

Monetary tightening at work: transmission and heterogeneity

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1. Introduction

The rapid and uneven recovery after the pandemic against the backdrop of expansionary fiscal and monetary policies, along with an energy price shock caused a global inflation surge. Inflation rates hovered well above targets in the major economies as well as in other jurisdictions. Consequently, central banks implemented a highly synchronised and sharp tightening cycle, as they tried to first stabilise and then to reverse inflation. After years of low interest rates – near or at the zero lower bound (ZLB), many central banks had to put the power of monetary policy to the test. This sharp tightening cycle creates an opportunity to reassess the transmission of monetary policy and the differential impact of monetary policy on different economic agents. Understanding heterogeneity is essential when tightening rapidly, because such a policy can have significant social and financial stability ramifications.

Effective monetary policy involves several channels through which the central bank's decisions can affect the markets and agents in those markets. The classic channels are well known: interest rates, the exchange rate, credit, asset prices and expectations. In addition to deciding on the necessary degree of monetary tightening or easing, modern central banking is in essence about making sure these channels are working efficiently. In recent years the expectations channel has become more central, and in order to strengthen it, it is more important than ever for the central bank to explain its actions and signal its intentions going forward. Transparent publications of economic forecasts, including for the policy rate itself, and frequent and ongoing interaction with the public through the traditional media as well as digital/social media are meant to achieve this goal.

The overarching framework of monetary policy which guides the Bank of Israel (BOI) and almost all central banks in OECD countries is the inflation targeting regime. This framework, if implemented successfully over time, provides a credible anchor for monetary policy and expectations.³ The recent breach of the targets in Israel as well as in many other countries was a stress test to this framework. The results are reassuring: while actual inflation rates deviated considerably from the targets for relatively long periods, expectations for the medium and long run remained relatively

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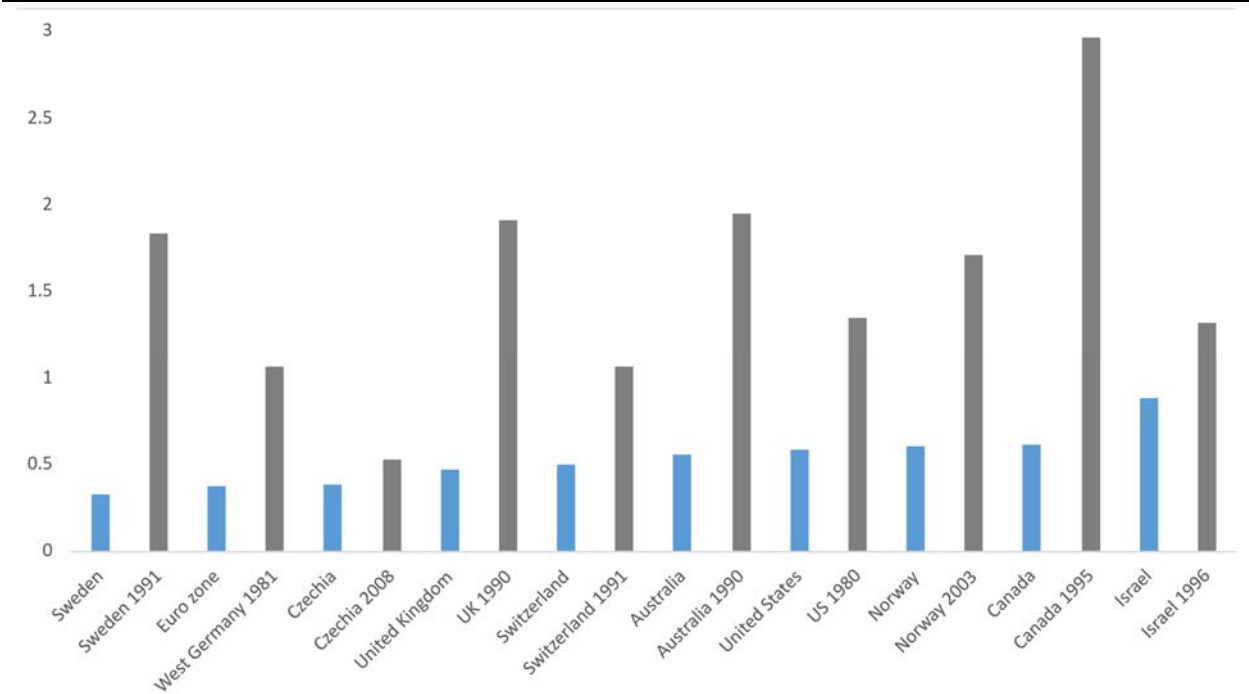
² Markets Department, Bank of Israel.

³ The BOI recently completed a review of its inflation target. The review concluded that the current target, which was set as a range between 1 and 3 percent in 2000, is still the preferable option. See www.boi.org.il/en/communication-and-publications/press-releases/6-11-24/.

stable and anchored around the targets. This phenomenon, which reflects a “credibility gain” central banks earned by keeping inflation rates around the targets for years since they had been adopted probably allowed central banks to react moderately in terms of changing the relevant policy rate: Graph 1 shows that in the United States, euro zone and selected Small and Medium Economies the highest policy rate in the cycle was lower than inflation at its peak. A historical perspective shows the interest rate hikes that were required to stabilise inflation in recent years were low relative to the hikes that were required to put the inflation genie back into the bottle in the past.⁴ Therefore, the costs of monetary tightening in terms of unemployment are lower when compared with the past.⁵

The ratio between the highest interest rate and maximum inflation in the 2022–23 cycle vs previous historical inflation surges

Graph 1



Source: Bloomberg.

The adoption of inflation targeting has allowed central banks to be more effective than ever in controlling inflation, but it is not a panacea. In order to reap the benefits of inflation targeting, monetary policy has to be transmitted into financial markets, firms and households. This note focuses on the *interest rate channel* of monetary policy, ie how the key rates affected market interest rates and yields. We show that monetary policy has a heterogeneous impact on different economic agents, and distinguish between large and small firms and households on both sides

⁴ In each country, the last hiking cycle is compared with a previous episode of inflation surge.

⁵ For example, the increase in unemployment in the US in the current cycle is 0.6 percentage points, while in the early 1980s unemployment increased by 5 percentage points. The unemployment rate has not risen at all in the euro zone in the current tightening cycle.

of the market, ie lenders and borrowers. Specifically, we zoom in on mortgages, as in Israel one third of the typical home loan is an adjustable rate mortgage (ARM) with a contractual interest rate linked to the policy rate.

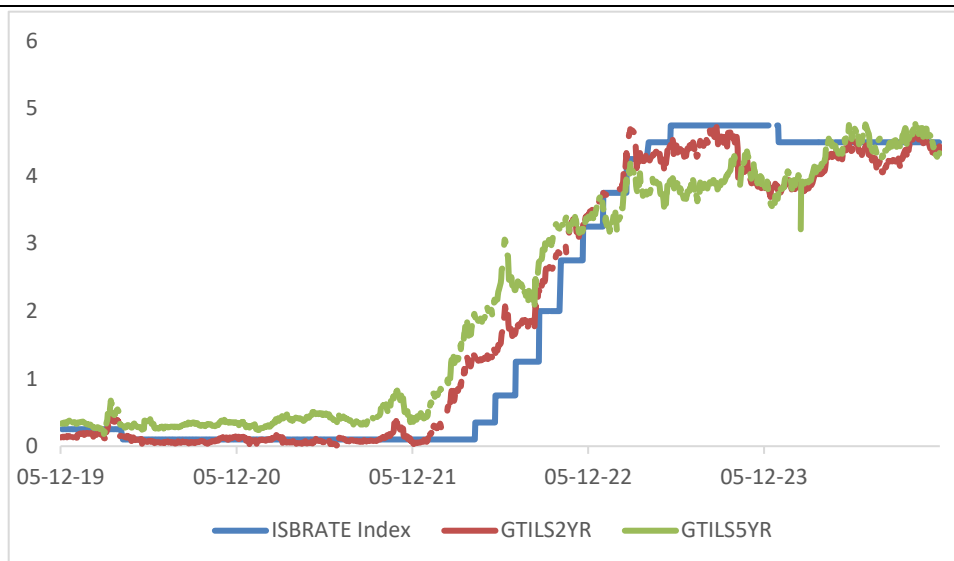
The interest rate channel is not the only one at work when the policy rate is lifted. Monetary policy can affect the exchange rate, credit, asset prices and expectations. We do not attempt to give a full account of the impact of the BOI's recent policy; however, the exchange rate channel in the recent tightening cycle was probably not a dominant one. The reason is that interest rate hikes were highly synchronised globally. Specifically, as the BOI and the Federal Reserve hiked in unison, the US-Israel interest rate spread remained low, so this channel was probably muted.⁶

2. The bond market

We start with the government bond market, as it is the cornerstone for financial markets, as well as for the banking system and real economy, as many consumption and investment decisions are linked to the rates from the bond market (with an additional spread). The Graph below plots the BOI's policy rate versus the yields of two-year and five-year government nominal bonds. As one can expect given the rise in inflation, the increase in yields preceded that in the policy rate, but in early 2023 the policy rate caught up in full. Later, however, the five-year yields plateaued at below 4% while the policy rate was tightened to 4.75%, a move that was not fully priced in in January 2023. The bottom line is that although the BOI's rate hikes affected mid-term yields in full during the early stages of hiking cycle, the last two to three increases did not have any noticeable effect.⁷ Although a flattening of the yield curve is a natural feature of late-stage tightening, this still points to the limited power of monetary policy.

⁶ Recent empirical results point that the USD/ILS exchange rate is affected symmetrically by Fed and BOI policy (Caspi, Friedman and Ribon, 2024).

⁷ Naturally, the yields are affected by other factors both domestic and global, and the drop in US yields in the summer of 2023 probably also affected local yields.



Source: Bloomberg.

3. Deposits

The banking system is a central channel through which central banks' monetary policy reaches firms and households, lenders and borrowers alike. Graph 3 below shows how the BOI's monetary policy passed through into deposit rates during the recent hiking cycle that started in April 2022, and the ZLB period that preceded it (actually the key rate was 0.1% then). During the ZLB period, deposit rates were compressed tightly to near zero levels and heterogeneity by sector had become negligible for all practical purposes.⁸ However, once the monetary tightening cycle commenced a clear pattern emerged: bigger clients receive higher rates. Larger firms are getting higher rates than smaller ones, and households receive the lowest rates on their deposits. The ZLB period temporarily obscured all these differences between the agents, but once the lift-off took place they resurfaced.

This outcome reflects economics of scale in a non-competitive market. Larger clients have larger deposits, are usually better informed and have more alternatives. All this puts them in a better position for negotiating deposit rates, while for less sophisticated households the rates are often posted as take-it-or-leave-it offers. Households too can shop around and look for alternatives: the BOI's regulation ensures that deposits are comparable, and in order to promote competition the BOI's website displays a real-time comparison of the deposit rates by bank, maturity and type (ie fixed or floating rate). In addition, households can invest in money market

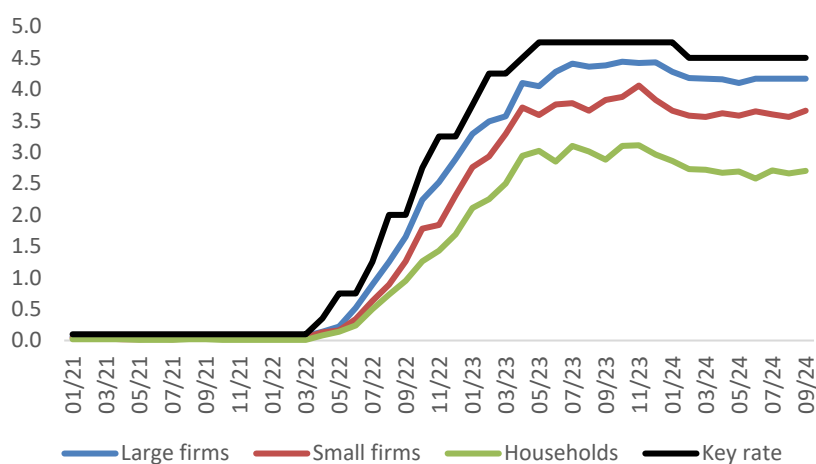
⁸ Although the "pecking order" was preserved, the differences were practically immaterial. For example, in January 2021, while the BOI rate was 0.1%, the deposit rates for large firms was 0.06%, for small firms 0.04% and for 0.02% households.

funds that offer attractive returns but at the price of some uncertainty, which possibly deters some clients while others are simply unaware of this option.⁹

The bottom line is that the pass-through of the BOI's hike into deposits is partial. The average households deposit rate today is 2.7%, while the BOI's key rate is 4.5%. This represents a pass-through rate of 60%. As to the implications, such a partial pass-through can result in a lower impact of monetary policy on consumption of middle-income households.¹⁰ This problem is further exacerbated by the very significant amounts held in checking accounts that receive zero interest rate. The pass-through to the business sector is much higher, and large firms can get a rate that is very close to the BOI's policy rate.

BOI key rate and average deposit floating rate interest rate by sector, %

Graph 3



Large firms are those with an annual turnover of over ILS 250 million. Small firms are those with an annual turnover below ILS 10 million.

Source: Bank of Israel.

4. Credit

4.1 New credit

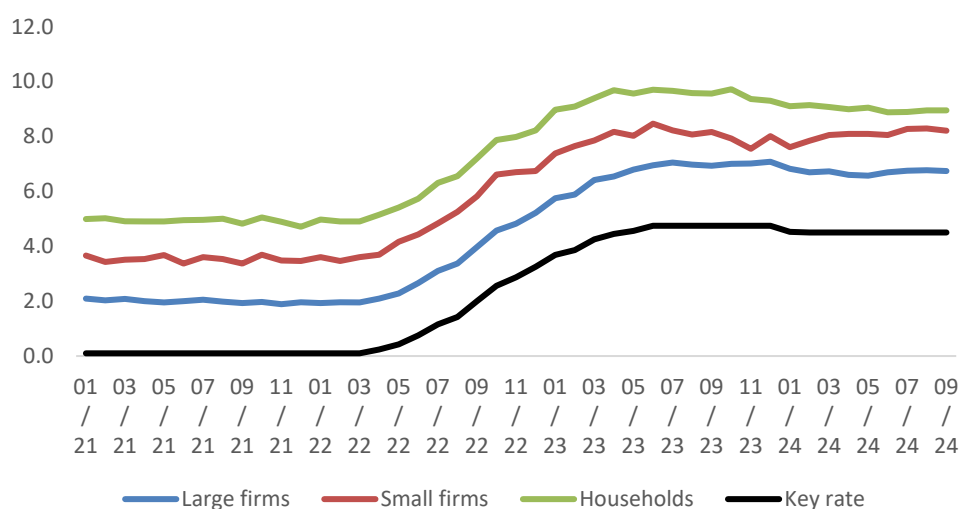
The banking system is also a major credit provider. Graph 4 presents the central bank rate and the rates on new loans to the same sectors as in the previous section. Unlike in the case of deposits, the pass-through to market rates seems to be full, and the spreads that prevailed in the ZLB period remained almost unchanged.

⁹ Risk aversion itself cannot explain the reluctance to use money market funds as the whole distribution is above the return on the "risk free" bank deposit. In addition, these days money market funds are also available to clients who do not have an investment account at their bank (ie a checking account is sufficient). Therefore, it seems that financial illiteracy plays a role here.

¹⁰ Wealthy households' consumption might be also affected by a negative wealth effect.

Average interest on new credit by sector and BOI policy rate

Graph 4



Large firms are those with an annual turnover of over ILS 250 million. Small firms are those with an annual turnover below ILS 10 million. Households' credit includes consumer loans (ie excluding mortgages).

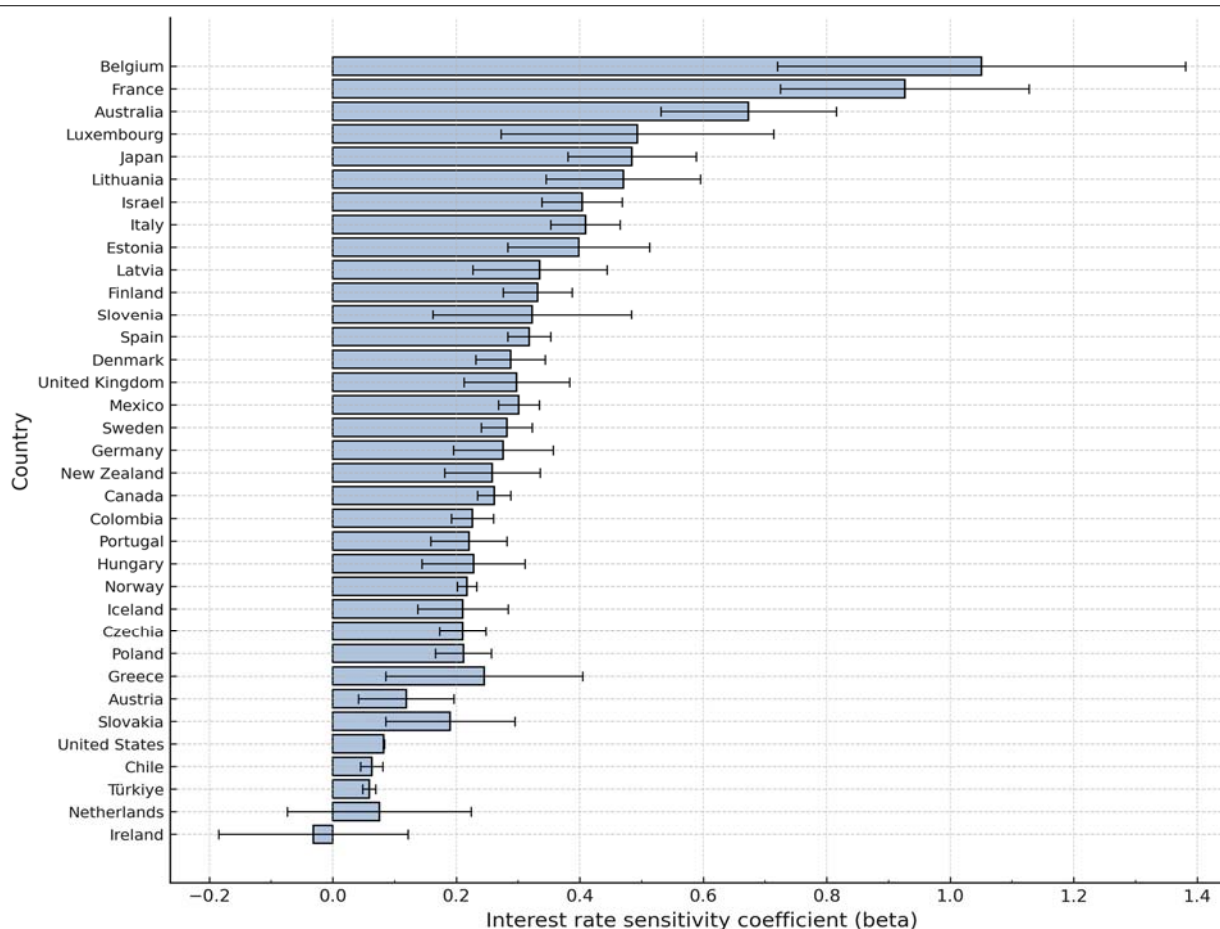
Source: Bank of Israel.

4.2 The credit stock

The full transmission of the BOI's rate to the price of new, relatively short-duration loans is a natural and almost trivial outcome one can expect. The full impact of the interest rate channel, however, is a function also of the adjustment of the interest rates on the pre-existing stock of credit. The higher the share of floating rate loans, the stronger the impact of monetary policy.

Graph 5, based on a cross-country panel of banks in OECD countries, compares the elasticity of banks' gross interest rate income with respect to a change in the key central bank rate. This income includes payments made by firms and households. These elasticities are a function of both the share of floating rate loans and the endogenous reaction of credit demand to rate changes, and also a possible interaction or correlation between monetary policy and financial risk, which might affect credit supply. As such, they are not easy to interpret, but from central banks' perspective they indicate the aggregate impact of monetary policy on the cost of the credit stock.

The graph shows that while in some countries the immediate impact is very low and even insignificant, in others the impact is sizeable. Israel clearly belongs to the latter group of countries, and this means that the BOI has to take into account that its interest rate changes directly and immediately affect consumers' disposable income as well as firms' cash flow. Other things equal, this should work to shorten the lag of monetary policy impact, and reduce the amplitude and magnitude of interest rate changes.



The graph shows the impact of a 1 percentage point increase in the central bank's interest rate on the gross interest income of banks, in per cent. These elasticities are based on a quarterly panel of 10,958 banks in 38 OECD countries between 2002 and 2023. Error bars represent 95% confidence intervals. A higher β_j indicates greater sensitivity to interest rate changes, suggesting a higher prevalence of adjustable rate credit.

Source: Eshel (2024).

4.3 Mortgages

One of the reasons for the relatively large impact of the BOI's rate change on banks' interest rate income in Israel is the structure of the mortgage market. A few words of background are necessary here, in order to understand why mortgages in Israel are so dominant.

On the one hand, a high rate of population growth¹¹ leads to a fundamentally high demand for housing by young, newly established households that purchase their first home, and about 30% of households have a mortgage. On the other hand, the

¹¹ Population growth is 1.9% per year, ranked third in the OECD, after Iceland and Luxembourg (source: OECD data for 2019).

scarcity of land results in high and ever increasing population density¹² and land prices. These factors are compounded by planning and zoning bottlenecks, and house prices are consequently very high.¹³

Mortgages are composed of fixed, semi-fixed and floating rate tranches, so almost all have some element of adjustable rate and thus are at least partly ARMs. The floating rate tranche in a typical mortgage that was originated by December 2020 is close to 33%, which was the limit under BOI regulation at that time.¹⁴ The contractual floating interest is set as a fixed spread relative to the BOI's key rate and is updated continuously on a monthly basis.¹⁵ Therefore, the pass-through of monetary policy to the ARM tranches of existing mortgage loans is full and immediate.

The increase in interest rates increased mortgage payments, an outcome that was continuously monitored and assessed by the BOI's Monetary Policy Committee (MPC). The MPC did have real-time access to granular data on the stock and flow of mortgages, also because the BOI is the supervisor of banks and operates a national credit data register. These data allowed the MPC to take into account the economic impact of its decisions as well as the public reaction to its decisions. This is important because public discussion and media coverage on monetary policy centred on its impact on mortgage payments. Monetary policy deliberations cannot be completely divorced from the public discussion around the costs of the policy, nor should they be.

The increase in households' mortgage payments had a direct impact on their consumption patterns. Graph 6 shows the marginal impact on debit card spending of a 1 percentage point increase in the size of the adjustable rate tranche share in a mortgage, which can be referred to as the ARM share, around the BOI's rate lift-off in April 2022. Before the lift-off, there was no clear relation between a higher ARM share on monthly spending. After the lift-off, however, there is a clear pattern. A monthly spending of households with a higher ARM share is lower.

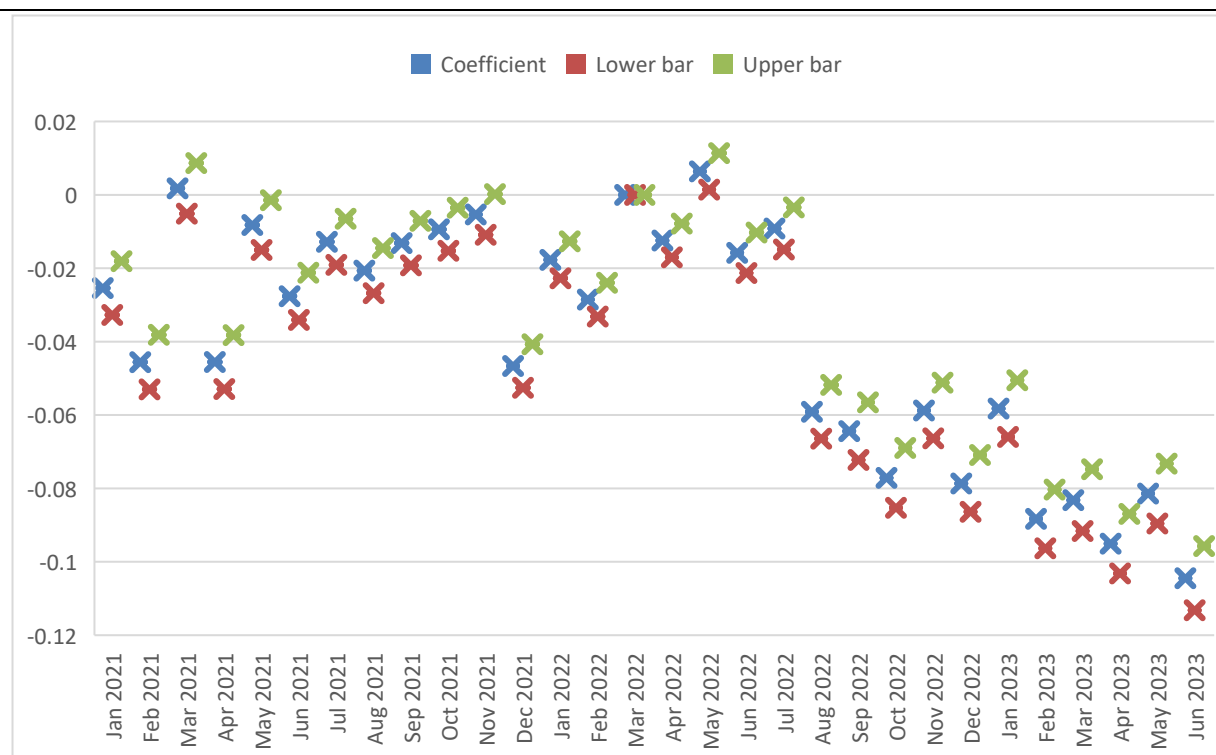
The impact increased over time because the interest rate kept going up. The dynamic specification reveals that by June 2023 the difference in consumption response was around 10 basis points for a 1% higher ARM share. As the average ARM was tightly grouped around 32%, this implies that by June 2023 consumption of those households dropped by over 3% relative to the level in April 2022 when compared with households with no mortgage. During this time, the BOI's key rate increased from 0.1% to 4.75%. This points to a very high elasticity of consumption with respect to the key rate of this group of households, although the drop in consumption, in absolute terms, was only 39% of the average increase in mortgage payment, which implies consumption smoothing was at work.

¹² Population density is 426 people per square kilometer, ranked third in the OECD, after Korea and the Netherlands (source: United Nations).

¹³ The ratio of the median 90 square metre home price to the annual median household disposable income is 14.3, ranked fifth in the OECD, after Korea, Colombia, Chile and the Slovakia (source: NUMBEO).

¹⁴ This cap increased to 66% in late 2021. The average floating tranche in early 2022 increased to 36%.

¹⁵ The average spread is usually about 2%, depending on the risk as assessed by the issuers.



¹ BOI rate hikes started in April 2022. The upper and lower and upper bounds indicate a 90% confidence interval.

Source: Caspi, Eshel and Segev (2024).

5. Conclusions

Like many other central banks, the BOI significantly increased its interest rate in 2022–23 to combat the spike in inflation above its target range. The recent tightening cycle provides a fresh opportunity to look into issues of monetary policy transmission and heterogeneity. We focus on the interest channel and show that it is a powerful channel through which the BOI's actions affected bond yields, deposit and credit rates, banks' interest rate income and household debit card spending. Nonetheless, the interest rate hikes had not been transmitted in full and not evenly across different segments of the economy.

Thus, monetary tightening has a heterogeneous impact. First, it puts a fundamental wedge between lenders and borrowers. While lenders are not necessarily better off, because for example tightening might have an adverse impact on asset prices, borrowers are worse off almost by definition. Next, the impact is heterogeneous among borrowers: while new borrowers can adjust their demand for credit, the onus of monetary tightening falls hard on borrowers with existing floating rate loans, and with perhaps the most glaring example being borrowers with an ARM. Lastly, the impact on depositors is uneven, and is a function of their relative market power and size. In this short paper we show how this heterogeneity looks.

As monetary policy might affect financial stability, and central banks' ultimate purpose is social welfare, their aggregate assessment has to be complemented with a granular approach that focuses on the heterogeneous impact of their actions on the most vulnerable households and weakest firms. Systematically collecting household- and firm-level data and analysing the impact of monetary policy based on these data is a step forward for conducting better policies.

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