natural logarithms in space in square meters (i.e., (ln (area$_t$) – ln(area$_{t-1}$); $\Delta Rent$ is calculated as the change in natural logarithms in average monthly rent (i.e., ln(rent$_t$) – ln(rent$_{t-1}$); and $\Delta OccupancyRate$ is calculated as the change in natural logarithms in the average occupancy rate. We also include a dummy variable for the year. The

[10] Such as: type of asset, location of the asset (e.g. a store on the street or in a mall and geographic region) and other less important factors (such as age of the asset, its quality, the period of the rental, the floor of the building, etc.).

Figure 4
Fair Value per Unit of Area – the Ratio of Fair Value to Area (in Square Meters), by Asset Type, 2010–21 (100=2010)



SOURCE: Based on published financial statements.

equation was estimated for each type of real estate asset (offices, retail and industrial).[11]

The estimation results are presented in Table 2.[12] First, it can be seen that the rate of change in area has a positive and statistically significant coefficient (at the 1 percent level of confidence). The coefficient for offices and industrial use is close to 1 (in other words, an increase of 1 percent in area is reflected in an approximately 1 percent increase in value), while the coefficient for retail use is only 0.7. With respect to fundamentals, the rate of change in the occupancy rate was not found to be statistically significant, although note that the changes in this variable are usually negligible, and therefore it does not provide explanatory power in the case of changes in fair value. The rate of change in rental revenue has a positive coefficient but in most cases is not statistically significant. Despite its importance as a factor that is meant to reflect one of the main fundamentals in valuation, it has a relatively small economic effect. In the case of offices, for example, an increase of 1 percent in monthly rental income is translated into only a 0.2 percent

[11] Prior to presenting the findings, it is important to expand on two main points: First, a more exact estimation of the equation would be on the individual asset level (and when necessary to add a company fixed effect); however, the data reported in the financial statements is on the aggregate level of the company and therefore we assume that rent and the average occupancy rate reflect each company's "average real estate asset". Second, the average capitalization rate used to value the assets does not appear in the financial statements. As mentioned, the capitalization rate includes two components (i.e. the risk-free interest rate and the "average" risk premium for the company's real estate assets). We capture the changes in the risk-free interest rate using a time fixed effect, which is also an explanatory variable capturing macro changes. With respect to the risk characterizing each company, we assume that the average risk of a company does not change significantly from year to year since we are estimating the change in asset values (in other words, it is assumed that such changes do not occur frequently).

[12] Table A1 in the Appendix presents the descriptive statistics for the main variables.

increase in value, a negligible rate relative to the average rate of change in fair value. (Figure A1 in the Appendix also demonstrates that the rate of change in rental income does not explain much of the change in the value of real estate assets).

Note as well that the model's correlation coefficient (R^2) is relatively high, even though the estimation results cast doubt on the ability of the fundamentals to explain the changes in fair value. Our assessment is that the explanation lies in future expectations, a component not captured by the model. An example of this is the expected rate of growth in rental income, which is an important assumption in the appraisal of an asset's value. In other words, the expectation of an increase in value is not reflected in the fundamentals.

The final point with regard to testing and measuring fundamentals is that the actual NOI, which usually constitutes an indicator of expected rental income, is likely to include other components that were not mentioned as fundamentals, such as management fees, parking revenue and the renter's maintenance costs. Therefore, in order to ensure that we are not ignoring an important component in the analysis of the fundamentals, we estimated the actual NOI by multiplying square meters (area) by annual rental income and the occupancy rate and examined it relative to the reported NOI

(in other words, we calculated $\widehat{\mathrm{NOI}_{i,t}} = Area_{i,t} \times 12Rent_{i,t} \times OccupancyRate_{i,t}$).

Figure A.2 in the appendix shows that the has good explanatory power with respect to actual NOI (an estimated coefficient close to 1, with 0.96 statistical significance and correlation coefficient equal to 0.97).

Table 2: Econometric estimation results

Dependent variable:	(1)	(2)	(3)
Rate of change in fair value	Offices	Retail	Industrial
Rate of change in area, in square meters	0.885***	0.681***	0.900***
	(0.041)	(0.034)	(0.038)
Rate of change in rents	0.208***	0.165***	0.109
	(0.063)	(0.048)	(0.068)
Rate of change in ocupancy rate	-0.082*	-0.056	-0.118
	(0.047)	(0.058)	(0.084)
FE for year	Yes	Yes	Yes
Observations	320	364	271
R^2	0.65	0.56	0.7

SD in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

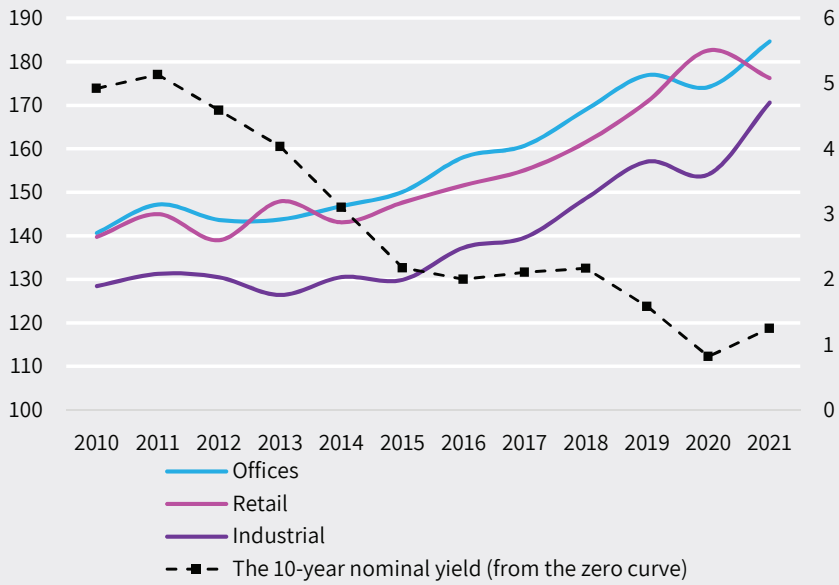
SOURCE: Based on published financial statements.

4. Is there likelihood of a bubble?

The estimation results and the analysis of performance over time cast doubt on the ability of actual rental income to explain the changes in the fair value of real estate assets, which raises the possibility that the expectations of an increase in value are not reflected in the fundamentals, at an increasing pace over time (bubble-like behavior).[13] One of the indications of this kind of behavior is the ratio over time of an asset's price to the revenue it produces, which constitutes the fundamentals. In the case of commercial real estate, it is possible to calculate the fair value per square meter relative to actual rental income per square meter. Figure 5 shows the average ratio for each type of asset.[14]

The figure shows an increase in the aforementioned ratio for all types of real estate assets, primarily since the end of 2015. We would mention that this result may stem from, among other things, the decline in the interest rate used for capitalization as a result of the decline in interest rates; nonetheless, the graph shows that in fact in 2011–15, a period in which there was a sharp drop in the estimated risk-free interest rate, there was no increase in the aforementioned ratio, while in 2016–18, a period in which the ratio increased, the estimated interest-free interest rate remained constant.

Figure 5
The Average Ratio (Weighted by Area) between the Fair Value per Square Meter and Actual Rent per Square Meter, 2010–21



SOURCE: Based on published financial reports.

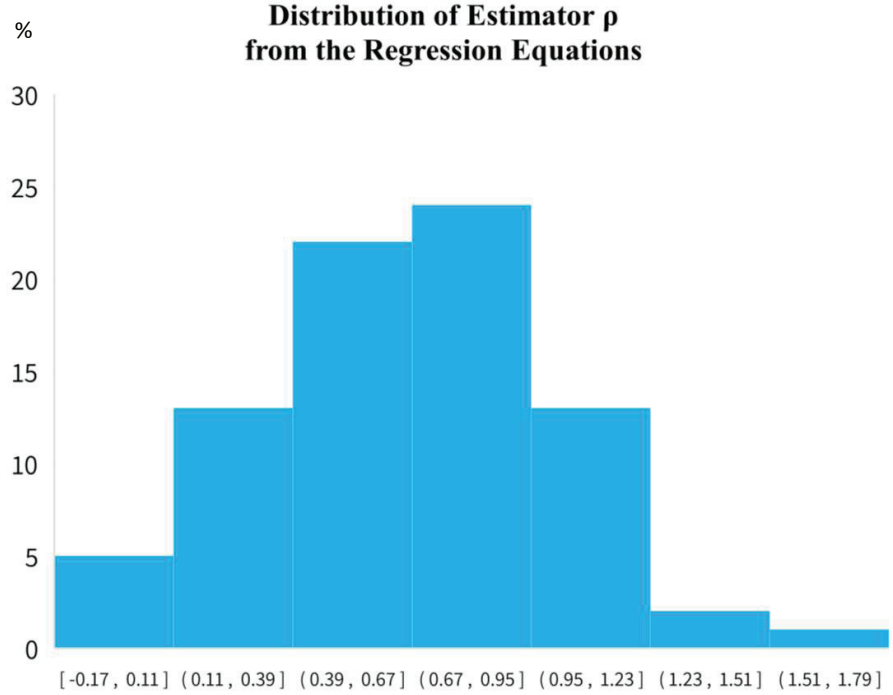
[13] It should be mentioned that the term "bubble" relates to a situation in which asset prices show an increasing rate of growth that is not reflected in fundamentals. Our analysis looks at appraised values, which are an estimate of asset prices. Therefore, we are talking about bubble-like behavior rather than an actual bubble which indicates overvaluation of the fundamentals.

[14] The average is weighted by the space in square meters (for each company). We would mention that the weighting by space is preferable over weighting by fair value since the latter takes changes into account twice. In any case, the picture remains similar even when the weighting is done with fair value and even when the simple average is calculated.

This trend may constitute an indication of bubble-like behavior. In the literature, there are econometric tests for detecting the potential for bubbles in asset prices. For example, a test in the Israeli context is presented in Caspi (2015). He tested for the existence of a bubble in the Israeli housing market. In order to test for a bubble, we assume a time series that follows the following equation:

When P<1, the process is defined as stationary, and when P>1, the rate of change of the series is increasing and it behaves like a bubble (or exhibits bubble-like behavior). When P=1, the process has a unit root.
To test for this kind of behavior in asset values, we will use the Panel Data Unit Root Test. The null hypothesis of the test is that all of the panel's series have a unit root, i.e., P=1. Specifically, we carry out the test presented in Harris-Tzavails (1999) since it assumes that the number of observations (N) is greater than the number of periods (T), as in the case of our panel. As part of the test, we estimated the following equation for each of the panel's series:

Figure 6
Distribution of Estimator ρ
from the Regression Equations



SOURCE: Based on financial statements.

where is defined as the natural logarithm of the ratio between the asset value per square meter and the average rental income per square meter. In order to test the hypothesis, the coefficient is averaged over all of the panel's series. Note that the test fulfills the important and strong assumption of independence between the panel's series (iid), and it is necessary that the panel be balanced. The results of the estimation do not reject the null hypothesis and the statistic is negative and statistically significant at a level of 1 percent. This result supports the claim that the series are stationary (P<1). That is, the test shows that there is no bubble-

like behavior in the value of commercial real estate assets. Figure 6 shows the distribution of the estimated coefficient p, which indicates that most of the panel's series have an estimated coefficient of less than 1, which essentially shows that there is no econometric evidence of behavior of this type. However, we would mention that there is an indication of divergence in about 15 percent of the series.

5. The expected change in the capitalization rate following the rise in interest rates

The year 2022 was characterized by a sharp increase in interest rates both in Israel and worldwide. Yields on government bonds for both short and long terms rose by hundreds of basis points. Thus, for example, the 10-year nominal yield derived from the zero yield curve—which is often used as an estimate of the risk-free interest rate for long-term investments—rose from 1.25 percent in 2021 to 3.375 percent as of December 2022. As mentioned above, the valuation of an asset is based primarily on its expected cash flow discounted at the relevant discount rate. The discount rate is composed of the risk-free interest rate and a risk premium. Thus, as a result of the increase in interest rates and in the estimated risk-free interest rate, the discount rate is expected to increase and in turn the value of commercial real estate assets is expected to decline.

Figure 7 shows the implied cap rate[15] (calculated as the ratio of NOI to fair value, i.e.) and the nominal 10-year yield derived from the zero yield curve (an estimate of the risk-free interest rate) since 2010. It also shows the gap between the implied capitalization rate and the estimated risk-free interest rate has been relatively stable since 2015 (at a level of about 4.5 percent), which provides evidence that these parameters moved in parallel from that year onward.

If so, then in order to construct the estimate of the capitalization rate in 2022, we added the change in the estimated risk-free interest rate (about 2.1 percent, as mentioned) to the implied capitalization rate in 2021. We obtained that on the assumption of no increase in risk (i.e., the aforementioned gap is maintained in 2022 as well), the estimated capitalization rate following the increase in interest rates is about 7.6 percent, in contrast to 5.5 percent at the end of 2021 and is somewhat higher than the implied capitalization rate in 2010 (about 7.3 percent).

As the graph shows, there has been a constant and significant decline over the years in interest rates, which led to a drop in capitalization rates and an increase in the value of real estate assets. As a result of the increase in value in the companies' financial statements, the companies recorded very large profits (revaluation profits) over the years.[16] With the increase in interest rates, we expect that the capitalization rates will return to the levels prevailing at the beginning of the previous decade, even if only gradually.[17] As of the end of the third quarter in 2022, the financial statements that were published did not include

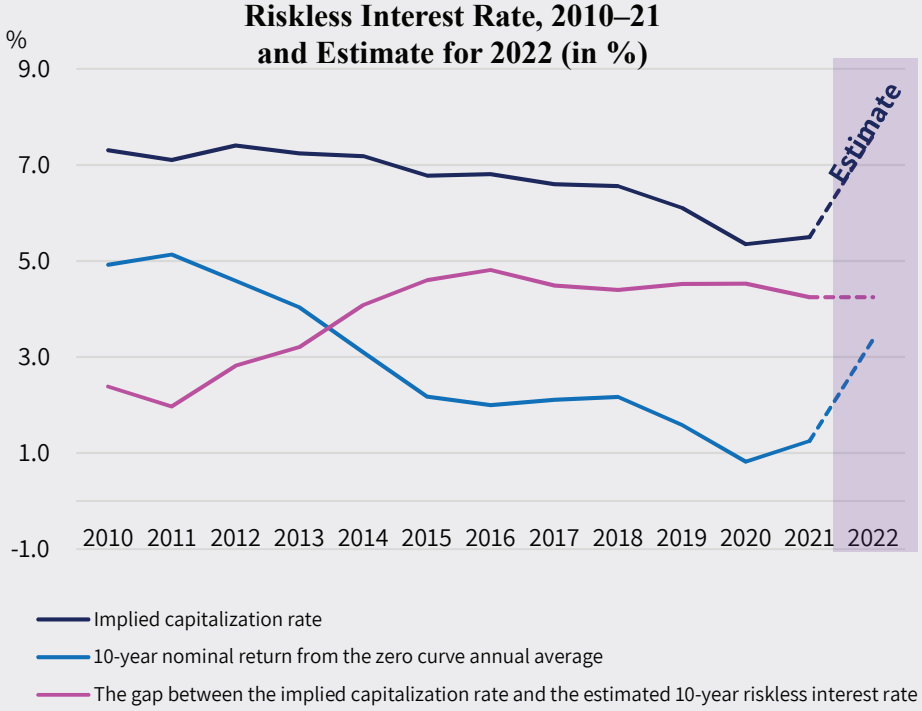
[15] The implied capitalization rate is an accepted calculation in the commercial real estate field (algebraically, it involves solving for the capitalization rate, given that the cash flow and PV are known in period t, and on the assumption that the asset will produce revenue in perpetuity; in other words PV=C/r, where C is the NOI and PV is fair value). The calculation usually appears in a company's financial statements as well, except that adjustments (including additions) are made there to the quarterly NOI in Q4 and to fair value. In contrast, we used the actual data reported for the end of the year, without any adjustments (and therefore there may be discrepancies). We would mention that according to both the aggregate (weighted average) calculation and according to the median, the same implied capitalization rate is obtained.

[16] According to Box 2 in the Financial Stability Report for December 2018 (Commercial Real Estate in Israel), about 46 percent on average of the pre-tax profit during the period 2010–17 was the result of valuation profit.

[17] Figure 5 and 7 show that the decline in the capitalization rates and the rise in asset valuation lagged behind the drop in interest rates. Therefore, it may be that also in the case of a rise in interest rates there will be a lag until the capitalization rates react.

significant declines in value, but we believe that the adoption of the methodology for determining asset values, which led to high profitability over the years, can now be expected—as a result of the expected increase in capitalization rates—to bring about a drop in profitability and perhaps even recorded losses for some of the companies.[18]

Figure 7
Implied Capitalization Rate and Estimate of 10-year Riskless Interest Rate, 2010–21 and Estimate for 2022 (in %)



SOURCE: Based on published financial reports.

6. Conclusion

The commercial real estate industry accounts for a considerable share of the financial system and it is important to analyze its performance and the valuation of commercial real estate assets relative to fundamentals. The analysis presented here shows that starting in 2010, there has been a gradual decline in the return on rentals, though it wasn't uniform across the different asset types. An econometric analysis found that actual monthly rental income—one of the most important fundamentals in asset valuation—explains only part of the change in fair value. Furthermore, there appears to be an upward trend in the ratio of asset value per unit of area (in square meters) to monthly rental income per square meter, which may indicate expectations of growth and an increase in the value of commercial real estate that is not reflected in fundamentals. Nonetheless, an additional econometric analysis did not find statistical evidence of bubble-

[18] We would mention that the real estate indexes worldwide (such as those published by InREV and MSCI for Europe) are pointing to a drop in value and negative returns already in Q3 of 2022.

like behavior in the value of commercial real estate assets. Accordingly, we expect that the sharp increase in interest rates in 2022 will lead to a drop in the value of commercial real estate assets and as a result we are expecting the start of a decline in the companies' reported profitability and also the possibility of an increase in the rate of leverage reported by some of the companies.

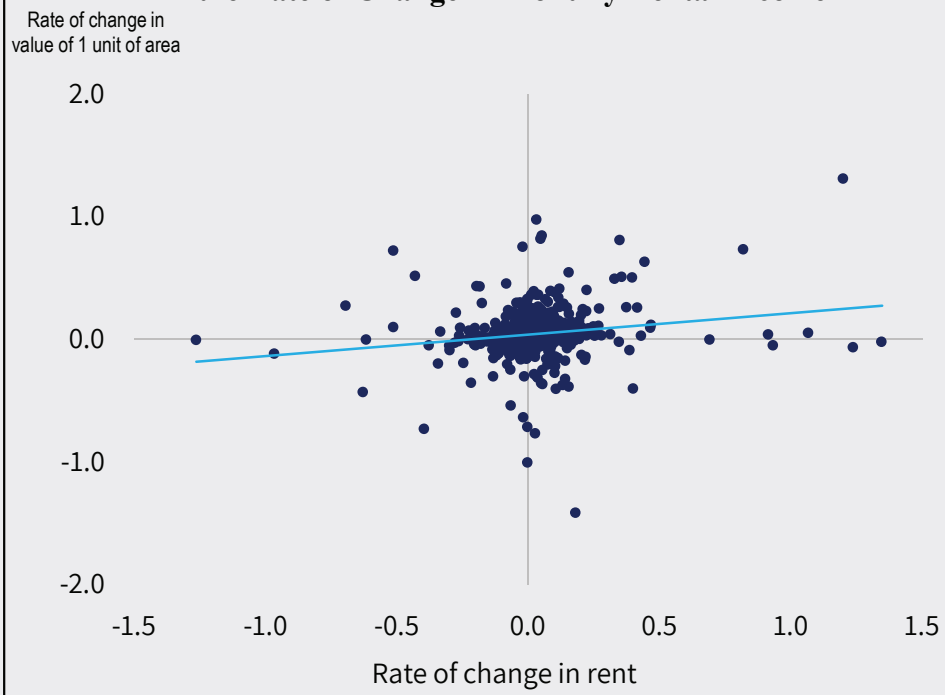
Appendix

Table A.1: Descriptive statistics for the main variables in the estimation equations

	Variable	Observations	Mean	SD	Median	Minimum	Maximum
Offices	Fair value (000's shekels)	352	1,078,345	1,637,679	346,420	641	12,400,000
	Area (square meters)	352	95,606	119,516	32,883	53	613,171
	Monthly rental income (NIS)	352	69	23	65	17	132
	Occupancy rate (percent)	352	92	10	95	11	100
	NOI (000's shekels)	352	70,784	102,022	19,669	0	690,000
	Rate of change in value	320	7.60%	0.21	4.70%	-130%	239%
	Rate of change in area	320	3.10%	0.19	0	-87%	164%
	Rate of change in rental income	320	2.80%	0.12	1.60%	-62%	107%
	Rat of change in occupancy rate	320	-0.50%	0.16	0	-161%	124%
Retail	Fair value (000's shekels)	399	1,291,453	2,687,213	371,754	14,185	14,200,000
	Area (square meters)	399	66,302	98,107	27,744	410	554,000
	Monthly rental income (NIS)	399	101	52	84	35	319
	Occupancy rate (percent)	399	91	9	94	15	100
	NOI (000's shekels)	399	83,495	176,562	23,430	615	885,000
	Rate of change in value	364	6.50%	0.22	3.50%	-101%	127%
	Rate of change in area	364	2.50%	0.23	0	-212%	100%
	Rate of change in rental income	364	1.90%	0.17	1.10%	-126%	135%
	Rate of change in occupancy rate	364	0.60%	0.14	0	-154%	190%
Industrial	Fair value (000's shekels)	296	498,698	697,943	197,045	3,800	4,255,707
	Area (square meters)	296	126,102	195,258	50,994	679	1,046,803
	Monthly rental income (NIS)	296	30	12	30	4	74
	Occupancy rate (percent)	296	93	15	99	27	100
	NOI (000's shekels)	296	35,059	46,909	13,046	62	268,740
	Rate of change in value	271	9.60%	0.28	5.30%	-198%	273%
	Rate of change in area	271	5.30%	0.26	0	-125%	282%
	Rate of change in rental income	271	2.50%	0.15	1.60%	-96%	124%
	Rate of change in occupancy rate	271	0.50%	0.12	0	-76%	69%

Source: Financial statements and data processing at the Bank of Israel.

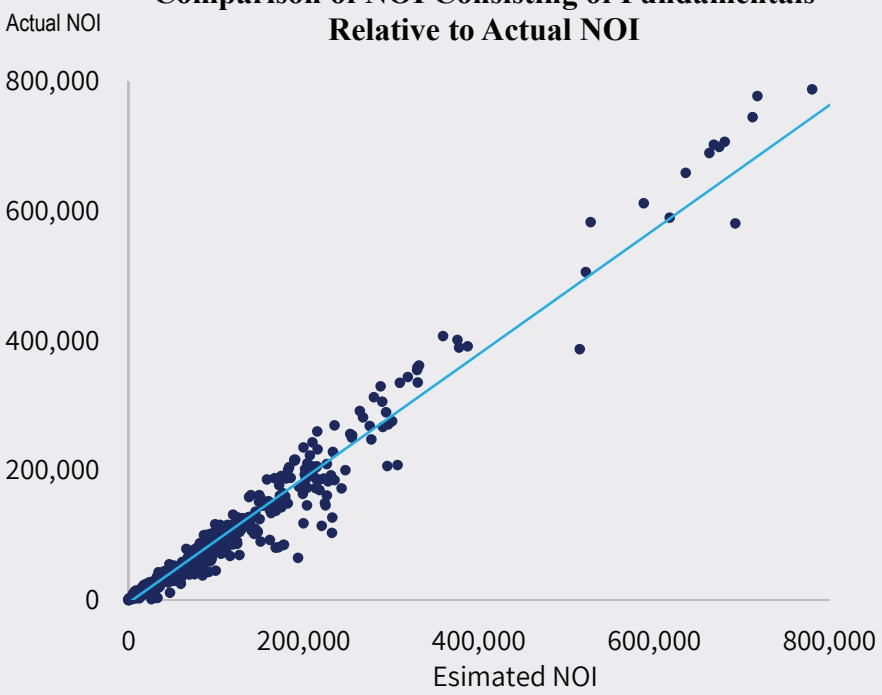
Figure A.1
Rate of Change in Value per Unit of Area Relative to the Rate of Change in Monthly Rental Income



SOURCE: Based on published financial statements.

Explanation: This figure shows the rate of change in the value per unit of area (namely, the value divided by the area in square meters) relative to the rate of change in monthly rental income per square meter. In other words, it is the elasticity of the value per unit of area relative to rental income. The estimate is statistically significant (at a level of 1 percent); however, its value is 0.175 (even when we add a dummy variable for the year) and therefore the explanatory power from an economic perspective is weak. We would mention that the picture is similar for each type of real estate.

Figure A.2
Comparison of NOI Consisting of Fundamentals Relative to Actual NOI



SOURCE: Based on published financial statements.

Explanation: In this figure, we determine whether the estimated NOI, which was calculated as the product of the aforementioned fundamentals, is able to explain the actual NOI (which is an indicator of the flow of income in asset valuations). The estimate from this equation is close to 1 and stands at 0.96 statistical significance at a level of 1 percent and R^2=0.97.

Box 2: Are investors identifying broad problems with the nonbank credit companies?

- In the summer of 2022, the "Gibui Holdings Ltd." and "Unet Credit Finance Services Ltd." nonbank credit companies collapsed.
- This box examines the performance of the share price of the other nonbank credit companies' around the time of the reports of the problems at "Gibui Holdings Ltd." and "Unet Credit Finance Services Ltd.".
- The findings of this analysis indicate that investors in the equity market did not interpret the negative developments at these two companies as a warning of broad serious problems in the nonbank credit market or of severe problems at the other companies in the industry.

1. BACKGROUND

The supply side of the Israeli credit market includes the banks on one side and credit card companies, nonresidents, the government, households, institutional investors, and private companies on the other. We will refer to this latter group of private companies that specialize in credit provision as nonbank credit companies. Due to the high concentration of the credit market at the banks, the nonbank credit companies have an important role to play in increasing competition in this market, particularly in the diversification of the sources of credit and in increasing access to them for small and medium enterprises.[1] The nonbank credit market has grown rapidly in recent years.[2] The number of publicly traded companies operating in this field has more than doubled since 2020, to about 20 companies. In addition, total assets of these public companies more than doubled in the second quarter of 2022 compared to the first quarter of 2020, from about NIS 11.8 billion to about NIS 25.6 billion. The rapid growth, alongside irregular prudential supervision[3] and the role that nonbank credit companies played in the Global Financial Crisis of 2008, raise concerns about the nonbank credit industry and its impact on financial stability.[4]

Evidence of mismanagement at "Unet Credit Finance Services Ltd." and "Gibui Holdings Ltd."—two relatively small nonbank credit companies traded on the Tel Aviv Stock Exchange—began coming to light in June 2022. At the beginning of the month, Unet announced the appointment of an outside examiner, and the delay of the publication of its financial statements.[5] In the middle of the same month, the company announced that in respect of loans it had provided, it was exposed to debts with risks that it could not assess.[6] Until August, the company continued to report on the loss of checks, loans that were not properly approved,

1 For more information, see the third report of the Committee to Examine Competition in the Credit Market: https://www.boi.org.il/en/NewsAndPublications/PressReleases/Pages/16-8-21.aspx

2 For more information, see the *Financial Stability Report* for the second half of 2021, Box 2.

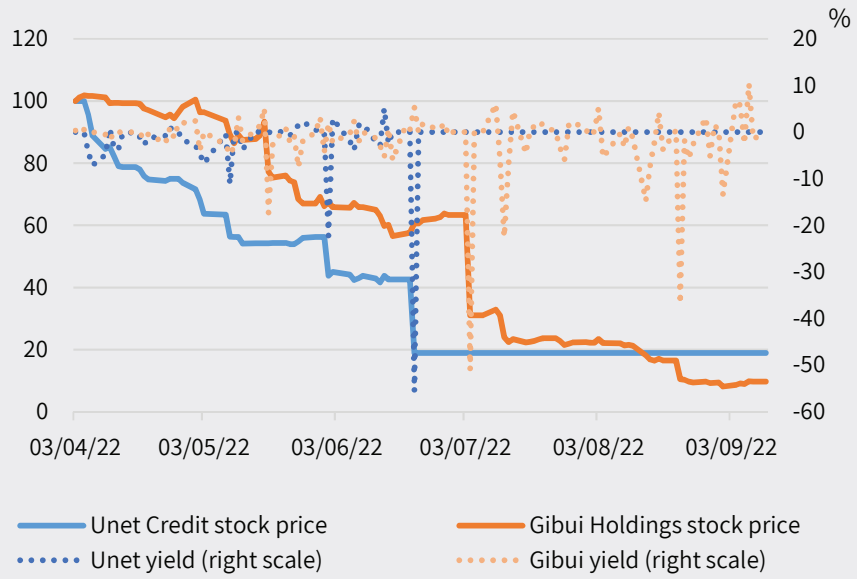
3 Nonbank credit providers are required to obtain a license to operate in the provision of credit from the Capital Market, Insurance and Savings Authority, and if the providers are publicly traded, they are supervised by the Israel Securities Authority regarding disclosure and transparency matters. The companies are not subject to prudential supervision.

4 https://www.imf.org/external/pubs/ft/fandd/basics/52-shadow-banking.htm; https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp105~ae3850b53d.en.pdf; https://www.fsb.org/wp-content/uploads/c_130129y.pdf

5 https://maya.tase.co.il/reports/details/1454074

6 https://maya.tase.co.il/reports/details/1456994

Figure 1
Development of Equities and Yields on Unet Credit and Gibui Holdings, Daily Data, 100=April 3, 2022



SOURCE: Based on TASE data.

and other irregularities[7], and that the company was trying to advance a debt restructuring agreement with bondholders.[8] As a result, the Israel Securities Authority decided to open an investigation concerning the company's behavior.[9] At the end of June 2022, "Gibui Holdings Ltd." reported on the appointment of an outside examiner due to concern of mismanagement.[10] At the beginning of July, the company announced that the volume of exposure to high-risk debt was about NIS 38 million[11], compared with company equity of about NIS 90 million. Later on, evidence of embezzlement by a senior company manager surfaced[12], which led to a half of trading, doubts regarding the repayment of bond debt[13], the opening of an investigation by the Israel Securities Authority[14], and the advancement of a debt restructuring agreement.[15]

This raises the question of whether these problematic events, which constitute the realization of operational risk, are the domain of two particular companies, or whether they indicate a broad problem in the nonbank credit industry. In particular, the failures that were discovered may indicate similar failures in other

7 https://maya.tase.co.il/reports/details/1458185; https://maya.tase.co.il/reports/details/1463996

8 https://maya.tase.co.il/reports/details/1474287

9 https://maya.tase.co.il/reports/details/1463999

10 https://maya.tase.co.il/reports/details/1460713

11 https://maya.tase.co.il/reports/details/1461703

12 https://maya.tase.co.il/reports/details/1463748; https://maya.tase.co.il/reports/details/1472198

13 https://maya.tase.co.il/reports/details/1472188

14 https://maya.tase.co.il/reports/details/1477193

15 https://maya.tase.co.il/reports/details/1476675

companies in the industry, which may lead to problems in those companies as well and/or to a tightening of regulation on them, which would come with costs to shareholders. Various reports in the media[16] raised concerns regarding the significance of these events for the entire industry, criticized the regulation on the industry, and reported a negative impact to the provision of credit by institutional investors to companies in the industry. The incidents at Unet Credit and Gibui Holdings also had an adverse impact on credit ratings agencies' expectations of future growth in the industry, and therefore on the credit ratings of companies in the industry.[17] As noted, the Israel Securities Authority supervises public companies in the industry on matters regarding disclosure and transparency. Due to these events, the Authority announced the opening of a broad examination of the companies in the industry, and published new guidelines for those companies, which obligate them to disclose the risks that may result from money laundering, theft, embezzlement, fraud, and irregularities, and to identify the company's risk management officers.[18] In contrast, if the events that took place at the two companies are perceived as isolated incidents that have no broad impact on the industry as a whole, then the collapse of these two companies may help their competitors. Overall, the negative events at Unet and Gibui" have the potential to affect the other companies in the nonbank credit industry in conflicting directions.[19]

This study examines equity market assessments of the effect of the Unet and Gibui events on the other companies in the nonbank credit industry. The analysis is based on the understanding that the financial markets can serve as a leading indicator of the future effects of present events, and in view of the gaps between the positions of various professionals and the lively public discussion on the matter. The equity market essentially serves as a "survey with incentives" regarding future results, and provides useful information, particularly in complex and developing situations (Wagner, 2020). This is due to the combination of a variety of market participants, who are heterogeneous in their positions, in their analysis capability, or in the information they have, alongside the incentives created by the investment of significant amounts by these participants.

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16 https://www.globes.co.il/news/article.aspx?did=1001417447; https://www.themarker.com/markets/2022-07-03/ty-article/.premium/00000181-c4bd-d09b-a18b-cffdcd0f0000; https://www.ice.co.il/finance/news/article/867317; https://www.calcalist.co.il/market/article/s1z30q0qc; https://www.globes.co.il/news/article.aspx?did=1001417141; https://www.themarker.com/markets/2022-07-28/ty-article/.premium/00000182-408a-d9f7-a9e6-d0bb3b170000; https://www.bizportal.co.il/capitalmarket/news/article/806865; https://www.calcalist.co.il/market/article/syvdq680c.

17 See, for instance, the Ma'alot ratings report for the Peninsula company on December 18, 2022. https://maya.tase.co.il/reports/details/1492989/2/0

18 https://www.isa.gov.il/%D7%94%D7%95%D7%93%D7%A2%D7%95%D7%AA%20%D7%95%D7%A4%D7%A8%D7%A1%D7%95%D7%9E%D7%99%D7%9D/175/2022/Pages/hodea20722.aspx; http://isa.gov.il/%D7%94%D7%95%D7%93%D7%A2%D7%95%D7%AA%20%D7%95%D7%A4%D7%A8%D7%A1%D7%95%D7%9E%D7%99%D7%9D/175/2022/Pages/hodea21722.aspx

19 This discussion focuses on the operational risks in the nonbank credit industry. In addition, nonbank credit companies are obviously exposed to financial risks. During the COVID-19 crisis, for instance, the yield spreads of these companies increased more than the credit spreads of the traditional financial companies such as banks and insurance companies. (See the *Financial Stability Report* for the second half of 2021, Box 2.) In addition, it is important to note that "Gibui Holdings Ltd." and "Unet Credit Finance Services Ltd." are relatively small companies, in the lower half of the market value distribution of public nonbank credit companies, and that they went public relatively recently (similar to most public companies in this field).

2. THE TIMELINE AND THE EFFECT OF EVENTS ON THE COMPANIES INVOLVED

A series of events between May and August 2022 exposed serious problems in the behavior of Unet Credit Finance Services and Gibui Holdings. These events led to the collapse of their shares, concerns over their ability to pay their debts, and investigations by regulatory bodies and the police. The associated events were monitored by searching through the reports to the public by Unet and Gibui in the Tel Aviv Stock Exchange's "Maya" system, and through searches of relevant press articles using the Google search engine. The decision on what the most significant events were is, obviously, a judgment call, but we based it not only on experience and expertise, but also on the reaction of the companies' shares to the events in question (Figure 1).[20]

The average daily return on Unet Credit shares on the days when the first significant negative events that we identified transpired was -17 percent. A number of days after that, trading in the company's shares was halted, and when trading resumed, the share immediately dropped by an additional 55 percent and did not resume trading. Gibui Holdings shares actually continued trading throughout most of the period. In the last seven negative events that we identified between July and August 2022, the company's shares fell by more than 20 percent on average in response to each event. It therefore seems that investors interpreted the events at Unet and Gibui as destructive to the value of those companies.

3. METHODOLOGY AND DATA

3.1 Data

For each company in the nonbank credit provision industry, the daily return (adjusted for dividends) on their shares was calculated for each day during the period around the events described above. Statistical examinations based on a test of the impact of each event on the shares of each of the companies in the industry separately may be problematic if there is a correlation between the companies' shares on each of the examined days. In order to deal with this concern, we examined the impact of the events not only on the shares of the individual companies, but also on the weighted portfolio of the industry. For this purpose, we built two synthetic portfolios of the companies in the nonbank credit provision industry, excluding Gibui Holdings and Unet Credit. The first portfolio is composed of the simple daily average of the daily returns on the companies in the industry, and the second is the daily average, weighted by market value, of the daily returns on the companies in the industry.

Table 1 shows the returns on the portfolios that combine the shares of the nonbank credit companies that compete with Gibui Holdings and Unet Credit on each of the days on which an event occurred that affected the probability of their collapse. The table shows that the daily returns on the shares of the competing nonbank credit companies during the 14 events that showed a worsening of the state of Gibui Holdings or Unet Credit tended to be negative but very close to zero. This simple descriptive statistics provide a hint

[20] On some of the tested dates, the share was under a trading halt due to the negative developments in the companies. In those cases, we were forced to rely on our judgment alone.

Table 1: Events that negatively affected Gibui Holdings or Unet Credit, and returns in the nonbank credit industry on those dates

Date	Company	Event	Weighted index	Equally weighted index	Gibui Holdings	Unet Credit
May 9, 2022	Unet	NIS 3.5 million was stolen from the company	-3.54%	-4.21%	-	-11.15%
Jun 1, 2022	Unet	External examiner was appointed due to irregularities at one of the company's branches, and the publication of financial statements was delayed	1.31%	0.97%	-	-22.28%
Jun 14, 2022	Unet	**A nonbinding statement of principles was signed to sell 18 percent of the company's shares to Giza for NIS 10 million**	-0.32%	-0.66%	-	5.07%
Jun 16, 2022	Unet	The external examiner's findings: The company has a higher exposure than previously known due to loans it provided	-0.93%	-1.57%	-	0.00%
Jun 22, 2022	Unet	Report on the loss of checks totaling NIS 10.6 million, and the exposure of an additional NIS 37 million	-0.38%	-0.38%	-	0.00%
Jun 23, 2022	Unet	Controlling owners announce that the shares will not be sold to Giza	0.77%	0.78%	-	0.00%
Jun 30, 2022	Gibui	Halt in trading and appointment of an external examiner to look at the company's activity in view of concern over mismanagement at the company's northern branch	-1.19%	-1.40%	0.00%	-
Jul 4, 2022	Gibui	Trading resumes in order to remove the share from the indices, and lowering of the company's credit rating and that of its bonds	0.34%	-0.07%	-50.94%	-
Jul 12, 2022	Gibui	Report on mismanagement at the northern branch: A member of management took an improper loan of .NIS 2.5 million	-0.34%	-0.36%	-22.51%	-
Jul 13, 2022	Unet	Discovery of additional irregularities at the company	-0.65%	-0.87%	-	0.00%
Jul 25, 2022	Gibui	Report of unapproved loans totaling about NIS 2.2 million provided to parties associated with the manager of the northern branch	0.20%	0.24%	-3.38%	-
Aug 14, 2022	Gibui	The external examiner's first draft finds that there are lost assets totaling NIS 50–100 million	0.75%	0.29%	-14.74%	-
Aug 22, 2022	Gibui	Notice of failure to repay bond debt	-1.09%	-0.97%	-36.76%	-
Aug 23, 2022	Gibui	Concern about embezzlement of about NIS 6 million at the company's northern branch	0.28%	0.40%	-1.78%	-
Sep 1, 2022	Gibui	Forecasted credit loss provision in the second quarter of 2022 of about NIS 80–100 million	-0.13%	-0.02%	-13.48%	-

SOURCE: Based on "Maya" system for public company reporting, media notices, and Tel Aviv Stock Exchange data.

that the dramatic events that occurred at Gibui Holdings and Unet Credit between May and August 2022 were not perceived as dramatic for the entire nonbank credit market.
The shares of the nonbank credit companies traded on the Tel Aviv Stock Exchange are affected not only by investors' assessments of the nonbank credit companies, but also by macroeconomic and financial events that influence the entire Israeli economy. In order to control for this effect, and in accordance with common practice in event studies (MacKinlay, 1997), we use an econometric estimation that controls for the daily return on the main index of the Tel Aviv Stock Exchange—the TA125—and in some cases also for the stock index that focuses on financial firms—the Tel Aviv Financial index.

3.2 Methodology

In order to examine the effect of the events at Gibui Holdings and Unet Credit on the other companies in the nonbank credit market, as assessed by the financial markets in real time, we use an event study method. It is worth noting that these events were unexpected and that each of them had a significant impact on the probability that Gibui Holdings or Unet Credit would collapse. The focus of our interest in this box is not the examination of the negative impact on the involved companies themselves, but rather on the question of whether and to what extent the negative events at the two companies reflect broader problems in the nonbank credit market.[21]

A negative response by shares of competing companies to a worsening in the state of Gibui Holdings or Unet Credit may be due to investors' assessments that the problems in the two companies are an indication of broader problems in the nonbank credit market and/or an assessment that the two companies' problems would lead to more severe regulation or a worsening of market conditions for the other companies in the industry. In contrast, a positive reaction by competitors' shares may be due to investors' assessments that the level of competition in the nonbank credit market would decline due to the collapse of two of the competitors, and that this would lead to an increase in the profitability of the other companies in the market.

In order to examine the effect of the collapse of Gibui Holdings and Unet Credit on investors' assessments regarding the state of the competing nonbank credit companies, we examined the response of the portfolios of the shares of the competing companies to the events, while controlling for the appropriate benchmark indices. For this purpose, we adopted the method used, for example, by Wan and Wong (2009). Specifically, we estimated the following equation:

$$(1) R_t = \alpha + \beta_m R_{m,t} + \beta_{fin} R_{fin,t} + \gamma D_t + \varepsilon_t$$

[21] Various studies have used event studies focusing on competing shares to examine the broad effects of events such as mergers and regulation. Eckbo (1983) and Stillman (1983) examined the shares of competing companies to look at the impact of mergers on the level of competition and consumer well-being. Bittlingmayer and Hazlett (2000) examined how enforcement of antitrust laws in the US against Microsoft affected the company's competitors and suppliers in the computer industry. Fee and Thomas (2004) and Shahrur (2005) used a broad sample of horizontal mergers to examine the impact of those mergers on competitors, suppliers, and customers of the merged firms. Karceski, Ongena, and Smith (2005) examined the impact of mergers in the banking industry on customers of the merged banks, and showed that the shares of companies that had borrowed from the purchased banks reacted negatively to the purchase announcement.

where R_t is the return on the portfolio, either equally weighted or value weighted; $R_{m,t}$ is the return on the Tel Aviv 125 Index on day t; $R_{fin,t}$ is the return on the Tel Aviv Financials Index on day t; and D_t is a dummy variable that obtains the value of 1 on each of the 14 days when we identified events that indicated a worsening of the state of Gibui Holdings or Unet Credit and a value of 0 otherwise. Therefore, the coefficient is expected to estimate the average effect of an increase in the probability of collapse of Gibui Holdings or Unet Credit on the shares of competing companies.

4. THE EFFECT OF THE COLLAPSE OF UNET CREDIT AND GIBUI HOLDINGS ON COMPETITORS—ESTIMATION RESULTS

Table 2 shows the estimation results of equation (1) over a period of 246 trading days from the beginning of September 2021 to the end of August 2022. The table shows the effects of the events that had an impact on the fortunes of Gibui Holdings and Unet Credit on the return of the average portfolio of the competing nonbank credit companies. The table clearly indicates that the severe events at Gibui Holdings and Unet Credit did not have a statistically or economically significant effect on the shares of the competing nonbank credit companies in any of the specifications that we examined.[22] The other coefficients are in the expected direction. In particular, the shares of the nonbank credit companies are very much in line with the Tel Aviv 125 Index. Alongside this, a comparison of the various specifications shows that the negative events at Gibui Holdings and Unet Credit tended to have a negative effect on their small competitors (as shown by the use of the simple average in Columns 2 and 4), but a positive effect on larger competitors (as shown by the use of the weighted average in Columns 1 and 3).[23] These differences may suggest that the collapse of Gibui

Table 2: The connection between the events at Unet Credit and Gibui Holdings and the return on shares of (%) competing companies

	(1)	(2)	(3)	(4)
Negative event	0.085%	-0.084%	0.076%	-0.091%
Tel Aviv 125	***0.771	***0.747	***0.653	***0.669
Tel Aviv Financials			0.110	0.724
Constant	0.001%	-0.049%	-0.002%	-0.050%
Number of observations	246	246	246	246
Adjusted R^2	63.3%	60.8%	63.5%	60.8%

SOURCE: Based on “Maya” system for public company reporting, media reports, and Tel Aviv Stock Exchange data.

[22] This conclusion remains valid even if we relate to the one positive event reported by Unet Credit during the period. The results also remain valid if we examine the events related to Unit Credit and those related to Gibui Holdings separately. In addition, even when we estimate a panel regression with the explanatory variable being the return of all nonbank credit companies every day, we do not find that the events at Gibui Holdings and Unet Credit had a statistically significant impact on the competing companies.

[23] Estimating the effects of the events on the small competing companies and on the large competing companies separately leads to qualitatively and quantitatively similar results to the use of the simple average and of the weighted average, respectively.

Holdings and Unet Credit did moderately increase concerns regarding the stability of the small nonbank credit companies, while investors were not concerned over the stability of the larger companies in the industry, and even believed that they would benefit somewhat from the decline in the level of competition and/or stricter regulatory requirements in the industry.

The table shows the results of the estimation of equation (1) for a period of 246 trading days from the beginning of September 2021 until the end of August 2022. The table shows the effect of the events en route to the collapse of Unet Credit and Gibui Holdings on the return (%) of the average portfolio of competing nonbank credit companies. Columns 1 and 2 control for the return on the Tel Aviv 125 Index, and Columns 3 and 4 control for the return on the Tel Aviv Financials Index in addition to the Tel Aviv 125. Columns 1 and 3 show the effect of the events at Unet Credit and Gibui Holdings on the return weighted by market value of the shares of the competing companies, and Columns 2 and 4 show the effect on the simple average return of the shares of the competing companies. *, **, and *** indicate that the tested coefficient is different from zero with a statistical significance of 10%, 5%, and 1% respectively, according to a t test, with standard errors that are robust to heteroskedasticity.

Finally, we used a two-stage estimation to examine the abnormal return (beyond expected) of each of the "other" nonbank credit companies on the negative event dates at Unet Credit or Gibui Holdings. Using a number of statistical tests, we examined the hypothesis that the abnormal returns on shares of the competing nonbank credit companies on the dates of the incidents are not significantly different from zero. However, as can be seen in Table 3, similar to the previous results, the estimation using this method, which is also common in event studies, does not generate a result that is significantly different from zero for any of the examined specifications.

Table 3: Abnormal stock returns of the competing companies at the individual company level (%)

	Number of observations	Average	Median	Negative observations	Positive observations
Abnormal return 1	238	0.00	0.00	122	116
Abnormal return 2	238	0.0001	0.0012	113	125

SOURCE: Based on "Maya" system for public company reporting, media reports, and Tel Aviv Stock Exchange data.

The table sums the abnormal returns (%) of the competing nonbank credit companies on the days on which significant negative events took place at Unet Credit or at Gibui Holdings. The abnormal returns for each company-event observation were estimated as the difference between the return on the company's share on the date of the event and its expected return based on the coefficients obtained in the estimation of the following equation throughout the estimation period, from the beginning of May 2021 to the end of April 2022:

$$(2) R_{i,t} = \alpha_i + \beta_{i,m} R_{m,t} + \beta_{i,fin} R_{fin,t} + \varepsilon_t$$

We used the coefficients obtained from this estimation as the basis for predicting the expected return on the days when there was a negative event at Unet Credit or Gibui Holdings, and calculated the effect beyond expected (abnormal return, AR) of each event on the returns of the competing nonbank credit companies using the equation:

$$(3) AR_{i,t} = R_{i,t} - \hat{\alpha}_i - \widehat{\beta_{i,m}} R_{m,t} - \widehat{\beta_{i,fin}} R_{fin,t}$$

Abnormal return 1 is the abnormal return based on the estimation of Equation (2) with one explanatory variable—the Tel Aviv 125 index. Abnormal return 2 is the abnormal return based on the estimation of Equation (2) with the Tel Aviv 125 index and the Tel Aviv Financials index. Column (2) shows the number of observations used in the estimation, which is equal to the number of events multiplied by the number of companies examined. Column (3) shows the average abnormal return, where the statistical significance is based on a two-sided t test of the hypothesis that the average abnormal return is equal to zero. Column (4) shows the median abnormal return, where the statistical significance is based on a two-sided Wilcoxon test of the hypothesis that the median abnormal return is equal to zero. Columns 5 and 6 show the number of company-event observations with negative and positive abnormal returns, accordingly, where the statistical significance is based on the sign test.

5. CONCLUSION

The nonbank credit market has grown rapidly in recent years, but in view of the slight prudential regulation, there have also been concerns of the stability of companies in this field. These concerns escalated with the revelation of evidence of significant mismanagement at the Unet Credit and Gibui Holdings companies in the spring and summer of 2022. Specifically they raise questions regarding whether these problematic events are the domain of two particular companies, or whether they indicate a broader problem in the nonbank credit industry. The failures discovered at Unet Credit and at Gibui Holdings may indicate similar failures in other companies in the industry, which may lead to problems in those companies as well and/or to stricter regulation on them, which would come with costs to shareholders. This point of view was expressed not only in the public discourse, but also in the new and stringent guidelines issued by the Israel Securities Authority. In contrast, if the events that took place at the two companies are perceived as isolated incidents in those companies only, which have no broad impact on the industry as a whole, then the collapse of these two companies may help their competitors.

We examined the shares of Unet Credit and Gibui Holdings, and found that investors did in fact interpret the events at those companies as very negative in terms of their valuations. In view of the two conflicting hypotheses regarding the impact on the competing companies, this study examines the equity market's assessment of the impact of these events on the other companies in the nonbank credit industry, on the basis of the understanding that the financial markets can serve as a leading indicator of the future effects of present events. In particular, we used the event study method, focusing on the effect of the various negative events that took place at Unet Credit and Gibui Holdings on the competing companies.

The findings show that the negative events at Unet Credit and Gibui Holdings did not have a statistically or economically significant effect on the shares of the competing nonbank credit companies. The events at Unet Credit and Gibui Holdings may have been perceived by investors—perhaps contrary to the sentiment in the media—as isolated, and not as broad events with implications for all companies in the industry. However, the large companies in the industry had a moderate positive reaction, compared with the moderate negative reaction of the small companies in the industry. This provides a hint that investors did perceive the events at the two collapsing companies as having some broad impact; they were expected to have a negative effect on the other small companies in the industry, but to help the larger companies due to an expected decline in the level of competition in the industry due to the collapse of the two companies and an increase in the regulatory threshold for activity in the industry. Either way, the empirical findings in this box do not support the hypothesis that the collapse of the two companies was perceived as an indication of a broad failure that endangers the entire nonbank credit industry. At the very most, it may have some implications for the level of competition in the industry.

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Box 3: Together we will march—examining the similarity in institutional investors' asset portfolios and its implications[1]

- The scope of long-term assets managed by institutional investors continues to increase consistently, and has reached NIS 2.2 trillion—132 percent of GDP (July 2022). There are 11 entities that manage 90 percent of the assets. Of those, 4 entities alone manage 50 percent of the assets.
- Alongside the size and concentration of institutional investors' holdings in the domestic capital market, it is important to examine the extent of diversification of their asset portfolios and to measure the level of similarity across them: thus, in a case of a significant shock, considerable similarity in asset portfolios is liable to serve as a transmission channel from an idiosyncratic event to a systemic one.
- An analysis of the extent of similarity in (tradable) asset portfolios of institutional investors in Israel indicates that it is very high. In contrast, the extent of similarity in their (tradable) asset portfolios abroad is markedly lower, though it is still high relative to existing benchmarks.
- The high similarity in the domestic portfolio derives from, among other things, the relatively small amount of potential assets for investment, but, apparently, also from the herd behavior in the investments of institutional investors.
- In view of the many possibilities for investment abroad and in view of the consistent increase in the scope of assets, there should be continued encouragement of geographically varying the asset portfolio and of examining the extent of effectiveness of existing regulation.

"Institutional investors" is a term for companies that manage the savings of the public for the medium and long terms, by way of a variety of products, such as pension funds, provident funds, advanced training funds, and life insurance policies.[2] For more than a decade, total assets managed by the financial institutions has grown consistently, primarily against the background of the Expansion Directive for Mandatory Pensions that went into effect in 2008. The total assets managed by these entities was about NIS 2.2 trillion in July 2022, which is equivalent to 132 percent of GDP. This is similar to the figure for the banking system (NIS 2.3 trillion). The breakdown between the various savings channels is presented in Figure 1.

The increasing size and power of the institutional investors and their influence on the level of saving in the economy fuels the public discussion of questions related to the level of competition and consumer welfare, investment, firm performance, institutional activism and corporate governance, the allocation of resources in the economy, and more.[3] These issues have been dealt with by a series of committees, guidelines, and laws,[4] and they are reflected in the public discourse that takes place in the publications

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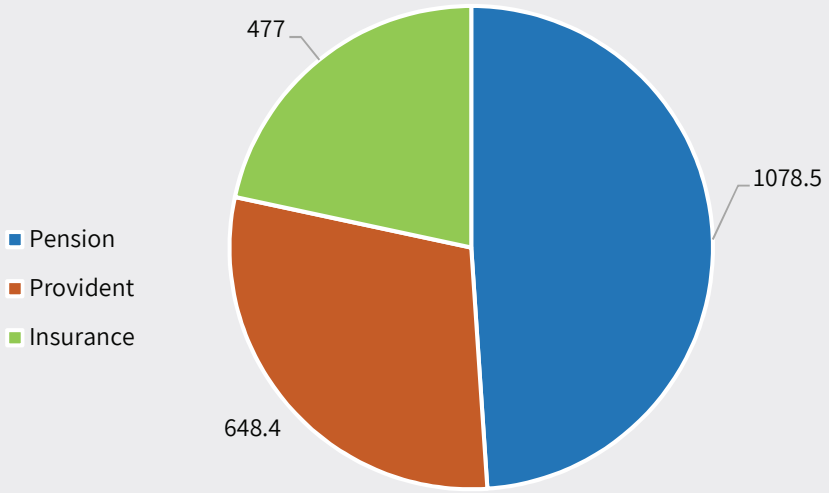
1 The box was written with the assistance of the Information and Statistics Department at the Bank of Israel and in collaboration with the Economic Department of the Israel Securities Authority.

2 Due to the lack of data, we are omitting defined benefit life insurance policies from the analysis. Similarly, the analysis does not include mutual funds, since they are different in terms of the character and horizon of investment, the need for liquidity, the constraints on investments, etc.

3 Thus, these entities are defined in the Concentration Law (2013) as significant financial entities. Two main arguments underlie this definition: their effect on the allocation of sources in the economy and on the degree of financial stability.

4 The main ones include: the recommendations of the "Hodek Committee" to Determine the Rules of Investment in Corporate Bonds (presented in 2010) which were later merged within the investment restrictions and rules that apply to financial institutions (2012), the restriction on management fees (2013), the conclusions of the "Goldschmidt Committee" for the Regulation of the Direct Loan Channel (2014) and those of the "Yafeh Committee" (2022) in the context of direct expenses.

Figure 1
Segmentation of Long Term Savings
by Institutional Composition
July 2022, NIS billion



SOURCE: Based on commercial bank balance sheets,Tel Aviv Stock Exchange, Ministry of Finance.

of the various regulatory authorities and in the media. The issues of competition and concentration in the activity of the financial institutions was recently surveyed in detail in an Israel Securities Authority report (2020), in which the authors used classic antitrust indices (the Herfindahl–Hirschman Index (HHI), CR3, etc.) to highlight the high degree of concentration in the insurance industry, the increasing level of concentration in the pension industry and the more moderate level of concentration in providence funds.[5] The authors of the report claim that concentration has implications for the level of competition in the market, on the variety of alternatives available to savers, on the volatility and liquidity of the financial assets in which the institutional investors invest, on the pricing of securities issues, etc. On the other hand, the Capital Market, Insurance, and Savings Authority authored a minority opinion that was published as part of the report of the Concentration Committee (2022),[6] which claimed that from the perspective of consumer welfare in Israel—at the very least—there is no evidence of the influence of concentration and that the long-term saving system in Israel is low-cost and trustworthy relative to other countries.

However, an examination of the degree of concentration in a given market using the classic indices is liable to produce only a partial picture that may be misleading. Thus, for example, common ownership

[5] For further details, see "Developments in the management of the public's funds in Israel during the past decade and their effect on the capital market", Economic Department, Israel Securities Authority, December 2020.

[6] For the full report:
https://www.gov.il/BlobFolder/unit/centralization_law_team_committee/he/Vaadot_ahchud_centralization_law_team_committee_centralization_law_team_committee-final-report.pdf?force_isolation=true

of competing entities in a given market segment or multiple encounters in various markets might lead to a cartel-like equilibrium and to tacit collusions, which reflect a level of concentration that is higher than that actually measured. In the domain of long-term saving, if financial institutions maintain contact among themselves by way of joint holdings (and even joint ownership) of tradable financial assets, i.e., stocks and corporate bonds of business companies that issue those assets, there may be adverse effects on the level of competition, on investment in innovation, on corporate governance (including ESG), on the level of salaries and also on the prices of the products (according to research studies).[7] Therefore, when examining the level of concentration in this market, consideration should also be given to the degree of interconnectedness or the similarity in holdings between the asset portfolios of financial institutions.[8] Indeed, as part of the recently published report of the Concentration Committee,[9] the issue of high concentration among institutional investors was raised. It concluded that the similarity between asset portfolios constitutes a central component of the issue of concentration in this segment of business activity. As stated in the report, if every competitor allocated its investments identically, the actual level of concentration would be higher than that measured by the standard indices. The connection between concentration, competition and similarity (common ownership) in asset portfolios raises various issues, including the importance of structural factors, regulatory factors and behavioral factors. These influence the level of similarity which has implications for competition, efficiency and more.

Without detracting from the above, it is worthwhile examining the issue of similarity between the investment portfolios of the institutional investors (interconnectedness) from the perspective of financial stability as well, and in particular with respect to its contribution to the speed of contagion among financial institutions in the economy following exposure to a shock. According to the empirical literature, there is a positive and statistically significant connection between the level of similarity and the simultaneous movements and sales of the same financial assets on their exposure to a given shock (referred to as fire sales and downward spirals).[10] Therefore, even if each portfolio is sufficiently diversified against idiosyncratic risks, the similarity between managed investment portfolios is liable to transform an idiosyncratic risk into a systemic risk (Wagner, 2011; Ibragimov et al., 2011; Allen et al., 2012). The realization of systemic risks in a crisis is liable to cause considerable adverse impact to the markets and to all financial institutions by way of the erosion of asset prices and of real activity, as the result of a sharp decline in private consumption and the level of investment in the economy (Ellul et al., 2011; Murray and Nikolova, 2021). It can even lead to intervention by the government or the central bank, which is the lender of last resort when a liquidity crisis occurs. It is no surprise that empirical research has shown that financial institutions with a high degree of overlap in their assets portfolios contribute more to the level of systemic risk.[11]

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7 For a more complete discussion of the issue, see: Report on the implications of common ownership and concentration in Australia (2022), Koch et al.(2021), Azar et al., (2018), and Lewellen and Lowry (2021).

8 A domestic analysis of similarity level, as well as a description of the methodology, can be found in Box 2 of Chapter 4 of the Bank of Israel Annual Report for 2012.

9 See footnote 6 for a link to the report.

10 Shleifer and Vishny (2011).

11 Kosenko and Michelson (2022) and Girardi et al. (2020).

It is true that most of the aforementioned risks exist primarily among leveraged financial institutions, whose liabilities are primarily short term and who are forced to respond to high liquidity requirements in the short term or to meet minimum capital requirements by the regulator.[12] In contrast, long-term saving institutions often serve as stabilizing agents in the financial system. Thus, they usually are less leveraged; their investment horizons are longer; they do not tend to carry out asset sell-offs even during periods of asset price declines (and even tend toward buying during these periods); and they are not directly exposed, as part of defined contribution pension saving schemes, to bankruptcy risk.[13]

Although these characteristics, which apply to most of the long-term savings in Israel, reduce the potential triggers that are liable to initiate a financial crisis,[14] they do not reduce the possible implications for financial stability since a sufficiently powerful shock will cause institutional investors to make major adjustments in their asset portfolios.[15] In such a case, and if there is a high level of similarity among asset portfolios, the institutional investors are liable to take actions that are not independent, which is liable to exacerbate the initial shock and extend its effect to all players in the financial system and to the economy as a whole.[16] The claim that institutional investors with similar asset portfolios operate similarly or even identically during periods of financial pressure was confirmed by Girardi et al. (2020), who found that insurance companies in the US that experience a shock to their assets or liabilities (originating either in the financial system or in the real economy) tended to simultaneously sell a similar mix of assets, depending on the level of similarity between their asset portfolios. In view of the aforementioned and in view of the Bank of Israel's obligation to support and maintain financial stability in the economy, we will focus on the level of similarity between the asset portfolios of institutional investors in Israel.

[12] Defined benefit pension plans (DB), which exist primarily in Europe are subject to regulatory restrictions of this type and therefore they are identified as financial institutions with systemic risk (see the discussion in Beetsma et al. (2016) on the systemic risk implicit in pension funds). This is in addition to banks that fully meet this description. For an analysis of the level of similarity between the banks' asset portfolios, see Box 2 in the Financial Stability Report for the Second Half of 2017. For an analysis of the factors that determine the level of similarity between the banks, see Kosenko and Michelson (2022).

[13] From a macroeconomic perspective, the fact that only savers suffer from the losses on their long-term savings makes the disposable income of many dependent on these institutions. This phenomenon has a potential effect on demand (consumption) and on economic activity.

[14] In Israel, there is a high level of structural synergy in the activity of institutional investors. This occurs between insurance companies and investment houses on the one hand and the management of pension products on the other. In general, there is a high degree of overlap between the supervision of pension and the supervision of insurance with respect to the identity of the asset managers.

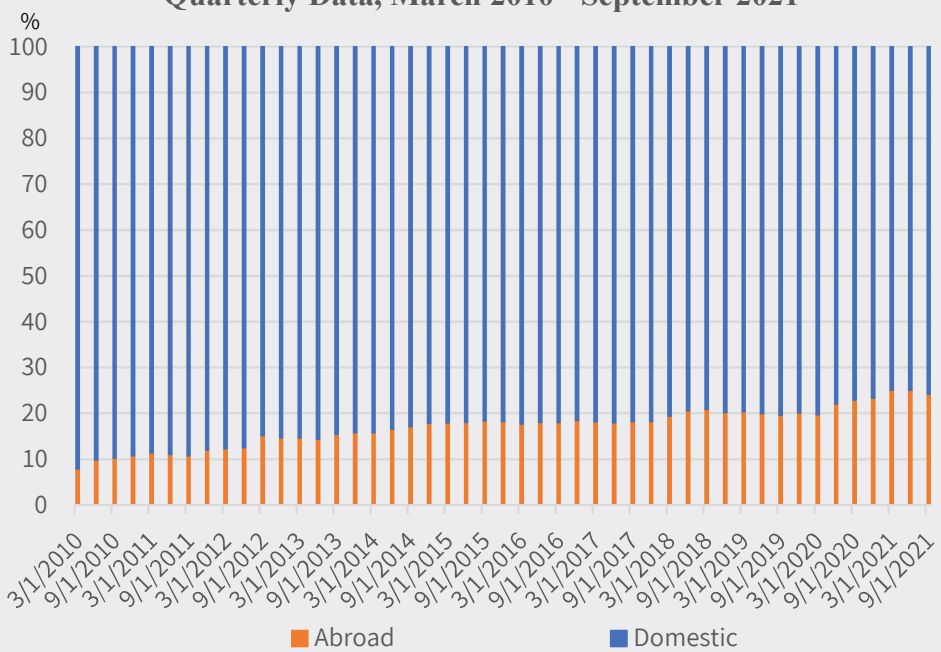
[15] Consumer regulation in relation to the pension funds in Israel makes it simple to transfer between pension funds, for example. In the scenario of multiple requests to transfer to another fund (a "run on the fund"), a fund may be required to sell its assets under pressure in order to obtain liquidity and facilitate the withdrawals. Also in the case of this activity, the pension institutions (depending on their size) have the potential to influence the prices of financial assets in the markets.

[16] An example is the event that occurred in the UK in September 2022. As a result of pessimism with regard to future fiscal policy, the prices of government bonds declined. These bonds serve as collateral in hedging transactions of pension funds and the decline in their value forced them to increase their collateral. In order to so do, the pension funds sold government bonds. This led to a further drop in the value of government bonds, which in turn led to additional demand for more collateral and so on. Only the quick intervention by the Bank of England stopped the downward spiral. Nonetheless, it is worth mentioning that the pension funds involved are benefit guarantee schemes. There was a similar event in Israel at the start of the COVID-19 pandemic (in March 2020), in which financial institutions had to increase their dollar collateral against their exposure to futures contracts in foreign currency. They did so by means of a massive selloff of government bonds. Notwithstanding the liquidity of this market in normal times, the scope of the selloff led to a sharp decline in their value and an increase in their yield, such that the Bank of Israel was forced to purchase government bonds in order to cool down the markets (for further details, see Chapter 3 of the Bank of Israel Annual Report for 2020).

The level of similarity: a quantitative analysis

The institutional investors included in this analysis are pension funds, provident funds, advanced training funds, and defined contribution life insurance plans. In most cases, the fund belongs to a management company, and every management company belongs to a controlling corporation.[17] The quarterly data[18] include the holdings of each fund on the individual asset level and its market value, starting from the end of 2010 until September 2020.[19] The total assets managed by these institutions grew continuously from about one trillion shekels at the start of the period to 2.5 trillion shekels at the end (Figure 2), with the majority of the public savings managed in the pension segment (which accounts for about 50 percent of savings, a level that has remained relatively constant over the years).

Figure 2
Institutional Investors' Asset Portfolio Composition, by Security Type and Geographic Location
Quarterly Data, March 2010 - September 2021



SOURCE: Based on Praedicta Ltd. data.

The largest category of assets in each of the saving segments is government bonds (including earmarked bonds) and Makam (Figure 2). With respect to geographic distribution, most of the assets are domestic; however, there is a move toward foreign assets. Thus, the proportion of foreign assets grew from about

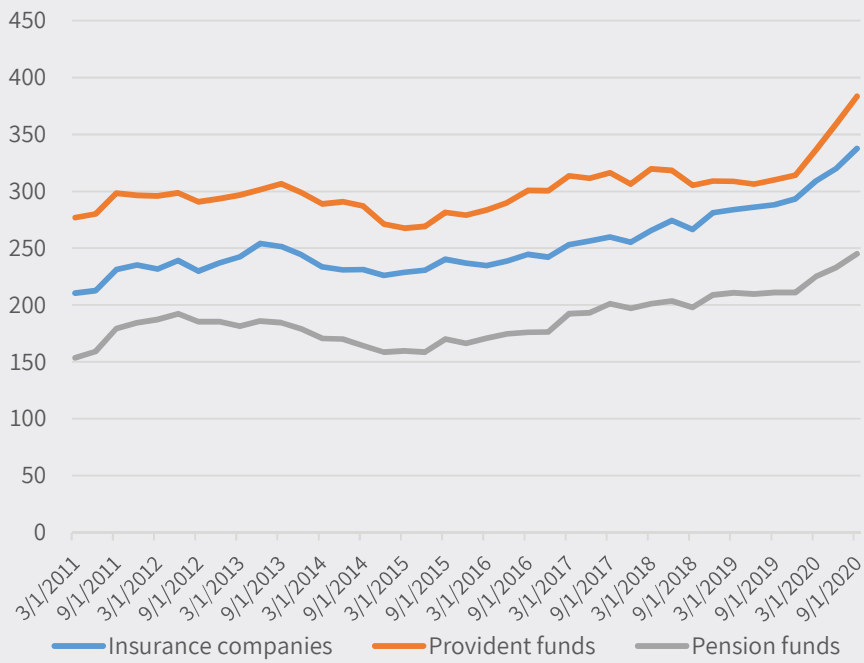
[17] The operating funds are an exception.

[18] Source: Praedicta Ltd.

[19] In view of the technical efforts required to carry out the analysis and based on the data that existed at the time of writing, this is the endpoint of the analysis. Nonetheless, it is worth mentioning that initial examinations of the data for 2021 and 2022 produce a similar picture.

10 percent to about 25 percent during this period. In order to measure the level of similarity, we focus on the portfolio of tradable Israeli equities and tradable Israeli corporate bonds, which constitute about one quarter (NIS 588 billion) of the assets managed by institutional investors. There are primarily two motivations: first, the similarity between liquid assets (cash and deposits) and the portfolio of government bonds can be viewed as absolute because even if there are certain differences in portfolio duration between the institutions, the risk profiles are similar. Second, based on Raddatz and Schmukler (2013) who found that financial institutions tend to adopt herd behavior, primarily with respect to assets for which information is less available, the focus on tradable assets, which have a high level of transparency, facilitates an examination of the level of similarity between assets in which investment is not influenced or driven by information limitations.[20]

Figure 3
Number of Effective Assets in Israel
March 2011 - September 2020



SOURCE: Based on Praedicta Ltd. data.

First evidence of the level of similarity between financial institutions is obtained from an examination of concentration in holdings by asset or in other words, the quantity of equities and corporate bonds, which make up the lion's share (90 percent) of the equity and corporate bond portfolios of the fund members.

[20] A third reason which is technical in nature can be added: these assets are unambiguously identified and therefore there is marginal chance for errors in identifying the asset, which would influence the measured level of similarity.

The right side of Figure 3 presents the quantity of these assets, which we will refer to as "effective assets".[21] The graph shows that in September 2020, the majority of the tradable portfolio was composed of between about 240 assets at the least (in the pension segment) and about 400 assets at the most (in the provident fund segment). Since the supply of assets in the market changes from year to year and only some of them can be invested in according to the investment regulations specified by law[22], we also calculated the proportion of effective assets within the total possible assets than can be invested in, or in other words all of the equities and corporate bonds that exist in the market, which are held by at least one management company. The graph shows that following a moderate upward trend over the years, this proportion (at the last point in time) stands at between 25 and 33 percent (depending on the saving segment), such that on average, most of the holdings of a management company in the pension domain are concentrated in about 240 securities out of about 1,000 possibilities and most of the holdings in the provident fund domain are concentrated in about 400 securities out of about 1,200 possibilities.

At first glance, the lack of degrees of freedom implied by the small number of assets for investment and the small number of assets that are actually invested in leads necessarily to a higher level of similarity. However, even with a small number of assets, there are various possibilities for diversifying a portfolio and therefore we will expand the examination with the help of cosine similarity (CosSim), a familiar and widely used index of similarly in the literature.

For each pair of management companies, this index of similarity is defined as:

$$CosSim_{i,j} = \frac{\sum_{k=1}^{n} asset_{k,i} asset_{k,j}}{\sqrt{\sum_{b=1}^{n} asset_{k,i}{}^2} \sqrt{\sum_{b=1}^{n} asset_{k,j}{}^2}}$$

where $asset_{k,i}$ is the proportion of asset k within the total asset portfolio of management company i, which is multiplied by -$asset_{k,j}$, the proportion of asset k in management company j's asset portfolio. The sum of the products is divided by the product of the Euclidean norms of each management company. The index ranges from minus 1 to plus 1, and in contrast to the Pearson correlation coefficient, the average exposure of a portfolio is not subtracted from the proportion of each asset in the portfolio. Thus, the CosSim index does reflect only correlation in the level of holding in the asset by each company, but also the correlation in the size of the exposure itself. Since according to the findings of the Israel Securities Authority, most of the public's saving is concentrated with a small number of management companies, we calculated the index

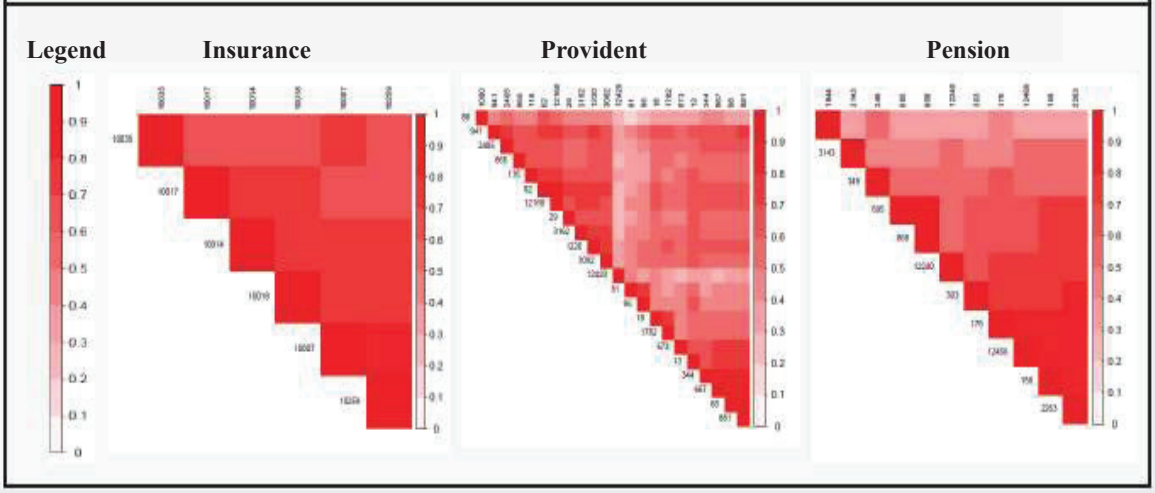
[21] In other words, assets in which the savings of the public are invested. Finding the effective assets is based on the "entropy index" which is the accepted measure of concentration in many domains. The justification for the use of entropy is based on the fact that it is the only concentration index (even in the choice of a logarithmic base) that has the following characteristics: 1. The index is dependent only on probabilities (the relative proportion of each asset). 2. The index is at a maximum when the distribution over the assets is uniform (each asset has an equal weight). 3. The addition of values with probability of zero (assets with a market value of zero) does not change the index. 4. The concentration index of two joint distributions is equal to the sum of the concentration index of one distribution and the expected concentration index of the other, give the first distribution. A formal statement and proof can be found in: Khinchin, Aleksandr Iakovlevich (1957). Mathematical Foundations of Information Theory. New York: Dover. Translated by R.A. Silverman and M.D. Friedman from two Russian articles in Uspekhi Matematicheskikh Nauk, 7 (1953): 3–20 and 9 (1956): 17–75.

[22] Some of the restrictions relate to types of assets in which it is permitted to invest while others relate to limitations on the maximum investment in a specific asset. See:
https://www.nevo.co.il/law_html/law01/500_710.htm.

of similarity for the effective management companies, that is, companies that together manage about 90 percent or more of the savings in each segment.[23]

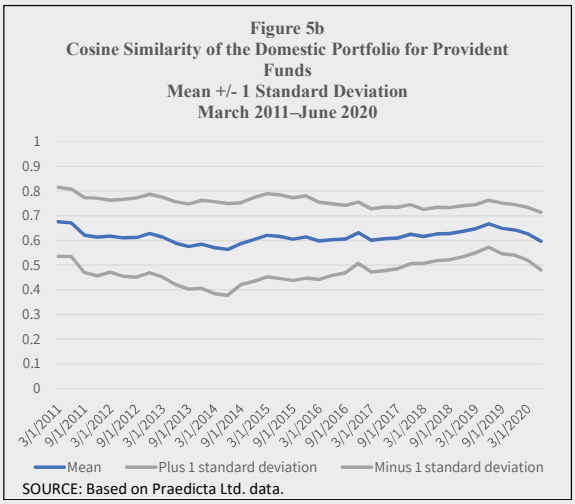
The index of similarity can be illustrated with a heat map (Figure 4), which presents the index of similarity between each pair of effective management companies during the last quarter of the period being surveyed. Each color represents a given level of similarity, according to the left scale. The heat map indicates that the majority of connections are found in the red sections of the map (i.e., at a very high level of similarity), where the insurance segment has the highest similarity and the provident segment the lowest. Confirmation is provided by Figure 5, which presents the average index (plus/minus one standard deviation) over time in each saving segment. The graph indicates that the level of similarity between the asset portfolios is very high, with somewhat of an upward trend in the insurance and pension segments.

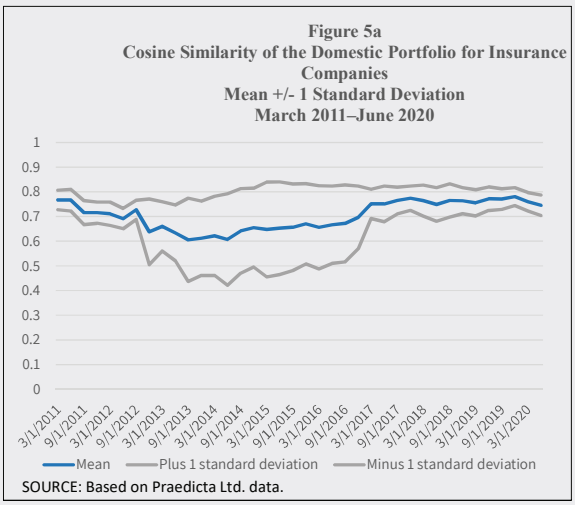
Figure 4: Index of Similarity between Each Pair of Managing Companies, Heat Map, September 2020

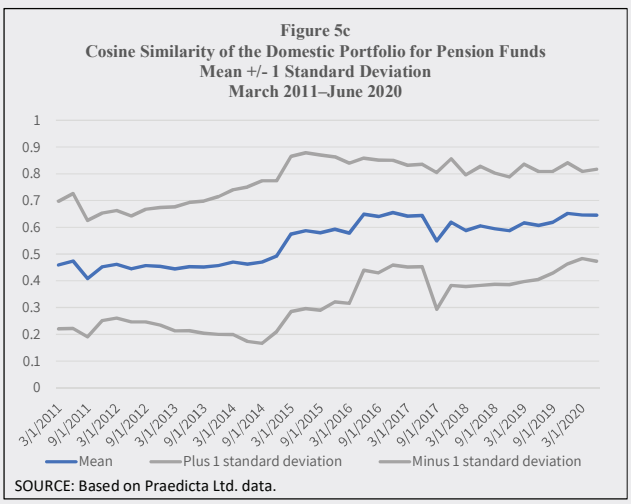


As noted above, one of the parameters that may influence the level of similarity is the quantity of relevant assets that are available for investment. Therefore, it may be that the high level of similarity is the result of the small size of the Israeli capital market, which has a limited number of eligible investment possibilities. Thus, the greater the "home bias" in investment decisions, the higher will be the expected level of similarity between the asset portfolios of institutional investors. The expansion of investment to assets outside of Israel is likely therefore to contribute to lowering the level of similarity, on the condition that the portfolio of foreign assets does not have a high level of similarity. In order to test this hypothesis, we carried out the above analysis also for equities and corporate bonds of companies abroad, which at the sample's last point in time constituted about 40 percent of the portfolio of foreign assets (NIS 240 billion).

[23] Also in this case, we used the entropy index in order to identify the effective management companies, i.e., the largest management companies, which together manage about 90 percent of the assets in each saving channel. According to this index, the insurance segment consists of about 5 companies, the provident segment consists of about 25 and the pension segment consists of about 10, with a small variation in number of effective companies from one quarter to another.





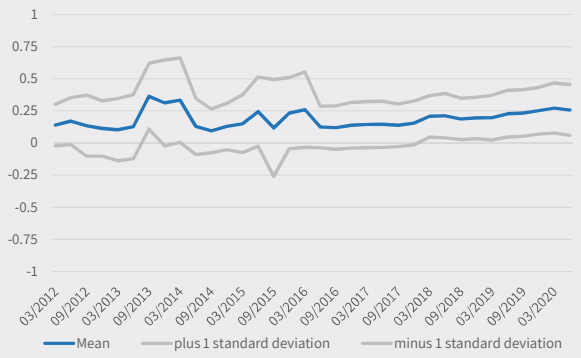


The effective number of equities and corporate bonds of companies abroad in which the financial institutions invest rose during the entire period being surveyed. At the last point in time, the effective number of assets held by the financial institutions in their foreign portfolios was between 350 (provident funds) and 420 (insurance companies). Within total possible assets for investment abroad, this number only constitutes between 23 and 43 percent.[24] It appears, therefore, that the portfolio of foreign assets is also small with respect to the number of assets in the portfolio.[25] To complete the analysis, we also calculated the index of similarity for the portfolio of foreign assets for the management companies included in the above analysis. The average of the index is presented in Figure 6.

[24] It is worth mentioning that it is certainly possible that the number of foreign assets that are available for investment is much larger and that the number of assets in which the financial institutions actually in invest is small from the start, also relative to the potential number.

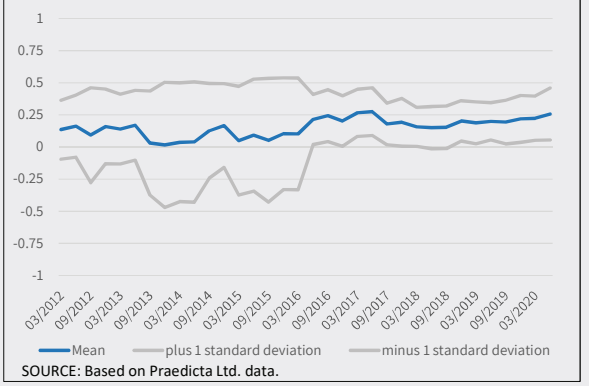
[25] Although investing in, for example, an ETF that tracks some share index implies the actual holding of hundreds of assets, from the point of view of similarity this is still an investment in identical assets.

Figure 6b
Cosine Similarity of the Foreign Portfolio for Provident Funds
Mean +/- 1 Standard Deviation
March 2012–June 2020



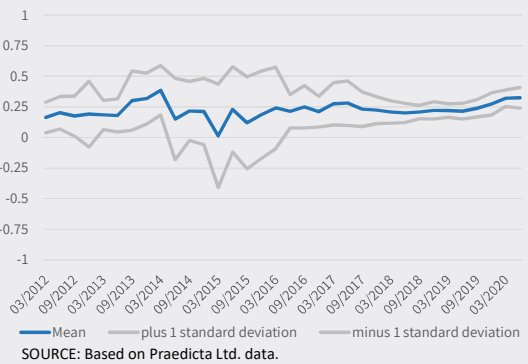
SOURCE: Based on Praedicta Ltd. data.

Figure 6a
Cosine Similarity of the Foreign Portfolio for Insurance Companies
Mean +/- 1 Standard Deviation
March 2012–June 2020



SOURCE: Based on Praedicta Ltd. data.

Figure 6c
Cosine Similarity of the Foreign Portfolio for Pension Funds
Mean +/- 1 Standard Deviation
March 2012–June 2020



SOURCE: Based on Praedicta Ltd. data.

Despite the volatility in the level of similarity, it appears that as the institutional investors gradually increased their investments abroad over the past decade, the level of similarity in fact increased.[26] Nonetheless, this level is still considerably lower than that measured in the portfolio of domestic assets. This means that even in the global market—where the number of tradable assets is much larger and during a period in which the public's savings are increasingly being channeled to the purchase of foreign assets—the way in which the portfolio is divided is becoming increasingly similar. With respect to the level of similarity itself and in the absence of any possibility of carrying out an international comparison of the index of similarity, it is challenging to state whether or not this is a low level in absolute terms. Nonetheless, it is worth mentioning the findings of Barucca et al. (2018), according to which the index of similarity in the portfolio of equities and bonds of insurance companies in the UK ranges from 0.01 to 0.07. This is significantly lower than the level measured in the portfolio of foreign assets and even more so with respect to the portfolio of domestic assets managed by the Israeli financial institutions. Girardi et al. (2020) used the same methodology as we

[26] The high values of the index at the beginning of the period can be attributed to the scarcity of investments abroad during this period and the limited data available for this period.

do and found that the level of similarity among insurance companies in the US is about 0.12 and that it has been relatively stable over time.

We emphasize that from the perspective of potential risk to financial stability, the level of similarity that we found is a lower bound to the actual level of similarity. Thus, as mentioned above, the portfolio of government bonds, which constitutes the lion's share, in effect reflects the same risk (sovereign risk) and therefore even if the duration and the indexation of every security is different in the portfolios of each financial institution, the identity of the issuer is the same and therefore the risk is similar. This is also true with respect to the portfolio of tradable assets, many of which have the same issuer (such as the equities and bonds of the same company or of a number of companies with common ownership) and therefore, to a certain extent, they reflect similar risks, and during a period of exposure to some shock they may be realized simultaneously (Kahanna and Thomas, 2009). Similarly, the holding of shares of different companies that belong to the same economic sector can make shocks dependent on one another.[27]

What might explain the high level of similarity between the portfolios of tradable assets? According to the comparison between the level of similarity in the portfolio of domestic assets and that in the portfolio of foreign assets, it appears that at least part of the explanation lies in the scarcity of investment possibilities. However, this is not a sufficient explanation as, if that is the case, why is there a non-negligible and increasing level of similarity in the portfolio of foreign assets as well? One of the main explanations in the theoretical and empirical literature (see Raddatz and Schmukler, 2013, and Beetsma et al., 2016) is the comparison of performance with similar funds and the possible effect of such a comparison on transfers by customers (Porat and Steinberg, 2013).[28] In such a case, the management company has an incentive to mimic another management company (or some reference point in the segment) to whatever extent possible, in order for its poor performance not to be noticed—even at the price that its good performance will not be noticed either—and thus avoid the risk of losing customers. Furthermore, the similarity in the portfolio of foreign assets raises the question of the extent of diversification in the way in which investment decisions are made, from the perspective of both risk management models and the choice of managers of foreign investments.

In summary, we found a high level of overlap in the asset portfolios of Israeli financial institutions. This finding is the mirror image of the findings of Ben Horin et al. (2014) on the herd behavior in the activity of financial institutions during the period 2002–11, although their work focused on a period in which the institutional investors were smaller and on asset groups rather the level of an individual asset. Apart from questions related to competition and efficiency, the degree of effectiveness of regulatory tools and the optimal number of effective institutions in the economy, the phenomenon of similarity in investment portfolios is identified as increasing systemic risk and as contributing to the amplification of price declines during a crisis, by way of the fire sale mechanism.[29] Even though the institutional structure of long-term savings in Israel significantly reduces the probability of a financial crisis that originates among the financial institutions that manage those savings, if a significant event does occur, then the currently high level of

[27] The level of similarity increases significantly when assets are grouped according to the identity of the issuer, as can also be seen in Box 4.2 in the Bank of Israel Annual Report for 2012.

[28] Other explanations in the literature include the use of identical decision-making models and the scarcity of information on assets.

[29] The risk of a "fire sale" as a result of financial distress takes on even greater importance in light of the findings in the Israel Securities Authority Report (2020) on the proportion of the float of financial asset held by financial institutions and in light of the low level of liquidity in the markets in Israel.

similarity is liable to serve as an accelerator for the spread of the crisis and its transformation into a more serious and perhaps even systemic crisis. Even if the financial stability of the institutional investors on its own is not at risk, the effect on savers and on other players in the system—who are sensitive to the prices of financial asset by way of connectedness and infection—is likely to be significant. In order to reduce the probability of this happening, the geographic and sectoral diversification of the asset portfolio should be further encouraged, together with an examination of the decision making process with regard to investment in Israel and abroad and its effect on the existing regulation.

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