Heterogeneity and monetary policy in Korea

Bank of Korea

Abstract

Heterogeneity in economic agents is increasing in Korea and these changes may affect the transmission channels and the effectiveness of monetary policy. In particular, the ageing population, high household debt levels, and differences between manufacturing and non-manufacturing companies, large enterprises and SMEs, and domestic demand-oriented and export-oriented firms are focuses of interest in Korea.

The effect of the increasing heterogeneity in the economy on the effectiveness of monetary policy is not obvious. However, recent studies suggest that the rising population of elderly households tends to reduce the effect of monetary policy, while the influence of high levels of household debt needs to be evaluated more comprehensively. Also, service industries, SMEs and domestic demand-oriented firms are more sensitive to interest rate changes compared to others.

Although the heterogeneity of households and firms is an important issue in monetary policy, the Bank of Korea (BOK) focuses on overall economic trends as captured by aggregate indicators for its monetary policy decisions, rather than explicitly considering the heterogeneity of agents such as sectoral income inequality and business cycle divergences. This is because it primarily aims to achieve macroeconomic stability by focusing on price and financial stability and is not designed to directly address sectoral imbalances. However, heterogeneity needs to be considered in economic assessments and analyses of policy effects, and the BOK could also contribute to narrowing sectoral gaps and reducing inequality by effectively achieving its mandate of price and financial stability.

Post-pandemic monetary policy operations show that the BOK focused primarily on the overall economic conditions in its monetary policy decisions, despite sectoral differences. In the meantime, it has also sought to enhance policy acceptance, especially for the vulnerable, through active communication, and has partially addressed the heterogeneity in economic agents through the Bank Intermediated Lending Support Facility (BILSF).

As the issue of heterogeneity among economic agents is expected to become more important in the future, it will be necessary to continue studying its interrelationship with monetary policy.

1. Introduction

In recent years, academia and central banks have increasingly focused on analysing the macroeconomy and policy effects considering the heterogeneity in economic agents. The Great Financial Crisis (GFC) and Covid-19 highlighted[1,2] the importance of the interrelationship between the characteristics of individual economic agents (such as income, assets and debt) and economic fluctuations. As analytical constraints have been eased due to the expansion of micro-level data and improvements in economic models and computational techniques, heterogeneous agent New Keynesian (HANK) models have been developed.

HANK models enable analysis of macroeconomic fluctuations and policy effects considering micro-level characteristics of economic agents, such as incomes, assets and debt of individual households and firms. Major studies on monetary policy using HANK models so far have shown that in the case of households, the main monetary policy transmission channel can vary[3] depending on the proportion of households facing borrowing constraints. Regarding firms, the effects of monetary policy may differ[4] depending on the distribution of companies with high default risk.

In the meantime, concerns have emerged that monetary policy easing might worsen asset inequality in the aftermath of the GFC and Covid-19. This has spurred research into the effects of monetary policy on inequality and distributional structures within the economy. However, studies have yet to reach a consensus on whether monetary policy impacts asset and income inequality.[5]

1 In the past, heterogeneity analysis was primarily focused on issues related to inequality or welfare, as there was a general consensus that the dynamics of macroeconomic fluctuations could be adequately explained using the representative agent New Keynesian (RANK) model. However, over the past decade, the importance of the interrelationship between the heterogeneity of economic agents and economic fluctuations has grown and its influence has spread. In other words, the heterogeneity of economic agents affects economic fluctuations and vice versa (Alves et al (2022)).

2 Following the GFC, central banks in major economies maintained accommodative monetary policies for a considerable time, raising concerns about widening asset inequality. Furthermore, as the Covid-19 shock, which was a health crisis, disproportionately affected low-income households with weak employment stability and the face-to-face services sector, there has been an increase in attention to the heterogeneity in the economy.

3 In the absence of borrowing constraints, households adjust their savings and borrowing in response to interest rate changes to smooth consumption between the present and the future (intertemporal substitution). Therefore, monetary policy effects are mainly transmitted to consumption through an intertemporal substitution in RANK models without borrowing constraints. In contrast, HANK models, which account for households with borrowing constraints (often referred to as hand-to-mouth households), show that monetary policy affects consumption primarily through indirect channels, such as changes in household income due to interest rate fluctuations, rather than through intertemporal substitution effects (Kaplan et al (2018)).

4 For firms with high default risk, even if overall financial conditions ease, for example due to interest rate cuts, their borrowing costs do not decrease significantly. Consequently, their investment sensitivity to changes in monetary policy is relatively lower than that of firms with low default risk (Ottonello and Winberry (2020)).

5 While opinions on whether monetary policy affects asset and income inequality differ from study to study, overall they tend to fall into three categories: (1) rising asset prices stemming from accommodative monetary policy may widen asset inequality; (2) monetary policy easing could alleviate income inequality by improving employment; and (3) monetary policy could temporarily affect inequality, but has neutral impacts in the long term (McKay and Wolf (2023)).

In Korea, there is a growing concern about how to incorporate the heterogeneity of economic agents into monetary policy operation. Rapid population ageing, high household debt levels and the realignment of global trade structures have acted to increase the heterogeneity in households and firms. These changes could affect the transmission channels of monetary policy and even policy effectiveness by altering the behaviours of consumption, savings, labour supply and investment.

In this paper, we first assess the major features of heterogeneity in households and firms that are considered in the conduct of monetary policy. Then, we detail the ways in which heterogeneity is considered in actual policy operation and central bank loan policy. Finally, we conclude with recommendations to further improve the use of heterogeneity for conducting monetary policy.

2. Heterogeneity in households and firms in Korea

The Bank of Korea (BOK) is focusing on the heterogeneity in economic agents, as it could significantly influence monetary policy transmission channels and overall effectiveness of policy. For households, key aspects of heterogeneity include a rapidly ageing population and substantial household debt levels, which affect consumption and saving behaviour. For firms, persistent disparities exist between the manufacturing and service sectors, large corporations and small and medium-sized enterprises (SMEs), and domestic demand-oriented and export-oriented firms, reflecting Korea's manufacturing- and export-driven growth structures.

2.1 Household heterogeneity

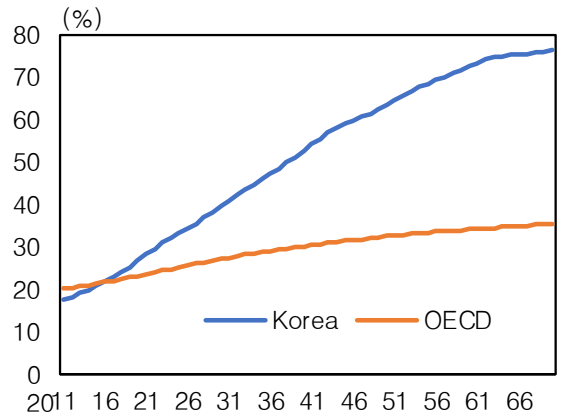
Starting with household heterogeneity, Korea is one of the fastest-ageing countries in the world, and the increasing share of elderly people is likely to influence monetary policy transmission. From a theoretical perspective, the impact of population ageing on household consumption and assets varies depending on whether the ageing process is in its early stages or has reached maturity. Ageing can also exert both upward and downward pressure on the neutral interest rate, indicating that its effects on monetary policy effectiveness are not obvious.[6] However, recent empirical studies[7]

[6] Population ageing influences the effectiveness of monetary policy through channels such as changes in the neutral interest rate and shifts in household consumption and asset holdings. A decline in the neutral interest rate reduces the scope for monetary policy, thereby diminishing its effectiveness. Population ageing simultaneously contracts aggregate supply (by reducing labour supply and undermining productivity) and expands aggregate demand (due to increased consumption by the elderly and a decline in their savings, in line with the life-cycle income hypothesis). As a result, ageing exerts both upward and downward pressure on the neutral interest rate. However, as population ageing progresses, aggregate demand may eventually decline due to rising precautionary savings, as individuals seek to secure their living standards post-retirement. During this period, ageing may exert downward pressure on the neutral interest rate. In terms of household consumption and asset holdings, the sensitivity of consumption to interest rates may increase in the early stages of ageing, as individuals accumulate assets in preparation for retirement. Once the ageing process matures, however, consumption begins to exceed savings and asset holdings decline, reducing the sensitivity of household consumption to interest rate changes (Yim et al (2022)).

[7] Lee (2024) finds that the interest rate sensitivity of consumption decreases as household age increases. This is attributed to elderly individuals' higher reliance on service consumption, which

suggest that in Korea, the rising proportion of elderly households is tending to reduce the sensitivity of consumption to interest rates, thereby limiting the effectiveness of monetary policy.

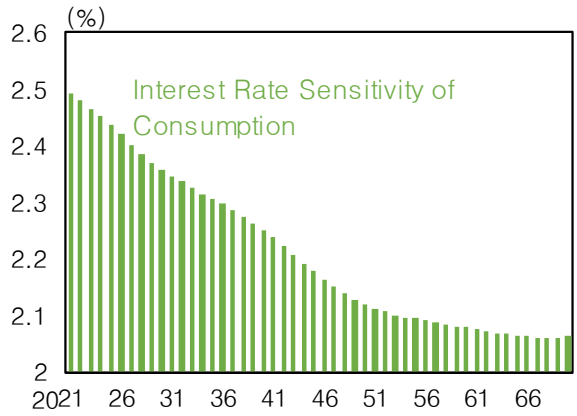
Figure 1: Share of the elderly population (aged 60 and above)[1]



[1] Figures for Korea are based on Statistics Korea's future population projections, and figures for OECD countries on UN estimates.

Sources: United Nations; Statistics Korea.

Figure 2: Interest rate sensitivity of consumption[1]



[1] The percentage of consumption decreases due to a 1%p increase in interest rates under the population structure of each year.

Source: Lee (2024).

In addition, household debt has risen significantly across the economy, and the increasing proportion of heavily indebted households – those with large debt burdens relative to income – has become a critical concern, particularly regarding its impact on monetary policy transmission channels. Generally, higher household debt amplifies changes in debt repayment burdens caused by interest rate fluctuations, thereby enhancing the impact of monetary policy on consumption through the cash flow channel. In Korea, where the household debt-to-income ratio is high and a substantial share of household debt has historically been in floating rate loans,[8] the transmission of monetary policy to the real economy has been relatively rapid during the post-Covid-19 period of interest rate hikes.

However, household debt levels are now estimated[9] to have exceeded the threshold at which they restrict consumption, and the proportion of heavily indebted households has continued to grow. As a result, during future interest rate reductions, the traditional channel of "rate cut → loan expansion → consumption growth" may

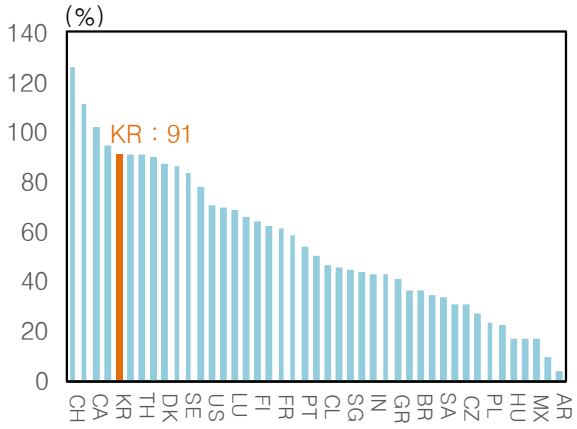
makes it more challenging to adjust intertemporal consumption in response to interest rate fluctuations. Additionally, their substantial net financial asset holdings may lead to an increase (or decrease) in their consumption capacity during periods of interest rate cuts (or hikes). Similarly, Lee (2023) finds that consumption among younger households, particularly those aged 30 and under, is more sensitive to interest rate changes compared to other age groups.

[8] The proportion of floating rate loans in Korea's total household loans (based on outstanding amounts) peaked at 72.5% in July 2022. Since then, driven by policy efforts to improve the structure of household loans, it has steadily declined and reached 54.5% as of October 2024.

[9] As of Q2 2024, Korea's household debt-to-GDP ratio stands at 91%, exceeding the growth-constraining threshold of approximately 80% estimated in major studies such as Cecchetti et al (2011) and Lombardi et al (2017).

be restricted due to borrowing constraints[10] and household debt repayment burdens. Nevertheless, the overall change in the effectiveness of rate cuts in the context of rising household debt should be evaluated comprehensively, taking into account the potentially strengthened effects of the cash flow channel.

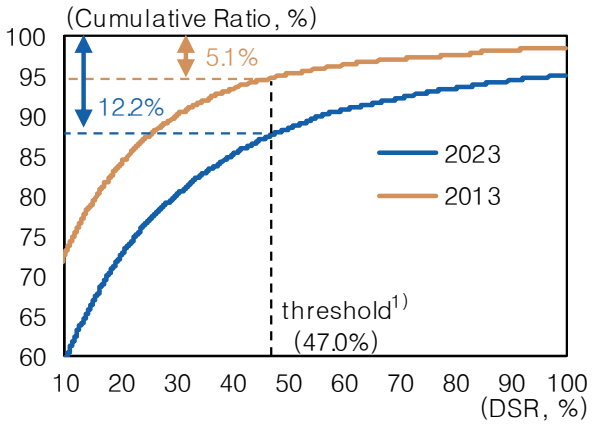
Figure 3: Household debt-to-GDP ratios[1,2]



[1] As of Q2 2024. [2] Calculated using BIS "Credit to the non-financial sector" statistics for 43 countries.

Source: BIS.

Figure 4: Share of households by DSR level



[1] The consumption-constraining DSR was estimated using panel micro data from the Survey of Household Finances and Living Conditions, covering the years 2013 to 2023.

Sources: Bank of Korea estimates; Statistics Korea.

2.2 Firm heterogeneity

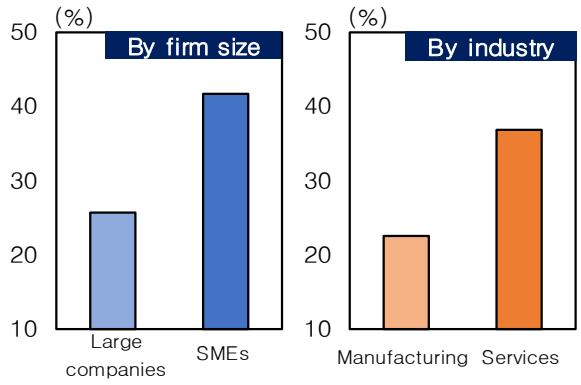
In the case of firms, differences between manufacturing and non-manufacturing companies, large enterprises and SMEs, and domestic demand-oriented and export-oriented firms have persisted, due to a growth structure centred on manufacturing, large corporations and exports. Service industries, SMEs and domestic demand-oriented firms are directly influenced by changes in the domestic economy and have a high dependence on indirect financing, such as bank loans. As a result, they are more sensitive to domestic economic conditions and interest rate changes compared to manufacturing, large enterprises and export-oriented firms. Empirical analysis shows that the impact of monetary policy changes on investment, profitability and financing costs is larger for SMEs than for large corporations. An analysis using recent regional data shows that the impact of monetary policy is greater in regions with a higher share of non-manufacturing, domestic demand-oriented and small companies.[11]

[10] With the overall level of household debt relative to income elevated and stricter debt service ratio (DSR) regulations in effect compared to the past, the proportion of households facing borrowing constraints may increase even if interest rates are lowered.

[11] Kim (2022), Baak and Ryuk (2018) and Park and Lee (2017) all consistently found that the impact of monetary policy on investment, profitability and financing costs is greater for SMEs compared to large corporations. According to Joo et al (2024), an analysis of regional panel data in Korea found

In addition, foreign investment by domestic companies has been expanding due to reshoring in major advanced economies. If this trend continues, the impact of monetary policy on domestic investment could become more limited.

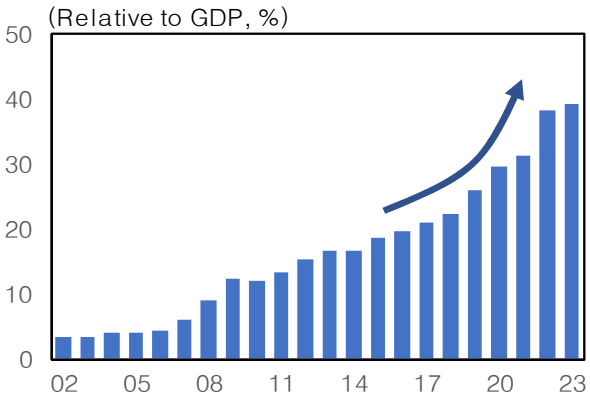
Figure 5: Total borrowings and bonds payable to total assets ratio by firm characteristics[1]



[1] As of 2023.

Source: Bank of Korea.

Figure 6: Trends in foreign direct investment



Source: Bank of Korea.

2.3 Limitations in considering heterogeneity in monetary policy transmission analysis

The heterogeneity of households and firms discussed earlier is an important issue in analysing the transmission effects of monetary policy. However, the BOK mainly uses a representative agent New Keynesian (RANK) model, which assumes homogeneous economic agents, to analyse the average effects on the overall economy when forecasting the economy and analysing policy impacts for monetary policy decisions. The reason for this is that, while micro data at the household and firm level are continuously expanding, long frequency, time lags and short time series of the data still pose limitations[12] for their use in analyses supporting monetary policy decisions. Furthermore, experience and confidence in the HANK model have not yet been sufficiently accumulated.

The BOK has developed and is supplementarily utilising the two agent New Keynesian (TANK) model,[13] which partially incorporates household heterogeneity into

that the growth impact of monetary policy shocks is larger in regions with a higher proportion of non-manufacturing industries, domestic demand-oriented firms and SMEs.

12 Statistics Korea has been providing micro data compiled by itself and various statistical compilation organisations since 2015, but the compilation interval, the length of time series, and other characteristics vary significantly by data, and the time lag between compilation and release can be as long as two years or so.

13 Bae et al (2018) constructed a TANK model in a BOK-DSGE model that divides households into general households and hand-to-mouth households, and individual researchers have been

the BOK-DSGE model. When necessary, we also utilise models that analyse economic conditions and the effects of monetary policy transmission by sector to provide further reference for monetary policy implementation.

3. Consideration of heterogeneity in monetary policy operations

In its monetary policy decisions, including policy interest rate adjustments, the BOK does not explicitly consider the heterogeneity of agents, especially in terms of sectoral income inequality and business cycle divergences. As monetary policy primarily aims to achieve macroeconomic stability, focusing on price and financial stability, and is not designed to directly address sectoral imbalances, the BOK focuses on overall economic trends in inflation and growth as captured by aggregate indicators for its monetary policy decisions. Furthermore, given that economic inequality is a long-term structural issue, and monetary policy has limitations in dealing with it, the BOK remains sceptical about directly addressing inequality within its policy framework.

As discussed earlier, however, the heterogeneous characteristics of economic agents have implications for monetary policy transmission and the macroeconomy, and thus need to be considered in economic assessments and analyses of policy effects. The BOK could also contribute to narrowing sectoral gaps and reducing inequality by effectively achieving its mandate of price and financial stability.

Post-pandemic monetary policy operations show that the BOK focused primarily on the overall economic conditions of growth, inflation and financial stability in its monetary policy decisions, despite sectoral differences in business cycles. It began raising the Base Rate in August 2021, earlier than other major economies, as the domestic economy and prices recovered due to its aggressive monetary policy accommodation after Covid-19.

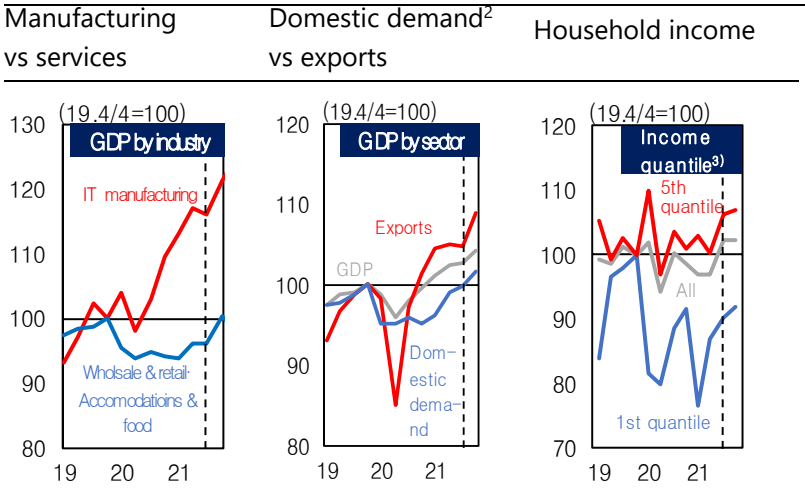
At the time, the pace of recovery was different across sectors. Exports, manufacturing and large corporations had already shown a rapid recovery, reaching pre-pandemic levels by the second half of 2020, driven by the increased demand for IT products during the pandemic. In contrast, low-income households, domestic demand, the service sector and SMEs were recovering at a slower pace. The BOK concluded[14] that aligning monetary policy with the overall momentum of recovery and normalising the low interest rate environment was necessary to achieve price and financial stability, in light of the broader economic trends of growth and inflation as well as concerns about financial stability, such as household debt. This pre-emptive

developing and utilising HANK models for purposes such as analysing the inequality effects of monetary policy.

[14] In mid-2021, inflation was not a significant concern, with core inflation remaining in the lower 1% range. However, the BOK deemed it appropriate to begin normalising the exceptionally accommodative monetary policy stance, due to clear signs of economic recovery and the rapid rise in housing prices and household debt under the ultra-low interest rate environment. Housing prices (based on actual transaction prices of apartments) rose by 14.5% in 2020 and 16.3% in 2021, while household debt increased by 6.6% and 5.9% relative to GDP during the same periods (Rhee and Park (2024)).

rate hike allowed the BOK to take a more gradual approach to raising interest rates[15] during the subsequent high-inflation period compared to other major economies.

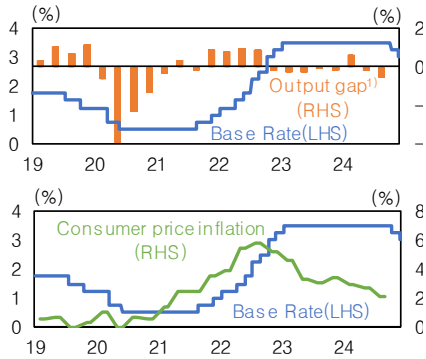
Figure 7: Sectoral differences in recovery pace at the time of most recent rate hike cycle[1]



[1] Dotted lines indicate the timing of the Base Rate hike (Q3 2021).
[2] Domestic demand is defined as consumption and investment in GDP. [3] Household income excluding transfer income in each quantile.

Source: Bank of Korea.

Figure 8: Bank of Korea Base Rate



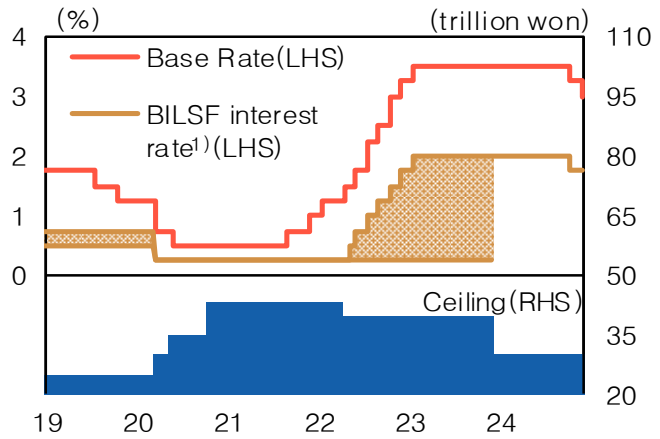
[1] Estimated using HP filter (Q1 2000–Q3 2024).

Sources: Bank of Korea; Statistics Korea.

However, some economic agents frequently argue that differences in the pace of recovery across sectors should be considered when the BOK conducts its monetary policy. In response, the BOK is striving to enhance policy acceptance through active communication about the decision-making process and objectives. For instance, during the process of raising interest rates to tame high inflation, it actively communicated through press conferences that interest rate hikes were unavoidable, as persistent inflation could disproportionately affect the vulnerable, including low-income households.

15 In its response to post-pandemic inflationary pressures, the BOK raised the Base Rate by a total of 300 basis points, from 0.5% to 3.5%, between August 2021 and January 2023.

Figure 9: Ceiling and interest rates of the BILSF



[1] The shaded area represents the upper and lower bounds of the range where loan interest rates were different or each programme.

Source: Bank of Korea.

Furthermore, unlike other major central banks, the BOK has the Bank Intermediated Lending Support Facility (BILSF), a selective lending policy instrument. The BOK uses the BILSF as one of its policy instruments to partially address heterogeneity among economic agents. As the programme was originally designed to support SMEs with limited access to financing by providing low-interest loans, its funding size and interest rates are adjusted primarily in line with the monetary policy stance. However, since the facility can also target specific sectors, it is used as a tool for supporting areas that need financial assistance. Looking at the recent application of this programme, during the period of monetary easing right after Covid-19 the BOK significantly expanded the total amount and the target of loans and cut interest rates to reinforce the stance of monetary easing. After the pandemic, although the BOK reduced the loan volume in alignment with monetary tightening and raised interest rates over the course of interest rate normalisation, it maintained lending support for a considerable period to help ease the burden on those businesses that had experienced relatively greater difficulties as a result of the rate hikes.[16]

[16] The BOK reduced the total ceiling of the BILSF, which had been significantly raised during the Covid-19 period. However, in January 2024, the BOK decided to implement the Temporary Special Support Program for SMEs to help alleviate the difficulties they were facing due to prolonged high interest rates. The programme is scheduled to run until July 2025.

Programmes under the BILSF

In trillions of won

Table 1

Programme		Feb 2020	Mar 2020	May 2020	Oct 2020	Dec 2023	Apr 2024
Support for trade financing		2.5	2.5	2.5	2.5	1.5	1.5
Support programme for new growth engine development and job creation		10.0	11.0	11.0	13.0	13.0	13.0
Programme for stabilisation for SME lending		6.5	5.5	5.5	5.5	0.3	0.3
Support for regional SMEs		5.9	5.9	5.9	5.9	5.9	5.9
Ceiling reserves	Support programme for SMEs affected by Covid-19	-	5.0	10.0	13.0	-	-
	Support programme for small businesses	-	-	-	3.0	-	-
	Temporary special support programme for SMEs	-	-	-	-	-	9.01
	Special support programme for emergency disaster relief	0.1	0.1	0.1	0.1	0.3	0.3
	Temporary ceiling reserves	-	-	-	-	9.0	-
Totals		25.0	30.0	35.0	43.0	30.0	30.0

[1] The ceiling for the programme was allocated in April 2024, following the decision made in January 2024.

Source: Bank of Korea.

4. Future tasks

As the heterogeneity in economic agents in the Korean economy is expected to become more important in the future due to demographic changes and the reorganisation of global trade and industry, it is necessary to strengthen efforts, such as improving models, to account for heterogeneity in the analysis of monetary policy transmission. Since data constraints will gradually ease as time series data

accumulate, the development of heterogeneous economic agent models, which is currently being done by individual researchers, should be more systemised. Furthermore, if income and asset parities between sectors in the economy widen in the future, the demand for considering heterogeneity in monetary policy operations may increase. Therefore, it will be necessary to continue contemplating how to use monetary policy and other macroeconomic policies to address these concerns.

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