Chapter 3
Inflation and Monetary Policy

- The Consumer Price Index increased by 3 percent in 2023—the upper bound of the inflation target. Inflation during the year encompassed many goods and services, led by nontradable goods and services.
- Annual inflation reached a peak of 5.4 percent in January 2023, and has since declined gradually. Inflation moderated due to the tight monetary policy in Israel, the decline in global inflation, the normalization of the supply chains, and the support of fiscal policy.
- The weakening of the shekel relative to the major currencies put upward pressure on inflation. Its weakening until September was correlated with the timing of developments in the legislative process advanced by the government with regard to the judicial system.
- We find evidence that since annual inflation exceeded the upper bound of the target range, actual price changes became related to households' one-year inflation expectations, a development that may contribute to the entrenchment of inflation.
- During the year, the Bank of Israel raised the interest rate by 1.5 percentage points to 4.75 percent in May, following an increase of 3.25 percentage points in 2022. The concern over the entrenchment of inflation was a major factor in the Monetary Committee's decisions to continue raising the interest rate this year.
- The pace of interest rate increases slowed during the year, as the interest rate reached a restraining level and due to signs that the inflation environment was moderating. Following the increase in May, the Monetary Committee kept the interest rate unchanged at a sufficiently restraining level to support the continued convergence of inflation to the target range.
- The Swords of Iron War that broke out on October 7 caused a significant impact to economic activity, increased financial risks, and initially led to a sharp depreciation of the shekel. Alongside these developments, inflation slowed in the fourth quarter, and inflation expectations for periods ranging from one to three years decreased.
- Upon the outbreak of the war, the Monetary Committee focused on stabilizing the markets and maintaining financial stability. Even before the opening of foreign exchange trading on the first day following the outbreak of the war, the Bank of Israel announced a program of intervention in the foreign exchange market by selling up to $30 billion and through swap mechanisms totaling up to $15 billion. After the markets were stabilized and annual inflation continued to decline, the Committee lowered the interest rate in January 2024 by 0.25 percentage points to 4.5 percent.
- To alleviate the impact to households and businesses that were severely affected by the war, the Bank of Israel initiated a comprehensive assistance program for households and small and micro businesses, which was adopted by the banking system. Later, the Bank of Israel also offered reduced-cost monetary sources against the provision of low-interest credit to small and micro businesses impacted by the war.

MONETARY POLICY TARGETS

According to the Bank of Israel Law, 5770–2010, the Bank of Israel has three objectives: (1) to maintain price stability as its central goal. The government determined that price stability means an annual inflation rate in the range of 1–3 percent. It was further determined that when inflation deviates from the target range, the Bank must adopt a policy that it believes will return it to the range within a period that does not exceed two years; (2) to support other objectives of the Government's economic policy, especially growth, employment, and reducing social gaps, provided that this support shall not prejudice the attainment of price stability over the course of time; and (3) to support the stability and orderly activity of the financial system. Since October 2011, monetary policy is set by the Bank of Israel Monetary Committee.

The concept whereby the central bank has multiple objectives, chiefly maintaining price stability, is referred to in the literature as "flexible inflation targeting". Under such a regime, when inflation deviates from the target range, policy makers act to return it to within the range, but allow some flexibility: They may allow a temporary deviation from the target range in order to achieve the Bank's other objectives, while maintaining price stability in the medium and long terms. The Bank has a variety of toolsat its disposal to achieve its objectives, and it enjoys independence in their implementation.

The first part of this chapter analyzes the changes that took place in the inflation environment this year before the outbreak of the Swords of Iron War, which broke out on October 7, and the significant consequences of the war. The second part of the chapter outlines the monetary policy implemented during the year in response to the changes in the inflation environment and in economic activity, with separate discussions of the measures taken prior to the war and after it began. The third section of the chapter outlines the development of the monetary aggregates over the course of the year.

1. INFLATION

Inflation was 3 percent in 2023, and encompassed many goods and services, led by nontradables.

Inflation totaled 3 percent in 2023, the upper bound of the target range. Inflation during the year encompassed many goods and services, led by strong demand for nontradable goods and services. Annual inflation reached its peak in January 2023—5.4 percent, the highest rate since the Global Financial Crisis of 2008. It then declined gradually, led by the prices of tradable goods and services. A main factor in the moderation of inflation was the tight monetary policy, which contributed to slowing the growth of domestic demand, and was supported by fiscal policy. In adition to these, global factors also contributed to the moderation of inflation, chiefly the decline in global inflation—particularly food and energy prices—alongside the normalization of the supply chains. In contrast, factors that drove price increases included the weakness of

the shekel in view of domestic political developments, and the acceleration of rental price increases (until June).

The impact of the Swords of Iron War on the economy was reflected in a significant disruption to economic activity, an increase in financial risks, and—initially—a sharp depreciation of the shekel. These developments were accompanied by a sharp decline in quarterly inflation during the fourth quarter (Table 3.1).[1] Market expectations for the period of 1–3 years at the end of 2023 were that the war and its consequences would have a moderating impact on inflation during that period. The decline in inflation expectations was accompanied by a significant decline in the expected path of the monetary interest rate.

The Swords of Iron War led to a significant impact to economic activity and an increase in risks.

Table 3.1
Main indicators of inflation and monetary policy, 2019–2023

						2023			
	2019	2020	2021	2022	2023	Q1	Q2	Q3	Q4
A. Inflation (percent)									
1. Actual inflation[a]	0.6	-0.7	2.8	5.3	3.0	1.2	1.0	0.7	0.1
2. Seasonally adjusted quarterly inflation[b]						4.0	3.1	3.1	1.5
3. One-year inflation expectations derived from capital market[c]	1.1	0.0	1.9	3.1	2.8	2.8	3.0	2.7	2.6
4. Ten-year inflation expectations derived from capital market[c]	1.6	1.6	2.0	2.3	3.0	2.9	2.9	3.0	3.0
5. Forecasters' one-year inflation forecasts[c]	1.2	0.5	1.2	2.8	2.8	2.9	3.0	2.8	2.5
B. Yields (percent)[c]									
1. Bank of Israel declared interest rate	0.25	0.14	0.10	1.25	4.50	3.93	4.59	4.75	4.75
2. Real yield to maturity on one-year government bonds[d]	-0.8	0.1	-1.9	-1.4	1.6	1.3	1.5	1.9	1.4
3. Nominal yield to maturity on ten-year government bonds[e]	1.6	0.8	1.2	2.6	3.9	3.6	3.8	3.9	4.3
4. Real yield to maturity on ten-year government bonds[e]	0.0	-0.5	-0.8	0.1	1.2	0.9	1.1	1.2	1.7
C. Change in the shekel exchange rate (percent)[f]									
1. Nominal effective	-8.0	-4.8	-8.4	4.0	4.3	5.1	-0.5	2.6	-2.9
2. Vis-à-vis the dollar	-7.4	-6.6	-3.6	10.2	6.4	4.9	0.7	4.8	-3.9
3. Vis-à-vis the euro	-9.6	2.3	-10.4	3.2	9.6	6.2	1.8	3.4	-1.9
D. Asset prices (percent)									
1. Overall yield on shares (general shares index, nominal)[g]	17.8	-0.4	30.9	-15.5	4.9	-5.4	4.8	4.7	1.1
2. Rate of change in home prices[h]	4.2	4.0	13.1	14.7	-0.6	-0.2	-1.3	-0.5	1.4

[a] Change in CPI during the period.
[b] In annual terms, as calculated by the Central Bureau of Statistics.
[c] Period average.
[d] Based on the zero coupon yield curve. Period average.
[e] Gross yield, based on the zero coupon yield curve. Period average.
[f] Average of last month in period compared with average of last month in previous period. Minus sign refers to appreciation of the shekel.
[g] Final date of the period compared with the final day of the previous period.
[h] Final month of the period compared with the final month of the previous period.
SOURCE: Bank of Israel, Tel Aviv Stock Exchange, and Central Bureau of Statistics.

a. Key drivers of inflation development in Israel

1. Global developments

Global inflation moderated this the year compared to the peaks that were recorded in 2022, and the global economy continued to recover—a process that has been termed "Soft Landing". However, inflation in most countries remained higher than the central bank targets (Figure 3.1). The factors for lowering global inflation in the first half of

Global inflation moderated significantly this year and the global economy continued to recover—a process that has been named "Soft Landing". However, inflation in most countries remained high.

[1] One-year inflation expectations in the fourth quarter were volatile, and at the end of the quarter they were unchanged relative to the previous quarter. For more details, see Section a below.

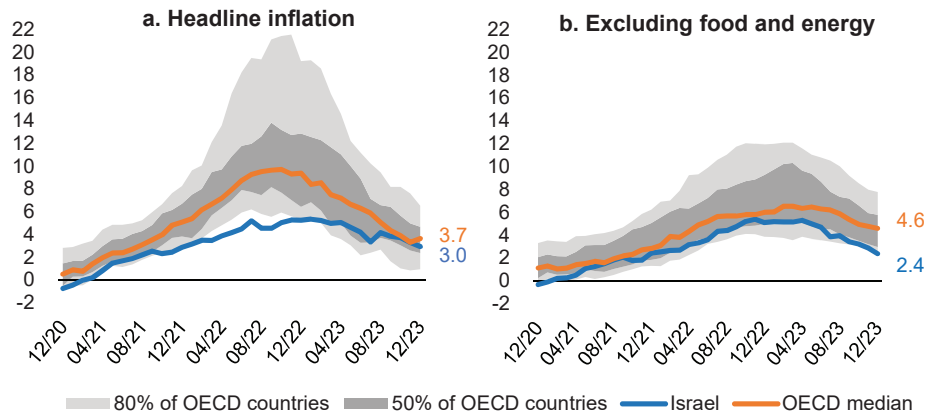
the year included declines in energy prices and in the prices of food products—partly due to the easing of supply-side constraints that were due to the consequences of the Russia-Ukraine war, and to the normalization of the supply chains.

Inflation excluding food and energy, which serves as a key indicator of core inflation, also moderated around the world, but less so than the headline CPI. One of the main drivers of core inflation worldwide was demand pressures in view of the tight labor market. Among the forces that worked to reduce demand pressures were the tight monetary policies implemented by the central banks in order to curb inflationary processes, as well as the dissipation of the impact of expansionary fiscal policies implemented by many countries following the COVID-19 crisis. Long-term inflation expectations globally remained anchored, and also acted as a stabilizing force.

Inflation in Israel has been consistently more moderate over the past two years than in most OECD countries.

In the past two years, inflation in Israel has consistently been more moderate than in most of the OECD countries. Global inflation trickles down to domestic inflation through a number of channels. The first mechanism operates directly through the increase in prices of final tradable goods in foreign currency terms. The second mechanism operates through the increase in prices of imported inputs in foreign currency terms, which drives domestic firms to raise prices.

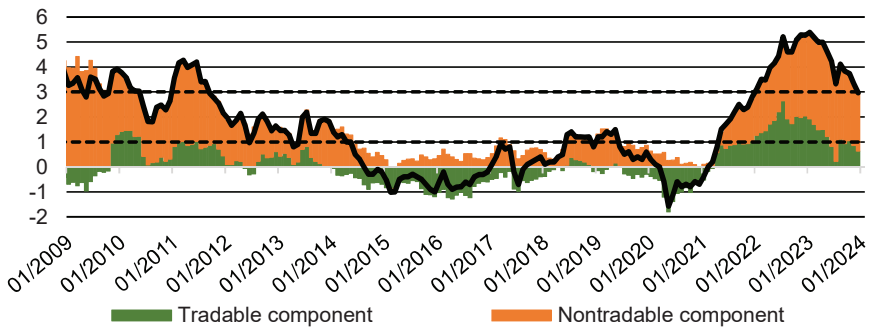
Figure 3.1
Inflation in Israel and in OECD Countries, December 2020– December 2023
(percent)



SOURCE: Based on OECD data.

With regard to the first mechanism, Figure 3.2 shows that the decline in inflation in Israel during the first half of the year was led by moderation in the rise of tradable

Figure 3.2
Annual Inflation and Contribution of the Tradable and Nontradable Components, January 2009–December 2023
(cumulative change in the Consumer Price Index in the past 12 months, percent)



SOURCE: Based on Central Bureau of Statistics.

goods prices. The decline was due to a reduction, in US dollar terms, of imported goods prices (including oil), which was partly offset by the depreciation of the shekel against the dollar. The dissipation of the positive contribution of energy prices was a significant factor in declining inflation abroad, but it had less of an impact in Israel thanks to Israel's greater energy independence than that of other countries.[2] Energy prices also rose less in Israel due to institutional intervention—a temporary reduction in the excise on fuel and coal.

In the first half of the year, the decline in inflation was led by tradable goods, including oil, and was partly offset by the depreciation of the shekel.

The second mechanism operates through changes in the prices of imported inputs. Apart from oil, which is a significant input component, the index of commodity prices excluding energy also declined, by about 7 percent (December 2023 average vs December 2022 average), which contributed to the reduction in the costs of imported inputs throughout the year. The supply chain disruptions, which had led to an increase in the cost of inputs (and of final products) in previous years, moderated significantly, as supply chains returned to their routine functioning.[3]

2. The exchange rate

The moderation in the pace of tradable goods price increases in the first nine months of the year was slower than that of prices abroad, due to the significant weakening of the shekel. During this period, the shekel depreciated by 8 percent in terms of the nominal effective exchange rate (September 2023 average compared with the December 2022 average), by about 11 percent against the US dollar, and by about 12 percent against the euro. According to a Bank of Israel analysis, the pass-through from the shekel-

[2] Global energy prices have risen due to the Russia-Ukraine war. In Israel, a significant portion of energy prices is determined by long-term agreements between electricity producers and natural gas suppliers. For further discussion, see Chapters 1 and 3 of the Bank of Israel Annual Report for 2022.

[3] For more discussion, see Chapter 3 of the Bank of Israel Annual Report for 2022.

The shekel depreciated by 8 percent this year in terms of the nominal effective exchange rate. As a result, the moderation of the pace of tradable goods price increases was relatively slow.

euro exchange rate to inflation is significantly lower than the pass-through from the shekel-dollar rate.[4] Therefore, to examine the impact of the exchange rate on inflation in Israel, we should focus on the development of the shekel/dollar rate.

A common starting point for analyzing exchange rate developments is the Uncovered Interest rate Parity (UIP) equation, according to which the exchange rate responds to the gap between foreign interest rates and the domestic rate—both actual and expected developments—as well as changes in the differences between countries' risk premia or other premia, for instance due to frictions in the financial markets. An analysis of the development of the exchange rate in 2023 up to the war indicates that the weakening of the shekel is not explained by the development of the gap in central bank interest rates between Israel and the US. The change in the Bank of Israel interest rate, beyond the change that was expected in 2022, was actually slightly higher than the corresponding development in the US.[5] Thus, the shekel's weakening was due to the developments of the premia or due to expectations for the trajectory of the interest rate gaps.

The weakness of the shekel in 2023 was excessive compared to the major currencies, and mainly reflected domestic factors.

In 2022, the weakening of the shekel against the US dollar was similar to the weakening of the major currencies against the dollar, as reflected in the dollar's cross rates. In contrast, the shekel's weakening in 2023 was excessive compared to the weakening of the major currencies, and mainly reflected domestic rather than global factors. Only one-quarter of the shekel's weakening is explained by the strengthening of the dollar world-wide.[6] An examination of the development of the domestic factor throughout the year indicates that significant changes in the exchange rate occurred around the times of developments in the legislative process that the government advanced regarding the judicial system.[7]

The global effects are reflected in the correlation between the US equity indices and the exchange rates of various currencies against the US dollar. This correlation exists—to varying degrees—in many countries, as well as in Israel. (For more discussion, see Chapter 3 of the Bank of Israel *Annual Report* for 2022.) The main mechanism leading to this statistical relationship is created by the significant exposure of Israeli institutional and other investors to foreign assets, and by their choice to hedge a large portion of their investments against exchange rate fluctuations. As a

[4] Uri Enzel, Eden Anavim, and Ari Kutai (2023). "The Pass-Through from the Exchange Rate to Prices", *Selected Research and Policy Analysis Notes*, Bank of Israel.

[5] Expected changes in the interest rate gaps are already supposed to be priced into the exchange. The unexpected change of the US interest rate during the year—about 0.65 percentage points according to federal funds futures contracts—was slightly lower than the parallel change in Israel—about 0.8 percentage points according to the forward rates on the Telbor market. This means that changes in the short-term interest rates should be more consistent with a strengthening of the shekel than with its weakening.

[6] The estimated change in the rate as a result of global influences is calculated according to a weighted average of the changes in the 12 currencies most traded against the US dollar, which constitute about 98 percent of total trade against the dollar. The estimated change due to domestic influences is the difference between the changes in the representative rate and the global effect.

[7] See the speech by Bank of Israel Governor Prof. Amir Yaron at the annual conference of the Aaron Institute of Economic Policy, Reichman University, Herzliya.

result of this investment strategy, rises and falls in the global equities market drive investors to make adjustments in their asset portfolios. Their hedging position forces them to also carry out swap transactions to adjust the hedging in their portfolios. All of these actions contribute to the appreciation of the shekel when US equity indices rise, and vice-versa.

In 2022, the (negative) correlation between the US equities market and the exchange rate was very high (-0.94). However, during 2023, until the start of the war, the link weakened, and sharp deviations from the statistical relationship occurred around the dates related to the advancment of legislative processes concerning the judicial system. For instance, the shekel depreciated sharply following the passage of the law prohibiting the courts from using a reasonability test, and appreciated after the President's proposal was presented.[8]

In 2023, the correlation between the US equities market and the exchange rate weakened. A main explanation is the increase in the risk associated with investing in the economy.

A main explanation of the temporary weakening of the correlation—until the war—is that the political processes in 2023 led to increased uncertainty regarding Israel's institutions and to an assessment that the long-term risks associated with investing in the Israeli economy had increased. As a result, domestic investors chose to increase the share of their investments abroad and to reduce their hedged exposure.[9] This interpretation is consistent with many indications of an increase in Israel's risk premium during the first half of the year, which was also reflected to some extent in the credit default swap (CDS) market, and with assessments of significant risks to Israel's economic and social stability, as expressed in various publications by the ratings agencies, investments houses, the IMF, and the OECD.[10] Demand for foreign currency was driven throughout the year by the institutional investors, whose purchasing pace increased relative to the previous year, and to a lesser extent by households. During the year, the movements of the exchange rate were largely in line with the foreign currency conversions of foreign financial institutions, particularly the depreciation of the shekel at the beginning of the war and the appreciation at the end of the year.[11]

[8] See also the speech by Bank of Israel Governor Prof. Amir Yaron at the annual conference of the Aaron Institute of Economic Policy, Reichman University, Herzliya. There were similar findings in Itai Atar, Tzahi Raz, Yinai Shpitzer, Ilai Gabbai, and Dolev Kolka-Gelber (2023), "The Economic Implications of the Coalition's Legislative Initiatives", Israel Democracy Institute (August).

[9] During the COVID-19 crisis, the rate of exposure to foreign exchange increased, and the rate of hedging declined—a trend that intensified this year. For more discussion on trends in the institutional investors' portfolio, and particularly on the rate of exposure to foreign exchange and the rate of hedging, see Box 2 in the Bank of Israel's *Financial Stability Report* for the second half of 2023.

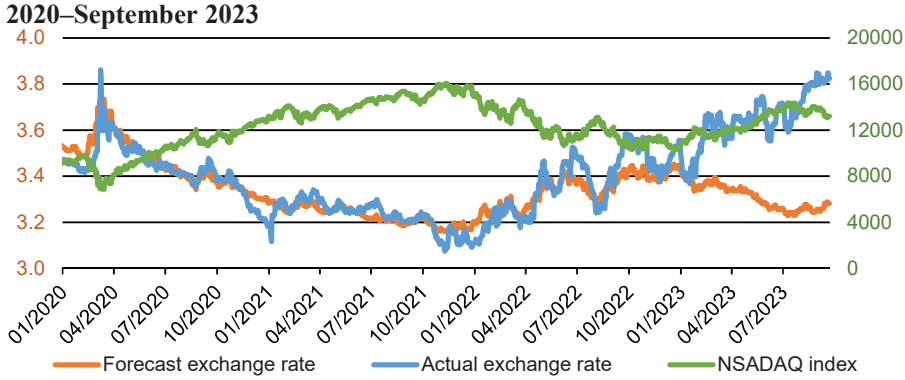
[10] For more discussion see the Bank of Israel's *Financial Stability Report* for the first half of 2023.

[11] Hercowitz and Friedman (2022) present evidence that foreign institutional investors are a dominant factor in the development of the shekel-dollar exchange rate (Zvi Hercowitz and Amit Friedman (2022), "The Effect of Foreign Exchange Market Activity by Various Sectors and the Bank of Israel on the Exchange Rate", in: A. Yaron and M. Strawczynski (eds.), *Monetary Policy In a Period of Price Stability*, Bank of Israel).

A Bank of Israel analysis indicates that the depreciation from the beginning of the year until the war, which deviated from historical correlations, is estimated at about 10%–15%, and contributed about 3 percentage points to annual inflation.

Analyses conducted by the Bank of Israel, based on the statistical relationship between the exchange rate and the equity market, as it was until 2022, show that the depreciation of the shekel from January to September 2023 deviated from the historical relationships by about 10–15 percent (Figure 3.3).[12] According to a recent estimation of the pass-through from the exchange rate to prices, a one-percent depreciation of the shekel against the US dollar contributes about 0.25 percentages points to inflation.[13] From this estimate, it emerges that the depreciation beyond what was expected according to the historical relationships until the war contributed about 3 percentage points to annual inflation, and delayed the return of inflation to the target range.[14]

Figure 3.3
NASDAQ Index, NIS/$ Exchange Rate, and Exchange Rate Forecasted by Regressing the Exchange Rate on the NASDAQ Index, January 2020–September 2023



SOURCE: Bank of Israel and based on Bloomberg.

The restrictive monetary policy implemented by the Bank of Israel this year acted against depreciation pressures.

Against the domestic developments that led to downward pressure on the shekel, one of the main forces that contributed to the appreciation of the shekel was the tight monetary policy implemented by the Bank of Israel, primarily increasing the interest rate by 1.5 percentage points in the first half of 2023. (For more discussion, see the section on monetary policy.) The foreign exchange market is forward-looking. Therefore, to estimate of the interest rate's impact on the exchange rate, we estimated

[12] The estimated model: $log(S_t) = \beta_0 + \beta_1 log(NDX_t) + \varepsilon$ where S_t is the shekel-dollar exchange rate, NDX_t is the NASDAQ index, and the sample covers the period from January 2020 until December 2022. The estimation coefficients are: $\beta_1 = -0.2$ and $\beta_0 = 3.1$, and the excess depreciation is defined as the change between the actual rates of change (9 percent) and the forecast rate of change (-4 percent). A robustness test in which we controlled for yields on 10-year US Treasury Bills yielded similar results. The correlation between the exchange rate and the NASDAQ index between 2019 and 2022 is -0.93. In contrast, the correlation with the yields on 10-year Treasury Bills was only about 0.25.

[13] See: Uri Enzel, Eden Anavim, and Ari Kutai (2023). "The Pass-Through from the Exchange Rate to Prices", *Selected Research and Policy Analysis Notes*, Bank of Israel.

[14] Slightly more conservative estimates of the pass-through, between 0.1 and 0.2, lead to a slightly lower estimate of the contribution to annual inflation—about 1.0–3.0 percentage points.

the impact of an unexpected change in the Bank of Israel interest rate on the shekel-dollar exchange rate in narrow windows around the interest rate decision dates (Table 3.2).[15] According to this estimation, an increase of 1 percentage point in the interest rate, particularly an increase that narrows the interest rate gap by the rate of its increase, with all other economic variables remaining constant, contributes to an immediate appreciation of 1.5–2.1 percent. This means that had the Bank of Israel not raised the interest rate by 1.5 percentage points this year, the shekel would have weakened by a further 2.3–3.2 percent.[16,17]

An estimate of the interest rate's impact on the exchange rate shows that had the Bank of Israel not raised the interest rate by 1.5 percentage points this year, the shekel would have weakened by a further 2.3–3.2 percent.

Table 3.2
The NIS/$ exchange rate's response to Bank of Israel monetary surprises

January 2008–November 2023

	Hourly window	Daily window	Hourly window	Daily window
	[1]	[2]	[3]	[4]
Unexpected change in the interest rate	-0.017***	-0.015**		
	[0.004]	[0.007]		
Change in the 3-month interest rate path			-0.021***	-0.016**
			[0.004]	[0.008]
Number of observations	151	145	151	145
Adjusted R ^{2}	0.192	0.054	0.229	0.049

*p<0.1; **p<0.05; ***p<0.01, Robust standard errors in brackets.

SOURCE: Bank of Israel. For details of the model, see footnote 15.

3. Domestic demand

Strong domestic demand was a significant factor in the increase in inflation over the past few years. Following the economy's recovery from the COVID-19 crisis, supported by accommodative monetary policy and expansionary fiscal policy during the crisis, there was strong demand in Israel, which led to an increase in inflation, similar to the situation worldwide. The moderate increase in private consumption this year until the war (1.7 percent, reflecting a decline of 0.5 percent in per capita

[15] The estimated model: $\Delta log(S_t) = \alpha + \beta_1 \Delta i_t + u_t$, where $log(S_t)$ is the change of the log of the shekel-dollar exchange rate from 15 minutes before the decision to one hour or one day after the decision (the official rate). Δi_t is the unexpected change in the monetary interest rate or in the interest rate path for the coming three months based on daily data from the Telbor market and in accordance with the method described in Ari Kutai (2023), "Measuring the Effect of Forward Guidance in Small Open Economies: The Case of Israel." *Israel Economic Review* 21(1): 75–142. The sample is based on the interest rate decisions between January 2008 and November 2023.

[16] The findings are robust when controlling for a change in the S&P 500 and when shortening the sample so that it starts in 2014.

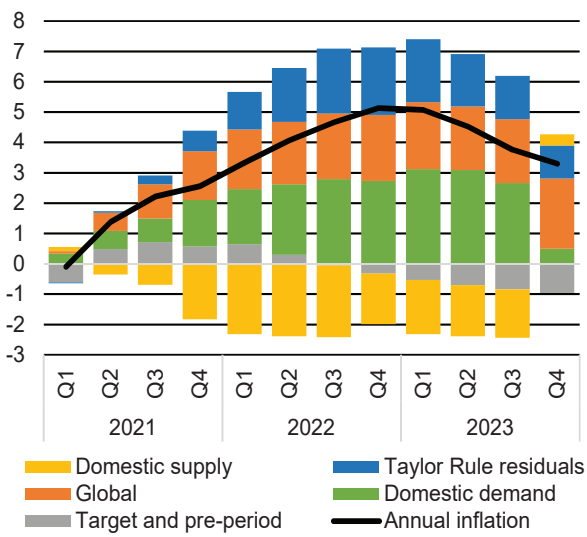
[17] At the end of 2022, the capital market expected that the Bank of Israel would significantly increase the interest rate in 2023, but it expected a more moderate increase (about 0.7 percentage points) than what actually took place. This means that about half of the policy effect was priced in to the shekel-dollar exchange rate at the end of 2022.

The moderate increase in private consumption this year, along with the moderation of inflation, suggests a relaxation of demand pressures, which is partly due to higher financing costs.

consumption) along with the moderation of inflation suggest a relaxation of demand pressures, partly due to higher financing costs following the interest rate increase, which led to a decline in disposable income. (For more discussion, see Chapter 2 and Box 4.2 in this report.)

Figure 3.4 shows a decomposition of annual inflation using the Research Department's DSGE model for the contributions to inflation according to the shocks that have occurred since inflation began to rise in 2021.[18] It is clear that the contribution of domestic demand moderated over the year. In contrast, the negative impact of supply shocks that hit the economy in 2022 has diminished.[19]

Figure 3.4
Decomposition of Inflation Using the DSGE Model, 2021–2023 (quarterly frequency, percent)



SOURCE: Bank of Israel calculations using the Research Department's DSGE model (Argov at al, 2012).

Domestic demand may affect prices through two main channels. First, strong demand allows firms to raise prices beyond the increase in their production costs, which will increase their profitability. Second, an increase in aggregate demand raises demand for labor inputs, which in turn creates pressure to increase wages. Wage increases raise the costs of the firm's means of production, which leads to higher prices for consumers.

In 2023, until the war, the GDP labor share continued to decline, similar to recent years. (For more discussion, see Chapter 2 of this report.) Under standard assumptions, such a decline is consistent with a decrease in the real marginal cost to domestic producers. This means that pressures originating from the labor market—which is at full employment—did not intensify, despite a moderate increase in real wages, after

[18] For more discussion on the methodology of the decomposition, see Box 3.2 in the Bank of Israel *Annual Report* for 2022.

[19] For more discussion on the supply shocks, see Chapter 3 of the Bank of Israel *Annual Report* for 2022. The blue section in the analysis in Figure 3.4 shows the contribution of monetary policy as derived from the gap between the Bank of Israel interest rate and the interest rate rule (the "Taylor Rule), which is set according to a historical adjustment of the interest rate in the Israeli economy to various variables. The positive contributions in 2023 are largely due to the fact that the effect of the accommodative policy implemented in the past operates partially with a lag. For more discussion, see Chapter 1 of this report. The gray section in the analysis shows the contribution of the shocks that occurred prior to 2021, and which led to a deviation from the midpoint of the target range (2 percent).

having eroded in 2022. (For more discussion, see Chapter 5 of this report.) This is an indication that there was no increase in inflationary pressures originating in workers' wages.

With the rise in inflation in many economies following the exit from the COVID-19 crisis, there was increased concern among central banks and international organizations that a "wage-inflation spiral" would emerge —a significant increase in inflation due high feedback between wage costs and inflation.[20] In Israel, for the time being, it appears that this risk has not materialized. A recent study found that the impact of wages on prices in Israel after the crisis was moderate, for two main reasons.[21] First, wage increases were concentrated on industries that produce goods and services that are not primarily aimed at the domestic market. Second, according to the wage agreement between the Histadrut Labor Federation and the Ministry of Finance, some of the public sector wage increases were postponed, which helped to alleviate wage pressures in the economy.

A Bank of Israel analysis estimated the relationship between wages and inflation in Israel, and also found that there is no indication of a wage-inflation spiral between 2006 and 2022. However, the analysis found that there has been an apparent strengthening of the relationships between wages and prices since the COVID-19 crisis. This result points to an increased risk of inflationary pressures from the direction of the labor market. According to the study's findings, following the COVID-19 crisis, wage increases led to a greater average increase in prices than between 2006 and 2019, a period that was characterized by relative price stability and during which there was a low estimated link between wages and prices.

The relationships between wages and prices appear to have strengthened since the COVID-19 crisis. This indicates an increased risk of inflationary pressures from the labor market.

A factor that significantly contributed to domestic demand in the years prior to 2023, and particularly during the COVID-19 period, was the accommodative monetary policy and expansionary fiscal policy. This year, until the war, fiscal policy was not expansionary, which helped the tight monetary policy stabilize the macroeconomic environment and moderate inflationary pressures. The original budget that was passed in May 2023 was countercyclical—it neither markedly expanded government expenditures relative to GDP, nor cut them. At that time, the expected deficit for each of 2023 and 2024 was only 0.9 percent of GDP. For more discussion, see Chapter 6 of this report.

Until the war, fiscal policy was not expansionary, which helped the restrictive monetary policy moderate inflationary pressures.

[20] Bank for International Settlements (2022). "Inflation: A Look Under the Hood", *Annual Economic Report*, Ch. 2, (pp. 41–73).

[21] Andrew Abir, Eyal Argov, and Itamar Caspi (2023). "Labour Market Tightness and Inflation in the Aftermath of COVID-19: The Case of Israel". BIS Working paper, 2023.

4. Inflation expectations

Inflation expectations are a main component in shaping inflation dynamic. Expectations of future price increases raise inflation in the present.[22] Therefore, influencing the public's expectations is an important channel of monetary policy.

One of the main elements influencing the effectiveness of monetary policy is how individuals in the economy form their expectations—whether they learn only from the past or are forward-looking. When individuals are forward-looking, the economic cost of restraining inflation can be minimized by monetary policy's commitment to an interest rate path—partly through communication from the central bank that would anchor expectations within the price stability target, thereby contributing to a quicker return of inflation to its target. In contrast, when individuals form their expectations based solely on past inflation, it becomes more difficult to curb inflation because restraining it operates only through the policy's direct impact on real activity (the output gap), which acts with a lag, and through the exchange rate.

When individuals form their expectations based solely on past inflation, it becomes more difficult to curb inflation.

The central bank's ability to influence the public's expectations also depends on the extent of the public's attention—that is, its awareness and internalization of inflation and monetary policy. Empirical economic literature has found that there are agents in the economy who always pay attention to the inflation rate and to monetary policy (for instance, the financial markets and the professional forecasters), and agents who sometimes pay less attention. In countries with a long history of low and stable inflation, firms and households tend to pay less attention to inflation (Candia et al., 2023)[23], and do not always know what the annual inflation rate is, what the inflation target is, or what the central bank interest rate is.

One of the main explanations for the low level of attention is monetary policy's success in maintaining low and stable inflation, thanks to which the benefit from the information falls short of the cost of monitoring inflation. In contrast, when inflation exceeds a certain threshold, public attention increases.[24] Box 3.2 indicates an increase in Israeli households' attention since inflation exceeded the upper bound of the target range. When individuals are not attentive to inflation, they do not take it into account when making economic decisions. If the public is attentive to inflation, and if inflation continues to rise, it may cross the threshold from which it is taken

There is evidence of an increase in Israeli households' attention to inflation since it exceeded the upper bound of the target range.

[22] The theoretical discussion on how expectations influence the inflation dynamic is partly based on Chapter 2 of the International Monetary Fund report from October 2023. The report examined the causal relationship between expectations and actual inflation and found that a one percentage point increase in one-year inflation expectations raises inflation by an average of 0.8 percentage points in advanced economies, and by an average of 0.4 percentage points in emerging economies. See International Monetary Fund (2023), "The Role of Expectations in Inflation Dynamics", *World Economic Outlook*, (Oct. 2023), Chapter 2, pp. 55–58.

[23] Bernardo Candia, Olivier Coibion, and Yuriy Gorodnichenko (2023). "The Macroeconomic Expectations of Firms", in *Handbook of Economic Expectations*, Academic Press, pp.321–353.

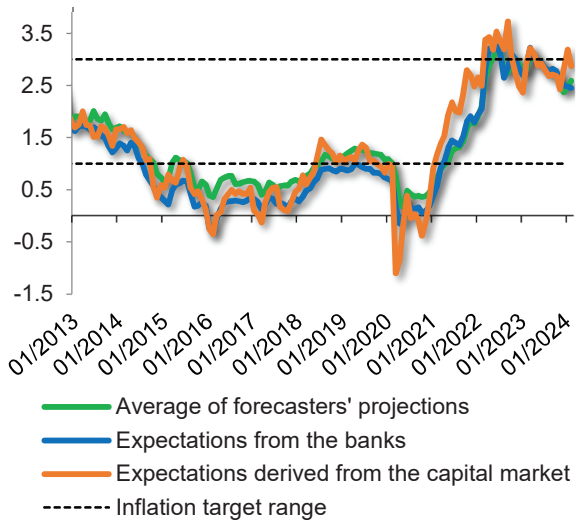
[24] Low attention to monetary policy can impair the effectiveness of some monetary tools. In particular, the forward guidance tool requires some extent of attention. In contrast, when attention is low, changes to the interest rate without changes to expectations has a stronger impact on the real interest rate. In particular, individuals respond to changes in the nominal, rather than real, interest rate.

into account in economic decisions. In such a situation, even price increases that are temporary in nature would lead to feedback and to the entrenchment of inflationary processes, which would make it difficult to return inflation to an environment of price stability. For more discussion, see the section on the characteristics of inflation in Israel in this chapter.

The development of inflation expectations in the reviewed year among agents that are highly attentive at all times (the capital market, the forecasters, and the banks) indicates that expectations remain anchored, despite the prolonged period in which inflation has deviated from the target range in Israel. Market-based inflation expectations for one-year rose to about 3–3.2 percent in the first quarter of the year, but then moderated before the war to 2.7–2.8 percent, around the upper bound of the target range (Figure 3.5). One-year expectations from one year onward, and forward expectations for longer ranges, remained within the target range throughout the year, suggesting that the public viewed the deviation from the target range as transitory (Figure 3.6). The fact that the public's expectations remained around the target range even though actual inflation exceeded it acted as a stabilizing force for inflation.

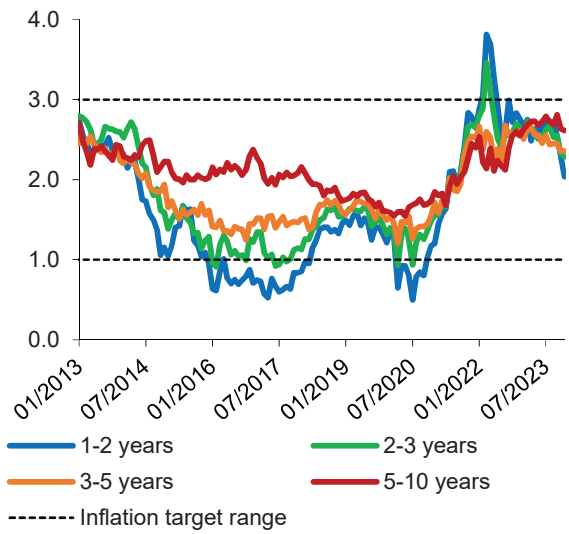
Market-based inflation expectations for terms beyond one year remained within the target range throughout the year, indicating that the public viewed the deviation from the target as transitory.

Figure 3.5
One-Year Inflation Expectations from Various Sources, January 2013– December 2023 (monthly average, percent)



SOURCE: Bank of Israel.

Figure 3.6
Medium- and Long-Term Forward Inflation Expectations, January 2013–December 2023
(monthly average, percent)



SOURCE: Bank of Israel calculations.

5. The Swords of Iron War and inflation

The Swords of Iron War resulted in a significant impact to economic activity. The impact to the supply side was mainly due to the absence of workers as a result of emergency mobilizations, evacuations from affected areas and areas at risk, partial operation of the education system at the start of the war, which forced many parents to remain at home, and a shortage of non-Israeli workers. (For more discussion, see Chapter 2 of this report.) At the same time, there was an impact on economic activity on the demand side as well—particularly private consumption. The drop in demand was due to increased uncertainty (economic and security) and negative consumer sentiment.

Prior to the war, economic developments indicated a convergence of inflation to the target without a severe impact to activity. Market-based expectations imply the war is expected to moderate inflation.

Before the war began, developments in the Israeli economy—similar to many economies around the world —indicated a "soft landing", meaning a convergence of inflation to the target range without a severe impact to activity. As of now, it is too early to determine what the medium-term effects of the war will be, but according to market-based inflation expectations, the war is expected to have a moderating effect on inflation. One-year expectations were highly volatile following October 7, and remained largely unchanged at the end of the year compared to their prewar levels. In contrast, one-year expectations one year on declined by 70 basis points, and one-year expectations two years on declined by 30 basis points. The development of expectations beyond one year is consistent with an interpretation of declining demand, while the development of short-term (one-year) expectations is consistent with the movements of the exchange rate during the period—a sharp depreciation of the shekel at the start of the war, followed by an appreciation to beyond its prewar level—and the pass-through from it to domestic prices. The decline in inflation expectations occurred alongside a sharp change in interest rate expectations—a decline of about 125 basis points within a year, compared with expectations of a slight increase before the war.

Historically, geopolitical shocks did not lead to a decline in the price level in Israel. As of now, the expected inflation according to the financial market deviates from the typical historical development.

As of now, the expected development of inflation according to the financial markets deviates from the typical historical pattern that follows geopolitical shocks, in Israel and abroad. In the past, in response to geopolitical shocks, price levels in Israel did not decline (at the very least) and the shekel depreciated. In previous instances, the Bank of Israel interest rate was initially left unchanged or even reduced, but was later raised beyond its initial level. For more discussion, see Box 3.1.

An analysis of the contributions of the shocks that occurred in the fourth quarter of the year using the Research Department's DSGE model, similar to the analytical framework offered in Figure 3.4 to obtain an estimation of the war's impact, indicates a negative demand shock that acted to reduce prices, and a negative supply shock that acted to increase them. In quantitative terms, the impact to demand was similar to the supply shock, but slightly more dominant. Therefore, as of now, the war has had a very small impact on prices.

BOX 3.1
THE EFFECT OF GEOPOLITICAL SHOCKS ON INFLATION, 1995–2022

- This box examines how the geopolitical shocks that took place in Israel between 1995 and 2022 influenced inflation, the exchange rate, and the monetary interest rate.
- The findings show that these shocks had only a temporary impact on the price level, in parallel with a slight and temporary increase in the monetary interest rate and a temporary depreciation of the shekel.

1. INTRODUCTION

This box discusses the expected consequences of the Swords of Iron War that broke out on October 7 on the main macroeconomic variables, chiefly inflation. A number of forces may contribute to an increase in inflation. These include an impact to supply as a result of the mobilization of reserve soldiers and their absence from work; the increase in defense expenditure and in rehabilitation costs; downward pressure on the shekel; and problems in the supply chains. In contrast, there are also forces working in the background that may contribute to a decline in inflation. These include the uncertainty that accompanies war, and the impact to the income of parts of the public, which contribute to a decline in aggregate demand. Given these contrasting effects, it is unclear whether the war will lead to an increase or a decline in inflation once all is said and done.

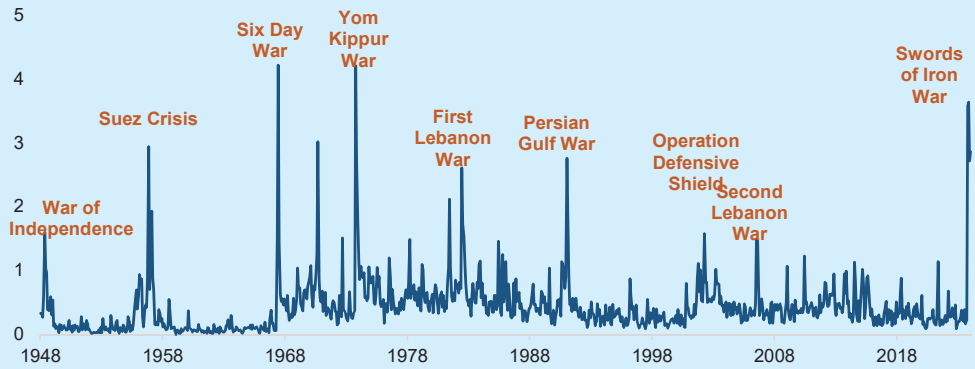
As background for examining the impact of the war, this box also examines the effect of geopolitical shocks on inflation and on the main macroeconomic variables in Israel between 1995 and 2022. The analysis uses the Geopolitical Risk (GPR) index that was developed by Caldara and Iacoveillo (2022) (hereinafter: CI), and that is intended to quantify geopolitical risks over time. The index relates to each threat, realization, or worsening of negative events connected with terrorism, war, or other tensions. It is built on the basis of a textual analysis of news articles in the media, and calculated according to the rate of stories in the English-language media that deal with security issues as a share of all articles.[1] The index was calculated by CI for several countries, and we use the index that they calculated for Israel. The timing of the start of the sample was chosen based on two considerations. First, the geopolitical events prior to 1995 took place in an environment of relatively high inflation. Second, the structure of Israel's economy changed significantly since then.

Figure 1 shows the historic GPR for Israel. It shows that the increase in October 2023 was significant, and that it overshadows events that took place in Israel following the First Gulf War in 1991.[2] The index is markedly higher—its highest since the Yom Kippur War—and it remained historically high into February 2024.

[1] The articles included are those that contain words related to war, terrorism, or nuclear issues, in proximity to words that denote some threat or action.

[2] In retrospect, events such as the Gulf War, Black September, and the Gaza flotilla were essentially "false positives"—situations of geopolitical risk that were not realized.

Figure 1
Historical Geopolitical Risk (GPR) Index for Israel, 1948–2024



Monthly data. The vertical axis measures the rate of news articles dealing with geopolitical issues in the Israeli context as a share of total articles published by English-language newspapers in the CI sample each month. This index, which includes a long-range view, uses articles from just three newspapers. The most up-to-date fiture is for February 2023.
SOURCE: https://www.matteoiacoviello.com/gpr_country.htm

2. EMPIRICAL EXAMINATION AND RESULTS

In order to estimate the dynamic effect of a domestic geopolitical shock on Israel's macroeconomic variables, we use the Local Projections method.[3] The dependent variables in the regression include the headline CPI and the CPI excluding energy and food, the shekel/US dollar exchange rate, and the Bank of Israel interest rate.[4] The control variables include lags of the dependent variable, lags of the GPR index, and lags of the other variables appearing in each of the regressions. Figure 2 shows the GPR index and the other macroeconomic variables during the sample period.

The results of the estimation are presented in Figure 3, which includes the impulse response functions of the macroeconomic variables to a geopolitical risk shock, beginning at time zero and ending at a horizon of 24 months. The blue line in each figure shows the , and the shaded areas show a confidence interval of 68 percent.[5]

[3] In this approach (see Jorda, 2005), we estimate a series of regressions of the dependent variable for a series of horizons (h) after time t on the geopolitical shock variable at time t and on control variables, including the dependent variable with a lag. In our case, we estimated the following series of regressions for different values of h:

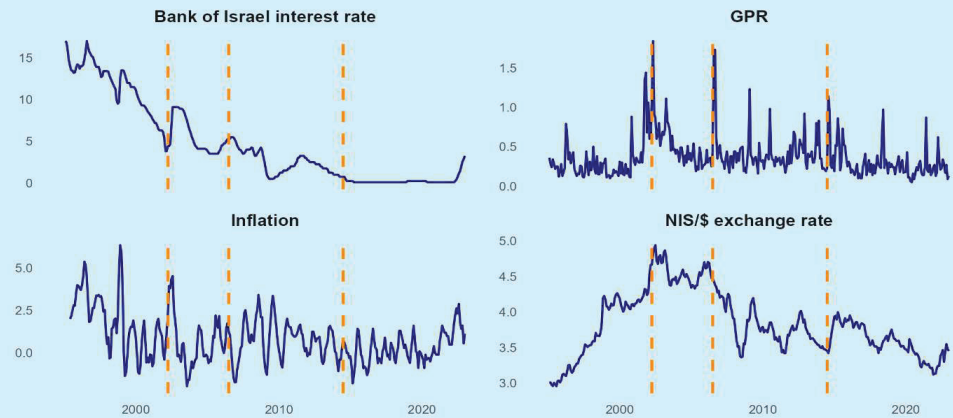
$$\Delta_h Y_{t+h} = \alpha^h + \beta^h GPR_t + \sum_{k=1}^{K} \theta_k^h \mathbf{X}_{t-k} + e_t^h$$

where $\Delta_h Y_{t+h} = Y_{t+h} - Y_{t-1}$ is the difference between the dependent variable at time $t+h$ and at the base time ; is the index for geopolitical events in Israel, and is a vector of control variables that includes lags of and , among other things. For each explanatory variable , a set of estimates of for various values of generates the estimation of the impulse response function of the dependent variable for a geopolitical shock over time.

[4] For interpretive convenience, the price indices and the exchange rates were converted to logs and multiplied by 100 (in order to show the data in percent).

[5] The standard deviations are calculated using the Newey-West method (with a lag horizon that is in line with the horizon of the dependent variable), which is robust to the presence of a autocorrelation and heteroskedasticity.

Figure 2
Historical Geopolitical Risk (GPR) Index and Macroeconomic Variables in Israel, 1995–2022



Monthly data. Inflation is calculated in annual terms (current month compared with the same month in the previous year). The vertical orange lines in each chart indicate the quarter in which the three largest geopolitical events in the sample period took place: Operation "Defensive Shield" (2002); the Second Lebanon War (2006); and Operation "Protective Edge" (2014).
SOURCE: Bank of Israel.

We start with a description of the CPI's response (Panels a and b in Figure 3). The estimation was made for two indices, the headline CPI, and the CPI excluding energy and food (the "core" index). Both panels generate similar findings—that the geopolitical events included in the sample had a very small impact on prices. In the first six months following the shock, the response of the price level to the shock was weak and negative. Thereafter, the trend reversed itself, and a year after the shock, the prices level climbed, peaking at about 0.2 percentage points higher than the baseline. Two years after the shock, the effect subsided, and the price level declined to below the baseline.[6,7]

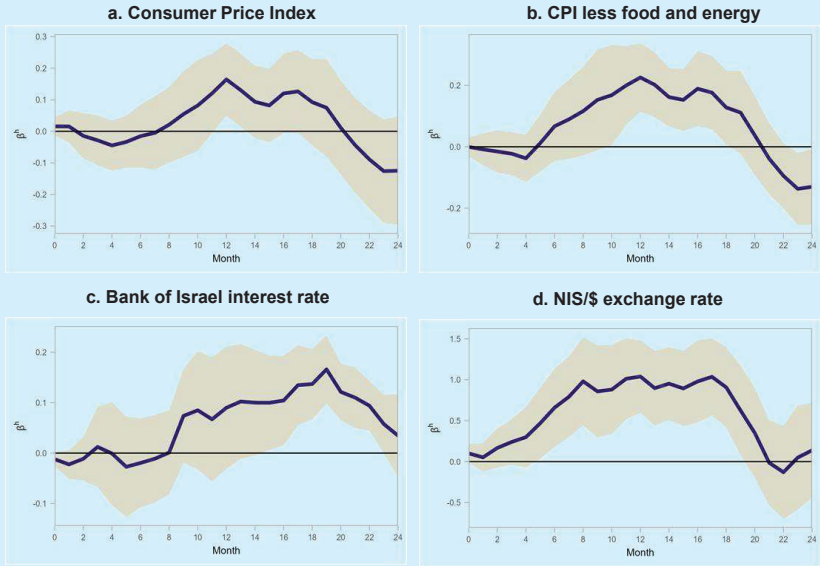
Panels C and D in Figure 3 show the responses of the Bank of Israel interest rate and the shekel/US dollar exchange rate. The response of the interest rate was negligible, with the rate remaining unchanged, on average, in the first months after the shock, and starting to rise about 8 months later, remaining about 15 basis points above its starting point until returning to that starting point after about two years.[8] The shekel/US dollar exchange rate remained virtually unchanged in the first two months after a shock, after which the shekel depreciated to a maximum of one percent a year after the shock. The depreciation moderated at a year and a half, and by the end of the second year, the exchange rate returned to around its starting level.

[6] In a new working paper Caldara et al. (2022) estimate the effect of geopolitical shocks on inflation and on other macroeconomic variables based on a sample of 44 countries between 1900 and 2021. The study finds that in response to geopolitical shocks, inflation increases significantly in the first three years, and then subsides gradually.

[7] Similar results are obtained for the CPI excluding housing, which reflected changes in the exchange rate due to the use of a mechanism that indexed rents to the US dollar until 2008.

[8] In this context, it is important to emphasize that the development of prices as described herein is obtained in parallel to a higher interest rate path. Without the restraining response of the interest rate, it is likely that the price level would have responded more strongly.

Figure 3
Cumulative Effect of a Geopolitical Shock on the Main Macroeconomic Variables, 1995–2022



This charge shows the cumulative change in four macroeconomic variables in response to a geopolitical shock. All of the data are at monthly frequency. The control variables include 1-4 lags of the consumer price level, the geopolitical risk (GPR) index, the exchange rate and the interest rate. The shaded area shows a confidence interval of 68 percent.
SOURCE: Based on Central Bureau of Statistics data.

CONCLUSION

The analysis of the impact of geopolitical shocks on the Israeli economy between 1995 and 2022 showed that their effect on inflation was temporary and not large. However, we must be cautions in drawing conclusions from the empirical examination presented here with regard to the current war, since the current war is the largest and most persistent since the Yom Kippur War. Moreover, the findings were influenced by the average response of monetary and fiscal policy to the geopolitical events. Policy reactions that are difference from historical behavior—for instance more accommodative monetary policy and more expansionary fiscal policy than in the past, made possible due to the robustness of the economy at the beginning of the current war—may lead, of course, to different developments of inflation and the other variables. As of this writing, the development of inflation expectations in capital markets and among the financial forecasters since the beginning of the war, as well as assessment of the expected interest rate, show that the war is not expected to lead to inflationary pressures.

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Caldara, D., S. Conlisk, M. Iacoviello & M. Penn (2022). "Do Geopolitical Risks Raise or Lower Inflation?", Federal Reserve Board of Governors.

Jordà, Ò. (2005). "Estimation and Inference of Impulse Responses by Local Projections", *American Economic Review*, 95(1), 161-182.

6. Housing prices[25]

The annual pace of increase in housing service prices peaked in May (7.5 percent), and moderated from then until the war.

The housing component of the CPI, which measures the cost of housing services (rent), accounts for about one-quarter of the Consumer Price Index. As such, the development of housing prices has a large impact on headline inflation. In May 2023, the annual pace of increase in housing service prices reached a peak of 7.5 percent after rising at an accelerated pace (6.3 percent) in 2022 as well. Between May 2023 and the outbreak of the war in October, the pace of increase in the housing component moderated, returning to around its level from the beginning of 2022.

A Bank of Israel analysis shows that the increase in the interest rates in Israel made a significant contribution to the increase in rents (owner-occupied housing services) until the war.[26] As part of the standard monetary policy transmission mechanism, an increase in the interest rate leads to a reduction in aggregate demand, which subsequently moderates the rate of price increases in the economy. However, there is an additional transmission mechanism for rents, which operates in the opposite direction: Monetary tightening leads to higher mortgage costs, making it harder to purchase homes. As such, some of the demand for home purchases shifts to the rental market, driving rental prices upward in the short term.[27] In the medium term, the standard channel of an interest rate increase on rents becomes dominant and acts to moderate rents. The fact that this year's price declines were focused mainly on high-demand areas in the center of the country, and were accompanied by an increase in the stock of unsold new homes (See Chapter 8) supports the hypothesis regarding a decline in demand for home purchases. In line with the findings of the analysis, the increase in interest rates this year contributed to a cumulative increase of about 2 percent in rents until the end of September—about half of the annual pace of increase in rents during that period. Another factor that contributed to higher rents is the increase in immigration to Israel since the outbreak of the Russia-Ukraine war.

Since the beginning of the Swords of Iron War, the prices of housing services declined in October and in November, which led to a significant reduction in the annual pace of increase.

Since the beginning of the Swords of Iron War, the prices of housing services declined by 0.4 percent in each of October and November, which led to a significant reduction in the annual pace of increase (3.9 percent). The owner-occupied housing services component, estimated through new and renewing rental contracts, declined even more—by 0.7 percent in the November CPI. The decline was likely due to

[25] This section reviews the development of housing services costs (rent) included in the Consumer Price Index. For an analysis of the development of home prices, see Chapter 8 of this Report.

[26] The owner-occupied housing services component accounts for approximately 70 percent of the housing component, and reflects the rent that home-owners would have received in the rental market based on new and renewing rental contracts.

[27] There is evidence that monetary tightening in the US raises rent prices and leads to a substitution effect between owned-housing and rental housing. See D.A. Dias and J.B. Duarte (2019), "Monetary Policy, Housing Rents, and Inflation Dynamics." *Journal of Applied Econometrics* 34(5): 673–687. There are also findings on the substitution effect between the rental and owned-housing markets following monetary tightening for Italy, Germany, and Switzerland (W. Koeniger, B. Lennartz, and M.A. Ramelet (2022). "On the Transmission of Monetary Policy to the Housing Market", *European Economic Review*, 145(3)). In contrast, another study found that monetary tightening lowers rents in the US (Z. Liu and M. Pepper (2023). "Can Monetary Policy Tame Rent Inflation?" *FRBSF Economic Letter*, 2023-04.

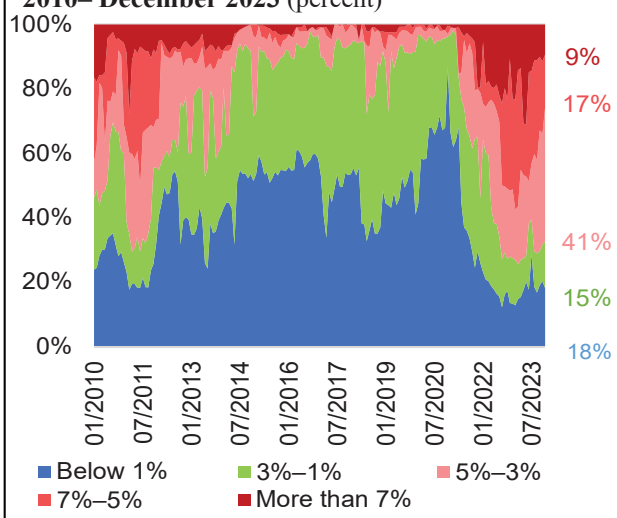
households' negative sentiment due to the war, a (temporary) decline in demand from individuals called up to the reserves, and students who postponed moving due to the delay in the start of the academic year at universities. In some cities, it also may have been due to the increase in housing supply due to the shift of short-term rental properties for tourists to the residential rental market. The number of online advertisements provides an indication of the increase in frictions in the rental market during the war. When the war broke out, the number of advertisements declined in most regions of the country, but later increased, returning to the typical prewar level. In December, the owner-occupied housing component resumed its increase, but overall, the annual pace of increase continued to moderate, reaching just 3.1 percent.

b. The characteristics of inflation in Israel

By 2023, inflation had encompassed many goods and services, and was led by strong demand for nontradable goods and services.

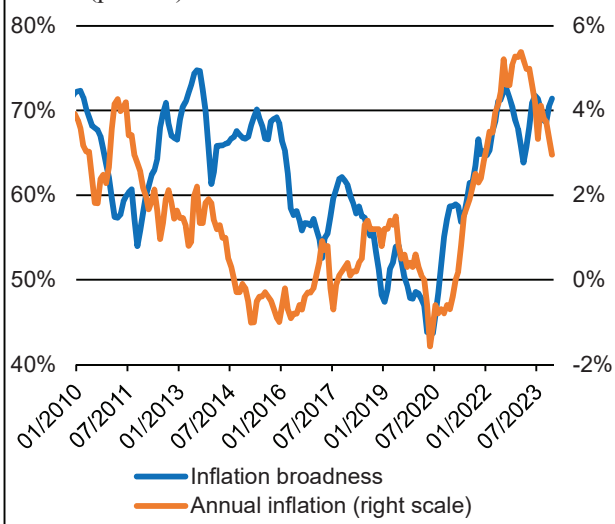
When inflation in Israel began to rise in 2021 the increase was primarily reflected in the prices of tradable goods (Figure 3.2), and was mainly driven by global developments.[28] In 2021 and 2022, inflation in Israel became more pronounced in the nontradable goods and services. By 2023, inflation had encompassed many goods and services, and was led by strong demand for nontradable goods and services. The weight of the CPI components that rose at a rate higher than the upper bound of the target range was about 70 percent on average, significantly higher than at the beginning of 2022, when it was 36 percent (Figure 3.7). This development was more pronounced in the index

Figure 3.7
Distribution of the Weight of CPI Components by Annual Rate of Change Ranges, January 2010– December 2023 (percent)



SOURCE: Based on Central Bureau of Statistics.

Figure 3.8
Inflation Broadness, January 2010–December 2023 (percent)



SOURCE: Based on Central Bureau of Statistics.

[28] For more discussion, see Chapter 3 of the Bank of Israel *Annual Report* for 2021.

of nontradables, where the weight of components whose rate of increase was higher than the target range was an average of 80 percent.

During 2023, inflation remained very broad-based.

Broad-based inflation tends to be more difficult to stabilize, as it tends to be perceived as comprehensive and prolonged, leading to wage increases and feedback to prices. To estimate the breadth of inflation and its change over time, we examined the common development of the main CPI components (38) using a Principal Component Analysis (PCA) based on a sample of a rolling window of 24 monthly observations. The indicator of broadness on which we focused is the total share of variance explained by the first two principal factors—the factors that explain most of the common variance of the CPI components (hereinafter: "breadth of inflation").

The analysis indicates that in 2016, the breadth of inflation began to trend downward, and the share of variance explained by the two first factors moderated from 65 percent to less than 50 percent (Figure 3.8). At the end of the second half of 2020, when inflation began to rise, the breadth of inflation reached a low point of about 45 percent. Along with the rise in the inflation environment, the breadth of inflation increased, and in the second half of 2022, it reached an average of 70 percent. During 2023, inflation remained very broad-based.

At the beginning of 2023, signs emerged that inflation in Israel was "sticky".

As inflation rises and becomes broad-based, there is increasing concern that it will trickle down to components that are fundamentally characterized by a more "sticky" pace of price increases—that is, with high persistence and low volatility.[29] An analysis of the CPI components shows that at the beginning of 2023, signs emerged that inflation was indeed "sticky". Each of the 38 subcomponents in the index was examined under the two dimensions of stickiness (persistence and volatility).[30] To classify the components, we examined their historical characteristics between 2010 and 2019. We found that in January 2023, the majority of the prices that increased at a pace that was higher than the target range were concentrated in components characterized by "stickiness", which is reflected in the concentration of red circles in the lower right quadrant of Figure 3.9—an area representing "sticky" components.

The signs that inflation was "sticky" may explain why the Monetary Committee continued to raise the interest rate this year.

The fact that components with a pace of increase above the target range had greater stickiness may explain why the Monetary Committee decided to continue raising the interest rate this year. Another explanation is the assessment that the continuation

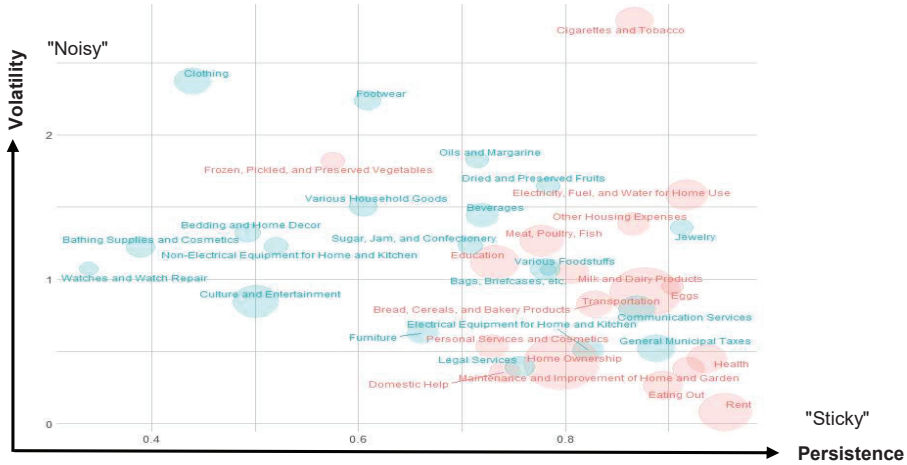
[29] A possible explanation for the observed differences in the degree of "stickiness" is the heterogeneity between industries with regard to the intensity of the feedback in the links between wages and inflation. Another possible explanation is that heterogeneity in the degree of price rigidity also affects the extent of stickiness of the pace of price changes. The results indicate a certain congruence between the degree of stickiness and the degree of rigidity of the components, as shown by a comparison to the findings in Ribon and Sayag, "Price Setting in Israel: An Empirical Analysis Using Micro Data", Bank of Israel Review, 89, 2017 (in Hebrew).

[30] The degree of persistence is calculated as the sum of two autoregressive coefficients: the first and the 12th lags of the annual rate of change in each component (y_t) , that is, the sum of coefficients $\rho_1 + \rho_2$ in the following equation: $y_t = \alpha + \rho_1 y_{t-1} + \rho_2 y_{t-12} + \varepsilon_t$. The first coefficient represents the persistence relative to the annual rate of the preceding month, while the second coefficient is in reference to the annual rate of change one year ago—the long-term persistence. Volatility is calculated as the standard deviation of the residual (ε_t) The sample covers the period from 2010 to 2019.

Another explanation is the concern about the entrenchment of high inflation expectations.

of the period in which inflation was high and exceeded the target range, or even accelerated further, would lead to the entrenchment of high inflation expectations by firms and households, and that firms and households may subsequently factor them into their decisions. Firms may factor their expectations into the pricing of their goods and services, employees would factor them into their wage demands, and residential landlords would factor them into the rent they demand.[31] Monetary policy makers are concerned about a situation in which price increases, even if they are temporary in nature, would lead to feedback and to further price increases.[32] As a result, the cost of eradicating inflation, in terms of output loss, would be higher. It is therefore important to curb inflation before it becomes entrenched.

Figure 3.9
"Stickiness" of the Pace of Increase of CPI Components in Israel, January 2023



Red circles mark the components that increased by more than 3.0 percent in 2023. Blue circles indicate components that increased by less than 3.0 percent. The size of the circles reflects the weight of each component in the CPI. The figure does not include fresh fruits or fresh vegetables, the prices of which are expecially volatile.
SOURCE: Based on Central Bureau of Statistics.

Box 3.2 presents evidence that since inflation in Israel exceeded the target range, households are paying greater attention to inflation, which raises the concern that this could be reflected in an internalization of high inflation in expectations and an intensification in the inflation feedback channel.

[31] An examination of the proportion of rental contracts that are indexed to the CPI, as estimated by the Central Bureau of Statistics, shows that the proportion is currently negligible—about 1.2 percent of the stock of contracts in September 2023, compared with 0.55 percent before inflation accelerated.

[32] For a theoretical discussion, see Box 1.2 in Chapter 1 of the Bank of Israel *Annual Report* for 2022.

BOX 3.2:
ATTENTION TO INFLATION AND ITS IMPACT ON ISRAELI HOUSEHOLDS' EXPECTATIONS [1]

- One of the implications of high and prolonged inflation is an increase in attention to price changes. As such, inflation is being given greater weight in the decision-making process.
- We find some evidence that since annual inflation exceeded the upper bound of the target range, households' attention to inflation has increased, and a relationship between prices changes during the month and households' inflation expectations has begun to form.

1. INTRODUCTION

One of the implications of high and prolonged inflation is an increase in attention—households' and firms' awareness and internalization of prices changes.[2] The term "attention to inflation" in the economic sense refers to a situation in which individuals in the economy closely follow information about inflation and expected inflation. We can assume that the longer the period of high-inflation, the higher the probability of an increase in households' attention to inflation.[3] We can also assume that when attention crosses a certain threshold, inflation will be taken into account in decision-making, and as a result, price increases—even if they are of a temporary nature—will lead to the persistence of inflationary processes.

This box examines whether the public's attention to inflation in Israel has increased in the past two years, during which annual inflation exceeded the upper bound of the inflation target.[4] In particular, we examine whether there is a relationship between households' one-year expectations and monthly price changes or the publication of the previous month's CPI.

2. LITERATURE REVIEW AND MOTIVATION

The empirical economic literature has found that in countries with a long history of low and stable inflation, firms and households generally show inattention to the inflation rate and to monetary policy (Candia et al., 2023). In particular, in many cases, they are not aware of what the annual inflation rate is, what the inflation target is, or what the central bank interest rate is. One of the main explanations for the inattention is monetary policy's success in maintaining low and stable inflation, which obviates the need to keep track of it. According to theoretical models of rational inattention (Sims (2003), Mackowiak and Wiederholt (2009), and Sims (2010)), when inflation is low, it is optimal not to devote attention to price changes in the economy, due to the costs associated with tracking, collecting, and monitoring the

[1] With thanks to Nurit Dobrin and Ayelet Mizrahi of the Central Bureau of Statistics for their assistance in preparing the individual level data of the Consumer Confidence Survey.

[2] For more discussion, see Weber et al. (2023), and Blinder et al. (2024).

[3] See the speech by Federal Reserve Chairman Jerome Powell at the 2022 Jackson Hole Conference: https://www.federalreserve.gov/newsevents/speech/powell20220826a.htm

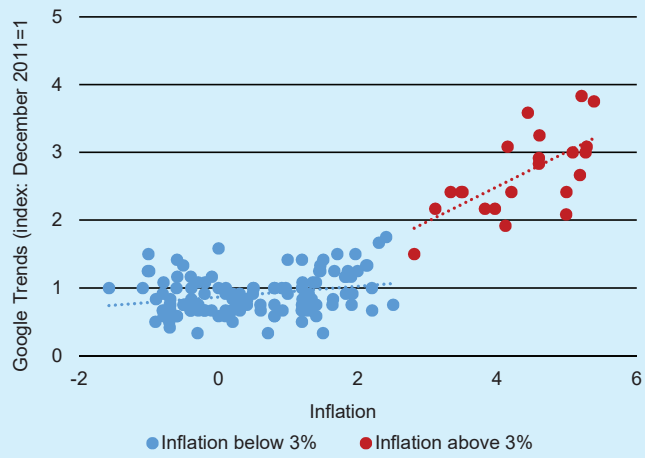
[4] Gorodnichenko, Kutai, and Melnick (2023) find evidence of attention to inflation among Israeli firms between 2001 and 2018—prior to the most recent wave of inflation. They find that firms revise their inflation expectations following surprises in the CPI.

information compared with the small benefit that would be generated. In contrast, when inflation exceeds a certain threshold, it is worthwhile to monitor it.

In a situation in which households exhibit a high level of attention to inflation, the dynamic of price developments may change in various ways. For instance, wage demands by workers and price demands by landlords may become more sensitive to price changes. Among other things, the use of indexation mechanisms—which revise prices in accordance with inflation during the previous period—may become more widespread to protect against inflation. Such developments may led to the entrenchment of inflation.[5]

Several studies have found evidence of a relationship between the inflation rate and the level of public attention. Weber et al. (2023) report that in the European Central Bank (ECB) Consumer Expectations Survey of households (CES), conducted in January 2023, about 60 percent of households reported that they monitor inflation more than in the past. They found evidence that the rise in inflation in recent years led to an increase in attention.[6] Korenok et al. (2023) took a different approach, and examine the correlation between the level of inflation and the Google Trends index measuring the relative popularity over time of the term "inflation" in Internet searches and in tweets on the X social network (formerly Twitter). They found that in most countries, there is a threshold rate for inflation, above which there is a positive relationship between inflation and Internet searches, and below which there is either no relationship or it is weaker. In other words, they found support for the hypothesis that households do not exhibit attention to inflation when it is low, and show attention once inflation exceeds a certain threshold. In most countries, that threshold ranges between 2 and 4 percent.

Figure 1
Actual Inflation and Frequency of Searches, January 2012–September 2023



SOURCE: Based on Google Trends and Central Bureau of Statistics.

In accordance with the findings of Korenok et al. (2023), we examined the relationship in Israel between annual inflation and the popularity of Internet searches (Google Trends), and we obtained similar findings: When inflation is below 3 percent, the upper bound of the inflation target range, the relationship

[5] For more discussion, see Box 1.2 of the Bank of Israel *Annual Report* for 2022.

[6] They combine a series of experiments using surveys (RCTs) across countries and time, in which some individuals receive publicly available information about inflation, and identify evidence of higher attention, which is reflected in a small revision of expectations when inflation is higher. Similar conclusions were reached in studies by Cavallo, Cruces, and Perez-Truglia (2017), Pfauti (2023), and Bracha and Tang (2019).

between the indices is weak or nonexistent (Figure 1), whereas when inflation exceeds the upper bound of the target range, the relationship is positive and strong.[7]

3. THE DEVELOPMENT OF PRICES OVER THE MONTH, AND HOUSEHOLDS' ONE-YEAR EXPECTATIONS

This section examines whether the increase in attention to inflation in Israel reached the level at which the relationship has been established between the development of prices during the month (change in the monthly CPI) or between the publications of the CPI, and households' one-year inflation expectations. To answer this question, we use individual-level data from the Israeli Central Bureau of Statistics (CBS) Consumer Confidence Survey for the period from January 2012 to September 2023. The survey consists of a representative sample of Israeli residents over the age of 21.[8] The survey was merged with data from the Population Registry and the Social Survey to obtain a broader picture of the individuals in our sample. Our focus in the Consumer Confidence Survey is on the quantitative question about inflation expectations.[9]

The Consumer Confidence Survey is a monthly survey, and responses are collected throughout the month. The responses on various days throughout the month are therefore based on different a information set. Individuals who answered the survey later in the month had access to more information on the development of prices during that month—as they experience them—and on the previous month's CPI reading than individuals who answered earlier in the month. If individuals' attention to prices changes is low, no significant differences are expected between individuals who answered at the beginning of the month and those who answered near its end. In contrast, if attention is high, we expect to find differences between respondent groups to align with price developments during the period in which responses are given and with new information that was contained in the publication the previous month's CPI. This is because the respondents in the later part of the month had access to information that was not available to the earlier respondent group.

For the analysis, we decompose the actual change in the CPI each month into two components. The component through which we describe the potential additional information available to respondents in the later part of the month is the gap between the official CPI for that month, as published on the 15th of the

[7] We obtained a similar result regarding attention to monetary policy: a relationship between Internet searches for the term "Bank of Israel interest rate" and the inflation rate when inflation exceeds the 3 percent threshold. In contrast, and as expected, no correlation was found in relation to other economic terms such as "unemployment" or "growth". An identical examination for the years 2008–2019 points to similar results—a positive and weak correlation when inflation is low and a strong relationship when inflation exceeds the 3 percent threshold.

[8] https://www.cbs.gov.il/en/subjects/Pages/Consumer-Confidence.aspx.

[9] The respondents are asked how prices will change over the next 12 months (increase, decrease, won't change, don't know, or refuse to answer). If a respondent answers that prices will increase or decrease, he is asked to provide a numerical value to his answer. The share of respondents who provided a numerical answer within a "reasonable" range—between -1 and 15 percent—increased from 71 percent at the end of the first half of 2021, when annual inflation was near the midpoint of the target range, to 82 percent at the end of 2022, when annual inflation had risen to more than 5 percent.

following month, and the forecasts of that reading that were known in the middle of the current month.[10] This component is an estimate of the price changes that occurred in the second half of the month[11] and were not known to respondents at the beginning of the month.[12] In addition, to identify the effect of the previous month's CPI, we use the gap between the published CPI change for the previous month and the average of the forecasters' projections before the CPI was published. If individuals in the economy are attentive to price changes, the components describing the potential additional information are expected to influence the expectations of respondents in the later group, but not those of the earlier group. We estimate the following equation:

$$(1)\ \pi^{e}_{i,t} = \beta_0 + \beta_1 T^{15}_{i,t} + \beta_2 T^{c}_{i,t} + \beta^{15}_{3} T_{i,t} \cdot LastCPI\ Unexp_t$$
$$+\beta_4 T^{c}_{i,t} \cdot PriceSecondHalf_t + \gamma_t + \vec{X}_i + \varepsilon_{i,t}$$

where $\pi^{e}_{i,t}$ are one-year inflation expectations of individual i in month t .[13] $T^{15}_{i,t}$ is a dummy variable of the availability of information about the preceding CPI reading, that is, whether the individual belongs to the group that answered in the second half of the month. $T^{c}_{i,t}$ is a continuous variable between 0 and 1 that reflects the proportion of information—price changes in the second half—that is available to the individual. Those who answered in the first half of the month obtain the value 0, and the value increases linearly the later the individual answers in the second half of the month, up to a value of 1 for an individual who answers at the end of the month. $LastCPI_t$ and $PriceSecond_t$ are estimates of the unexpected change in the CPI for the preceding month and for price developments in the second half of the month, respectively. The regressions include control for fixed effects for the month (γ_t). X_i is a vector of control variables (gender, marital status, education, religion, and age). $\varepsilon_{i,t}$ is the error term. To examine whether the relationships depend on the inflation rate, we estimate Equation 1 allowing for different effects during periods when annual inflation is above 3 percent $(high_t)$ or below 3 percent (low_t).

The results show that when annual inflation is above 3 percent, an unexpected increase in the current month's CPI, which we assume reflects a price rise in the second half of the month, leads to a positive and statistically significant increase in one-year expectations. A monthly price increase of 0.1 percentage points leads to an increase of about half a percentage point in one-year expectations, reflecting an expectation of further price increases in the coming months (Column 1 in Table 1). In contrast, the effect of publication of the previous month's CPI is not significant. The results remain similar when examining

[10] The forecasters' projections of the CPI in that calendar month, as reported to the Bank of Israel shortly after the 15th of that month, the publication date of the previous month's CPI. The identification assumption is that the change in the CPI that was not reflected in the forecasters' midmonth projections reflects information that was not available to those who responded in the first half of the month.

[11] In fact, the unexpected change also includes a component of CPI surprise that will be revealed to the public only when the CPI is published, on the 15th of the following month, and is therefore not expected to influence either of the groups.

[12] The use of the gap between forecasts and actual publication as an estimate for information is common in the literature. For example, Gürkaynak et al. (2005).

[13] Expectations after removing outliers (above 70 percent or below -70 percent) and winsorizing observations in the top five and bottom five percentiles each month. The results of the analysis without winsorizing, winsorizing of 10 percent, or winsorizing of 1 percent are similar.

the two effects separately (Columns 2 and 3 in Table 1).

In conclusion, the results show that in Israel, individuals are attentive to inflation when it exceeds the upper bound of the target range, similar to findings in other countries. We find that in the past two years, during which inflation exceeded the upper bound, price developments during the month influenced households' inflation expectations. An increase in prices led to an increase in expectations, and vice-versa. When inflation is low, we did not find such relationship. The continuation of these processes can cause the actual inflation rate to be taken into account in economic decisions, due to which price changes—even those of a temporary nature—could lead to feedback and accelerate inflationary processes.

Table 1: Results

	(1)	(2)	(3)
$T^c \cdot PriceSecond \cdot high$	5.729***	5.474**	
(effect of price changes – high inflation)	(2.209)	(2.208)	
$T^c \cdot PriceSecond \cdot low$	0.226	0.186	
(effect of price changes – low inflation)	(0.832)	(0.830)	
$T^{15} \cdot LastCPI \cdot high$	1.402		1.019
(effect of CPI publication – high inflation)	(1.279)		(1.280)
$T^{15} \cdot LastCPI \cdot low$	0.022		0.016
(effect of CPI publication – low inflation)	(0.593)		(0.594)
T^c	-0.503*	-0.237	
(Proportion of available information on prices)	(0.269)	(0.163)	
T^{15}	0.191		-0.022
(availability of information on previous CPI)	(0.152)		(0.093)
$T^c \cdot high$ – (Proportion of available	0.886	0.430	
information – high inflation)	(0.752)	(0.491)	
$T^{15} \cdot high$ – (availability of information on	-0.424		0.013
previous CPI – high inflation)	(0.433)		(0.285)
Obs.	33,371	33,371	33,371
Adj. R^2	0.196	0.196	0.196
Controls & Time FE	+	+	+

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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2. MONETARY POLICY

a. Policy measures until the start of the war

During 2023, monetary policy continued to deal with inflation above the target range, in view of the strong level of economic activity and the tight labor market, similar to most other central banks. To curb inflation, the Monetary Committee raised the interest rate in four increments from January to May: two increments of 0.5 percentage points each and two increments of 0.25 percentage points each, from 3.25 percent at the end of 2022 to 4.75 percent in May 2023. From May to the end of the year, the interest rate was left unchanged. The interest rate increases this year, both in Israel and around the world, were a direct continuation of the monetary tightening process in 2022, during which the Bank of Israel interest rate was raised from 0.1 percent in April 2022 to 3.25 percent in December. This, in turn, was further to the measures that the Bank of Israel took in 2021, when it stopped its bond purchasing program and the use of the other special tools that were used during the COVID-19 crisis. The process of increasing the interest rate in Israel began earlier than in other countries, relative to the timing at which inflation exceeded the target (Figure 1.7 in Chapter 1 of this Report).

The pace of interest rate increases slowed in 2023, in view of the high interest rate level and its entrenchment at a sufficiently restraining level, together with the multiplicity of signs that the pace of inflation was moderating.

The pace of interest rate increases slowed in 2023, in view of the high interest rate level and its entrenchment at a sufficiently restraining level, as well as the multiplicity of the indications of moderation in the pace of inflation. In particular, the pace of increase in the prices of nontradables over six months, seasonally adjusted, has steadily declined since the end of 2022. Since the effect of the monetary tightening is manifested with a lag, the Monetary Committee's assessment was that the effect would continue, especially in view of the rise in the real interest rate. In contrast, the multiplicity of indications that inflation was supported by strong domestic demand

and that it appeared "sticky" and broad; the weakness of the shekel, which acted to raise domestic prices; and the concern of undermined stability in the financial markets as a result of a significant increase in the country's risk premium explain why the Monetary Committee chose to keep the interest rate at a high level.[33] Moreover, in its interest rate decisions in July and September, the Monetary Committee noted that it saw a considerable likelihood of continued interest rate increases in its upcoming decisions. At the same time, and until the war, real economic activity continued at a high level, and GDP grew strongly. These indicated a "soft landing"—convergence of inflation to the target without severe output loss—similar to the situation in many other countries. The labor market was in a full employment environment, and real wages were increasing. In addition, the government's budgetary policy was working in concert with the tight monetary policy. In particular wage agreements that were signed in the public sector were in line with curbing inflation and returning it to the target range.

Throughout the year, the assessment was that the depreciating trend of the shekel and the acceleration in the housing component of the CPI were delaying the convergence of inflation to the target range. Throughout the year, until the war, the dollar yields on Israeli government bonds rose compared to those of US Treasury Bills, and the Israeli capital market was characterized by underperformance relative to capital markets abroad. Furthermore, Moody's lowered its credit rating outlook, and publications regarding uncertainty and risks in Israel were shared by other credit rating agencies, the IMF, and the OECD. These, alongside other indications, reinforced the Monetary Committee's perception that the shekel's depreciation reflected an increase in Israel's risk premium, in view of the possibility of significant legislative changes concerning the judicial system, which may have an impact on the economy.

The assessment throughout the year was that the shekel's depreciation delayed inflation's convergence to the target range. The Monetary Committee viewed this as reflecting a higher risk premium due to the advancement of the legislative changes concerning the judicial system.

b. Policy measures following the start of the war

With the outbreak of the war, the Monetary Committee's policy focused on stabilizing the markets and reducing uncertainty in order to prevent financial instability that may impair economic activity and lead to a sharp increase in inflation. This was alongside targeted easing of credit conditions for households and businesses that were severely affected by the crisis. The Monetary Committee chose to employ a combination of monetary tools to address the challenges posed by the war.

With the outbreak of the war, the Monetary Committee focused on stabilizing the markets and reducing uncertainty, alongside targeted easing of credit conditions for those who were severely affected by the crisis.

Immediately with the onset of the war, there was a sharp depreciation of the shekel. To stabilize the markets, even before the main trading hours on the morning of October 9 (the first day of foreign exchange trading after the war began), the Bank

[33] For more discussion regarding the concern of an increase in the risk premium, see the analysis of the potential economic implications published as part of the Research Department's staff forecast for April 2023. The scenario examined the impact in the event that legislative processes concerning the judicial system, which the government promoted, would be accompanied by an increase in the country's risk premium, a negative impact to exports, and declines in domestic investment and in demand for private consumption.

of Israel announced a program to sell foreign currency totaling up to $30 billion out of the country's foreign exchange reserves, which stood at about $200 million. As part of the program, the Bank of Israel announced that it would operate in the market as necessary to moderate the volatility in the shekel exchange rate and to provide the necessary liquidity for the continued proper functioning of the financial markets. In addition, the Bank announced the provision of liquidity to the market through SWAP mechanisms in the foreign exchange market totaling up to $15 billion, as necessary. For details of the Bank of Israel's measures, see Chapter 1 of this report.

At the end of October, in view of the Bank of Israel's activity in the foreign exchange market—selling foreign currency totaling about $8.2 billion and swaps totaling $0.4 billion—and the assessment at the time that the war would not spread to additional significant fronts, the shekel exchange rate stabilized, and the shekel later strengthened beyond its prewar level. In November, the Bank of Israel sold a lower amount of foreign currency —$338 million—and in December it did not sell foreign currency. The balance of the reserves as a share of GDP at the end of the year was 39.5 percent. In addition to the measures taken in the foreign exchange market, the Bank of Israel operated a repo transaction program using government and corporate bonds, the aim of which was to provide shekel liquidity to institutional investors and mutual funds.[34] These measures helped stabilize the financial markets, beyond stabilizing the foreign exchange market.

Following the outbreak of the war, the Monetary Committee faced considerations supporting a reduction in the interest rate and considerations that supported keeping the rate unchanged. The war's impact on economic activity, concern over the collapse of businesses, and the need to provide available low-interest credit to assist businesses and households were considerations that supported a reduction in the interest rate. In contrast was the consideration of maintaining the stability of the markets, particularly the foreign exchange market, and concern over a further acceleration of inflation due to the significant depreciation of the shekel at the beginning of the war, which contributed to an additional increase in prices. Moreover, a financial crisis—if it had developed—could have significantly impaired economic activity for a prolonged time. These considerations supported keeping the interest rate unchanged. In addition, if the supply constraints resulting from the war were to become restrictive, there would be no room, at that stage, to encourage demand by lowering the interest rate. Therefore, the Monetary Committee decided to give greater weight to stability considerations at the outset of the war, and to use other policy tools to provide targeted responses to credit needs.

Several indicators pointed to an increase in uncertainty and a worsening of the risks to financial stability following October 7. These included sharp price declines on the equity market, a significant depreciation of the shekel, and an increase in the implied volatility of foreign exchange options. In addition, long-term government bond yields rose and corporate bond spreads widened, alongside increased price volatility

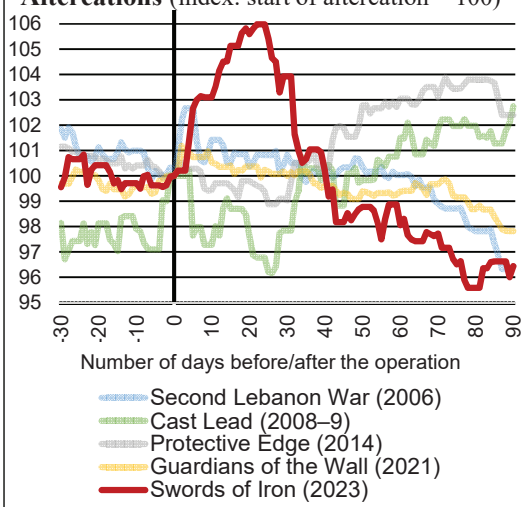
[34] In October, repo transactions totaling NIS 95 million were conducted. There were no such transactions in November of December.

and wider bid-ask spreads in the bond markets. There was also a sharp increase in several indicators of country risk. The State of Israel's 10-year Credit Default Swaps (CDS) price increased by about 60 basis points (October average compared with the September average), and the dollar yield spread between 10-year Israeli government bonds and parallel US Treasury Bills increased by about half a percentage point.

The financial markets' reaction to the war was intense even compared to previous security altercations of the past two decades (Figure 3.10). While indicators of country risk remained high, most of the financial market indicators returned to their prewar levels. For more discussion, see the Bank of Israel's *Financial Stability Report* for the second half of 2023.

The financial markets' reaction to the war was intense even compared to previous security altercations in the past two decades.

Figure 3.10
Response of the Nominal Effective Exchange Rate Relative to Previous Altercations (index: start of altercation = 100)



SOURCE: Based on Tel Aviv Stock Exchange.

As stated, the Monetary Committee decided in October and November not to lower the interest rate, with the aim of maintaining stability and restoring certainty to the markets. However, at the same time, it was decided to implement targeted monetary tools to address the challenges. The Committee decided to assist small and micro businesses that were harmed by the war, allowing them to obtain credit at improved interest terms, despite the risk inherent in providing credit to those businesses at that time.[35] This measure came in addition to the broad program promoted by the Banking Supervision Department to defer household loan repayments to banks and credit card companies and government measures such as utilizing state-backed loan funds. For more discussion on the measures taken in the credit market and their impact, see Chapters 1 and 4 of this report and the *Monetary Policy Report* for the second half of 2023.

Looking forward, the Monetary Committee stated in November that, "Insofar as the recent stability in the financial markets becomes entrenched and the inflation environment continues to moderate toward the target range, monetary policy will be able to focus more on supporting economic activity." This statement was consistent with the decline in the expected path of the interest rate since the beginning of the war. Compared to prewar expectations, there was a sharp drop in expectations for the interest rate path—a reduction of 125 basis points in the interest rate over the coming year. Part of the expected interest rate decline was apparently not related to

Looking forward, the Monetary Committee stated in November that if the stability in the financial markets becomes entrenched and the inflation environment continues to moderate, policy would be able to focus on supporting economic activity.

[35] For more information, see https://www.boi.org.il/en/communication-and-publications/press-releases/a06-11-23/

In January 2024, the Committee lowered the interest rate to 4.5 percent.

the effects of the war, and was due to global developments, as indicated by the decline in expected central bank interest rates around the world. However, our assessment is that domestic effects explain the majority of the expected decline in the interest rate.[36] In January 2024, in view of the significant economic implications of the war for activity and the continued decline of the inflation rate towards the target range, the Monetary Committee lowered the interest rate by 0.25 percentage points to 4.5 percent.

c. The degree of monetary tightening

As outlined above, the Monetary Committee raised the Bank of Israel interest rate significantly from 3.25 percent at the beginning of the year to 4.75 percent at the end of the year, further to the increases in 2022. To assess the degree of monetary tightening derived from the policy measures, we can look at the slope of the real forward yield curve in the short–medium term. The more negative the slope, the tighter the policy.[37] Real yields for these terms affect the public's consumption and investment decisions, and are also affected by monetary policy measures—both directly through the impact on nominal yields, and indirectly through the impact on the public's inflation expectations. However, we must note that the curve is influenced by the risk premium, which certainly increased in the short term due to the war.

The interest rate environment before the war, at the end of September 2023, was more restrictive than at the end of 2022.

Figure 3.11a shows that until the war, the nominal and real yield curves rose by half to one percentage point relative to the curves at the end of 2022.[38] Inflation expectations, which are reflected in the gap between the nominal and real curves, did not change significantly, and stood at about 2.5 percent for the range of 1–10 years.[39] The negative slope of the real yield curve became significantly steeper until the war, after being moderate at the end of 2022. This means that the interest rate environment at the end of September 2023 was tighter than at the end of 2022, in line with the moderation of demand and of inflation. An additional estimate of the natural interest rate points to similar findings—a significant increase in monetary tightening from the end of 2022 until the war. For more discussion, see Chapter 1.

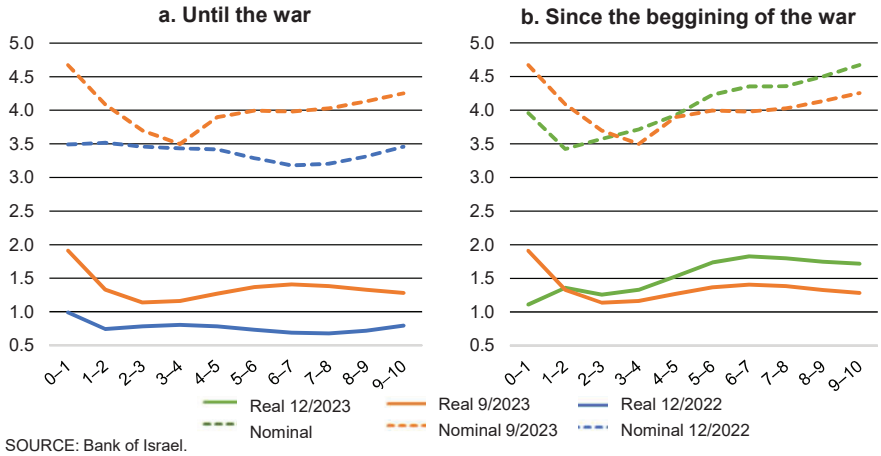
[36] At the end of September 2023, the expected Federal Funds Rate for December 2024 stood at 4.8 percent based on futures contracts, indicating a decline of approximately 60 basis points. By the end of November, expectation had shifted to anticipate a greater decline of about 100 basis points. This means that between September and November, expectations were revised downward by approximately 40 basis points—about one-third of the decline in expectations in Israel.

[37] According to the new-Keynesian model, the extent of monetary accommodation is determined as the difference between the interest rate and the natural interest rate—the rate that would prevail in a hypothetical situation in which prices and wages are completely flexible (see Chapter 1). A common estimate for the natural interest rate is the real interest rate in the medium–long term.

[38] We note that the nominal and real interest rates include a term risk premium.

[39] The method of calculating the yield curves adopted by the Bank of Israel is detailed in Ana Brodesky and Nadav Steinberg (2011), "Improving the Yield Curve Estimation Model Implemented at the Bank of Israel", Periodic Papers 2011.01, Bank of Israel Research Department.

Figure 3.11
Real and Nominal Yield Curves



SOURCE: Bank of Israel.

Figure 3.11b shows that since the beginning of the war, the yield curves in the short term have declined, with the real one-year yield declining by about 1 percentage point (December compared to September). The slope of the curve became slightly positive, meaning that the interest rate environment after the outbreak of the war is less restrictive, or even accommodative. Over time, the real yields in the capital market rose to positive levels at the beginning of 2022, in parallel with the upward trend of real yields in the US. The interest rate increases in Israel and the US in 2023 led to a continued increase in real yields and in the cost of credit in the economy. For more discussion on the contribution of tight monetary policy to the slowdown in the growth of credit to households and businesses, see Chapter 4.

Following the outbreak of the war, the interest rate environment became less restrictive, or even accommodative.

3. THE MONETARY BASE AND THE MONETARY AGGREGATES

Interest is the price of money—the alternative cost of holding liquidity. As such, changes in the interest rate, in addition to changes in economic activity, affect the demand for liquidity. When the nominal interest rate serves as a policy tool, the central bank determines a completely flexible money supply at the interest rate that it declares, and the monetary base—the total of banknotes and coins in circulation and the commercial banks' demand deposits at the Bank of Israel[40]—is determined according to the demand for liquidity at the central bank's interest rate. The monetary base is influenced by both flows that are not under the Bank of Israel's control, such as the government's accounts, and flows that are under its control, such as foreign currency and government bond purchases and the issuance of *Makam* (short-term

[40] The banks are required to deposit money in demand deposits at the Bank of Israel as part of their liquidity requirements.

Bank of Israel bills). The Bank absorbs or injects liquidity to meet the demand for monetary base in accordance with the Bank of Israel interest rate.[41]

The monetary base at the end of 2023 remained virtually unchanged compared to the end of 2022. There was a slight increase of about NIS 60 million—an increase of 1.6 percent from the end of 2022 (Table 3.3), which was very low relative to the last decade, but which followed significant growth in 2020 and 2021.

Table 3.3
Rate of change in the monetary aggregates, 2019–2023

	0	1	2	1+2=3	4	5	6	3+4+5+6=7
	Monetary base[a]	**Cash held by the public**	**Demand deposits**	**M1[b]**	**Term deposits up to 3 months**	**Term deposits of 3 months to 1 year**	**SRO[c]**	**Total[d]**
	(Average in December compared to average the previous December)							
2019	2.9	1.8	5.8	5.1	-4.0	33.2	7.0	6.3
2020	25.8	23.3	30.7	29.4	24.7	12.2	25.9	26.0
2021	12.6	6.9	25.2	22.0	-3.6	12.6	23.8	17.5
2022	3.0	6.0	-12.9	-10.0	34.6	85.0	-7.9	4.9
2023	1.6	8.8	-19.8	-14.6	24.9	17.3	-15.5	-3.1
	(Quarterly average compared with the average of the previous quarter							
2023								
Q1	-3.1	0.4	-13.5	-11.1	3.5	16.0	-14.4	-5.5
Q2	0.4	3.1	-7.3	-5.3	5.8	4.6	-6.8	-1.9
Q3	0.4	2.1	-6.2	-4.5	7.4	3.3	-0.7	0.0
Q4	2.8	2.7	-0.1	0.6	6.0	-0.3	1.0	1.6

[a] Total banknotes and coins in circulation and current deposits by the commercial banks with the Bank of Israel.
[b] M1 = cash and demand deposits.
[c] Self-renewing overnight deposit - a liquid daily deposit.
[d] M1+SRO+unindexed deposits of up to one year.
SOURCE: Bank of Israel and Central Bureau of Statistics data.

In view of the continued increase in the Bank of Israel interest rate, the public's demand deposits continued to decline this year, as interest-bearing deposits for up to one year increased.

The M1 aggregate—the amount of money—is comprised of cash in the hands of the public and the public's demand deposits at the banks. The M1 aggregate declined by about 15 percent in 2023, further to the 10 percent decline from the previous year. Prior to that, it had increased consistently in preceding years (Table 3.3). The decline in M1 is a result of the decline in the public's demand deposits, while the amount of cash continued to grow slightly more rapidly than the level that was prominent prior to the COVID-19 crisis. Concurrently with the decline in demand deposits, interest-bearing deposits with maturities of up to one year increased significantly—by 17 percent—in view of the continued increase in the Bank of Israel interest rate. The development of demand deposits in the fourth quarter indicates a slowdown in the rate of contraction— possibly due to the war, which led to an increase in liquidity needs.

[41] It adjusts the monetary base to the interest rate taking into account the total of other flows, through interest-bearing deposits that it offers to the banks through tenders, which are not included in the monetary base, and by issuing Makam.