How can central banks take account of differences across households and firms for monetary policy?

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Abstract

This paper explores how differences among households and firms influence monetary policy. It draws on a novel survey about the role of these differences in the decision-making process of emerging market central banks. Cross-sectional data enhance policymakers' understanding of economic conditions as well as of monetary policy transmission given that different economic agents respond differently to policy actions. For households, factors like debt, income and wealth are key. For firms, size, leverage, sector and especially export-orientation are crucial. Cross sectional data about households and firms also shed light on the distributional effects of monetary policy. However, these effects are less important than the aggregate effects of monetary policy and thus central banks do not consider them when making policy decisions.

JEL classification: E52, E58, E2, C53, C8.

Keywords: cross-sectional differences, heterogeneity, monetary policy, central banking, household inequality, between-firm inequality, informality, distributional effects, granular data, surveys, central bank communication.

1. Introduction

Central banks have given increasing attention to the implications of cross-sectional differences across households and firms for the conduct of monetary policy. For example, starting in 2010, a rising proportion of central banks' speeches referred to such cross-sectional differences (Graph 1.A). One potential reason for this rising attention is that the transmission of monetary policy depends on such cross-sectional differences. The Covid-19 pandemic was a vivid reminder that households' and firms' exposure to shocks is not uniform. Such developments raised questions about whether monetary policy responses should take account of cross-sectional differences. In addition, improvements in the availability of granular data to analyse cross-sectional differences, as well methods to analyse such data, have facilitated central banks' interest. Research showing that differences across households and firms matter for monetary policy have also stimulated the interest of central banks.

[1] The views expressed in this paper are those of the authors and not necessarily those of the BIS. We thank Eduardo Amaral, Kevin Cheng, Gaston Gelos, Yi Huang, Benoit Mojon, Ilhyock Shim, Hyun Song Shin, Frank Smets, Christian Upper, Alexandre Tombini, James Yetman and Tao Zhang for useful comments. We are also thankful to Christina Manea for providing analytical inputs and to Berenice Martinez and Cecilia Franco for outstanding research assistance.

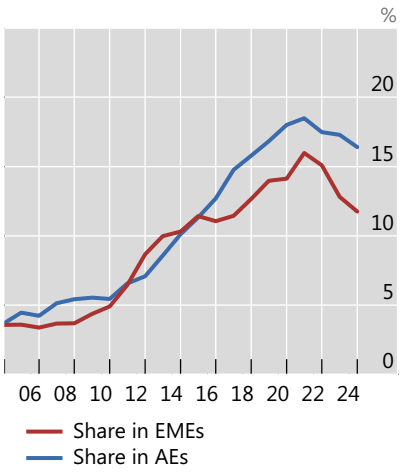
Motivated by this rising attention, this paper analyses three questions: the extent to which differences across households and firms matter for monetary policy, why they matter and how central banks can adjust their monetary policy approaches in response. The paper builds on a survey completed by central banks in 22 emerging market economies (EMEs) as well as papers contributed by these central banks explaining how they have taken cross-sectional differences into account in their monetary policy decisions.[2] These central bank inputs are combined with theoretical and empirical results from the rapidly expanding literature on the topic.

To maintain focus, this paper concentrates on households and non-financial firms. While central banks are also interested in differences across financial institutions, they have historically given less attention to differences across households and firms.

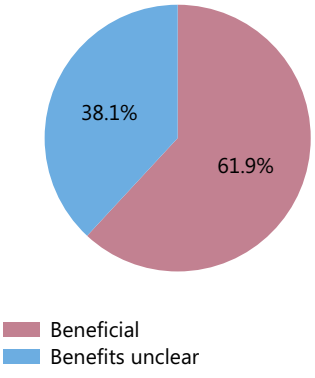
Further, the paper focuses on EMEs, even though the topic is of interest to central banks in all economies. In part, this focus is because the topic is particularly relevant for EMEs, where certain cross-sectional differences tend to be more pronounced than in advanced economies (AEs). For instance, financial inclusion tends to be lower in EMEs (Findex (2021)). In addition, income inequality is very high in some EMEs (Chancel and Piketty (2019)), and financing gaps between small enterprises and large corporates also tend to be larger in EMEs (Bruhn et al (2017)). Moreover, some EMEs have large informal sectors, resulting in a dual economy de facto.

Central bank interest in differences across households and firms is rising — Graph 1

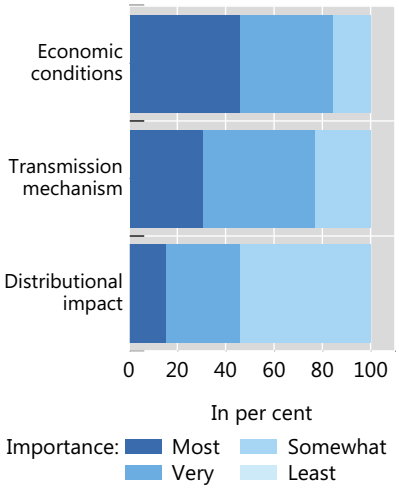
A. Speeches show rising interest in cross-sectional differences[1]



B. Is considering cross-sectional differences beneficial for monetary policy?



C. What are the most important areas where cross-sectional differences improve understanding?



[1] Speeches that contain the keywords: heterogeneity, heterogeneous, inequality, granular, HANK, distributional impact(s), distributional concern(s), distributional consequences or distributional consideration(s). Data across 30 AEs and 30 EMEs.

Sources: Central bank speeches; BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

[2] The survey questionnaire and the contributed papers were published together with this paper, in a *BIS Papers* volume on the BIS website (www.bis.org/bispapers/index.htm).

A key finding from the survey is that a majority of EME central banks deem it beneficial to consider household and firm differences when making monetary policy decisions (Graph 1.B). There are three areas in which data on cross-sectional differences can help to improve policymaking at central banks.

The most important use of information on these differences is to understand current economic conditions and how they might evolve (Graph 1.C). Any inputs that contribute to a more complete understanding of the pulse and outlook of the economy are helpful for forward-looking monetary policy decisions (eg the distribution of incomes and wealth matters for consumption growth and thus overall growth and inflation). Accounting for cross-sectional differences has also been found to improve the identification of vulnerabilities or financial stability risks that may, in turn, constrain monetary policy (eg a larger share of highly indebted households may justify more measured rate hikes).

The second benefit of cross-sectional information is that it can improve the understanding of monetary policy transmission. Different economic agents might react differently to the same monetary policy action depending on their circumstances (eg high or low levels of household debt). Understanding differences in these characteristics and the attendant reactions can help improve decision-making at central banks. In the case of households, central banks reported that the most relevant characteristics for monetary transmission include the level and type of debt, the level and source of income, and the level and liquidity of assets. The share of so-called hand-to-mouth households (those that hold little liquid wealth and largely consume their current income) matters in particular. In the case of firms, the most relevant characteristics are sector, size, currency exposure, the level and composition of debt, and export orientation. Monetary policy has a stronger impact on small, domestically oriented firms that tend to rely on domestic funding as compared to export-oriented or foreign-owned firms with access to diversified funding sources. In the case of both households and firms, informality further weakens transmission.

A third use for cross-sectional information – albeit a use that central banks deem less important in policy deliberations – is to understand the distributional consequences of monetary policy. While monetary policy can have distributional effects, central banks consider these effects to be less important than aggregate effects. When setting monetary policy, central banks focus on aggregate outcomes. Monetary policy is a blunt tool that is not well suited for influencing distributions in the population. Fiscal instruments are more easily targeted and thus more appropriate for this purpose. Moreover, vulnerable segments of society are best served when monetary policy focuses on the price stability mandate.

That said, central banks cannot ignore cross-sectional differences either. In part, this is because cross-sectional differences matter for policy transmission. Many EME central banks take complementary measures to mitigate certain cross-sectional disparities. For instance, financial inclusion and literacy programmes can improve transmission to households. Targeted lending programmes can help improve transmission to small, credit constrained firms. And macroprudential tools (eg sectoral stress tests or loan-to-value ratios) can help manage pockets of vulnerabilities that pose policy trade-offs. Furthermore, distributional effects might require adjustments to central bank communications (eg explaining to the public why

some distributional effects might be unavoidable when monetary policy is focused on meeting its primary objective of price stability).

While considering household and firm differences can help improve monetary policy, central banks face challenges on several fronts when incorporating these considerations into their decision-making processes.

For one, there are conceptual challenges. The value added of cross-sectional differences in monetary policy analysis can be state-dependent (eg more relevant in a crisis). Relatedly, knowing which specific cross-sectional differences are more relevant is not always obvious, and can vary across jurisdictions.

Then there are practical challenges. While granular data such as survey data are increasingly available – in part due to digitalisation – the potential for bias, lack of timeliness and privacy concerns can impede usage. Another issue is that the informal sector – which is large in some economies – is often underrepresented in surveys and administrative data. And while incorporating cross-sectional differences into existing empirical analyses and models can help extract more value from granular data, this can be technically complex. Some central banks, for instance, cited insufficient experience and confidence in such models.

Finally, there are communications-related challenges. Given the risks related to misinterpretation, most central banks rarely communicate about the interplay between cross-sectional differences and monetary policy, unless the situation clearly calls for it.

The rest of this paper is organised as follows. Section 2 reviews how considering cross-sectional differences can help improve economic monitoring and forecasting. Sections 3 and 4 discuss how monetary policy transmission is affected by differences across households and firms, respectively. Section 5 studies the distributional effects of monetary policy. Section 6 discusses the ultimate policy implications and communications challenges. Two boxes review, respectively, the challenges of using granular data and quantitative models that feature multiple types of agents.

2. Cross-sectional differences shed light on economic conditions

Central banks rely, in the first instance, on aggregate series for analysing and forecasting economic conditions. Only one fifth of EME central banks reported that information on cross-sectional differences is as important as aggregate series (Graph 2.A); an overwhelming majority attached greater importance to aggregate series. That said, central banks expect their use of cross-sectional data to increase over the next decade (Graph 2.B). The focus in this paper is on how cross-sectional information can provide additional insights on monetary policy matters.

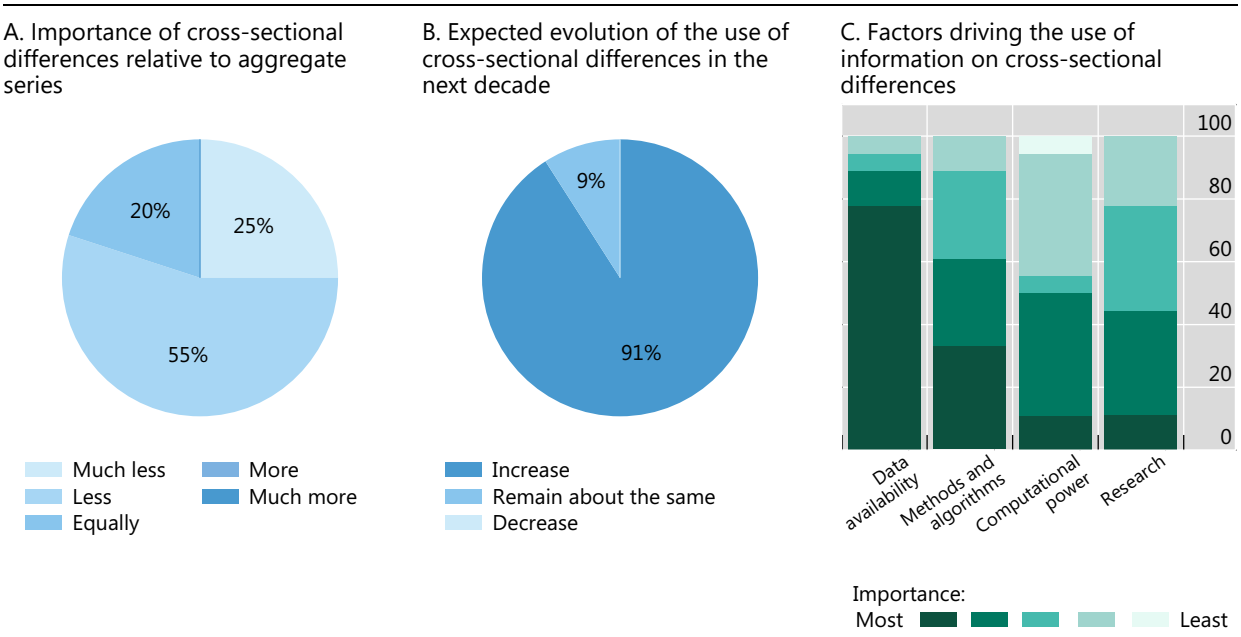
Several factors are motivating central banks' greater use of cross-sectional information in monetary policy analysis (Graph 2.C). For one, the digital revolution has improved the availability of granular data. For central banks, the most prominent sources of granular data are surveys, followed by administrative records and market data (Annex B). While surveys are less timely than alternative sources (such as

payments data or unaudited financial statements), they are more comprehensive and less noisy (Box A).

In addition, methods to process granular data have improved. To be sure, central banks have always used granular data to estimate aggregate statistics such as headline inflation and GDP. That said, advanced model solution and estimation methods have boosted the use of cross-sectional information – obtained from granular data – in economic analysis. Relatedly, more and cheaper computational power is available. A facilitator is cloud services that reduce the need for institutions to setup computational facilities themselves. A final factor motivating central banks' greater use of cross-sectional data is emerging research showing that differences across households and firms can be important for monetary policy.

Use of cross-sectional differences among EME central banks

Percentage of responses from EME central banks — Graph 2



Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

Information on cross-sectional differences can shed light on the current state of the economy and where it might be headed. Many EME central banks view this as the area in which such data add the most value (Graph 1.C). The Bank of Thailand noted that accounting for cross-sectional differences can make economic assessments more "inclusive, comprehensive and representative of the entire economy".

First, cross-sectional differences can help explain the drivers of past and current inflation and growth dynamics. For example, looking beyond aggregates can help identify the conditions under which relative price changes can morph into broader-based inflation due to unhinged expectations and wage-price spirals. This can help better understand the evolution of inflation, especially during periods of high inflation, such as in 2022 (BIS (2022)). Another application of cross-sectional information comes from Chile, where data on firm-level differences has been used to estimate sectoral output gaps. The gap was negative in goods-related sectors and

close to zero in services-related sectors in 2023, which helped explain the greater moderation in inflation in goods than in services. Relatedly, household payments data as well as firm-level data (eg aspects such as size, location and sector) can improve the real-time tracking of economic activity (eg Beck et al (2024), Chetty et al (2024)).

A second, more nascent use of information on cross-sectional differences is that it can sharpen understanding of the macroeconomic outlook, including projections. For instance, measures of disagreement – eg variance or skewness – in households' inflation expectations or perception can help improve the prediction of inflation, especially during periods of high inflation.[3] Likewise, the distribution of income can inform the outlook for consumption demand because rich and poor households face different unemployment risks, financial constraints, and marginal propensities to consume (eg Pereira da Silva et al (2022) and the paper contributed by the central bank of Malaysia). This underpins the variation in their consumption behaviours, which matters for aggregate consumption. Similarly, a higher share of heavily indebted households can dampen consumption demand (eg Lombardi et al (2017), Mian et al (2021)). In particular, the share of "zombie households" ie those subject to very high debt service burdens, can matter for consumption growth and thus help predict overall growth (eg Lee and Shim (2025)). Likewise, the share of "zombie firms" can help to improve understanding of the supply-side outlook.

Some central banks have incorporated these insights into their monetary policy analysis.[4] For example, motivated by the experience of the Great Financial Crisis and the empirical relevance of precautionary motives, the Hungarian central bank incorporated household leverage constraints in its main forecasting model. The Reserve Bank of India includes differences in wages across business sectors and varying cost conditions across firms in its projection models. Tellingly, the Czech National Bank compared inflation projections from two models – a standard New-Keynesian model and a two-agent New-Keynesian model. The difference in the inflation projections of these models can be as large as five percentage points, suggesting potentially very different implications for monetary policy. In Chile, the amended two-agent model has better inflation and growth forecasting capabilities than the representative model. It is also able to better explain past patterns (eg consumption during the Covid-19 pandemic). That said, there are a few studies that question the value added of data on cross-sectional differences for forecasting. For instance, models that incorporate differences across households to forecast consumption demand or inflation have been shown to be no more (or even less) accurate than representative household models.[5]

[3] This observation is made by several central banks (eg Peru) and is also supported in the literature (eg Reis (2022), Brandão-Marques et al (2023)).

[4] Typical forecasting models used by central banks include local projections (Jordà (2005)) and vector autoregressions. Cross-sectional differences can typically be incorporated in these models by including higher-order moments of the relevant distribution as endogenous, control or conditioning variables. Another approach is to use machine learning (ML) techniques that are more amenable to granular data. Indeed, incorporating ML has been shown to help improve the accuracy of growth and inflation forecasts (eg see the paper contributed by Bank Indonesia).

[5] See, for instance, Acharya et al (2023) who compare a standard New Keynesian model with a heterogeneous agent New Keynesian (HANK) model. Relatedly, Angeletos et al (2024) find that a benchmark HANK model with sufficiently slow fiscal adjustment predicts just as much inflation as the representative agent model. There may be an adverse selection problem in the literature too as non-

A third use of cross-sectional information is to identify financial vulnerabilities that may constrain monetary policy decisions. For instance, a higher share of heavily indebted households or firms might – from a financial stability perspective – inhibit the central bank from raising rates or keeping them high (which might otherwise be justified from a price stability perspective). Such considerations have recently featured in monetary policy deliberations in Thailand and Korea, among others. More generally, granular data can help understand correlations and concentrations of risk exposures across firms, and thus help identify potential systemic risks.

Box A

Challenges associated with using granular data

Despite the benefits, there are impediments and risks that limit the use of cross-sectional information in monetary policy analysis.

One is the absence or incompleteness of the data needed for monetary policy analysis. A related shortcoming is time series that are insufficiently long to draw time-tested insights. Such shortcomings can stem from the cost of carrying out surveys or the absence of institutional arrangements to collect such data regularly (eg a credit register). In some cases, legal hurdles can be prohibitive. For instance, administrative data collected by the tax authorities might not be available to the central bank. Even proprietary data (ie data collected by a firm in its course of business) might not be freely shareable with the central bank because of contractual requirements.①

A related issue is biased data. For example, online surveys exclude respondents who lack digital access or digital literacy. Digital surveys might also overrepresent certain population groups, such as those who are online more frequently (eg the young). Using such data without acknowledging bias and correcting for it can result in misleading conclusions.

Noise or measurement errors are another concern, which can create disincentives to use such data. This is more common in survey data (Brault et al (2024)). Even proprietary data (such as scanner transactions at supermarkets) can be prone to this issue due to limited quality control compared with official data sources (such as inflation statistics).

Timeliness can also be an issue. Monetary policy decisions are due every couple of months and require frequent and timely assessments of the economic situation. However, surveys and administrative data releases – two key sources of granular data for monetary analysis – are typically subject to lags due to the time needed to conduct compilation and/or accuracy checks.

Granular data often contain detailed information about individuals or entities, which can also lead to privacy-related constraints. For instance, there is a risk of re-identification even if survey data are anonymised, such as by combining auxiliary data sources using advanced technologies. This risk can induce survey respondents to curtail information or limit data-sharing rights.

① The central bank of the Philippines aims to narrow existing data gaps by operationalising its ability under the law to require any data from any person or entity – including government-related ones – for statistical and policy development purposes.

results – ie studies showing that cross-sectional information does not improve projections – tend to get published less often.

3. Monetary policy transmission and the impact of differences across households

Another key use of data on cross-sectional differences is to improve understanding of the transmission of monetary policy. This section focuses on how transmission channels are impacted by household heterogeneity. The subsequent section focuses on how they are impacted by firm heterogeneity.

Monetary policy impacts households through several transmission channels. First, it affects how households allocate consumption across time. That is, it affects consumption, saving and borrowing plans. We refer to this as the savings-investment channel. It can also affect their cost of servicing already existing debt (the cash flow channel) and the supply of credit that is available to households (the bank lending channel). Further, it impacts the value of their housing, bond, equity or foreign asset holdings (the balance sheet channel).[6] In smaller economies, or economies where foreign currency plays a large role – eg due to dollarisation or euroisation – monetary policy can also impact households' finances through the exchange rate. Last but not least, expectations about the future evolution of the economy and, in particular, inflation constitute a key mechanism through which it impacts behaviour (the expectations channel).[7]

The relative importance of the above-mentioned channels for households varies across countries owing to differences in income level and distribution, market characteristics, as well as monetary histories and frameworks. Among the central banks surveyed, Asian EMEs deem the savings-investment and the bank lending channels to be the most important monetary transmission channels for households (Graph 3.A). By contrast, central banks in Latin America and elsewhere point to the exchange rate as being the most important channel. This could partly be a legacy of past high-inflation episodes, when the exchange rate played a dominant role.

Cross-sectional variation in household-specific factors influence how each of the above-mentioned channels operate. This is because each household is exposed differently to the various transmission channels. Accordingly, the average of the policy impact across households might not be the same as the policy impact on the average (or representative) household. In such cases, the power of monetary policy might hinge not only on the average of a given factor in the economy, but also on its cross-sectional distribution across households.[8]

[6] Relatedly, it may also affect the appetite for taking on risk (the risk-taking channel). This channel is explained in greater detail in Adrian and Shin (2010), Borio and Zhu (2012) and Bruno and Shin (2015).

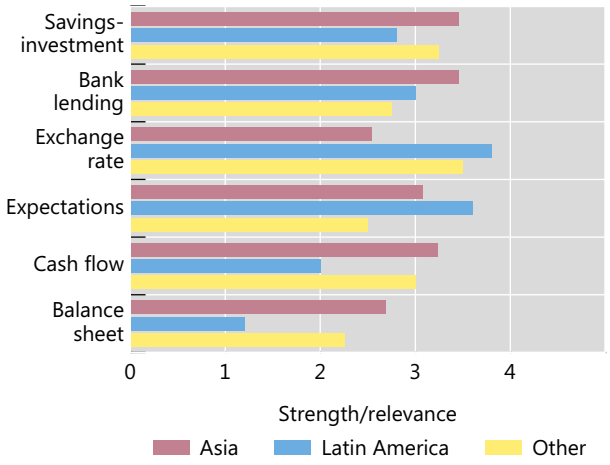
[7] A related channel is the sentiment channel. For instance, lower interest rates and increased liquidity can spur optimism among households and firms.

[8] Graph A1 in Annex A illustrates cross-sectional variation in selected household characteristics.

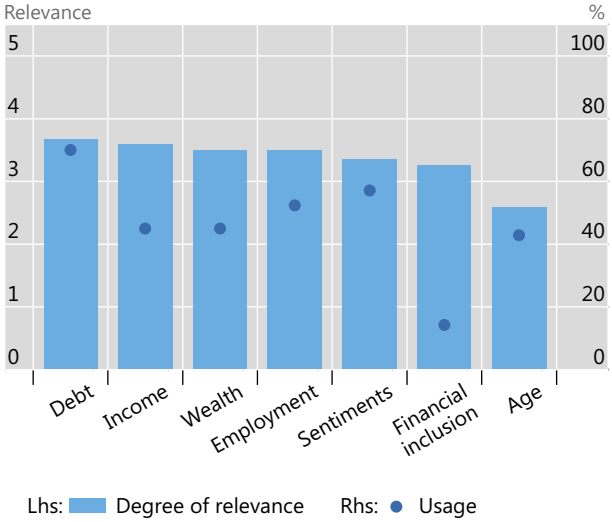
Household characteristics and monetary policy transmission[1]

Graph 3

A. Relative strength of transmission channels for households



B. Cross-sectional differences in the following household characteristics matter for monetary transmission



[1] Based on central bank responses on a scale of zero to five, with zero indicating not relevant and five indicating strong relevance. The graphs show the average across economies.

Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

Take for instance household debt. Transmission is typically more powerful when households are more indebted and their debts have adjustable rates. This is because, for such households, interest rate changes have a direct and larger impact on their disposable incomes – ie the cash flow channel becomes more prominent.[9] Yet, the effects of debt on transmission may not be linear. The response of a localised cohort of very highly indebted households to policy rate changes might be disproportionally strong, driving variation in the aggregates.[10] However, it might also be the case that highly indebted households are less stimulated by rate cuts if their balance sheets remain fragile (Mian et al (2021)). In either case, tracking the distribution of debt across households – and not only the average – is crucial. Currently, 70% of surveyed EME central banks report using information on household debt in their background analysis for monetary policy decisions (Graph 3.B).

Monetary policy's effectiveness might be reduced in countries where households hold substantial debt that is either denominated in or indexed to a foreign currency. This is because the currency depreciation that would normally be associated with a monetary easing could reduce rather than increase the spending power of households, as the nominal value of their debt effectively increases. More generally, debt can also affect how the bank lending channel of monetary policy plays out. High initial indebtedness might diminish policy effectiveness due to debt overhang, eg if

[9] For instance, mortgage borrowers are known to react more to policy rate changes than homeowners or renters (Cloyne et al (2020)). See also Voinea et al (2018), Ahn et al (2024) and CGFS (2024).

[10] Gelos et al (2024) find that more indebted and less liquid households show the strongest consumption response to monetary policy, and the share of such households in the United States has increased.

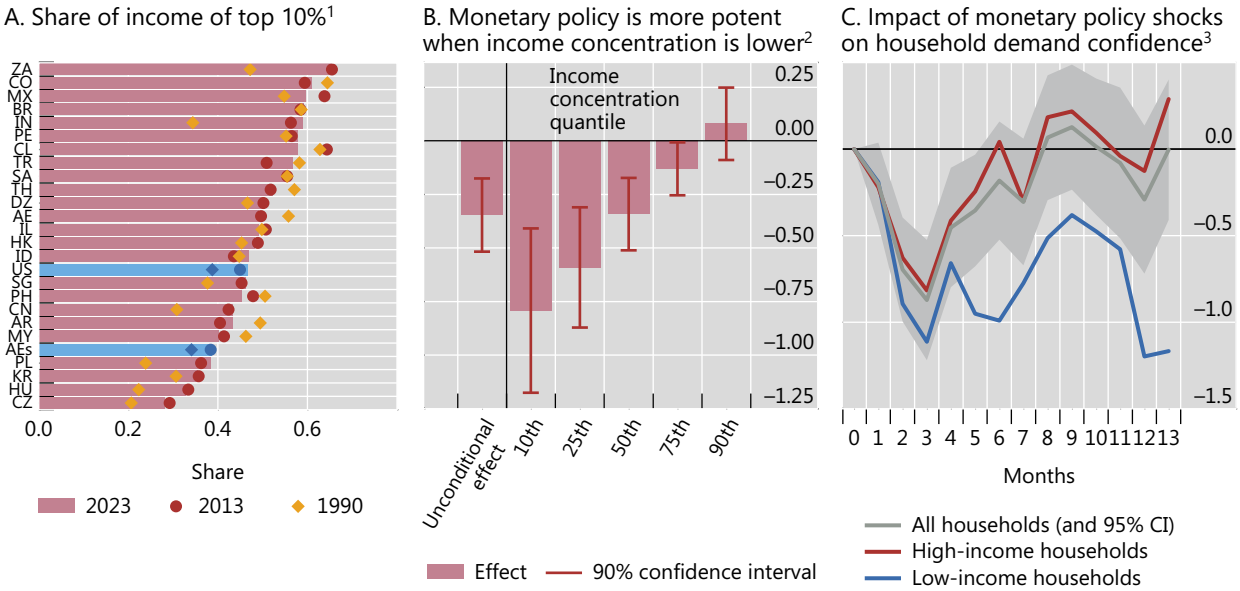
households are limited by banks in how much new borrowing they can take on given more favourable interest rates.

Beyond debt, central banks report that the income distribution – which tends to be highly skewed in most EMEs (Graph 4.A) – can also have a direct bearing on the power of monetary policy (Graph 3.B). Quantitative models support this experience. In a typical heterogeneous agent New Keynesian model, the short- to medium-term responses of poor hand-to-mouth agents to monetary policy are stronger than that of rich agents. Monetary policy affects aggregate demand and eventually labour demand and income. As a result, hand-to-mouth agents' consumption – which is driven by current rather than permanent income – reacts strongly. Thus, one would expect a stronger response to monetary policy induced changes where the overall weight of such agents in aggregate income is higher (Box B).

Empirical evidence shows that monetary policy is indeed stronger when income concentration at the top is lower. The impact on inflation of a surprise increase in the policy rate, based on a panel of medium and large EMEs, is presented in Graph 4.B. In the baseline case, disregarding income distribution, a surprise 25 basis point rate increase reduces inflation by 35 basis points within 12 quarters. When estimates are conditioned on the share of income of the top decile within a country, the effect on inflation is found to be more than twice as strong when such concentration is very

Monetary policy is more potent when income inequality is lower

Graph 4



[1] AEs = CA, FR, DE, IT, JP, GB, US, euro area. [2] Effect of a 25 basis point contractionary monetary policy shock on inflation within 12 quarters. Estimates based on linear projection models for CPI inflation 12 quarters ahead. In the conditional model, a monetary policy shock is interacted with the deviation of the aggregate income share of the top 10% from its country-specific mean. Monetary policy shocks are based on Checo et al (2024). Confidence intervals are based on Driscoll-Kraay standard errors. [3] Impact of monetary policy shocks on household confidence (as per a survey by IPSOS) in their ability to make major purchases currently and in the future using a pooled panel local projection analysis. Monetary policy shocks are based on Checo et al (2024).

Sources: Bloomberg; Checo et al (2024); Goldman Sachs; LSEG Refinitiv; HIS Markit; IPSOS; World Inequality Database; national data; BIS.

low.[11] Conversely, the effect of monetary policy weakens considerably when income concentration at the top reaches very high levels; that is, when the poor populations' share in aggregate income is very low. This positive effect of a more equitable distribution of income on the power of monetary policy is also evident throughout when conditioning on the state of the business cycle (Annex C).[12]

A separate exercise reveals that a contractionary monetary policy shock hurts demand confidence (ie the reported intention to make purchases). The impact is again more pronounced in the case of low-income individuals (who tend to be subject to greater employment risk and have higher marginal propensity to consume), reinforcing the message that cross-sectional differences matter (Graph 4.C).

A potential explanation for these findings is that when the share of income of the top decile is very high, the weight of households who are affected indirectly by income effects – and who typically have the highest marginal propensities to consume – is reduced. In such an economy, policy changes lead mostly to short-run changes in savings by the relatively rich cohorts, without causing large effects on short-run consumption expenditures or prices. The global long-term trend towards a larger concentration of income in the top decile could thus make aggregate demand management more challenging.[13, 14] Meanwhile, wealth inequality also affects the transmission of monetary policy (eg Matusche and Wacks (2023)).

The interaction between income, wealth and debt make the analysis of monetary transmission more complex. Different household characteristics can have opposing effects on transmission. Crucially, the relationship between characteristics differs from country to country. For instance, while high income households are the most indebted in the case of Korea, Poland and South Africa, debt burdens are highest among the poorer cohorts in Hungary and Hong Kong SAR.[15] In some cases such differences can stem from past policies to encourage credit uptake by the poorer cohorts (for instance through subsidised mortgage programmes).

Central banks report that differences between households along other dimensions can also matter for the transmission of monetary policy. One such dimension is demography. Policy rate hikes tend to have different effects on consumption by the young versus the old (eg see the paper contributed by Bank of

[11] More specifically, when the share of those in the top income decile in national income is at the 10th percentile of the distribution. Within the sample used for this exercise, the correlation between the share of income of the top decile and the income Gini coefficient is 0.991.

[12] This finding resonates with Voinea et al (2018) and, for advanced economies, BIS (2021).

[13] The World Inequality database shows a secular trend towards greater income concentration in many economies, eg between 1985 and 2023 in China the income share of the top 10% of earners increased from 30% to 44%, in India from 36% to 59% and in South Africa from 47% to 65%. This trend partly reflects the confluence of globalisation and skill-biased technical change (Acemoglu (2002), BIS (2021)).

[14] Greater concentration of income in the top decile is also associated with significantly larger contractions in aggregate consumption during economic downturns (Kohlscheen et al (2021)). This could be partly because stabilisation policies are less effective when income is highly concentrated in the segment of the population that has low propensities for immediate consumption.

[15] See Bazillier et al (2021) and the paper contributed by Hong Kong Monetary Authority. Also, as noted by South African Reserve Bank, the upper two deciles of income distribution account for almost all mortgage, vehicle and credit card lending, and are thus responsive to changes in the policy rate. By contrast, poorer South Africans are highly exposed to inflation.

Korea). These differences can stem from age-related differences in consumption behaviours (eg elderly's higher reliance on services) and incentives to save (eg weaker in the case of the old), but frequently also reflect the legacy of past house price increases and asset or debt trajectories. Differences in beliefs and expectations can also matter for the efficacy of monetary policy.[16] Another dimension is financial literacy. Urban households tend to be more financially aware, which facilitates a more sophisticated response to changes in interest rates and credit conditions (eg see the paper contributed by Saudi Central Bank). Yet another dimension is informality. The informal economy matters because policy rate changes may have a weaker transmission to informal financial contracts, while labour mobility between the formal and informal sectors may affect wage inflation and income dynamics.[17]

Box B

Advances in macroeconomic modelling

Incorporating cross-sectional differences into macroeconomic models has long been a goal of economic researchers.① Such efforts were revived by an influential article by Kaplan et al (2018), who analysed the effect of differences across households' incomes and wealth in an otherwise standard New Keynesian framework. Notably, they found that the response of aggregate consumption to policy rates is significantly stronger in a heterogeneous agent New-Keynesian (HANK) model, when compared with the standard representative agent New-Keynesian (RANK) model. The much larger effect of monetary policy is mostly due to an indirect effect, as explained below.

In a typical RANK model, monetary policy affects consumption exclusively via the intertemporal elasticity of consumption and savings. In a richer HANK model, which features non-Ricardian hand-to-mouth agents – ie agents with limited liquid wealth that largely consume all their income – these changes in consumption also affect employment and labour income, leading to further changes in consumption for all employed agents. This occurs because hand-to-mouth agents react strongly to current rather than permanent income.

Research on incorporating differences across households into models provides useful insights, but it is a rapidly growing and evolving field. For instance, whether incorporating differences across households has a substantial impact on macroeconomic aggregates can depend on modelling choices as well as the calibration strategy. Some studies have found substantial effects, partly because the majority of hand-to-mouth households are not poor, ie they are not in the bottom quintile of the long-run earnings distribution. Aguiar et al (2024) document and rationalise this and the fact that a high share of hand-to-mouth households have high debt in a model with persistent differences in discount factors across households. Tellingly, the much higher marginal propensity to consume of hand-to-mouth agents, together with their relevant weight based on income levels, causes these households to have sizeable macroeconomic effects even when 80% of households have standard preferences (a high degree of patience and low intertemporal substitution).

By contrast, other studies have found that hand-to-mouth consumers make little difference to business cycle fluctuations. For example, in Albonico et al (2024), the estimated fraction of hand-to-mouth consumers (for the US economy) was only 11% and they are modelled as being poor. As a result, such households carry very little weight in macroeconomic aggregates.

Meanwhile, the two-agent indebted demand model of Mian et al (2021) finds very important effects of heterogeneity on macroeconomic aggregates. They attain this result without resorting to hand-to-mouth agents. Instead, they focus on the savers-borrowers distinction, which they rationalise through different weights on bequest

[16] Flack et al (2021) show that when disagreement in inflation expectations is high, contractionary policy may lead to higher inflation, while when disagreement is low, the same policy leads to lower inflation.

[17] See Alberola and Urrutia (2020). While data on the informal sector may be harder to obtain due to the very nature of the sector (eg official records may not exist), sources such as household sentiments and supermarket scanner data can still help gauge trends in this sector.

motives. The differences in how much wealth each type of agent wants to pass on to their offspring generates different saving behaviours. In their model, even temporary policies that shift resources between borrowers and savers end up affecting overall indebtedness and can therefore have long-term effects. A monetary expansion, for instance, redistributes from savers to borrowers and leads to more debt accumulation. New lending boosts income in the short run. Later, when debt needs to be serviced, it acts as a drag on demand. With highly indebted demand, policy rates need to keep falling to avoid a recession, so that even the natural interest rate falls.

Even if substantial progress has recently been made in modelling heterogeneities, some areas still appear to deserve further exploration if the aim is to attain more realistic working models. For example, in several countries the richest households are also the ones with the highest debt-to-income ratios.② While there are efforts to address this observation, most HANK models do not yet rationalise such patterns.

Some central banks have been incorporating heterogeneous agents in their macroeconomic models in recent years. More common is incorporating two types of agents as opposed to adopting a fully heterogeneous model (Graph A4 in Annex A). For instance, in the central bank of Chile's model, 40% of the households cannot borrow or save and behave like hand-to-mouth households; the rest of the households have financial market access. The central bank of Peru allows firms of different sizes to have varied costs of credit. Monetary policy is found to be less potent in this case as compared to assuming a uniform cost of credit across firms.

Central banks acknowledge challenges or caveats in amending their workhorse models. These include modelling complexities, computational constraints and practical calibration challenges. Heterogeneity can also make it more difficult to fully grasp interactions in the model. For instance, Bank of Korea noted insufficient experience with and confidence in HANK models. Relatedly, Bank of Thailand faced calibration-related issues in implementing a HANK model. Consequently, satellite models or complementary studies are commonly used by central banks to understand the role of heterogeneity (eg in Colombia, Philippines and Poland).

① Krusell and Smith (1998) were among the first to study how differences across households affect economic dynamics. They found that differences across households had only a limited impact on the dynamics of the neoclassical growth model. ② See eg Bover et al (2016) who find that the odds of having secured debt increase with the level of household income.

4. Monetary policy transmission and the impact of differences across firms

Complementing the previous discussion on households, this section focuses on firms. It lays out the relevant monetary transmission channels in the case of firms and then discusses how these channels are impacted by firm heterogeneity.

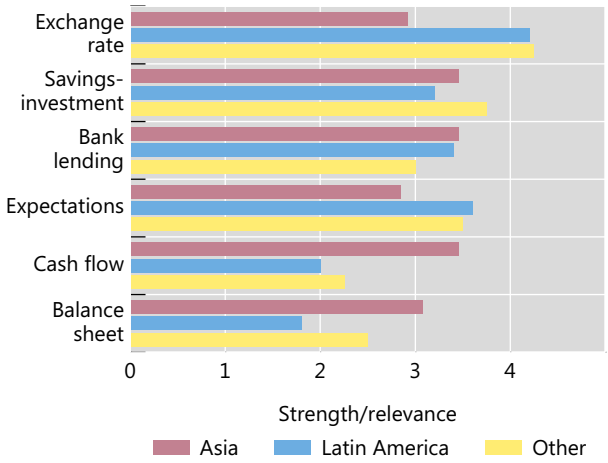
Monetary policy affects the opportunity cost of putting capital to productive uses because it impacts returns on firms' savings. It also alters firms' borrowing costs and thus cash flows.[18] Importantly, monetary policy affects the exchange rate and rebalances the prospective composition of domestic vs external demand, the cost of imported inputs and sometimes foreign exchange (FX) leverage, with possible reverberations for a firm's pricing decisions. It also affects the expectations of decision-makers at firms about future prices and business conditions.

[18] That said, the empirical evidence suggests that expected profits and low uncertainty are more important boosters of business investment than low interest rates, at least for firms facing less binding financing constraints (see eg Banerjee et al (2015) and Sharpe and Suarez (2021)).

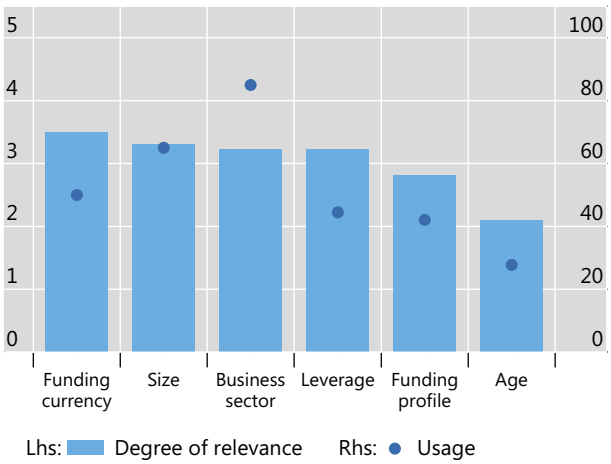
Surveyed central banks outside Asia indicated that the exchange rate channel was the most important, while those in Asia attached more importance to the savings-investment and bank lending channels (Graph 5.A). The cash flow and balance sheet channels were not considered important outside Asia but ranked more highly among Asian central banks.

Firm characteristics and monetary policy transmission[1] Graph 5

A. Strength of transmission channels



B. Relevance and use of firms' characteristics[2]



[1] Based on central bank responses on a scale of zero to five, with zero indicating not relevant and five indicating strong relevance. The graphs show simple averages across economies. [2] Funding currency means whether the funding is denominated in foreign or domestic currency. Funding profile can mean own funds, bank debt, bond funding or stock market financing.

Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

It is important to note that, particularly for very small businesses, the distinction between the household sector and business sector is blurred at best.[19] Debt to finance businesses is often incurred by households, sometimes even with the primary residence as collateral. This blurred dividing line between households and businesses is even more important in developing countries, particularly in the informal sector. While such small businesses may not always move the needle on aggregate investment volumes, they tend to be important in terms of employment. That said, what is clear is that business investments tend to follow a different rationale compared with decisions on household expenditures. Firms face much more complex decisions, as they need to make inferences about the strategies of competitors, their future price setting and ultimately their prospective profits – which tend to drive investments. And by their nature, differences between firms tend to be even starker than those between households, not least because they operate in different sectors and often follow different business models.

In terms of the specific characteristics that matter for transmission, the funding currency is seen as key (Graph 5.B), especially for the exchange rate channel. In several

[19] See, for example, the paper contributed by South African Reserve Bank, which stated that credit is more readily available to private individuals than to small businesses and entrepreneurs must sometimes rely on personal loans to finance their enterprises.

EMEs, a material share of corporate debt is denominated in foreign currency (Graph 6.A). For firms in the non-tradable sector whose receivables are in local currency this can lead to a currency mismatch. For instance, property developers that borrowed abroad can face sudden exchange rate induced changes in FX debt servicing costs, which reverberate on their investments plans. At the same time, exchange rate changes can cause banks to expand or retreat in sectors that are perceived as being riskier, altering their supply of loans to these market segments.[20] More generally, export-oriented or foreign-owned firms with access to more diversified sources of revenue or funding are less affected by domestic monetary policy shifts.

Which sector a business is in is also highly relevant. More than 80% of surveyed EME central banks reported using sectoral information about businesses in their background analysis for monetary policy decisions (Graph 5.B). Dynamics often differ substantially between the tradeable and the non-tradeable sectors, and between the commodity producing and manufacturing sectors. The central bank of Chile, for instance, highlighted that the mining sector is particularly relevant for understanding the response of aggregate investment in their economy. Meanwhile, a higher share of firms in the informal sector can weaken transmission.

Firm leverage also matters for monetary transmission. The interquartile range of the debt-to-asset ratio points to a very large dispersion in leverage across firms, particularly in the cases of Israel, Chile and India (Graph A.2 in Annex A). This suggests that monetary policy is likely to have more heterogeneous effects across firms in these countries. This is because the investment channel of monetary policy is stronger for firms with low debt burdens and high "distance to default", as these firms face a flatter marginal cost curve for financing investment (Ottonello and Winberry (2020)).

Another relevant characteristic is firm size and, relatedly, concentration among firms. Concentration in firm activity is prevalent across countries. In a majority of the EMEs, the top decile of firms accounts for more than 80% of aggregate firm assets, and in a few cases even above 90% (Graph 6.B). In some countries, a few large corporates (for instance commodity producers) tend to be the dominant players, often driving the variation in investment aggregates. Concentration can matter for policy effectiveness because it is related to the extent of financing constraints. Larger firms tend to have much more diversified sources of funding (including external ones) and may thus be less affected by monetary policy changes than small firms that tend to rely on banks only. This point is highlighted, for instance, in the paper contributed by the central bank of Malaysia, which says that small firms are much more exposed to the bank lending channel.

Relatedly, access to finance or financing constraints are also relevant factors. Many corporates, particularly in Latin America, identify access to finance as a significant constraint on their activity (Graph 6.C).[21] When this is the case, firms are often restricted to using their retained earnings as a source for financing expansion. It follows that firms will not be able to react to monetary policy changes as strongly

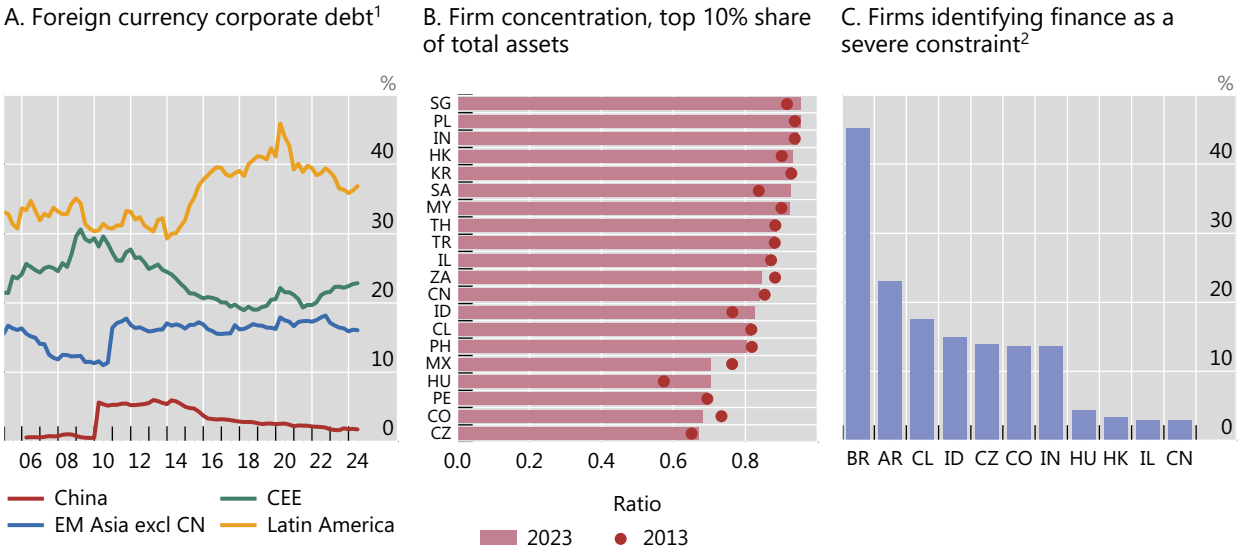
[20] See Pozo and Rojas (2020) for an analysis of the risk-taking channel in the case of Peru.

[21] This survey is based on an unweighted average of about 2,000 firms for the countries reported in Graph 6.C. More generally, one important caveat is the imperfect coverage of small firms in surveys. This issue is even more prevalent when the informal sector is large.

as in countries where access to finance at competitive rates is seamless.[22] At the same time, globalised firms that rely on longer global value chains typically need much more financing of working capital to bridge the timing mismatch between incurring costs and realising the cash flow from sales. As a result, their activity and exports are more sensitive to financing conditions (Kim and Shin (2023)).[23]

Varying FX exposure and heavy firm concentration

Graph 6



CEE = CZ, HU and PL; EM Asia excl CN = ID, IN, KR, MY, PH and TH; Latin America = AR, BR, CL, CO and MX.

[1] Share of debt. Simple average across countries in the region. Foreign currency and total debt of non-financial corporates are estimated from BIS data on bank lending and debt securities issuance. [2] Figures correspond to 2009 for BR; 2010 for CL; 2012 for CN; 2013 for IL; 2017 for AR; 2019 for CZ; 2022 for IN; and 2023 for CO, HK, HU and ID.

Sources: Dealogic; Euroclear; Refinitiv; TRAX; World Bank, Enterprise Surveys; S&P Capital IQ; BIS locational banking statistics; BIS.

At the current juncture, cross-sectional differences in leverage according to firm size may be particularly relevant for monetary policy. One indication of this emerges when one looks at a sample of the top 100 firms in each country – which tend to weigh more on economic aggregates. Debt servicing costs of medium and large enterprises have been impacted by recent changes in monetary conditions, after a prolonged period of low borrowing costs and abundant capital searching for yield globally (Graph 7). For instance, in China – where policy rates and bond yields have decreased – the ratio of interest expenses over earnings has been trending down. By contrast, in India and more recently also in Brazil interest costs for the top 100 companies increased after the pandemic. What is also evident is that this metric can vary substantially across different firm sizes.[24] Currently, the average interest burden is higher for the top 100 companies than for the top 10 companies in the majority of

[22] More generally, Banerjee and Manea (2025) show that even the output of unconstrained firms can react more strongly to monetary policy when there are fewer credit constrained firms in the economy than when a substantial share of firms are credit constrained. This is because effects on constrained firms spill over to unconstrained ones via input and output markets (Graph A3 in Annex A).

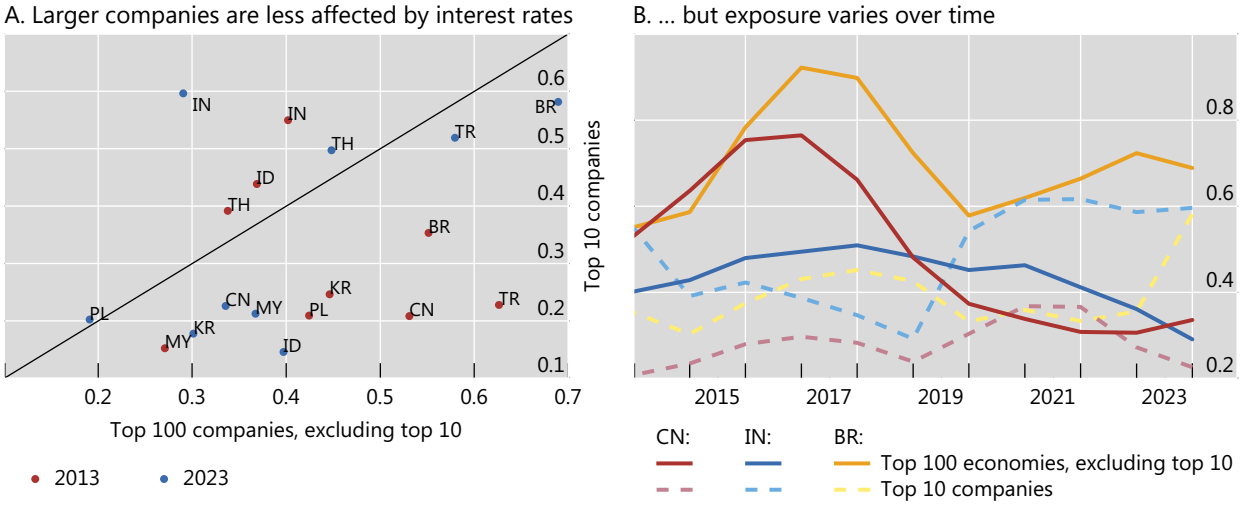
[23] As an appreciation of the US dollar against the local currency generally implies tighter financing conditions in EMEs, it affects production and export activity.

[24] This ratio also differs by sector of activity.

EMEs. This indicates that changes in monetary stances are likely to impact medium-size companies more strongly than the largest companies.[25]

Interest burden is typically lower for the largest companies[1]

Ratio of interest expenses to earnings before interest and taxes (EBIT) Graph 7



Graphs show three year moving unweighted averages. Only economies for which the average number of firms with available data was above 300 during the sample period are shown.

Sources: Capital IQ; BIS.

5. Distributional effects of monetary policy

A third area – in addition to the state of the economy and monetary transmission channels – where analysis of differences across households and firms can prove informative is the distributional effects of monetary policy. Growing public attention to inequality among households and differences in financing patterns across large and small firms have, in recent years, turned the spotlight on the potential contribution of monetary policy to distributional shifts.

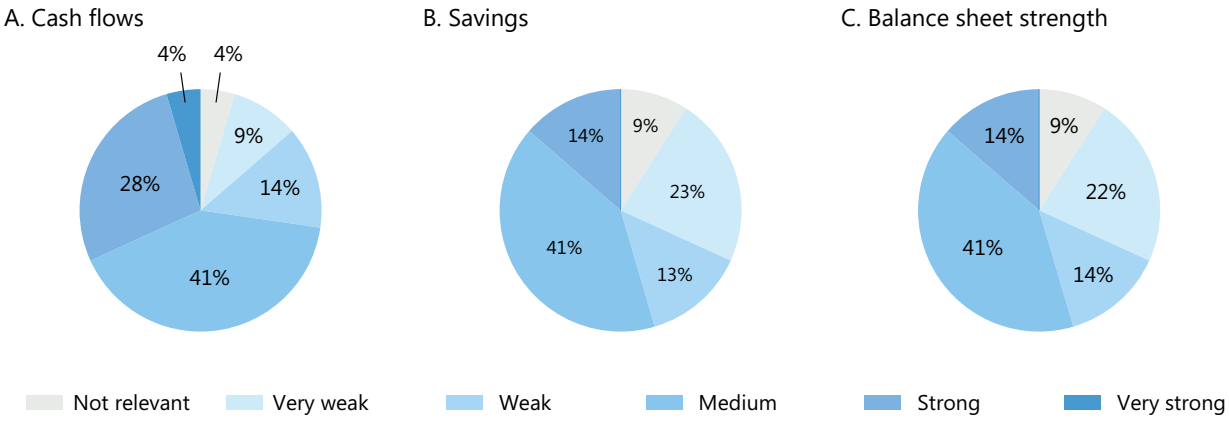
Central banks have a role in analysing and explaining the distributional consequences of their policies. However, as the primary mandate of monetary policy is price stability, when setting policy central banks focus on aggregate outcomes and do not consider distributional effects. Indeed, the most effective way for central banks to help reduce cross-sectional differences is by delivering on their price stability mandate and keeping inflation in check, as stressed in the papers contributed by several central banks (eg Bank of Korea and South African Reserve Bank). Moreover, monetary policy is a blunt tool that is not suited for achieving distributional outcomes (BIS (2021)). The policy rate applies to everyone, and while the impact may differ depending on household- and firm-specific factors, these factors are beyond the

[25] For instance, Durante et al (2022) find that monetary policy has a larger effect on investment by firms that are more leveraged.

control of central banks.[26] Fiscal and structural policies are more appropriate tools for addressing cross-sectional differences (eg Cox et al (2024)).[27] In recognition of central banks' limited role in this area, many do not attach high importance to the use of cross-sectional information for understanding distributional effects (Graph 1.C).

This section reviews the various channels through which monetary policy can redistribute attributes across households and firms (eg McKay and Wolf (2023)). As per central banks' survey responses, the impact of policy changes is strongest on households' cash flows (Graph 8.A). The direction of net impact, however, is unclear. Lower interest rates can hurt savers who earn less on their deposits, but benefit borrowers by reducing their debt servicing costs. Relatedly, lower rates can hurt the poor if inflation rises but benefit the unemployed or underemployed by improving their employment and wage prospects (eg Altavilla et al (2021)).

Monetary policy can affect the distribution of household attributes — Graph 8



Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

The net distributional impact in this case depends on the distribution of savers vs borrowers and poor vs rich in the first place, among other factors. What also matters is how different household characteristics are correlated with each other. For instance, if the rich tend to be more indebted (as in Korea), then higher rates can, ceteris paribus, hurt the rich due to higher debt servicing costs. In such cases, the equalising impact of tighter monetary policy can be outweighed by the dampening effect on overall demand (as opposed to when the rich tend to be savers, like in India).

A second effect of policy changes is on the distribution of the type and level of household savings (Graph 8.B). Lower rates can induce lower savings (and more consumption). Or they may induce a shift from one savings instrument to other assets, eg stocks, while keeping consumption constant. Lower rates might even induce more savings due to risk aversion or a desire to generate the same amount of interest income as before.

[26] The paper contributed by the central bank of Vietnam stressed that cross-sectional differences across firms (at least along some dimensions) is a natural economic feature that facilitates competition. Attempts by the central bank to address the same can undermine competitive mechanisms and capital allocation.

[27] The paper contributed by Saudi Central Bank provides various examples of such measures.

Monetary policy can also affect the relative strength of households' balance sheets (Graph 8.C). For instance, asset price inflation resulting from expansionary monetary policy – especially unconventional measures such as quantitative easing – can benefit those who own equities and real estate. Since the rich tend to own more of these assets, expansionary policy can strengthen their balance sheets and worsen wealth inequality. Relatedly, monetary expansions tend to benefit the young and hurt the old due to differential sources of income and asset holdings across these two groups (eg paper contributed by the central bank of Poland). The impact of policy changes can similarly transmit via the liability side of households' balance sheets.

It is worth noting that what ultimately matters is the effect through the monetary policy cycle. For instance, if contractionary policy undoes any redistributive effects of expansionary policy, then the "residual" impact through the cycle would be zero. One way in which monetary policy can have a residual impact is if contractions and expansions have asymmetric distributional effects, ie hysteresis. Another way is if the stance of monetary policy is biased in one direction over a period.

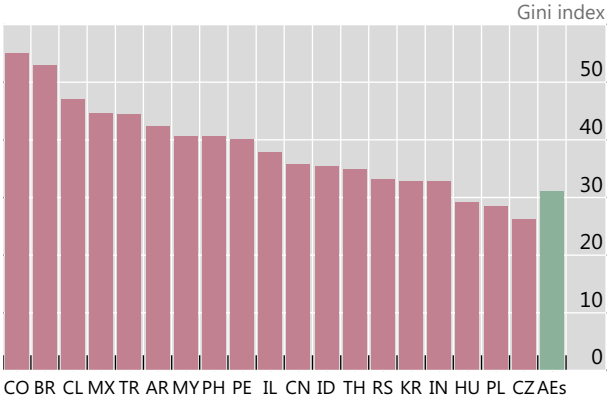
Distributional effects apply in the case of firms too. For instance, small firms tend to face greater financing constraints than large corporates, meaning that small firms benefit less from rate cuts or are constrained more by rate increases. Meanwhile, a low-interest rate environment could support the survival of non-viable firms or encourage entry by less productive firms, which can hurt resource allocation across firms. Relatedly, larger firms have greater bargaining power and tend to enjoy higher deposit rates (eg paper contributed by the central bank of Israel) while also having access to more diversified funding sources (eg paper contributed by the central bank of Malaysia). As a result, rate changes are likely to have an uneven impact on small versus large firms.

A recent but growing literature investigates some of these effects empirically, but the evidence is mixed. Some studies find that expansionary monetary policy can increase household income inequality or that contractionary policy that reduces credit supply to firms can lower wage inequality (eg Andersen et al (2023), Moser et al (2021)). Yet, other studies find that quantitative easing reduces income equality, contractionary monetary policy worsens income inequality, or that distributional effects are exacerbated under an active policy that reacts strongly to inflation. Some of these studies have further emphasised that the effect is asymmetric – that is, while contractionary policy tends to worsen inequality, expansionary policy does not necessarily alleviate inequality (eg Lenza and Slacalek (2024), Furceri et al (2018), Bobasu et al (2024)).

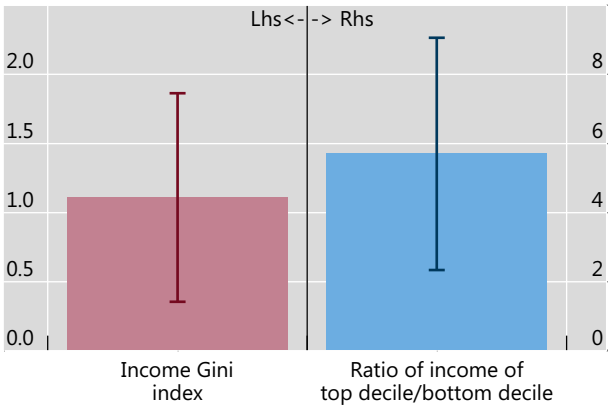
The lack of congruence in findings across studies likely reflects jurisdictional differences and the multiplicity of redistributive channels that may be acting in opposing directions. Against this backdrop, a large cross-country analysis lends support to the hypothesis that contractionary monetary policy can worsen household income inequality in EMEs, where it is already higher compared with AEs (Graph 9).

Interest rate hikes tend to increase income inequality Graph 9

A. Income inequality across EMEs[1]



B. Effects of contractionary monetary policy on income inequality[2]



[1] AEs consist of AU, AT, BE, CA, CH, DE, DK, ES, EE, FI, FR, GB, GR, HT, IE, IS, IT, JP, LT, LU, LV, MT, NL, NO, NZ, PT, SK, SI, SE and US. [2] Cumulative effect of a 100 bp contractionary monetary policy shock on inequality after 12 quarters. Estimates based on linear projection models for CPI inflation 12 quarters ahead, following Coibion et al (2017). Confidence intervals are based on Driscoll-Kraay standard errors. Average ratio of income of top decile/bottom decile is 22:1.

Sources: World Bank; BIS.

6. Towards policy decisions and communication

The previous sections explained why household and firm differences might matter for monetary policy. This section turns to the question of how, in practice, central banks have incorporated such differences into their policy decisions.

Surveyed central banks emphasised that their mandate focuses on price stability and consequently distributional effects were not explicitly considered when setting the policy rate. That said, data on household and firm differences still matter for policy transmission. As such, in many countries, such information is regularly collected and frequently informs policy discussions. For instance, in the Philippines, the central bank tracks inflation developments for the bottom 30 percent of households, in addition to monitoring overall inflation.

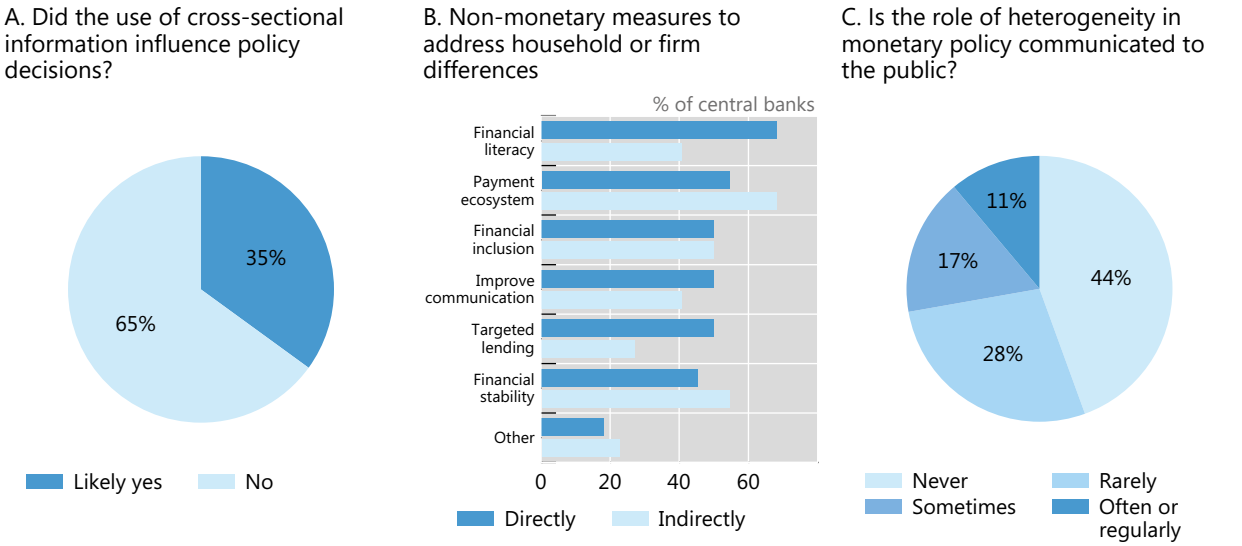
Incorporating cross-sectional differences in policy discussions influenced the ultimate decision for about a third of the surveyed central banks (Graph 10.A). For instance, in Malaysia granular data on households' balance sheet strength helped to establish that the impact of a negative income shock on private consumption would be small because much of the aggregate consumption is attributed to the rich, who can manage the shock and smooth consumption more easily. The analysis shaped the considerations that guided Malaysian monetary policy during 2024. In Thailand, household heterogeneity contributed to gradual and measured hikes after the Covid-19 pandemic, which made it more manageable for fragile groups to adapt to the increased interest burden. In Peru, the central bank regularly monitors relative prices and how they affect the inflation expectations of households differently. This enables

the central bank to identify any broadening of relative price pressures. In 2022–23, when large supply-induced relative price changes began to unhinge inflation expectations, the central bank decided to shift from an accommodative to a contractionary stance.

Some central banks explicitly seek to improve transmission by influencing cross-sectional differences. This is typically done via complementary non-price-based measures that are distinct from the primary interest rate or exchange rate tool. Also, non-price-based measures can be more easily targeted. While some of these measures seek to influence cross-sectional differences directly, others might only have an indirect impact.

Commonly used complementary measures include financial literacy programmes and payment system reforms (Graph 10.B). Among other benefits, financial literacy and inclusion have been shown to strengthen the effectiveness of monetary policy transmission (eg Brandão-Marques et al (2023)). A more efficient payment system can bolster the growth of small firms (eg see the paper contributed by Bank Indonesia). More generally, payments often serve as a point of entry into the formal financial system, meaning that payment reforms can also improve financial inclusion.

Policy decisions, non-monetary measures and communication — Graph 10



Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

Another common measure is special lending facilities that help address differentiated access to credit. For example, a bank-intermediated facility in Korea helps to partially offset varied access to finance among firms, especially small firms. The programme is flexible and was used to facilitate sectoral credit during the Covid-19 period. China has had a central bank lending programme for small businesses since 2014. In some other economies, such programmes were introduced temporarily during the Covid-19 period. In Chile, targeted measures were implemented for firms that were hit hardest. In Peru, while directing credit to specific sectors is prohibited, a guaranteed lending programme helped small firms navigate the economic challenges presented by the pandemic. Other measures that can help to reduce financing gaps

across firms include better data-sharing policies and well-regulated open banking (Caballero et al (2025)).

While targeted measures are useful for addressing cross-sectional differences, they present challenges for central banks. Measures that are meant to be temporary might become popular and difficult to discontinue. Furthermore, spillovers across tools means that central banks might face difficulties in fully controlling the effects of these tools or achieving desired results. In addition, the implementation of numerous measures aimed at addressing the needs of different groups is an operational burden for central banks and might lead to resource constraints (eg see the paper contributed by the central bank of Vietnam). A related challenge is identifying which groups to target, an issue that could run into political economy debates. Moreover, the overall complexity of the policy package can hamper communications efforts and reduce transparency.

Central bank communications about cross-sectional differences face similar trade-offs. On the one hand, transparency has benefits. By explaining the rationale behind policy decisions, communications can help improve policy acceptance among the public as well as the government and other policymakers. Moreover, if a perceived or real side effect of monetary policy decisions is higher inequality, then communication can help refocus the discussion on the central bank's role and mandate. In the absence of such communications, public or political pressure might mount on the central bank to act differently. In extreme cases, the government might even threaten to curtail the central bank's independence (Panetta (2015)). On the other hand, summarising the underlying rationale is not easy because there are several complex ways in which differences across agents can matter for policy decisions (and vice versa). This creates scope for misinterpretation.

Central banks balance these trade-offs differently depending on the circumstances in their country and thus diverge in their approach to communicating about cross-sectional differences. One aspect of their approach is the channel. While all central banks use traditional channels (eg central bank publications, press conferences), some have also used social media, including influencers, who tend to be good at simplifying complex arguments and reaching specific audiences like the young. Another aspect of their communication approach is its frequency. A majority of central banks reported that they rarely discussed heterogeneity in policy communications (Graph 10.C). Only a few do so regularly.

In general, in their communications central banks emphasise their primary mandate, roles and constraints. Several central banks highlighted the value of conveying to the public that central banks strive to protect the purchasing power of the public by stabilising prices, which especially helps the vulnerable. In Czechia, a recent example is when the deputy governor tried to explain the dilemma of higher-for-longer rates on public radio. She explained that higher rates were necessary to fend off inflation, especially a wage-price spiral, while acknowledging the pain that it caused to mortgage holders. Relatedly, when rate normalisation was criticised by some in Malaysia because of its negative impact on low-income households, the central bank intensified communications across channels and pointed to the availability of targeted programmes. The paper contributed by the central bank of Peru highlights the importance of tailoring communication strategies given the limitations of monetary policy in addressing food inflation, which hurts the poor

more. This can help to set realistic expectations about what monetary policy can achieve and the path of inflation.

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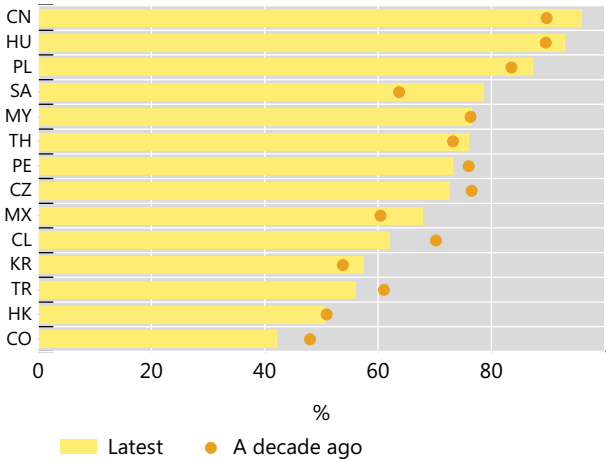
Annex A: Additional graphs

Large differences across households in EMEs

Graph A1

A. Share of households able to come up with emergency funds in 30 days[1]

B. Share of households that are homeowners[2]

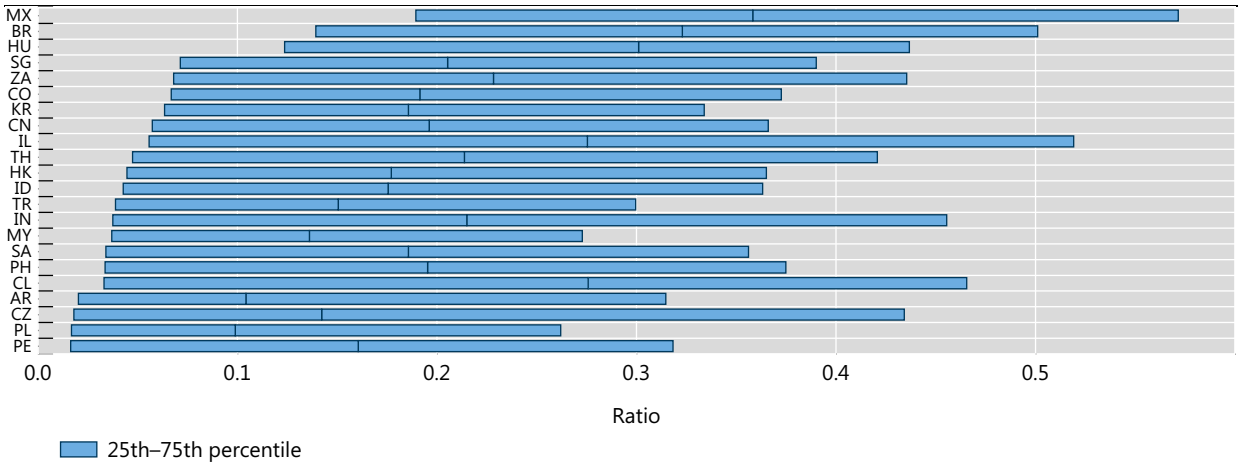


[1] Figures as of 2021, except VN as of 2022. [2] Latest corresponds to 2020 for MX; 2021 for CL; 2022 for HU, KR and MY; 2023 for CZ, TH, TR, SA, PL and PE; and 2024 for CN, CO and HK. A decade ago, corresponds to 2011 for CL, HU; 2012 for KR; 2013 for TH, TR and PE; 2014 for CN, CO, CZ, HK, MX and PL; and 2016 for MY.

Sources: World Bank, *World Development Indicators* and *Global Findex Database*; BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

Interquartile range of non-financial firms' debt-to-assets ratio[1]

Graph A2

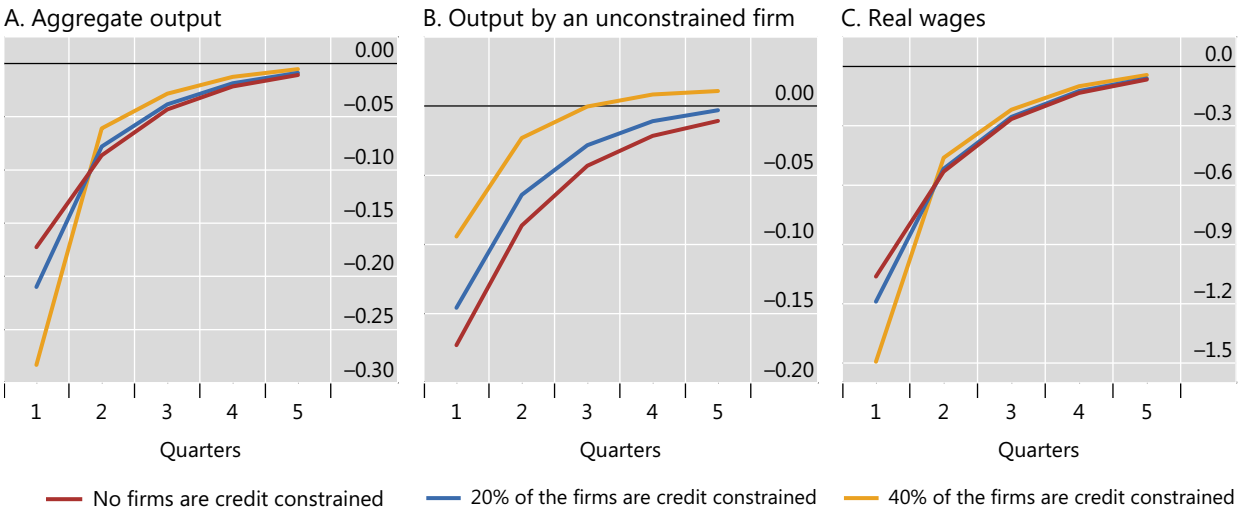


[1] Figures correspond to 2023.

Sources: World Bank, Enterprise Surveys; S&P Capital IQ.

Credit-constrained firms generate spillovers to unconstrained firms

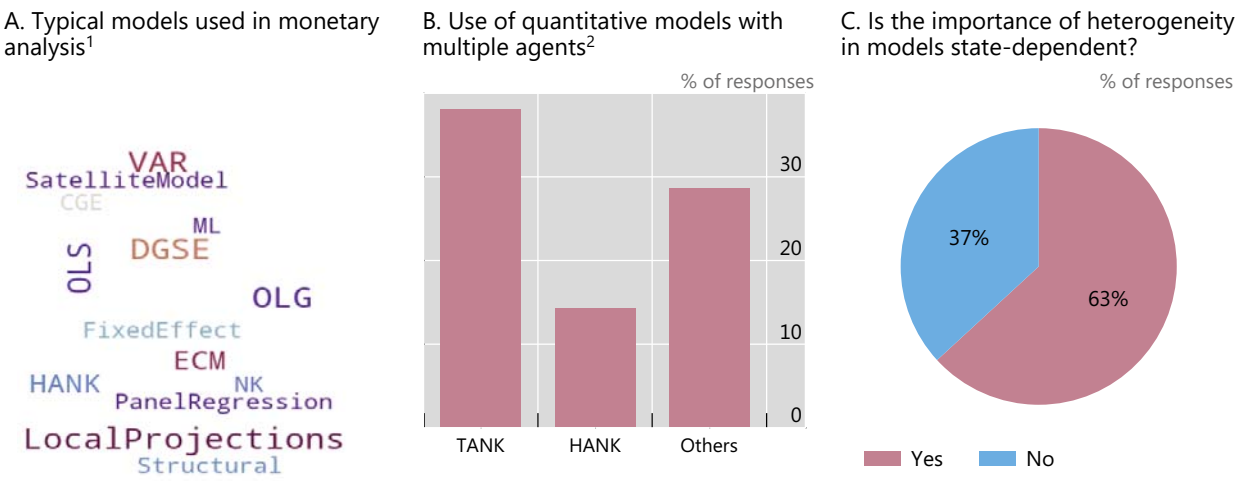
In per cent — Graph A3



Source: Banerjee and Manea (2025).

Macroeconomic models used by central banks

Graph A4



[1] Word cloud based on textual answers by central banks. CGE = computable general equilibrium; ECM = error correction model; HANK = heterogeneous agent New Keynesian model; ML = machine learning; OLS = ordinary least squares; OLG = overlapping generations model. [2] TANK = two-agent New Keynesian model; VAR = vector autoregressions.

Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

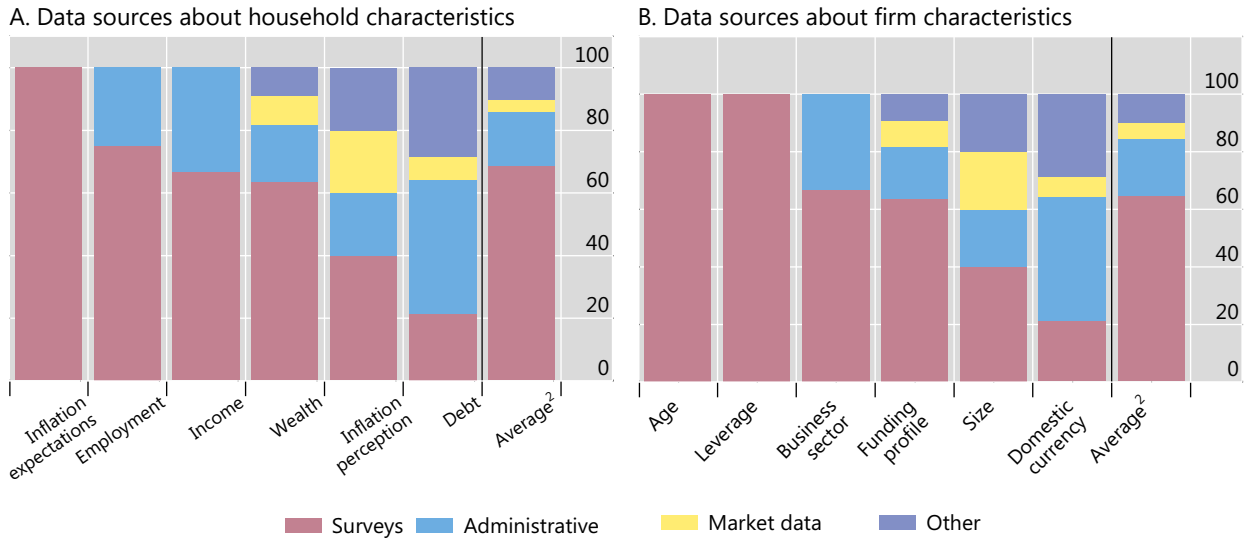
Annex B: Sources and features of granular data

Surveys are the most common source for granular data, administrative records are another frequent source, and in the case of some indicators market data are also a relevant source (Graph B1). Digitalisation has facilitated the use of each of these sources: conducting surveys has become easier due to online applications, sharing administrative data has become more efficient due to digital storage and more market data are generated because more transactions happen online. Such data also tend to be available for analysis more quickly or frequently, thus improving their potential to inform monetary policy analysis.

Among the beneficial aspects of granular data, central banks report that breadth (or representativeness) and depth (detail and comprehension) are most important (Graph B2.A). These attributes offer a window into cross-sectional differences, especially when heterogeneities exist along multiple dimensions. Another aspect is accuracy, which tends to be higher in the case of administrative sources. Moreover, unlike surveys, they often cover the whole target population. Another desirable attribute of granular data is the ability to follow the same entities over time – longitudinal data – as this facilitates panel regression analysis.

Primary data source by household and firm characteristics[1]

Percentage of responses — Graph B1



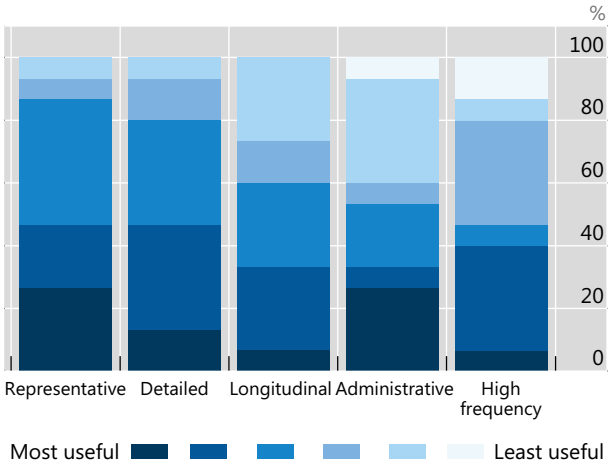
[1] For each household or firm characteristic, the stacked bar shows the share of primary data source across central banks. In the case of households, only the six most important characteristics are shown. [2] Average across all households or firm characteristics is shown.

Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

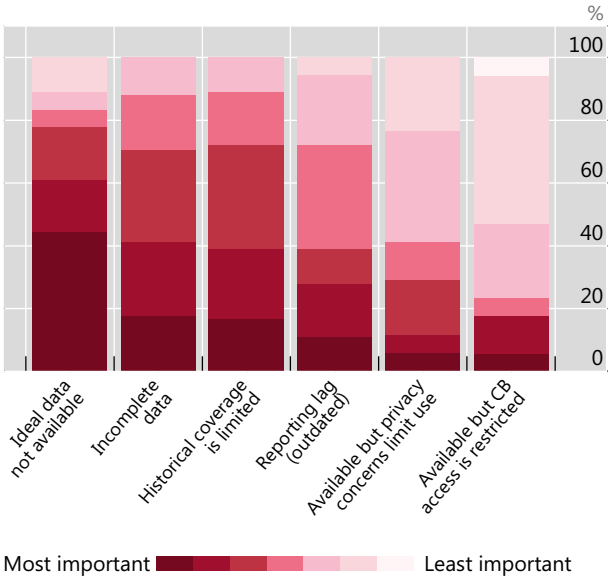
Benefits, risks and constraints of using granular data

Percentage of responses — Graph B2

A. Most useful attributes of granular data



B. Impediments or risks in the use of granular data



Sources: BIS survey for the 2025 Emerging Markets Deputy Governors meeting.

Annex C: Income concentration and monetary policy transmission

We empirically analyse the effects of income concentration on monetary policy transmission in two steps. First, the effects of monetary policy on aggregate real consumption growth are estimated with the following specification:

$$\Delta c_{i,t+h} = \alpha.\Delta c_{i,t} + \beta.IncShare_{i,t} + \gamma.mp_{shock_{i,t}}$$
$$+ \delta.[IncShare_{i,t}\ .\ mp_shock_{i,t}] + \lambda.controls_{i,t} + \phi_i + \varepsilon_{i,t}$$

where $\Delta c_{i,t+h}$ denotes real consumption growth in country i in quarter $t+h$, $IncShare_{i,t}$ denotes the share of the top decile in aggregate income, $mp_{shock_{i,t}}$ the monetary shock, $controls_{i,t}$ is a vector containing other time-varying control variables, ϕ_i controls for unobserved fixed heterogeneity in consumption growth across countries and $\varepsilon_{i,t}$ is the error term. In what follows, we report the results when the private credit-to-GDP ratio is included as a control variable, capturing credit expansion and acting as a proxy for financial development.[28]

Second, the effects on consumer price inflation are estimated through the specification:

$$\pi_{i,t+j} = \alpha.\pi_{i,t} + \beta.IncShare_{i,t} + \gamma.mp_{shock_{i,t}}$$
$$+ \delta.[IncShare_{i,t}\ .\ mp_shock_{i,t}] + \lambda.controls_{i,t} + \theta.ygap_{i,t} + \phi_i + \varepsilon_{i,t}$$

where $\pi_{i,t+j}$ denotes headline inflation in country i in quarter $t+j$, $ygap_{i,t}$ denotes the Hodrick-Prescott-based output gap and the remaining variables are as before.

Monetary policy shocks are calculated by Checo et al (2024) based on policy rate expectations collected from Bloomberg surveys, after removing any predictability based on macroeconomic and financial data that were available before monetary policy meetings. The sample is based on quarterly panel data for Brazil, Chile, Colombia, India, Mexico, the Philippines, Poland, Romania, South Africa and Thailand between 2000 and 2022.

Estimation results are shown in Graph C1. The unconditional effect of a surprise 25 basis points contraction is to reduce consumption growth by one percentage point within two years. When the specification is conditioned on the level of income inequality, it becomes clear that this effect is stronger when income concentration at the top is low and weaker when it is high (Graph C1.A).

Similarly, the unconditional effect of the same shock is to reduce inflation by 35 basis points within three years. Again, the effect is substantially stronger when income concentration is low (Graph C1.B). Further, the significant difference in effects holds irrespective of the level of economic slack (Graph C1.C).

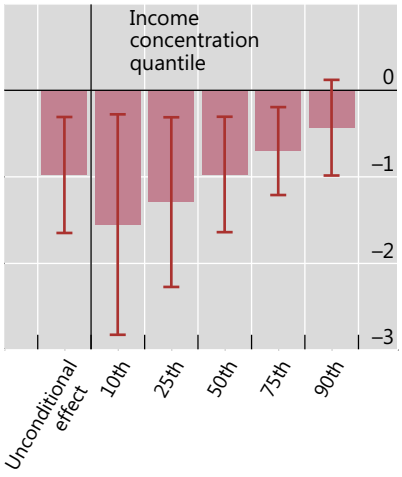
The results above are consistent with the notion that non-targeted stabilisation policies are less powerful when a very substantial portion of aggregate income is held by well-off agents, who tend to have a much lower propensity to consume than the average agent.

[28] Results are robust to the exclusion of the additional control variables in $controls_{i,t}$.

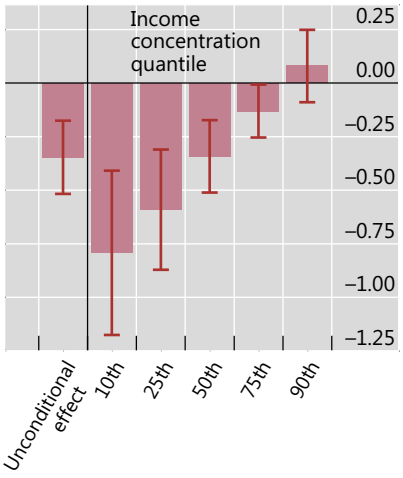
Effect of a 25 basis point contractionary monetary policy shock on consumption growth and inflation[1]

Graph C1

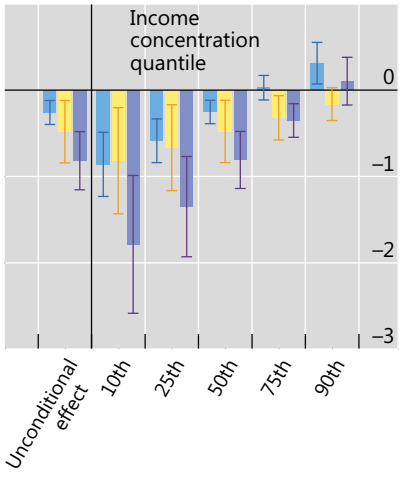
A. Effects on real consumption growth after eight quarters



B. Effects on inflation after 12 quarters



C. Effects on inflation by stage of business cycle



[1] Estimates based on linear projection models for real consumption growth eight quarters ahead and CPI inflation 12 quarters ahead. In the conditional model, the monetary policy shock is interacted with the deviation of the aggregate income share of the top 10% from its country-specific mean. Confidence intervals are based on Driscoll-Kraay standard errors.

Sources: Bloomberg; Checo et al (2024); Goldman Sachs; LSEG Refinitiv; HIS Markit; IPSOS; national data; BIS.