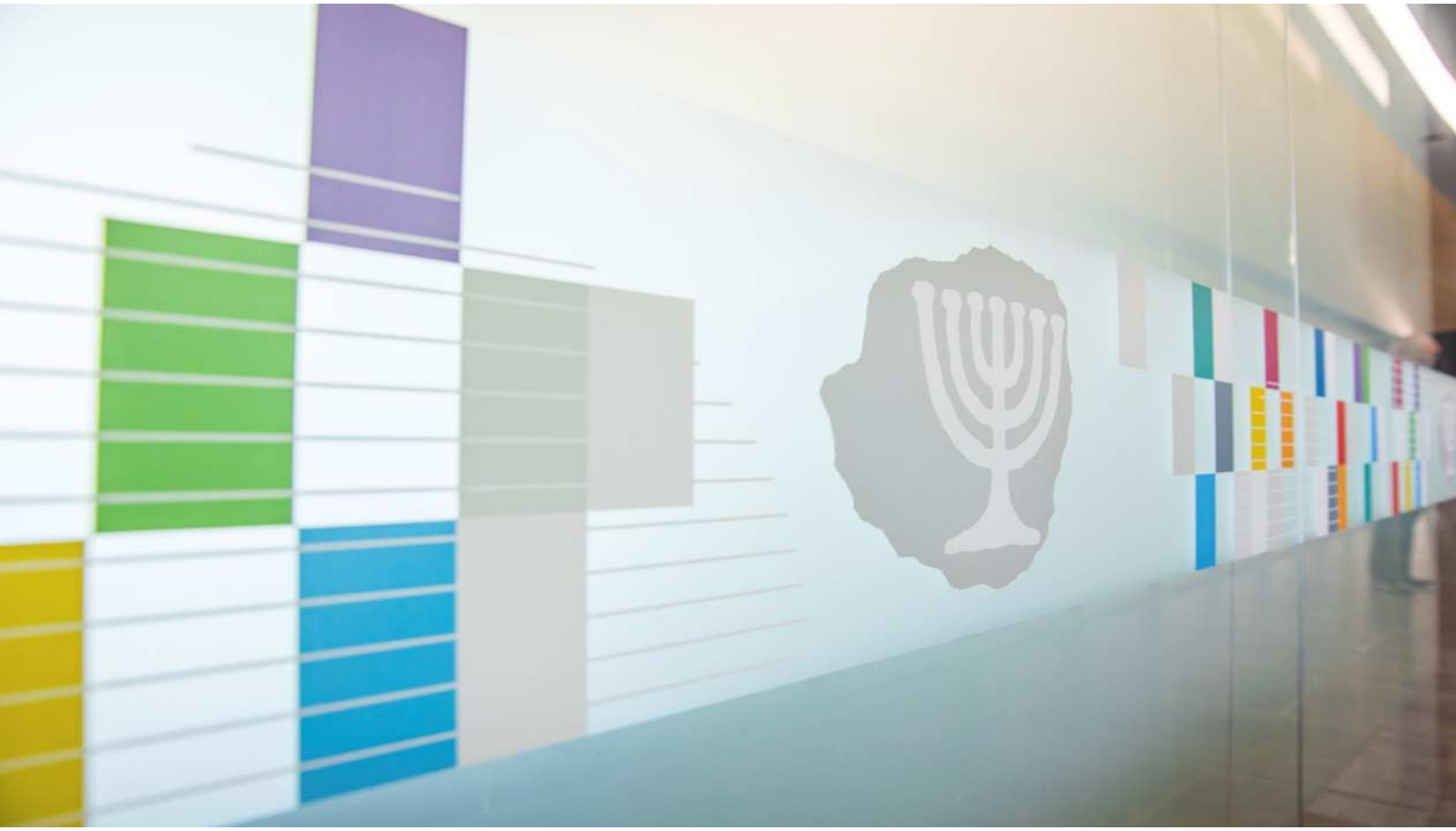
Bank of Israel
Research Department

Research and Policy Analysis Notes



The Impact of Monetary Policy and its Communication on the Exchange Rate and Related Uncertainty

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- The analysis examines the impact of monetary policy and its communication on the shekel-dollar exchange rate and the uncertainty regarding it. It focuses on assessing the effects of changes in the Bank of Israel interest rate and the publication of the Research Department's macroeconomic forecast, particularly when they deviate from market expectations and surprise the market.
- Interest rate decisions and their accompanying communication affect the exchange rate asymmetrically: A reduction in the interest rate has a greater impact on the exchange rate than an increase. A possible explanation for this asymmetry is that when the interest rate deviates from market expectations, it increases uncertainty, raises the exchange rate premium, and leads to a depreciation of the shekel. This depreciation partially offsets the appreciating effect of an interest rate increase while amplifying the depreciating effect of an interest rate decrease.
- Interest rate decisions that are accompanied by a forecast publication and a press conference reduce uncertainty regarding the exchange rate, as reflected in the implied volatility of shekel-dollar options, compared to interest rate decisions without a forecast publication. However, when the forecast for the interest rate one year ahead deviates from the market's expectations, the reduction in uncertainty is smaller.
- The findings of the analysis highlight the importance of transparency and information provision by the central bank, including the publication of forecasts and the holding of press conferences, in reducing uncertainty in financial markets.

1. Introduction

The exchange rate is one of the main transmission mechanisms of monetary policy, thereby playing a crucial role in the policy's effectiveness and impact on the economy. The exchange rate is influenced by two main channels of central bank policy, alongside other factors: first, directly through the impact of interest rate changes on interest rate differentials with other economies; and second, through its impact on market uncertainty, reflected in the exchange rate premium.[1] This analysis examines how the communication of monetary policy, that is, the manner in which the central bank conveys its decisions and expectations for the future, and the clarity with which it does so, can influence exchange rate uncertainty.

Clear, transparent, and frequent communication from the central bank about monetary policy can reduce uncertainty in financial markets (Bernanke, 2007). When a central bank provides forward guidance, publishes forecasts, and explains the considerations behind its decisions, investors and the public can better understand the future trajectory of monetary policy and the broader macroeconomic environment. This understanding can reduce uncertainty and, consequently, mitigate exchange rate volatility. Conversely, unexpected monetary policy shifts, or unclear communication, can increase uncertainty.

In recent decades, there has been a marked change in the management of monetary policy at many central banks. In the past, central banks often operated with a high degree of ambiguity to avoid constraining their future actions and to maintain as much flexibility as possible (Blinder et al., 2008; Coibion et al., 2020).[2] However, since then, monetary policy at many central banks, particularly in the United States, has become more transparent, interest rate changes have become more predictable (Swanson, 2006), and more information is now provided to the public through various channels

[1] The exchange rate premium is defined as the deviation of the exchange rate from the expected rate according to the uncovered interest parity (UIP). In other words, it represents the ex-post difference between the current exchange rate and the rate that reflects the interest rate differentials between the domestic economy and the foreign economy.

[2] Alan Greenspan, former Chairman of the US Federal Reserve, was known for his complex and ambiguous style of communication, and often acknowledged this himself. In late 1987, he told a Congressional subcommittee: "Since I've become a central banker, I've learned to mumble with great incoherence. If I seem unduly clear to you, you must have misunderstood what I said."

beyond periodic interest rate decisions, such as speeches by the Chairman of the Federal Reserve (Swanson and Jayawickrema, 2024).[3]

In Israel, too, monetary policy communication has evolved, becoming more transparent in recent decades. Since December 2011, the Bank of Israel Research Department has been publishing a quarterly macroeconomic forecast alongside the interest rate decision (so that some interest rate decisions are accompanied by a forecast publication and some are not). This publication includes forecasts for key macroeconomic variables, particularly GDP growth and inflation, as well as the Bank of Israel's interest rate. Additionally, since June 2015, interest rate decisions that come with a forecast publication have been accompanied by press conferences, during which the Bank of Israel Governor elaborates on policy considerations, presents the Monetary Committee's perspective on the state of the economy, and answers journalists' questions.

This analysis examines how monetary policy in Israel and its communication regarding the interest rate path affect the shekel-dollar exchange rate and the uncertainty surrounding it. As a measure of uncertainty, we use implied volatility of shekel-dollar options. Implied volatility reflects market expectations of future exchange rate fluctuations, and is derived from option prices. Implied volatility is commonly regarded as a measure of uncertainty because when it is high, it reflects investors' expectations of greater exchange rate volatility, consistent with greater uncertainty about the future exchange rate level. We estimate the impact of the Bank of Israel's interest rate on the exchange rate level and implied volatility, as well as the impact of the Research Department's forecast publication on these variables, particularly the effect of publishing an interest rate forecast for one year ahead that deviates from market expectations. The identification strategy in the analysis relies on changes in short windows around interest rate decisions to isolate the effects of interest rate and forecast publications on the exchange rate and the implied volatility.[4]

[3] The study also found that speeches by the Chairman of the Federal Reserve have become more influential than FOMC announcements in their impact on stock prices and government bond yields.
[4] The analysis focuses on the short-term effects on the exchange rate level and the implied volatility, and does not address the persistence of these effects.

We find that in Israel, a one percentage point interest rate increase causes an appreciation of the shekel by 0.9%–2.4%. However, a market surprise, as captured by the unexpected change in the interest rate in absolute terms, leads to depreciation. An unexpected change of one percentage point causes depreciation of 0.8%–2.2%. In other words, we find that an unexpected interest rate decrease leads to significant depreciation, while an unexpected interest rate increase has a moderate impact on the exchange rate.[5] This finding is consistent with the interpretation that an interest rate surprise leads to increased uncertainty and, therefore, to an increase in the exchange rate premium demanded by investors in the shekel, leading to currency depreciation. Thus, the appreciation due to higher interest rate differentials is offset by the depreciation caused by the surprise. The increase in implied volatility due to an unexpected interest rate change, as found in this analysis, supports this interpretation.

Additionally, we find that interest rate decisions accompanied by a forecast publication and a press conference, which provide additional information to the public, are associated with a reduction in uncertainty compared to interest rate decisions without a forecast publication. However, when the forecast for the interest rate one year ahead deviates from market expectations, the reduction in uncertainty is smaller.

For illustration, in July 2019, the Bank of Israel left the interest rate unchanged at 0.25%, in line with market expectations. At the same time, the Research Department updated its forecast for the interest rate one year ahead to 0.75%, while market expectations at that time were for a lower interest rate of 0.35% in one year. In other words, this forecast conveyed a hawkish message relative to market assessments, following a period when the Research Department's forecasts and market expectations were similar. After the publication, there was only a moderate appreciation of the shekel, a moderate increase in the one-year yield, and an increase in implied volatility of shekel-dollar options for one year. This development suggests

[5] In our sample, the effect of an interest rate increase on the exchange rate is near zero, but this result is sensitive to the sample period. However, the finding that an interest rate increase has a smaller effect than an interest rate decrease is robust across different sample periods.

that following the forecast publication, the market moderately adjusted its interest rate expectations, and therefore the exchange rate changed only slightly. However, at the same time, uncertainty regarding the exchange rate increased, as reflected in the implied volatility, due to the unexpected change in the forecast.

The findings of this analysis regarding the direct impact of an interest rate increase on currency appreciation are consistent with the economic literature (Swanson, 2021).[6] The communication of policy, such as forward guidance, has also been found in the literature to have an impact on the exchange rate, but to a lesser extent (Caspi, Friedman, and Ribon, 2024). Regarding the impact of monetary policy on uncertainty, previous studies have found that macroeconomic data releases reduce uncertainty regarding the exchange rate as reflected in implied volatility (Kim and Kim, 2003).[7] However, the impact of monetary policy-related releases (Fed interest rate announcements and FOMC minutes) is only moderate and statistically insignificant (Marshall et al., 2012). Using a different measure of uncertainty, Bauer et al. (2022) find that FOMC decisions, especially when accompanied by a forecast publication and a press conference, lead to a reduction in uncertainty, which in turn affects the exchange rate. Boehm and Kroner (2024) identify a component of monetary policy that affects exchange rates around FOMC decisions and link it to FOMC communication, which operates through premia and risk perceptions in the markets.

2. Data and methodology

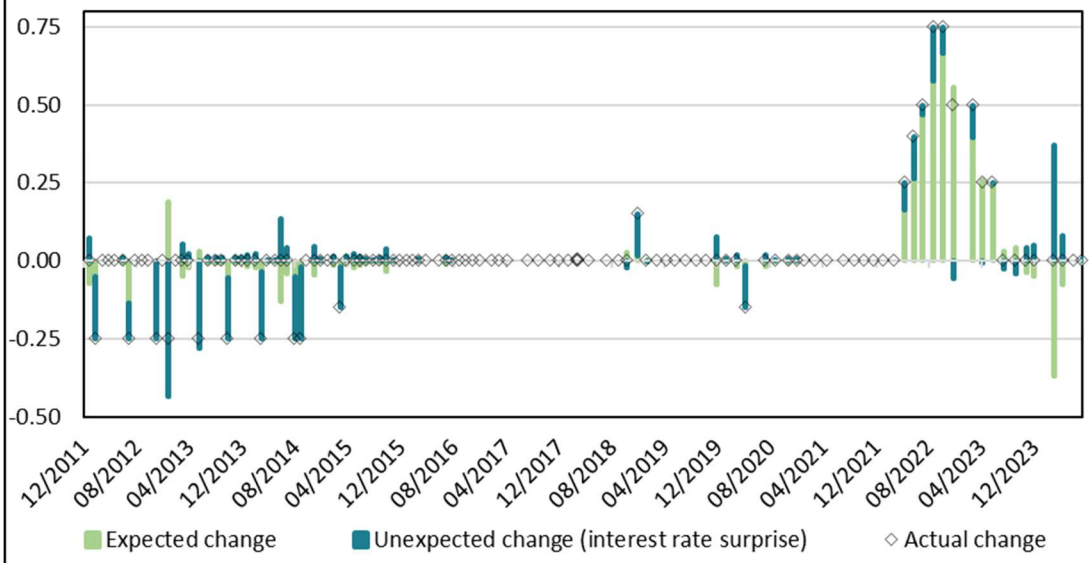
This analysis focuses on interest rate decisions between December 2011 and July 2024. The data include the Research Department's quarterly interest rate forecasts, as well as financial data from trading days surrounding the interest rate decisions: implied volatility in one-year options on the shekel-dollar and dollar-euro exchange

[6] Chapter 3 in the Bank of Israel *Annual Report* for 2023 presents a similar examination to the one presented in this analysis, which looks at the Bank of Israel interest rate's impact on the exchange rate.
[7] Monetary policy's impact on uncertainty has been primarily studied in the context of the implied volatility of equities (VIX). The literature has found that this index is affected by uncertainty, but also by other factors such as risk preferences (Bollerslev et al., 2009; Drechsler and Yaron, 2011; Bekaert and Engstrom, 2017), and the monetary policy rate affects the implied volatility of equities through these two channels (Bekaert et al., 2013; Bauer et al., 2023).

rates, and yield data from the Telbor market. The sample includes 122 interest rate decisions, of which 54 included a forecast publication.[8]

To examine the impact of the Bank of Israel's interest rate on the exchange rate and implied volatility, we used an estimate of the unexpected change in the interest rate for each decision (hereinafter "interest rate surprise" or “surprise”), as reflected in the change in the one-month Telbor rate (Figure 1) and the three-month Telbor rate around the time of the interest rate decision.[9] Additionally, to examine the impact of the Research Department’s forecast publication, we defined several variables.

Figure 1 | Expected and Unexpected Changes in the Bank of Israel Interest Rate, December 2011–July 2024



Note: The figure breaks down the change in the interest rate at each decision into the expected and unexpected portions, based on the one-month Telbor rate, according to the methodology detailed in Kutai (2023).

SOURCE: Bank of Israel.

[8] Until 2016, the Bank of Israel held interest rate discussions every month—12 times per year— and the Research Department published a forecast four times per year, coinciding with interest rate announcements. In 2017, the frequency of the interest rate decisions was reduced to eight times per year, while the frequency of the Research Department’s forecasts remained unchanged.

[9] For more information on the methodology, see Kutai (2023). The estimates of the interest rate surprises are not available for every decision in the sample, as some decisions could not be calculated in accordance with the methodology of Kutai (2023), due to a lack of trading in the Telbor market on the days surrounding those decisions.

First, to examine the average effect of the additional information published alongside the Research Department's forecast, we defined a dummy variable, $d\_forecast$, which takes the value of 1 when the interest rate decision includes a forecast publication, and 0 otherwise. It is important to note that since June 2015, press conferences have been held concurrently with the forecast publication, so the dummy variable captures the overall impact of both the forecast publication and the press conference.

Second, to assess the impact of the interest rate forecast, we defined two additional variables that reflect the information provided to the public regarding the Research Department's forecast for the Bank of Israel's interest rate one year ahead. The first variable, $forecast\_gap$, measures the gap between the Research Department's forecast for the interest rate one year ahead and the forward Telbor rate for 9 to 12 months ahead on the day of the interest rate decision, which represents the most up-to-date data before the forecast publication. This variable captures the discrepancy between the interest rate forecast published by the Research Department and the interest rate expected by the market prior to the forecast's release:

$$forecast\_gap_q = i\_forecast_q - telbor_{q,0}$$

where $i\_forecast_q$ is the forecast for the Bank of Israel's interest rate one year ahead as published by the Research Department in quarter q, and $telbor_{q,0}$ is the forward Telbor rate for 9–12 months ahead from the day of the forecast publication.[10]

The second variable, $disagreement$, is used to control for the degree of disagreement between the Research Department and the market, which is not directly related to the publication of the new forecast. Even if the market has access to the same information as the central bank, it may have a different interest rate forecast.[11] This variable measures the gap between the previous forecast published by the

[10] The Telbor rates are set at a random time according to quotes between 11:45 and 11:55, while the interest rate decision and the Research Department's forecast are published at 16:00.

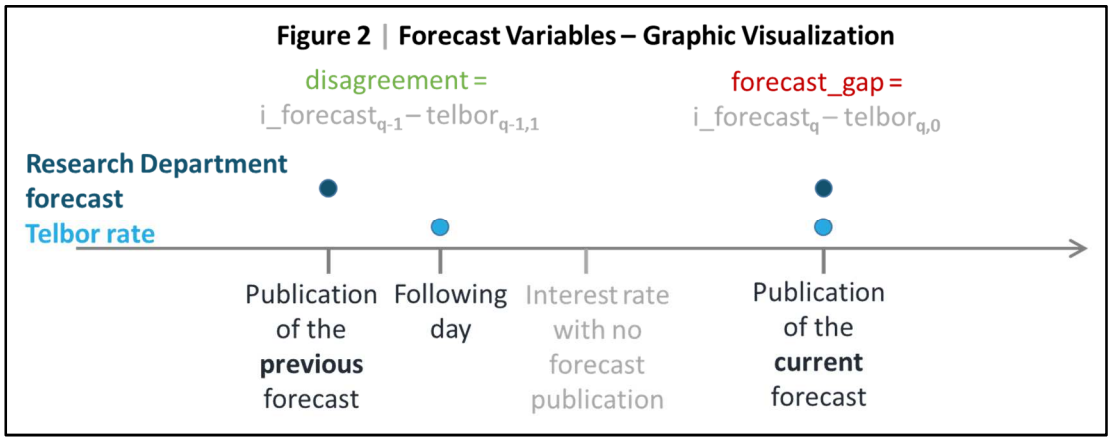
[11] We conducted a "placebo test" to ascertain that the lack of agreement between the Research Department and the market does not have a direct impact on the exchange rate and implied volatility, but only acts as a control variable when new information is provided. We found that in interest rate decisions that are not accompanied by a forecast publication, the *disagreement* variable does not have a statistically significant effect.

Research Department and the updated Telbor rate immediately after the publication of the previous forecast. In other words, it captures the discrepancy between the forecasts provided by the Department and the market when both were exposed to the same information. It is important to note that this variable is based on the Research Department's forecast and the Telbor rate at the time of the previous forecast publication, $q-1$, but it is used for estimation in period q:

$$disagreement_q = i\_forecast_{q-1} - telbor_{q-1,1}$$

where $telbor_{q-1,1}$ is the forward Telbor rate for 9–12 months ahead at the trading day following the publication of the forecast for quarter *q-1*. Figure 2 presents the time windows according to which the two forecast variables are defined.

Figure 2 | Forecast Variables – Graphic Visualization

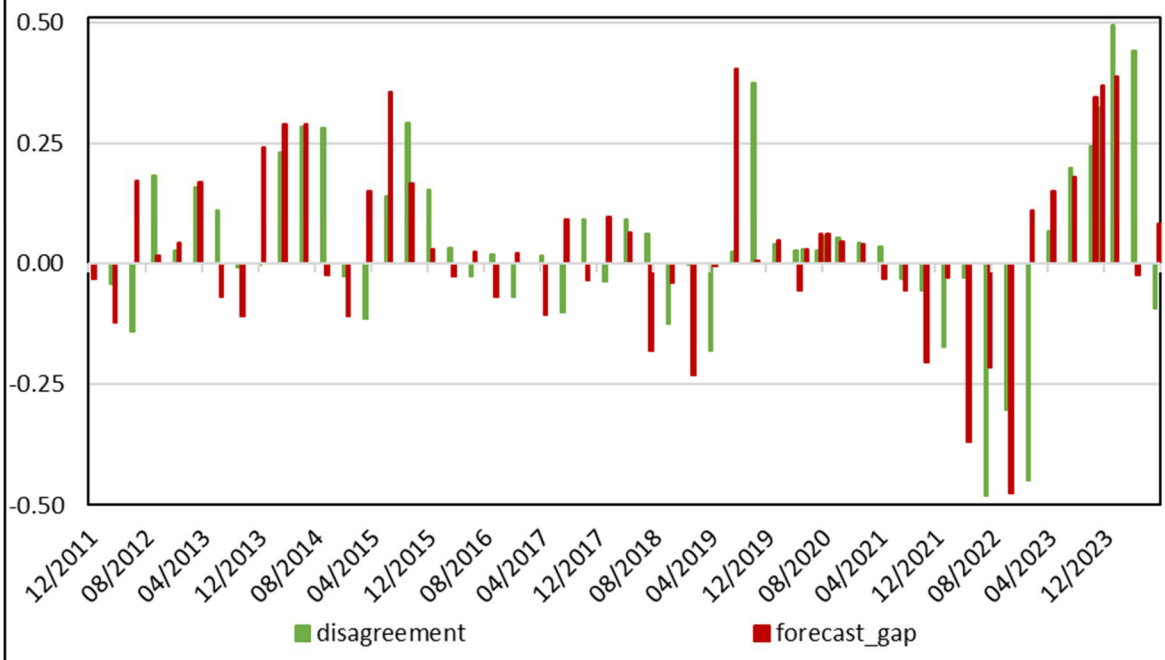


We assume that when there is no forecast publication, the Research Department's assessments, which are not known to the public, do not affect the capital market. Therefore, on the dates of interest rate decisions that were not accompanied by a forecast publication, the *disagreement* and *forecast_gap* variables take the value of 0.[12]

[12] The structural assumption is that when a forecast is not published, it does not affect the market. Since the *disagreement* variable serves as a control for the *forecast_gap* variable, we assume that it also does not affect markets in interest rate decisions without a forecast (see previous footnote). Formally, setting the variables to zero in observations that do not include a forecast publication is equivalent to running the regressions in this analysis with an interaction between the forecast variables and the dummy variable *d_forecast*, while constraining the coefficients of the noninteraction variables to zero. This assumption assists identification given our small sample size. To support this assumption, we examined the impact of the forecast variables in a subsample that includes only interest rate decisions without a forecast publication, under the assumption that when the forecast is not published,

Figure 3 shows the development of the two forecast variables on the dates of forecast publications within the sample period. On many publication dates, there are significant gaps between the Research Department's forecast and the market, meaning the *forecast_gap* variable takes on significant values (in absolute terms). The sample mean and median of the gap are approximately 0.1 percentage points, while the maximum value is about half a percentage point. In about half of the instances, the market narrows the gap from the Research Department's forecast on the following trading day, but in the other half, the gap remains unchanged or even widens.[13] This indicates that sometimes the market chooses to adopt the forecast (at least partially), but there are cases where the information provided by the bank leads the market to update its forecast in a different direction.

Figure 3 | Forecast Variables, December 2011–July 2024



Note: The figure presents the two forecast variables: $forecast\_gap_q = i\_forecast_q - telbor_{q,0}$; and $disagreement_q = i\_forecast_{q-1} - telbor_{q-1,1}$.

SOURCE: Bank of Israel.

it remains unchanged. We did not find that the forecast variables had a significant impact in this test. Additionally, in robustness checks, we found that the main results remained robust after restricting the sample to a subsample that includes only interest rate decisions accompanied by a forecast.

[13] This phenomenon can be observed by comparing the red column in each forecast with the green column in the subsequent forecast.

In the first analysis, we estimate the impact of the interest rate and the forecast on the exchange rate within a short window around the interest rate decision, as is common in the literature (for example, Swanson, 2021):

$$(1) \qquad \Delta S = \beta_0 + \beta_1 \cdot d\_forecast + \beta_2 \cdot forecast\_gap + \beta_3 \cdot disagreement + \beta_4 \cdot surprise + \beta_5 \Delta SP500 + \varepsilon$$

where the dependent variable ΔS is the percentage change in the shekel-dollar exchange rate within an hourly window, examining the exchange rate level fifteen minutes before the decision and one hour after it, or within a daily window, examining the exchange rate fifteen minutes before the decision and the representative rate on the next business day. A positive change ($\Delta S > 0$) indicates a depreciation of the shekel against the dollar. The $surprise$ variable represents the interest rate surprise for one month (Figure 1) or three months (Kutai, 2023). In the daily window regression, we include the percentage change in the S&P 500 index on the relevant trading day, $\Delta SP500$, to control for exchange rate changes resulting from adjustments made by institutional investors in their portfolios following changes in stock prices abroad.[14,15]

Additionally, we estimated a specification that includes the explanatory variables in absolute terms:

$$(2) \qquad \Delta S = \beta_0 + \beta_1 \cdot d\_forecast + \beta_2 \cdot forecast\_gap + \beta_3 |forecast\_gap| + \beta_4 \cdot disagreement + \beta_5 |disagreement| + \beta_6 \cdot surprise + \beta_7 \cdot |surprise| + \beta_8 \Delta SP500 + \varepsilon$$

The absolute value variables help us examine the additional impact of deviations of the interest rate or the Research Department's forecast from market forecasts, under the assumption that the magnitude of the deviation, rather than its direction, affects uncertainty. However, if we find that the coefficients β_3, β_5, and β_7 are statistically significant, the results will also be consistent with an alternative interpretation that increases and decreases in the Bank of Israel's interest rate have an asymmetric effect.

[14] We assume that in the hourly window, the impact of this channel is negligible, and therefore does not require control.

[15] For more on the impact of equity prices abroad on the shekel exchange rate, see Chapter 3 of the Bank of Israel Annual Reports for 2020 and 2022, as well as Ben Zeev and Nathan (2024).

To directly test the hypothesis that an unexpected interest rate decision leads to an increase in uncertainty, we examine the impact of policy variables on the implied volatility of the exchange rate. Specifically, we investigate whether deviations of the interest rate or the forecast from market expectations (in absolute terms) affect the implied volatility of shekel-dollar options:

$$(3) \qquad \Delta IV_{NIS-USD} = \beta_0 + \beta_1 \cdot d_{forecast} + \beta_2 \left| forecast_{gap} \right| + \beta_3 |disagreement| + \beta_4 \cdot |surprise| + \beta_8 \Delta IV_{EURO-USD} + \varepsilon$$

where $\Delta IV_{NIS-USD}$ is the change in the implied volatility of one-year shekel-dollar options, within a daily or two-day window (Figure 4). The daily window is calculated from the end of the last trading day before the interest rate decision to the end of the trading day on the day of the interest rate decision. The two-day window extends to the end of the next trading day in the two-day window.[16] In these regressions, the control variable $\Delta IV_{EURO-USD}$ is the change in the implied volatility of euro-dollar options within the window corresponding to the window of the dependent variable.

[16] Due to the fact that interest rate decisions are generally published on Mondays, and foreign exchange trading is typically very thin on Sundays, the windows in most of the sample are calculated from Friday to Monday (daily window) and from Friday to Tuesday (two-day window).

Figure 4 | Implied Volatility of One-Year Shekel-Dollar Options, December 2011–July 2024

SOURCE: Bloomberg.

3. Results

We first examine the impact of monetary policy and its communication on the shekel-dollar exchange rate using Equation (1). Table 1 presents the estimation results. Consistent with economic theory and empirical findings in the literature, we find that a one percentage point increase in the interest rate leads to an appreciation of 1.2%–2.4% (Columns A and C), and an increase in the expected interest rate path over three months leads to an appreciation of 1.5%–2.2% (Columns B and D). As shown in Table 1, this analysis did not find that the $forecast\_gap$ variable had an impact on the exchange rate, and the $d\_forecast$ variable was found to have a statistically significant effect only in the hourly window.

In an additional test, where we replace the dependent variable in Equation (1) with the change in the one-year Telbor rate (both the forward rate for 9 to 12 months ahead and the one-year spot rate), we did not find that the forecast gap had a strong or statistically significant effect on the forward and spot rates in the Telbor market (Table A1 in the Appendix). These findings suggest that given the short-term interest

rate update, financial markets only partially incorporate the interest rate forecast. This finding may explain why we do not find a statistically significant impact of the forecast gap on the exchange rate.[17]

Table 1:
Impact of interest rate forecasts and surprises on the shekel-dollar exchange rate
Interest rate decision dates, January 2012–July 2024

	(a)	(b)	(c)	(d)
Dependent variable	**Change in the exchange rate in the hourly window**		**Change in the exchange rate during the daily window**	
d_forecast	-0.125**	-0.107**	-0.143	-0.138
	(0.060)	(0.054)	(0.162)	(0.163)
forecast_gap	-0.209	-0.175	-0.22	-0.188
	(0.222)	(0.239)	(0.505)	(0.526)
Disagreement	0.095	0.027	0.551	0.397
	(0.222)	(0.229)	(1.001)	(0.992)
1M_surprise	-1.167***		-2.365***	
	(0.330)		(0.907)	
3M_surprise		-1.552***		-2.191**
		(0.553)		(0.967)
S&P500			-0.015	-0.016
			(0.069)	(0.069)
Intercept	0.039*	0.040*	0.037	0.048
	(0.022)	(0.022)	(0.053)	(0.053)
Observations	105	105	91	91
Adjusted R^2	0.147	0.144	0.059	0.031

Note: Newey-West standard errors are reported in parenthesis. ***p<1%; **p<5%; *p<10%. In Columns (c) and (d), the number of observations is slightly lower since the regressions include a control variable for the change in the S&P 500 in the daily window, which does not exist on days when there is no trading in the US.

Even when we estimate Equation (2) and include the explanatory variables in absolute terms in the regression, we do not find that the forecast variables have a statistically significant effect on the exchange rate (Table 2). However, interest rate surprises have a statistically significant effect here as well. The coefficient for interest rate surprises is negative and statistically significant, confirming the previous conclusion that a one

[17] The "forecast decisions" are characterized by a moderate decline in the one-year Telbor interest rate (Table A1), but also by a moderate appreciation of the shekel (Table 2). Together, these findings suggest that the additional information provided as part of the "forecast decisions" reduces the exchange rate premium, since the direct effect of a decline in the Telbor rate is a depreciation of the shekel.

percentage point increase in the interest rate beyond market expectations leads to an appreciation of the shekel by 0.9%–1.6%. However, the magnitude of the surprise in absolute terms has a positive and statistically significant coefficient: A one percentage point deviation of the interest rate from market expectations leads to a depreciation of 0.8%–2.2%. In other words, the larger the deviation of the interest rate decision from market expectations, the greater the depreciation. These findings are consistent with the interpretation that a deviation of the interest rate from market expectations increases uncertainty around the exchange rate, raises the exchange rate premium demanded by investors in the shekel, and leads to depreciation.

Table 2:
Impact of interest rate forecasts and surprises on the shekel-dollar exchange rate
Interest rate decision dates, January 2012–July 2024, including explanatory variables in absolute value

	(a)	(b)	(c)	(d)
Dependent variable	**Change in the exchange rate in the hourly window**		**Change in the exchange rate during the daily window**	
d_forecast	-0.103 (0.087)	-0.062 (0.077)	-0.118 (0.140)	-0.132 (0.141)
forecast_gap	-0.211 (0.234)	-0.088 (0.246)	-0.16 (0.433)	-0.075 (0.444)
forecast_gap||	0.092 (0.257)	-0.042 (0.250)	0.056 (0.381)	0.029 (0.400)
disagreement	0.131 (0.231)	0.042 (0.251)	0.384 (1.564)	0.081 (1.590)
|disagreement|	-0.165 (0.182)	-0.195 (0.172)	-0.029 (1.277)	0.281 (1.330)
1M_surprise	-0.886*** (0.268)		-1.394* (0.731)	
|1M_surprise|	0.761*** (0.224)		1.854*** (0.661)	
3M_surprise		-1.257*** (0.339)		-1.587** (0.678)
|3M_surprise|		1.251*** (0.347)		2.151*** (0.703)
S&P500			-0.005 (0.069)	-0.006 (0.069)
Intercept	0.003 (0.024)	-0.011 (0.030)	-0.027 (0.052)	-0.025 (0.053)
Observations	105	105	91	91
Adjusted R^2	0.163	0.18	0.058	0.046

Note: Newey-West standard errors are reported in parenthesis. ***p<1%; **p<5%; *p<10%.

The finding that an unexpected interest rate cut leads to significant depreciation while an unexpected interest rate hike has a minimal impact is consistent with other interpretations unrelated to the exchange rate premium. For example, it is possible that during certain periods, the Bank of Israel acted to offset the impact of an unexpected interest rate hike through foreign exchange purchases, or that when the interest rate was close to the zero lower bound (as was the case in a significant portion of our sample), the transmission for interest rate hikes and cuts differed. However, in sensitivity tests, we did not find that the Bank of Israel's foreign exchange purchase program or the proximity to the zero lower bound affected the main results (see the sensitivity tests section).

To directly examine the hypothesis that an unexpected interest rate decision leads to an increase in uncertainty, we assess the impact of policy variables on the uncertainty index regarding the exchange rate. For this purpose, we estimate Equation (3), where the dependent variable is the change in the implied volatility of one-year dollar-shekel options, and the explanatory variables appear in absolute terms.[18]

The results of this regression are presented in Table 3 and show that interest rate decisions accompanied by a forecast publication tend, on average, to reduce uncertainty compared to decisions published without a forecast. We find that the additional information published in "forecast decisions" reduces the implied volatility by approximately 0.07. This is three times the change in implied volatility on a typical trading day in the sample[19] and represents a reduction of about one percent from the average level of this index over the sample period (Figure 4). However, when the interest rate decision is accompanied by a forecast that deviates from market expectations, the forecast's moderating effect on implied volatility is less pronounced. Table 3 shows that an interest rate forecast that deviates by one percentage point from the market projection leads to an increase of about 0.2 in implied volatility, above and beyond the impact of the short-term interest rate path update (up to three months). The average deviation of the interest rate forecast from market expectations

[18] It should be noted that when the estimation included the variables in their original form, they were found to be statistically insignificant.
[19] The median daily change in implied volatility in our sample is 0.023 (in absolute terms).

in our sample is about 0.1 percentage points (10 basis points). Thus, the publication of a "typical forecast" reduces implied volatility by about 0.05[20], compared to 0.07 in a publication where the interest rate forecast does not deviate from market expectations.

We examined the results of Equation (3) on several subsamples and found that the impact of the forecast variables was particularly significant during periods when the Bank of Israel's interest rate was far from the zero lower bound, especially since the COVID-19 crisis and the subsequent interest rate hike cycle.[21]

Table 3 also shows that interest rate surprises affect uncertainty. When the one-month and three-month interest rate surprises were separately included in the regression, they were not found to have a statistically significant positive effect. However, combining the surprises in both horizons into the regression yields significant results in opposite directions. An unexpected change in the three-month interest rate path increases uncertainty, but given that, the surprise in the interest rate change (the one-month surprise) actually reduces uncertainty. These findings are consistent with the interpretation that most unexpected interest rate changes, after controlling for the three-month path surprise (i.e., the path remains unchanged), reflected a surprise regarding timing only, and therefore mitigated the increase in expected volatility.[22] For example, if the market expected that a change in the Bank of Israel's interest rate would occur either in the current decision or the next decision (and did not expect further changes), and the change indeed occurred in the current decision, the market would then expect with high certainty that no change would

[20] According to the estimations in Table 3, the publication of a forecast that includes a 0.1 gap between the interest rate forecast and market expectations leads to a change of -0.07 + 0.2 X 0.1 = -0.05 in implied volatility, compared to an interest rate decision that is not accompanied by a forecast.

[21] We found that the forecast variables had a particularly large impact between 2020 and 2024. Those years differed from the rest of the sample in several ways. First, during that period, the foreign exchange purchases that characterized the first part of the sample were stopped, and foreign exchange sales were even conducted at the beginning of the Swords of Iron War in late 2023. Second, there was tremendous uncertainty during a significant part of this period due to both the COVID-19 crisis and the Swords of Iron War. Third, the interest rate increases in Israel were highly correlated with those in the US, in contrast to the interest rate cycles in the rest of the sample. These findings remain robust when expanding the sample to include earlier periods in which the Bank of Israel interest rate was above 0.25% (above the zero lower bound).

[22] The surprise in the three-month interest rate path reflects the entire path over the next three months, and therefore also incorporates the unexpected change in the current interest rate decision.

occur in the next decision. Therefore, once the event has materialized, there is greater certainty regarding the interest rate path in the coming months.

Table 3
Impact of interest rate forecasts and surprises on the implied volatility of shekel-dollar options
Interest rate decision dates, January 2012–July 2024

	(a)	(b)	(c)	(d)	(e)	(f)
Dependent variable	**Daily change in implied volatility**			**Two-day change in implied volatility**		
d_forecast	-0.063*** (0.020)	-0.059*** (0.019)	-0.056*** (0.019)	-0.076*** (0.023)	-0.070*** (0.024)	-0.067*** (0.024)
|forecast_gap|	0.210** (0.093)	0.202** (0.090)	0.192** (0.092)	0.242*** (0.082)	0.226** (0.094)	0.215** (0.084)
|disagreement|	0.214** (0.093)	0.212** (0.093)	0.204** (0.088)	0.167 (0.113)	0.159 (0.099)	0.15 (0.105)
|1M_surprise|	0.014 (0.066)		-0.179*** (0.066)	0.073 (0.106)		-0.2 (0.155)
|3M_surprise|		0.136 (0.103)	0.339** (0.143)		0.251 (0.162)	0.478** (0.230)
EURUSDIV1Y (in the matching window)	0.129* (0.071)	0.135* (0.072)	0.137* (0.073)	0.125*** (0.048)	0.129*** (0.050)	0.131*** (0.049)
Intercept	0.014** (0.007)	0.009 (0.007)	0.009 (0.007)	0.015 (0.012)	0.008 (0.012)	0.009 (0.013)
Observations	111	111	111	111	111	111
Adjusted R^2	0.138	0.15	0.157	0.148	0.205	0.169

Note: Newey-West standard errors are reported in parenthesis. ***p<1%; **p<5%; *p<10%.

4. Sensitivity tests

We found that the reported results are robust across a series of sensitivity tests we conducted. First, we sought to separately examine the effect of holding a press conference alongside the publication of a forecast, as although they are often concurrent, they do not completely overlap. We added a dummy variable for the presence of a press conference at the time of the interest rate decision but did not identify a separate effect for the press conferences, and the results for the other variables remained robust. It should be noted that the correlation between the dummy variables for forecast publication and the presence of a press conference is high, and when they did not occur together, it was during a short period at the beginning of the sample or in exceptional cases such as the COVID-19 period and the Swords of Iron War. During these exceptional periods, extraordinary interest rate

decisions and forecasts were published outside the predetermined publication schedule, and our results remain robust even when these publication dates are omitted.

We also sought to test the robustness of our results to the extent of the Bank of Israel's intervention in the foreign exchange market, as Hertrich and Nathan (2023) found that foreign exchange purchases affected the implied volatility of shekel-dollar options. We divided the sample into two subsamples: one for intervention periods and one for non-intervention periods. The results held in both subsamples. Additionally, the results remained robust when we controlled for the amount of foreign exchange purchases by the Bank of Israel.

Our results were also found to be robust when excluding the period when the interest rate was close to the zero lower bound (0.25% or lower). Finally, we confirmed that the results remain robust to the level of uncertainty and the exchange rate conditions before the interest rate decision, by adding controls for the level of the outcome variables before the interest rate decision. All additional results are not reported in this note but are available upon request from the authors.

5. Conclusion

This analysis examined the impact of monetary policy and its communication on the shekel-dollar exchange rate and the uncertainty surrounding it, as reflected in the implied volatility of shekel-dollar options. The analysis focused on a period during which policy communication included a quarterly macroeconomic forecast by the Research Department, and for most of the period, those interest rate decisions were also accompanied by a press conference. Under this communication structure, we examined the impact of the Bank of Israel's interest rate and the publication of forecasts, especially when they deviated from market expectations.

We found that a one percentage point increase in the interest rate led to an appreciation of the shekel against the dollar by 0.9%–2.4%. However, a deviation of the interest rate decision from market expectations (in absolute terms) actually led to a depreciation of 0.8%–2.2%, which is consistent with an increase in the exchange rate

premium. In other words, we found that an unexpected interest rate cut resulted in significant depreciation, while an unexpected interest rate hike had a moderate impact. Additionally, we found that interest rate decisions accompanied by the publication of a forecast, which provides additional information to the public, are characterized by a reduction in uncertainty, as perceived in the implied volatility of shekel-dollar options, compared to interest rate decisions without a forecast publication. However, an interest rate decision or a forecast publication for the interest rate path that deviates from market expectations was found to increase uncertainty. At the same time, the interest rate forecast was not found to have a strong impact on the one-year Telbor rate or the exchange rate, given the short-term interest rate path update.

These findings highlight the importance of transparency and the provision of information by the central bank in reducing uncertainty in financial markets. The publication of detailed forecasts and the holding of press conferences have been found to reduce uncertainty. However, the results show that in cases where the Research Department's interest rate forecast deviates from market assessments, uncertainty decreases to a lesser degree, and the market does not necessarily adopt the Department's forecast. More detailed communication in such cases could potentially lead to the adoption of the interest rate forecast by the market. These insights are valuable for the Bank of Israel and other central banks worldwide seeking ways to increase confidence in monetary policy and stabilize markets.

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APPENDIX

Table A1
Impact of interest rate forecasts and surprises on the 1-year Telbor rate
Interest rate decision dates, January 2012–July 2024

	(a)	(b)	(c)	(d)	(e)	(f)
Dependent variable	**Daily change in the forward Telbor rate for 9–12 months**			**Daily change in the 12-month Telbor rate**		
d_forecast	-0.013 (0.013)	-0.017** (0.009)	-0.018** (0.009)	-0.007 (0.011)	-0.011* (0.006)	-0.011** (0.006)
forecast_gap	0.008 (0.067)	0.017 (0.050)	0.007 (0.040)	0.00004 (0.057)	0.008 (0.035)	-0.001 (0.020)
disagreement	-0.053 (0.037)	-0.121*** (0.031)	-0.082*** (0.018)	-0.025 (0.037)	-0.094*** (0.026)	-0.054*** (0.017)
1M_surprise		0.837*** (0.130)			0.844*** (0.0101)	
3M_surprise			1.031*** (0.0159)			1.013*** (0.110)
Intercept	0.012 (0.015)	0.020** (0.008)	0.015** (0.007)	0.007 (0.013)	0.015** (0.006)	0.010** -0.004
Observations	105	105	105	105	105	105
Adjusted R^2	-0.017	0.575	0.739	-0.026	0.696	0.861

Note: Newey-West standard errors are reported in parenthesis. ***p<1%; **p<5%; *p<10%.