



# Inequality, heterogeneous agents, and the transmission channels of monetary policy: a survey

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## Abstract

This paper reviews the transmission channels of both conventional and unconventional monetary policy, including income composition, earnings heterogeneity, interest rate exposure, savings redistribution, inflation tax, portfolio composition, and household debt, with a focus on their impact on income and wealth inequality. The survey highlights the crucial role of household heterogeneity in shaping the transmission of monetary policy and its differential effects on income and wealth distribution. These effects operate through several factors, including the primary source of income, employment status, net debtor or net saver positions, differences in portfolio composition, and debt levels. The paper also discusses the shadow banking sector to illustrate the relationship between monetary policy and inequality in a complex financial system. Overall, the paper provides policymakers with a guide to the multifaceted nature of the monetary policy–inequality nexus, given the pervasiveness of household heterogeneity. It also suggests avenues for further research on the combined effects of different transmission channels using macroeconomic models suited to this purpose, such as agent-based models (ABM) with heterogeneous interacting agents.

**Keywords** Monetary policy · Inequality · Transmission channels

## 1 Introduction

In recent decades, income and wealth inequalities have widened in many developed countries, attracting significant attention from researchers and policymakers. This phenomenon has been extensively documented in various studies, including works by Piketty and Saez (2003), Dabla-Norris et al. (2015), Domanski et al. (2016) and Piketty

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et al. (2018). The macroeconomic implications of inequality, however, remain debated. While some contributions suggest that higher inequality may be associated with weaker economic performance, the strength and direction of this relationship depend on the mechanisms considered and on the institutional and macroeconomic context. In particular, Dabla-Norris et al. (2015) provide evidence of a negative relationship between the concentration of income among wealthy households and economic growth. One possible interpretation is that high inequality may constrain growth when it limits lower-income households' access to health care, education, and other opportunities for accumulating physical and human capital. In this sense, inequality may interact with existing barriers to human capital formation rather than acting as a simple or direct cause of lower growth. Moreover, high inequality may also contribute to social tensions and political pressures, potentially discouraging investment and fostering protectionist responses. Overall, these considerations suggest that inequality may influence macroeconomic outcomes through several channels, although these effects should be interpreted with caution, as their magnitude, direction, and persistence depend on the specific mechanisms at work and on the broader institutional and economic context.

Given the increasing focus on income and wealth disparities, central bankers have engaged in discussions regarding the potential redistributive effects of monetary policy. Indeed, monetary impulses are transmitted differently to households because of their heterogeneity, giving rise to various transmission channels. The existing literature has examined specific channels, such as the household debt channel (Alpanda and Zubairy 2019), the portfolio composition channel (Bach et al. 2016; Domanski et al. 2016), earnings heterogeneity and income composition channels (Coibion et al. 2017; Mumtaz and Theophilopoulou 2017), the marginal propensity to consume (Fisher et al. 2020), and the interest exposure channel (Tzamourani 2021). Some studies have instead reviewed these transmission mechanisms, as in Amaral (2017).

This paper aims to provide a comprehensive review of the transmission channels associated with both conventional and unconventional monetary policy, taking into account the presence of the shadow banking system and its interconnection with monetary policy and inequality. The review pays particular attention to household heterogeneity, which shapes the different effects of monetary policy across various income and wealth groups.

Monetary policy influences income and wealth inequality through a set of interconnected channels based on household heterogeneity. On the income side, the income composition and earnings heterogeneity channels are based on household differences in the primary source of income and employment status, respectively. They describe how lower interest rates stimulate aggregate demand and employment, allowing low- and middle-income households, whose earnings rely mainly on wages, to become employed and benefit from higher labour income, or to receive wages instead of unemployment benefits. This tends to reduce inequality, although the effect may be offset by rising capital gains that favour wealthier households with substantial financial assets.

The interest rate exposure or savings redistribution channel is based on household differences, particularly whether households are net savers or net debtors. When rates fall, debt-servicing costs decline for borrowers, while interest income falls for savers, temporarily improving the relative position of indebted or lower-income households.

Regarding wealth inequality, distributional effects arise through balance-sheet channels. The household debt channel reflects differences in leverage. Usually, middle-income households are the most indebted, so changes in interest rates can either relieve debt burdens or encourage additional borrowing through collateral and refinancing. At the same time, the portfolio composition channel operates as lower rates increase asset prices or incentivize households to accumulate more financial assets. This process may generate more unrealized capital gains, disproportionately benefiting high-wealth households with diversified portfolios and increasing wealth inequality.

Furthermore, we examine the distributional effects of unconventional monetary measures such as quantitative easing (QE). The *portfolio substitution* or *rebalancing channel*, the *signalling channel*, and the *bank financing channel* are analysed to explain the impact of QE on wealth distribution and borrowing costs for businesses. The review reports divergent perspectives within the literature, with some studies suggesting that unconventional measures can stimulate the economy by enhancing household wealth and investment, while others argue that these measures may contribute to greater wealth concentration among higher-income households, limiting the economic stimulus and potentially exacerbating inequality.

Monetary policy, inequality, and the shadow banking system are all interconnected. Monetary policy can foster the expansion of shadow banking during both tightening and easing phases. Recent contributions show that the expansion of shadow banking and non-bank financial intermediation has reshaped the transmission of monetary policy. In financial systems increasingly based on market-based finance, monetary policy no longer affects credit conditions only through regulated banks, but also through shadow money creation and non-bank lending outside the traditional banking sector. Xiao (2020) identifies a “shadow money channel” through which shadow banks expand money-like liabilities during monetary tightenings, thereby offsetting part of the contraction in commercial bank deposits. This mechanism suggests that shadow banking can weaken the traditional bank lending channel by providing alternative sources of liquidity when regulated banks reduce balance-sheet activity. Consistent with this view, Cucic and Gorea (2026) show that non-bank lenders increase credit supply after a monetary contraction, both relative to banks and in absolute terms. This implies that non-bank intermediaries may partly substitute for bank credit when banks restrict lending, thereby attenuating the contractionary effects of monetary policy through the conventional credit channel. However, shadow banking should not be interpreted simply as weakening monetary policy transmission. A more precise interpretation is that it may attenuate transmission along the traditional bank lending channel while amplifying transmission through asset-price, portfolio rebalancing, risk-taking, and financial fragility channels. In financialized economies, shadow banking may dilute the contractionary impact of monetary policy on bank credit while simultaneously strengthening its effects on leverage, liquidity mismatch, asset prices, and the accumulation of vulnerabilities outside the regulated banking sector. During periods of economic restriction, for example, the private sector increasingly relies on shadow banking entities that issue structured products, such as collateralised debt obligations (CDOs). Conversely, during periods of economic expansion, low interest rates encourage securitisation and the creation of assets such as mortgage-backed securities (MBS). The resulting expansion of shadow banking exacerbates inequality, as the returns from

these structured financial products flow from borrowers to high-wealth investors, who primarily hold these assets. This rising inequality then sustains demand for credit and complex financial instruments, thereby further enlarging the shadow banking system and modifying the transmission and distributive effects of monetary policy.

Overall, this paper contributes to the current macroeconomic literature by offering a comprehensive examination of the transmission channels of monetary policy and their relationship to income and wealth inequality, with an emphasis on inter-personal distribution. It also provides important insights for policymakers when making monetary policy decisions and a framework for future studies in which macroeconomic models should be able to incorporate a wider range of heterogeneity, as in agent-based models (ABMs). These models are particularly powerful in dealing with heterogeneity in different ways, as in Botta et al. (2021), compared to Heterogeneous Agent New Keynesian (HANK) models, which tend to focus on one or two channels at a time, as in Kaplan et al. (2018). ABMs allow direct interaction between agents, such as households and the banking sector, as well as imitation in consumption between individuals, which is a powerful tool for tracking the dynamics of inequality. Regarding heterogeneity, ABMs allow researchers to model it in different ways, such as through differences in income sources, indebtedness, and portfolio decision-making processes, which are useful for understanding the different transmissions of macroeconomic policies. In particular, compared to existing work on the transmission channels of monetary policy (Mumtaz and Theophilopoulou 2017; Casiraghi et al. 2018; Alves and Silva 2020; Slacalek et al. 2020; Zungu and Greyling 2022), a simulation model such as an ABM can also be useful not only for studying how each individual transmission channel shapes the effects of macroeconomic policy on inequality, but also for understanding the joint effects of these transmission channels.

The paper is structured into five sections. The first two sections examine the potential causes of income and wealth inequality. The third section concentrates on the transmission channels of monetary policy, considering both conventional and unconventional measures. The fourth section analyses the implications of shadow banking, shedding light on its definition and its interactions with monetary policy and inequality. Finally, the fifth section provides some concluding remarks.

## 2 Income and wealth inequality

Income and wealth inequality have risen steadily in most advanced economies over the past four decades (Piketty and Saez 2003; Dabla-Norris et al. 2015; Piketty et al. 2018; Domanski et al. 2016). While some degree of inequality may stimulate innovation and human capital accumulation, persistent disparities in earnings and wealth accumulation tend to weaken aggregate demand and thereby reduce long-term growth (Dabla-Norris et al. 2015). Empirical evidence confirms that income concentration among the top 20% of earners is negatively correlated with growth, whereas higher income shares for the middle and lower classes support consumption and investment, fostering economic stability.

A number of structural forces underpin these long-run trends. The most evident is the decoupling between productivity and wages observed since the 1980s (Fig. 1).

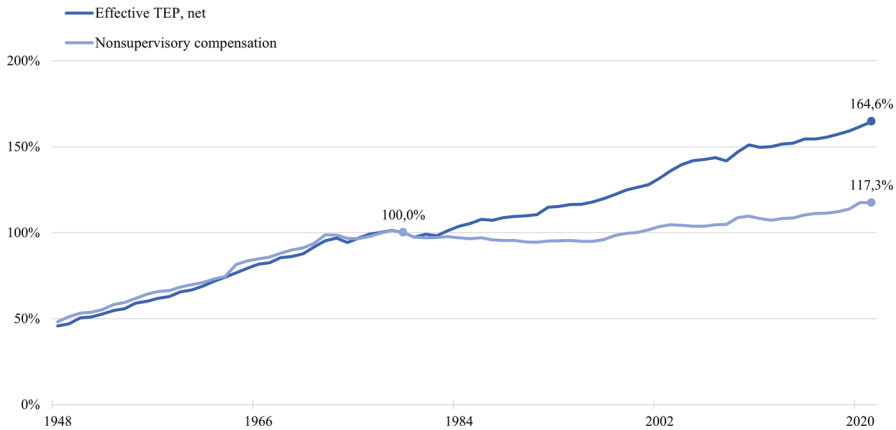


**Fig. 1** Gap between productivity and typical worker's compensation, 1948–2021. *Note:* Index 1979 = 100 on the horizontal axis. Compensation for production or non-supervisory workers is based on wages and benefits in the private sector. Net productivity is the growth of output of goods and services less depreciation per hour worked. *Source:* Reproduced with data from EPI analysis *The Productivity–Pay Gap* (<https://www.epi.org/productivity-pay-gap/>). The article refers to Bivens and Mishel (2015), figure A

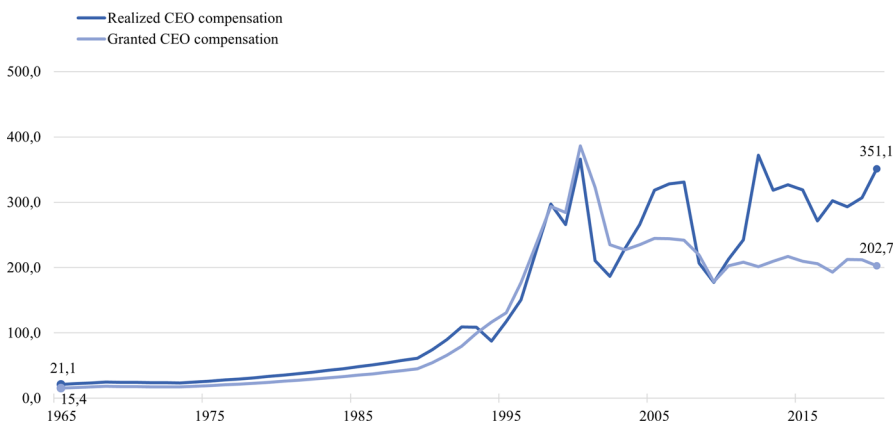


**Fig. 2** CEO-to-worker compensation ratio, 1965–2020. *Note:* Average annual compensation for CEOs at the top 350 U.S. firms. Granted CEO compensation includes salary, bonuses, and long-term incentive payouts, as well as the value of stock options and stock awards. Realised CEO compensation is salary, bonus, long-term incentive payout, and the value of stock-related components accrued on options or stock awards. Worker compensation is the average annual wages and benefits of a full-time, full-year non-supervisory worker (typical worker) in the industries in which the top 350 firms operate. *Source:* Reproduced from Figure A in Mishel and Kandra (2021)

While productivity has continued to rise, the compensation of typical workers has stagnated, implying that the gains from growth have disproportionately accrued to capital owners and top earners (Cooper and Mishel 2015; Gordon 2014). The sharp increase in executive compensation (Fig. 2) has further accentuated this gap: in the

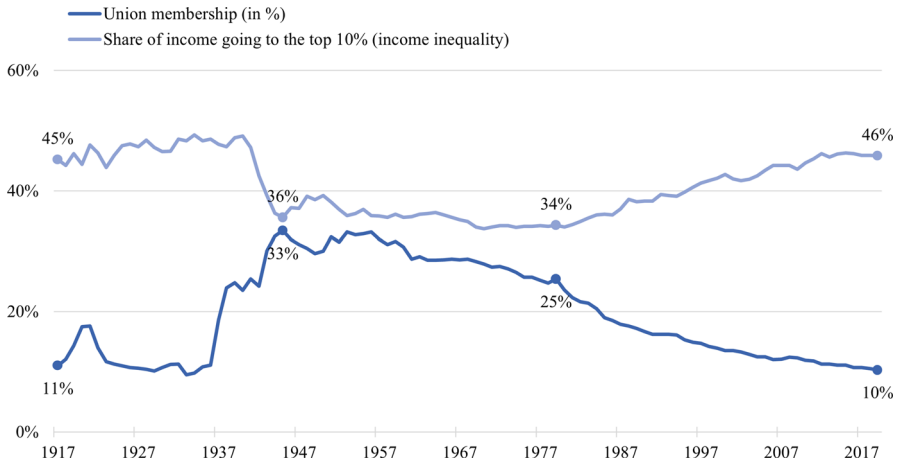


**Fig. 3** Union membership and share of income going to the top 10%, 1917–2019. *Source:* Reproduced from Figure A in *Unions help reduce disparities and strengthen our democracy*. (<https://files.epi.org/uploads/226030.pdf>) The article refers to Shierholz (2019), Figure B

United States, the CEO-to-worker pay ratio rose from roughly 20 times the compensation of the average worker in 1965 to over 350 times by 2020 (Mishel et al. 2015; Mishel and Kandra 2021).

Institutional changes have exacerbated these dynamics. The decline in union membership (Fig. 3) has eroded workers' bargaining power, putting downward pressure on median wages while allowing income shares at the top to increase (Stiglitz 2019; Shierholz 2019). Similarly, the erosion of real minimum wages has contributed to lower incomes for low- and middle-income households, thus limiting wage growth for low-income workers. Furthermore, less progressive fiscal policies, through reductions in corporate and estate taxation, have favoured the accumulation of disposable income among the wealthiest (Piketty and Saez 2007; Piketty et al. 2018; Stiglitz 2019).

At the same time, technological change and globalisation have altered the demand for skills, rewarding high-skilled workers, who are usually richer, and capital-intensive firms, while reducing employment opportunities and wage levels for low-skilled workers, who are typically poorer, thus expanding income inequality (Stiglitz 2019).

These structural forces interact to generate and reinforce wealth inequality. Income concentration leads to unequal saving capacity and asset accumulation (Hubmer et al. 2017; Saez and Zucman 2016). As income inequality rises, high-income households can save a larger proportion of their earnings, which accelerates the concentration of wealth and produces a self-reinforcing "snowball effect" (Domanski et al. 2016). Furthermore, wealthier households tend to receive higher returns on capital, since they invest a greater proportion of their portfolios in long-term and riskier financial assets, which pay higher returns (Campanale 2007; Calvet et al. 2015; Gomez et al. 2016; Kuhn et al. 2020). This asymmetry in saving and return rates amplifies wealth polarisation over time.

In addition, portfolio heterogeneity exacerbates inequality by exposing different households to varying degrees of asset-price dynamics and capital gains. Wealthier households typically hold diversified portfolios concentrated in equities and business ownership, which increase in value during economic expansions and generate substantial unrealised capital gains. In contrast, middle- and low-income households tend to have portfolios concentrated in housing and deposits. These assets yield lower returns and are more vulnerable to financial downturns (Wolff 2014; Garbinti et al. 2017; Wei et al. 2019). Following the 2007–2008 financial crisis, the collapse in housing prices led to the loss of much of the middle class’s wealth, while the top decile recovered rapidly thanks to their more diversified portfolios, which yielded higher financial returns, as shown by Kuhn et al. (2020).

Finally, fiscal policy contributes to shaping long-term wealth dynamics. Lower progressivity in income and estate taxation allows richer households to retain higher after-tax income, which, combined with their greater propensity to save, accelerates capital accumulation and spreads wealth inequality (Cagetti and De Nardi 2008; Piketty et al. 2018).

In a nutshell, income and wealth inequality are intertwined phenomena sustained by feedback mechanisms. For instance, unequal labour earnings result in unequal saving and investment capacity, while diversified portfolios consisting mainly of high-return assets exacerbate wealth disparities. These structural imbalances form the context in which monetary policy is transmitted, influencing its effects through household heterogeneity and ultimately shaping distributional outcomes once again.

### 3 Transmission channels of monetary policy

The transmission of monetary policy plays a crucial role in shaping income and wealth inequality. The impact of monetary policy can vary across households due to their heterogeneity, leading to different transmission channels. The literature has identified various channels through which both conventional and unconventional monetary policies affect the economy, thereby influencing income and wealth inequality.

To establish a structured discussion of the main transmission channels of monetary policy, we start with a definition of disposable income and net worth, as outlined by Kappes (2023):

$$\begin{aligned}\text{Disposable income} &= \text{Net wages} + \text{Transfers} + \text{Interests} + \text{Business profits} \\ &\quad + \text{Capital gains} - \text{Debt payments} \\ \text{Net Wealth} &= \text{Shares} + \text{Bonds} + \text{Deposits} + \text{Housing} - \text{Debts}\end{aligned}$$

Net wages refer to income earned from labour after taxes on wages have been deducted. Transfers encompass government subsidies such as pensions and unemployment benefits. Interest income arises from bank deposits and government bonds, while business profits stem from stock dividends. Capital gains denote the appreciation in the value of assets such as real estate, bonds, and stocks. Shares represent household holdings in the financial and non-financial sectors. Bonds encompass corporate and

government securities, while debt consists of both short-term and long-term borrowing, such as loans, residential mortgages, or auto loans. The following sections describe the transmission channels through which monetary policy impulses are transmitted to the economy, changing households' disposable income and net worth.

### 3.1 Conventional monetary policy

In the context of conventional monetary policy, several theoretical channels affecting mainly income or wealth inequality have been examined (Amaral 2017; Coibion et al. 2017; Guerello 2018; Colciago et al. 2019; Luettkie 2021). Transmission channels arise from differences among households, and this heterogeneity affects the transmission of monetary policy, which is transmitted differently across families, either increasing or reducing inequality. Inequality, in turn, emphasises the differences among households.

Channels such as income composition, earnings heterogeneity, and savings redistribution directly affect income inequality, with a second-order effect on wealth inequality that is mediated by other channels. The *income composition channel* and the *earnings heterogeneity channel* are sometimes interconnected. Indeed, the *income composition channel* refers to differences in the main source of income. For instance, lower-income households rely more on transfers, such as unemployment benefits and pensions, while middle-income households primarily earn labour income. High-income households, on the other hand, rely heavily on financial income, such as interest on bonds, dividends on stocks, and capital gains. The *earnings heterogeneity channel*, instead, focuses on heterogeneity in labour market status, namely employment versus unemployment. Thus, if the policy rate is lowered to stimulate investment and consumption, and therefore economic growth and employment, through the lens of the *earnings heterogeneity channel*, middle- and low-income households receive higher wage income instead of unemployment benefits, which can reduce inequality between middle- and higher-income groups (Amaral 2017; Casiraghi et al. 2018; Colciago et al. 2019). However, if firms choose to replace low-skilled workers with high-skilled ones, the reduction in income inequality resulting from an expansionary policy may be limited (Colciago et al. 2019).

Furthermore, income inequality could rise if richer households experience an increase in capital gains. Thus, considering the earnings heterogeneity channel together with the income composition channel, income inequality can rise if capital income increases more than labour income for low- and middle-income households.

Another key mechanism for studying income inequality is to examine what happens to financial flows by comparing financial income and debt through the lens of the *savings redistribution channel* (Casiraghi et al. 2018; Coibion et al. 2017; Igan et al. 2021) or the *interest rate exposure channel* (Auclert 2019; Ampudia et al. 2018; Tzamourani 2021; Colciago et al. 2019). These channels are based on differences in households' positions as net savers or net debtors and are useful for analysing the direct effects on interest receipts and debt payments following changes in interest rates (Ampudia et al. 2018; Kappes 2023). Indeed, a decrease in the policy rate directly lowers interest income for net savers, who are often wealthier households, while net

debtors, who are often middle-income households with loans, see their debt-service costs decline, boosting disposable income and possibly lowering inequality.

The *inflation tax channel*, also known as the Fisher channel (Auclert 2019), erodes the real value of assets and liabilities, leading to a redistribution of wealth from lenders to borrowers and thus reducing wealth inequality (Doepke and Schneider 2006; Amaral 2017; Auclert 2019; Alves et al. 2022). Indeed, it decreases the real value of assets for net savers, who are lenders, and also lowers the real value of debt for net debtors, who are borrowers. Additionally, inflation can exacerbate income inequality (Albanesi 2007; Colciago et al. 2019). Amaral (2017) and Erosa and Ventura (2002) argue that expected inflation can be seen as a consumption tax that increases income inequality. In fact, it reduces real income available for purchases, particularly for households that rely more on wage income or public transfers to consume, usually low- and middle-income households, relative to richer households, which usually also receive income from financial assets and hold more of these assets than low- and middle-income classes.

The *portfolio composition channel* (Campanale 2007; Wei et al. 2019; Fuller et al. 2020; Kuhn et al. 2020; Domanski et al. 2016) arises from differences in households' portfolio structures. Wealthier households typically hold diversified portfolios containing risky assets with longer maturities, while low- and middle-income households mainly hold deposits, cash, and real estate (Campanale 2007; Domanski et al. 2016; Gomez et al. 2016; Kuhn et al. 2020; Wei et al. 2019). Assets with longer maturities or higher risk premia, such as long-term government bonds, corporate bonds, or equities, are more price-sensitive, while short-term deposits or cash equivalents are largely unaffected. Because wealthier households tend to hold a greater share of these interest-sensitive assets in their portfolios, they may experience larger valuation changes when policy rates move. In contrast, lower-income households' portfolios, whose wealth is mostly concentrated in deposits or housing, react less to such price movements. Thus, the portfolio channel illuminates how monetary policy affects financial asset prices and how wealth accumulation changes after movements in the policy rate, thereby shaping wealth distribution due to heterogeneous household portfolio compositions (Colciago et al. 2019; Coibion et al. 2017). When the central bank lowers its policy rate or purchases securities in the open market, it increases liquidity in the banking system. Commercial banks, now holding excess reserves, rebalance their portfolios by purchasing other financial assets, such as government and private bonds. This rise in demand raises the prices of these assets and pushes their yields downward. The increased liquidity and lower yields thus create a self-reinforcing mechanism: higher asset prices and lower returns in one market segment prompt investors to seek returns elsewhere, extending the cycle of price appreciation and yield compression. Indeed, investors shift towards corporate bonds, mortgage-backed securities, and other credit products, such as equities, that look relatively more attractive. This cascading dynamic leads to an increase in the demand for, and therefore the prices of, these more remunerative financial assets, while their yields compress (Nawabi 2019; d'Amico et al. 2012). The reduction in the policy rate, moreover, compresses borrowing costs. In turn, lower mortgage rates stimulate credit demand and housing purchases, driving up house prices (Kuhn et al. 2020; Fuller et al. 2020). Thus, following the reduction in the policy rate, households positioned at the top of the wealth distribution, whose portfolios contain

larger shares of these financial assets, accrue significant unrealized capital gains due to higher financial asset values, whereas lower-income households holding primarily deposits or cash see little benefit and often face declining interest income. On the other hand, the extent to which housing wealth moderates or exacerbates these disparities depends on the distribution of homeownership: where ownership is broadly distributed, rising home values can offset some inequality (Mian et al. 2013; Adam and Tzamourani 2016; Hedlund et al. 2017), while in economies where property is concentrated among high-wealth households, housing booms reinforce the unequal distribution of wealth. Thus, while monetary easing supports aggregate demand, it tends to increase wealth inequality through asset revaluation effects concentrated among wealthier groups.

The *household debt channel* (Voinea et al. 2018; Cloyne et al. 2020) highlights how changes in interest rates affect households differently depending on their initial debt levels. Middle-income households often carry more mortgage debt (Domanski et al. 2016; Kuhn et al. 2020). Voinea et al. (2018) finds that lower-income individuals have lower levels of debt due to income constraints, so they have a weaker reaction to monetary policy decisions compared to other income groups. In contrast, the middle-income class is typically more indebted and often holds adjustable-rate loans, making it more responsive to monetary policy (Casiraghi et al. 2018; Voinea et al. 2018; Bartscher et al. 2020). If interest rates drop, these households can refinance or borrow more at cheaper rates, or extract equity by leveraging the increase in housing values (Alpanda and Zubairy 2019), leading to greater indebtedness. Over-indebted households, instead, may reduce borrowing or use extra cash to pay down debt, limiting the consumption stimulus (Alpanda and Zubairy 2019).

The *heterogeneity of marginal propensities to consume (MPCs)* is a key determinant of how monetary policy affects aggregate demand and inequality. The overall effect of a policy shock depends on which households receive income or wealth gains: its expansionary power is stronger when those households have higher MPCs (Auclert 2019). Empirical evidence consistently shows that MPCs are negatively correlated with income and liquid wealth (Drescher et al. 2020; Carroll et al. 2017; Kaplan et al. 2018; Fisher et al. 2020; Lueticke 2021), but often positively correlated with debt levels (Cloyne et al. 2020). Low-income and liquidity-constrained households are often hand-to-mouth and spend most of any additional disposable income because they lack savings buffers and face tight borrowing limits (Kaplan et al. 2018). Even if they own illiquid assets such as housing, they cannot easily convert them into cash for daily expenses. In contrast, high-income households can smooth consumption over time. The relationship between debt and MPCs depends on the nature of indebtedness. Moderately indebted households tend to have higher MPCs because interest rate reductions lower their debt-service burden, freeing up disposable income that is immediately spent on consumption rather than saved, highlighting a positive correlation between household debt and MPCs (Cloyne et al. 2020). However, other studies, such as Jappelli and Pistaferri (2014), argue that heavily indebted households may use extra income to repay debt, showing lower MPCs and thus a negative correlation between household debt and MPCs. Thus, a reduction in interest rates can raise disposable income and stimulate consumption, particularly among liquidity-constrained or moderately indebted households with high MPCs. However, the aggregate outcome of monetary easing is not uniform. Its effectiveness depends on how the additional

income is distributed across households. If the gains accrue mainly to high-income or high-wealth groups with lower propensities to consume, the overall expansionary effect on aggregate demand may be limited.

Table 1 offers a summary of these transmission channels of monetary policy.

### 3.2 Interrelations and feedback loops among channels

Monetary policy channels do not operate in isolation; rather, they interact with each other in complex, mutually reinforcing ways. For instance, when interest rates fall, the earnings and income composition channels are activated, as lower rates reduce debt-servicing costs for indebted households and interest income for wealthy households through the savings redistribution channel, while also stimulating aggregate demand. This leads to increased employment and labour income, particularly among low- and middle-income households. There are also interactions between the portfolio composition channel, the savings redistribution channel, and the household debt channel. Lower interest rates raise the prices of housing and other long-term assets. Higher house values increase collateral capacity, facilitating refinancing or further borrowing and affecting wealth distribution. At the same time, the decision to increase debt, through the household debt channel, can lead to higher indebtedness and interest payments, which counterbalances the reduction in debt-servicing costs highlighted by the savings redistribution channel. This affects the response of earnings and, consequently, income through the earnings and income composition channels. Furthermore, higher asset values could increase wealth inequality. However, higher income could also lead to greater asset accumulation. If this second scenario prevails, it could generate more financial income on savings. This can affect the income composition channel, as well as consumption, employment, and the earnings heterogeneity channel.

Conversely, an increase in the policy rate leads to higher interest payments for the most indebted households through the savings redistribution channel and increases financial income for richer households. This directly reduces disposable income, mainly affecting indebted, low-income households with a high marginal propensity to consume. Lower consumption leads to lower labour demand and rising unemployment. This propagates through the earnings and income composition channels, lowering wage income and increasing income inequality. Higher unemployment can push vulnerable households to borrow more in order to sustain consumption. This increases interest-payment burdens and further reduces disposable income, thus extending the feedback loop for the income composition channel and potentially exacerbating wealth inequality. As disposable income and savings fall, asset accumulation slows for the households most affected by unemployment. This could reinforce wealth inequality, although lower asset values could also mitigate wealth inequality if they affect richer households more. If wealth accumulation decreases more than capital gains fall, this subsequently lowers financial income from savings, affecting the income composition channel and further reducing consumption and employment. This perpetuates the cycle, as shown in more detail in Fig. 4.

Several distributional channels respond more immediately to conventional monetary policy changes than others. Among these, the earnings heterogeneity and income

**Table 1** Transmission channels of monetary policy

| Channels                                                               | Initial heterogeneity                                                                                                                                                                                                      | Effects of $i \downarrow$                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>I. Channels primarily affecting income inequality</i>               |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Income composition and earnings heterogeneity</i>                   | Source of income: Low-income rely more on labour income, high-income rely more on financial income<br><br>Employment status                                                                                                | Demand, output and employment $\uparrow$<br><br>Low/middle income/low skilled: wages $\uparrow$ , inequality $\downarrow$<br>High income/high skilled: wages $\uparrow$ , capital income $\uparrow$ , inequality $\uparrow$<br>Net effect: depends who is employed the most and what income sources prevail in aggregate                                                                                                                                     |
| <i>Saving redistribution</i>                                           | Net position (debtors vs. savers)                                                                                                                                                                                          | Low-middle income/ most indebted: debt-servicing costs $\downarrow$ , inequality $\downarrow$<br>High income/less indebted: interest income $\downarrow$ , inequality $\downarrow$<br>Net effect: inequality $\downarrow$                                                                                                                                                                                                                                    |
| <i>II. Channels primarily affecting wealth inequality</i>              |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Portfolio composition and Household debt</i>                        | Portfolio composition: Low-income rely more on cash, deposit, housing, high-income rely more on financial assets<br><br>Debt: Low-income with high debt, high-income with low debt                                         | Prices of assets (equities, bonds, housing) $\uparrow$<br><br>Low-middle income/ most indebted: debt $\uparrow$ or $\downarrow$ , inequality ?<br>Gain if housing price $\uparrow$ , inequality $\downarrow$<br>If they have more income can accumulate more assets, inequality $\downarrow$<br>High income/wealthy: gain from if assets values $\uparrow$ , inequality $\uparrow$<br>Accumulate more assets, inequality $\uparrow$<br>Net effect: ambiguous |
| <i>III. Channels affecting income inequality and wealth inequality</i> |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Inflation tax channel</i>                                           | Source of income: Low-income rely more on labour income, high-income rely more on financial income<br><br>Portfolio composition: Low-income rely more on cash, deposit, housing, high-income rely more on financial assets | Low-middle income/net debtors: real value of debts $\downarrow$ , inequality $\downarrow$<br><br>High income/net savers: real value of assets $\downarrow$ but they can hedge transferring assets abroad, inequality ?<br><br>Purchasing power loss for all, particularly for low-income households<br>Net effect: ambiguous on wealth inequality, income inequality may rise                                                                                |

The table summarises how monetary policy affects income and wealth inequality through different transmission mechanisms

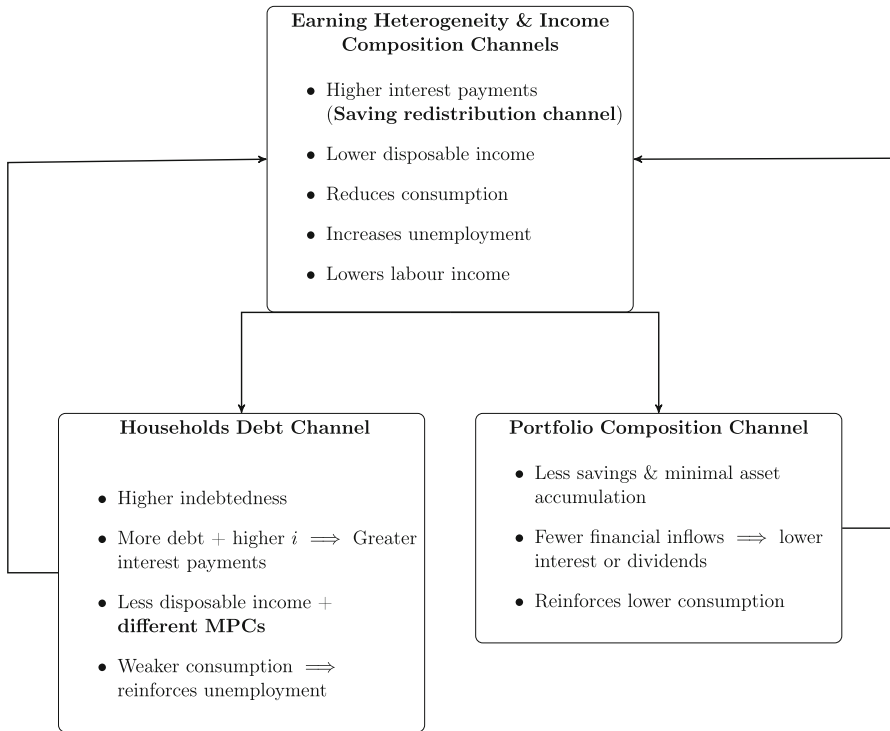


**Fig. 4** Feedback loops of transmission channels after interest rate hikes

composition channels operate on the quickest timescale, causing changes in employment and wage dynamics (Auclert 2019; Amaral 2017). For instance, when the central bank lowers the policy rate, the ensuing economic stimulus can raise labour demand and wages, especially for lower- and middle-income households that may previously have relied on transfers or unemployment benefits (Colciago et al. 2019; Coibion et al. 2017). Simultaneously, the savings redistribution/interest rate exposure channel plays out rapidly because a policy rate change immediately affects net interest payments and net interest income: lower rates reduce the interest income of net savers and ease debt-service burdens for net borrowers. Ampudia et al. (2018) and Tzamourani (2021) provide evidence of this quick resource reallocation across households with heterogeneous balance sheets.

In contrast, other channels unfold more gradually. The household debt channel, for instance, involves changes in borrowing, mortgage refinancing, equity extraction, and collateral capacity; these adjustments require several quarters or even years to materialise. For example, Alpanda and Zubairy (2019) and Cloyne et al. (2020) emphasise that the effects of lower interest rates on indebted households through refinancing and collateral work through over time. Furthermore, on the asset side, Domanski et al. (2016), Kuhn et al. (2020) and Adam and Tzamourani (2016) document that asset-price effects accumulate over several quarters or years. For instance, housing supply is inelastic in the short run, so housing price gains and wealth accumulation

among homeowners are slow to appear. These slower channels are therefore more relevant for wealth inequality than for immediate income redistribution. Empirical studies employing panel data, micro-level datasets, and dynamic structural models confirm these responses. While immediate cuts in interest rates can lower unemployment and boost low-income households' earnings within a few months (Mumtaz and Theophilopoulou 2017; Fisher et al. 2020), measurable changes in wealth inequality through portfolio rebalancing or housing market adjustments may not be evident until several quarters or years later.

Evidence indicates that labour income channels dominate in the short run. Coibion et al. (2017) show that monetary policy rapidly affects income inequality through earnings heterogeneity and income composition, as employment and wages respond quickly. Similar conclusions are drawn by Mumtaz and Theophilopoulou (2017), while Kaplan et al. (2018) emphasise that small wage changes have large distributional effects given the central role of labour income. Auclert (2019) further highlights the direct effects of earnings heterogeneity and the interest rate exposure channel, which Cloyne et al. (2020) show to operate immediately through debt-servicing adjustments, especially for leveraged households. Over time, however, the balance-sheet and portfolio channels become more relevant. Asset prices, refinancing, and borrowing decisions adjust gradually, and these slower mechanisms are identified by Coibion et al. (2017) as central to the evolution of wealth inequality.

### 3.3 Differences in monetary transmission channels among countries

The distributional consequences of monetary policy are highly context-dependent. Differences in labour share, household balance-sheet structures, financial market development, and welfare redistributive capacity imply that the same monetary intervention can produce different inequality outcomes across countries.

In labour-intensive economies, expansionary monetary policy generally improves employment prospects for vulnerable households and may therefore reduce income inequality. Empirical studies confirm this mechanism: Cloyne et al. (2020) show that in the United States and the United Kingdom, the consumption response to lower interest rates is mainly driven by mortgagors and renters, who typically hold very little liquid wealth and display a high marginal propensity to consume. By stimulating firm investment and household spending, lower interest rates raise household income for all groups, but translate into higher consumption only for households with low liquid wealth. Furceri et al. (2018) show that countries with a higher labour income share experience stronger increases in inequality when policy tightens, and that redistributive policies are able to attenuate the widening of net inequality. Relatedly, Hafemann et al. (2018) highlight that in countries where monetary policy primarily boosts capital income rather than labour income, such as Canada, easing can actually exacerbate income inequality, despite modest improvements in employment.

Thus, in general, expansionary monetary policy can stimulate employment and reduce inequality by raising labour income. However, it can also increase inequality because it favours those who receive income from capital over those who receive income mainly or solely from labour. Nevertheless, countries with high redistribution,

such as those with a strong welfare state, progressive transfers, and relatively high capital taxation, mitigate the increase in net inequality induced by expansionary monetary policy, as is the case in Norway. Conversely, in countries such as Canada, the impact on labour income relative to capital income is small because capital owners profit disproportionately from expansionary monetary policy in countries with less redistribution. Furthermore, institutional differences in household debt contracts further shape transmission. Where adjustable-rate mortgages dominate, as in Spain and partly in Italy, monetary shocks feed quickly into disposable income through cash-flow and interest-rate exposure effects. Where fixed-rate mortgages prevail, as in France and Germany, the immediate cash-flow impact is attenuated.

Amputia et al. (2018) show that cross-country differences in mortgage design, such as the prevalence of adjustable-rate mortgages (ARM) in Spain versus fixed-rate mortgages (FRM) in Germany, produce strikingly different cash-flow transmission and therefore different inequality outcomes. When rates fall, leveraged households in ARM-dominant economies experience an immediate easing of debt burdens and a consumption stimulus relative to FRM-dominant economies. This evidence suggests that the direct effect of a reduction in monetary policy rates on indebted households should be stronger in countries where households are highly indebted at variable rates. This argument is also supported by Di Maggio et al. (2017), who show that areas with a larger share of ARMs are more responsive to lower interest rates and experienced a relative decline in defaults and an increase in house prices, car purchases, and employment, in turn producing effects on both income and wealth inequality.

Monetary shocks also affect the distribution of wealth through changes in asset prices, leverage dynamics, and debt-servicing costs. In the euro area, Adam and Tzamourani (2016) document that price increases in equities and bonds disproportionately benefit households at the top of the wealth distribution, where participation in financial markets is concentrated, whereas housing price gains tend to favour the median homeowner. Similar results are found by O'Farrell and Rawdanowicz (2017). This suggests that in market-based systems with high participation in risky asset markets, such as the United States, the United Kingdom, and the Netherlands, the portfolio valuation channel tends to raise wealth inequality, while in bank-based systems with high homeownership and limited equity market access, such as Italy and Spain, housing wealth may have neutral effects on wealth inequality.

### 3.4 Unconventional monetary policy

The relevance of the distributional effects of unconventional monetary measures in the context of increasing income and wealth inequality has become a prominent topic in policy debates. Under normal circumstances, central banks typically respond by adjusting the short-term interest rate using conventional monetary policy tools. However, during the Great Recession, when short-term interest rates reached the Zero Lower Bound (ZLB), conventional measures became ineffective, since interest rates could not be lowered further. Consequently, central banks resorted to unconventional monetary policies, aiming to stimulate economic recovery through lower long-term

real interest rates. Unconventional monetary measures are aimed at improving financial conditions by facilitating lending, supporting business investment and consumer spending, and thus preventing deflationary scenarios. Unconventional monetary policy can take various forms, as summarised by Bernanke and Reinhart (2004), Joyce et al. (2012) and Nawabi (2019), including forward guidance, operations that change the composition of the central bank's balance sheet, such as Operation Twist, and operations that expand the central bank's balance sheet.

*Forward guidance* is employed by central banks to influence investors' expectations of future short-term interest rates. By establishing a credible commitment, central banks can affect economic activity and asset prices, as the anticipated path of short-term interest rates influences long-term interest rates. *Operation Twist* does not involve an expansion of the central bank's balance sheet. Through this approach, the central bank can sell short-term assets and use the proceeds to purchase longer-term securities, thereby reducing the term premium or default risk associated with the remaining long-term financial assets in the market. Since sales and purchases are equal, the size of the central bank's balance sheet remains unaffected by these operations.

*Quantitative easing* (QE) is another type of unconventional monetary policy that expands the central bank's balance sheet. QE relies on the "quantity" of securities purchased by the central bank. Under this policy, the central bank expands its balance sheet by adjusting the size of its holdings of financial assets through securities purchases and sales. For example, when the central bank purchases assets, the securities purchased correspond to the increase in liabilities, represented by higher private sector deposits and reserves. The impact of unconventional monetary policy on income and wealth inequality is a subject of debate in the literature. To study how unconventional stimulus affects inequality, it is crucial to examine the channels through which an expansion of the central bank's balance sheet, such as QE, influences long-term interest rates and asset prices. The literature has identified several channels: the portfolio substitution or rebalancing channel, the local supply or scarcity channel, the signalling channel, the arbitrage channel, and the bank funding channel.

The *portfolio substitution or rebalancing channel* operates as follows: when central banks purchase long-term securities, such as government bonds, agency mortgage-backed securities, or corporate bonds, investors shift their investments from long-term assets to short-term assets, such as bank deposits, and then use the proceeds from asset sales to acquire other long-term assets, including government bonds, equities, or corporate bonds, thereby lowering their yields (d'Amico et al. 2012; Nawabi 2019; Lhuissier and Szczerbowicz 2022).

This channel can be further examined through sub-channels: Krishnamurthy and Vissing-Jorgensen (2011) divide it into the duration risk channel, the default risk channel, the prepayment risk channel, and the safety channel. These four channels allow for a better understanding of the impact of non-standard measures on the interest rates and values of each security.

Following the *duration risk channel*, when the central bank buys long-term assets, investors may reallocate their portfolios towards other long-term securities, thereby reducing the overall duration risk in the market. Indeed, long-term securities are riskier than short-term ones, since a short-term bond will be affected for a shorter period by interest rate changes than a long-term bond. Thus, the central bank's QE policy reduces

the risk premium component of longer-term securities, causing bond yields to decline (Krishnamurthy and Vissing-Jorgensen 2011; d'Amico et al. 2012; Joyce et al. 2012; Bauer and Rudebusch 2014; Engen et al. 2015; Andrade et al. 2016; Kuang et al. 2020).

The *default risk channel* reduces the default risk premia associated with lower-rated bonds, such as corporate bonds. For instance, after the central bank purchases long-term securities through a policy such as the Corporate Sector Purchase Programme (CSPP), investors who have a preference for long-term assets may replace the long-term securities sold with corporate bonds. This shift reduces firms' default risk, since they receive increased liquidity, leading to lower risk premia on corporate bonds (Krishnamurthy and Vissing-Jorgensen 2011; Joyce et al. 2012; Nawabi 2019; Lhuissier and Szczerbowicz 2022).

Krishnamurthy and Vissing-Jorgensen (2011) also discuss the prepayment risk channel and the safety channel. The *prepayment risk channel* focuses on the central bank's purchase of mortgage-backed securities (MBS). Since MBS interest rates incorporate the risk of mortgage prepayment, when QE increases the demand for MBS, the prepayment risk decreases for those holding these securities, resulting in lower yields.

The *safety channel*, instead, relies on the effect of central bank purchases of safer assets on their interest rates. Thus, when the central bank purchases safer securities, such as Treasury and agency bonds, it reduces the availability of these low-default-risk assets in the market. Investors with a preference for low-default-risk assets then increase demand for the remaining safe assets in the market, causing their yields to decrease.

d'Amico et al. (2012) describe the portfolio substitution or rebalancing channel as a scarcity channel because the central bank's acquisition of assets can be seen as withdrawing long-term securities from the private sector. As a result, the value of the remaining securities increases, leading to a decrease in their interest rates.

The *signalling channel* affects interest rates on all securities (Krishnamurthy and Vissing-Jorgensen 2011; d'Amico et al. 2012; Bauer and Rudebusch 2014; Engen et al. 2015; Andrade et al. 2016; Kuang et al. 2020). The announcement of long-term securities purchases by the central bank signals a commitment to maintaining low policy rates, implying a decline in short-term interest rates. Since the average of short-term interest rates affects long-term interest rates, the yields on long-term bonds are also reduced. Another important effect of central bank purchases is the change in the value of short-term bonds and stocks, which is studied through the *arbitrage channel* (Bauer and Rudebusch 2014; Tooze 2018). As QE lowers long-term yields, arbitrageurs can redirect their investments to other financial assets, such as equities, thereby increasing their prices. Joyce et al. (2012) examine the influence of central bank purchases on banks' willingness to expand credit through the *bank financing channel*. As primary dealers, commercial banks buy financial assets from mutual and investment funds and sell them to the central bank. Investment funds can increase their deposits in commercial banks, which can then transfer a portion of these increased liabilities to the central bank in the form of reserves by selling securities. Since commercial banks have more reserves, if their reserve holdings exceed their demand for liquidity,

they may be more willing to lend, including through riskier loans, while also lowering lending interest rates.

Several articles argue that unconventional monetary policies generate positive effects that contribute to economic recovery and have the potential to reduce income and wealth inequality (Casiraghi et al. 2018; Eberly et al. 2019; Hohberger et al. 2020; Cui and Sterk 2021). According to Hohberger et al. (2020), the purchase of long-term bonds, for instance through the Corporate Sector Purchase Programme (CSPP), raises their prices and lowers their yields. This leads to an increase in wealth for households holding these securities and reduces borrowing costs for businesses. The resulting higher levels of wealth and lower financing costs stimulate consumption and investment, ultimately boosting GDP. Lower-income households, in particular, benefit from increased output and employment, leading to a reduction in inequality.

In addition, Andrade et al. (2016) highlight that quantitative easing (QE) enhances the solvency of financial institutions, including banks, insurance companies, and money market funds. This contributes to the stability and functioning of the financial system, thereby supporting economic recovery. The *bank funding channel* is another mechanism through which QE can stimulate investment and consumption by increasing the availability of bank loans (Cui and Sterk 2021). QE increases the deposits of investment funds, allowing them to replace these deposits with mortgage-backed securities (MBS) and government bonds. The increased demand for MBS leads to greater issuance of new mortgages.

Additionally, the central bank's purchase of MBS has two channels through which it affects bank lending: the "net worth channel" and the "liquidity channel" (Rodnyansky and Darmouni 2017). The "net worth channel" refers to the increase in the value of commercial banks' balance sheets when they hold a large proportion of MBS in their financial activities. As the central bank purchases MBS, commercial banks record unrealized capital gains, improving their balance sheets and increasing their lending capacity. The "liquidity channel" operates through the central bank's acquisition of MBS, which leads to increased bank liquidity through realised capital gains that can stimulate banks to lend.

Overall, these studies suggest that unconventional monetary policies can have positive effects on economic recovery and contribute to reducing income and wealth inequality by raising asset prices and improving bank lending.

Other articles highlight the potential negative consequences of unconventional monetary policy. Albert et al. (2019) argue that unconventional monetary policy in the United States can increase income and wealth inequality through the portfolio channel. Higher-income households, which have a larger proportion of their wealth in financial assets, benefit more from policies that increase the prices of financial assets and their financial income. In contrast, lower-income households, which hold a larger portion of their wealth in cash, are adversely affected by the potential inflation resulting from these policies, which may lead to greater inequality.

Albert et al. (2019) also note that, while quantitative easing can help prevent a financial collapse, it may not lead to a significant increase in aggregate demand. In fact, Watkins (2014) suggest that the positive effect of quantitative easing on the economy depends on whether asset owners use their increased financial income to increase consumption. If the beneficiaries of asset purchases are typically wealthy

households with a lower marginal propensity to consume, they may limit the stimulus to the economy and exacerbate income and wealth inequality.

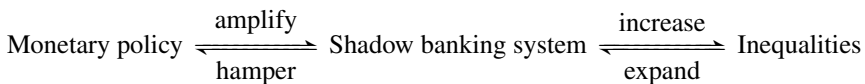
Montecino and Epstein (2015) investigate the effects of quantitative easing and find that the disequalising effect can also emerge if firms primarily respond to unconventional measures by hiring highly skilled workers rather than providing employment opportunities for the poorest households with lower-skilled jobs.

Furthermore, ten Hoopen (2021) stress that the rise in housing prices following QE can have an ambiguous effect on wealth inequality. The literature suggests that higher real estate values can reduce inequality if houses are more equally distributed among households. However, the positive effect may be offset by the fact that higher house prices make it more difficult for the poorest households to become homeowners, preventing them from benefiting from rising housing prices and leading to a possible increase in wealth inequality.

In a nutshell, factors such as the main beneficiaries of the increase in financial asset prices, the employment opportunities created, and the impact on house prices are important for understanding the possible negative aspects of unconventional monetary policy.

#### 4 Monetary policy, the shadow banking system and inequality

The interaction between monetary policy, the shadow banking system (SBS), and inequality is two-way. Monetary policy can foster the expansion of shadow banking and thereby raise income and wealth inequality; in turn, higher inequality can enlarge shadow banking and weaken the effectiveness of monetary transmission.



Briefly, the SBS consists of non-bank intermediaries, such as investment funds, broker-dealers, and special purpose vehicles (SPVs), that perform credit intermediation outside traditional bank regulation. The literature offers two views. A conventional view includes these entities within the broader intermediation chain, relying on securitisation and repo markets to perform bank-like functions (Gorton and Metrick 2010; Pozsar et al. 2010; Adrian and Ashcraft 2012; Poschmann 2012). A post-Keynesian and macro-financial view treats shadow banks as distinct from deposit-creating commercial banks: they rely on market-based funding and cannot create deposits *ex nihilo* (Mazelisy 2015; Prates and Farhi 2015; Caverzasi et al. 2019; Botta et al. 2020; Bouguelli 2020). We adopt this second perspective to discuss transmission and distributional effects. Both restrictive and expansionary monetary policies can foster the growth of shadow banking, though through different mechanisms.

Under contractionary policy, when policy rates rise and conventional bank lending becomes more expensive, part of credit intermediation shifts to unregulated markets. Shadow banks compensate for reduced bank lending by purchasing corporate bonds

and creating structured products such as asset-backed securities (ABS) and collateralised bond obligations (CBOs). This pattern leads shadow bank lending to move in the opposite direction of traditional bank lending, thereby expanding the SBS (Mazelisy 2015; Gebauer and Mazelis 2019).

Under expansionary policy, low interest rates stimulate credit demand among lower- and middle-income households, while investors and financial institutions, seeking higher returns, demand more profitable assets. In this context, banks originate additional loans and sell them to SPVs, which issue ABS or mortgage-backed securities (MBS) that are subsequently purchased by institutional and high-wealth investors. This securitisation chain expands the SBS by connecting borrowers' new debt with investors' appetite for yield.

The expansion of the SBS reinforces income and wealth inequality. Through securitisation, interest payments from lower-income households and firms become the returns received by high-wealth investors (Botta et al. 2015, 2021), reinforcing income and wealth inequality.

Growing inequality, in turn, fosters the expansion of shadow banking. As income concentrates among the rich, low-income households must borrow more to sustain consumption, while wealthier households, facing declining returns on safe assets, seek more profitable and complex financial products. This dual behaviour drives securitisation and structured-asset creation, providing fertile ground for shadow banking growth.

Such dynamics also weaken monetary-policy effectiveness. When central banks raise rates, firms and households can bypass the banking system by turning to bond markets and non-bank lenders, limiting the intended restrictive impact (Crouzet 2018; Cappiello et al. 2021). Conversely, during expansionary phases, economies with large shadow banking sectors or high corporate-bond shares tend to be less responsive to conventional measures, as liquidity and credit flow primarily through securities markets rather than bank loans (Nawabi 2019; Cappiello et al. 2021; Holm-Hadulla and Thürwächter 2021; Schnabel 2021).

In summary, shadow banking acts as both an amplifier and a feedback mechanism within monetary transmission. It expands under both easing, through securitisation and yield-seeking, and tightening, through substitution away from banks, while transferring income from borrowers to asset holders. The result is a financial structure that magnifies inequality and dilutes the direct transmission of monetary policy to the real economy.

## 5 Agent-based models for studying inequality

The study of monetary policy transmission has traditionally relied on Dynamic Stochastic General Equilibrium (DSGE) models, in which economic fluctuations are driven by stochastic shocks and agents are optimizers. The standard formulation, known as the Representative-Agent New Keynesian (RANK) model, assumes a single household that smooths consumption over time according to the intertemporal Euler equation. This setup rules out heterogeneity in income, wealth, or portfolio composition and therefore limits monetary policy to operating mainly through the

intertemporal substitution channel, while income and wealth effects remain negligible (Colciago et al. 2019).

To overcome these limitations, recent research has developed Heterogeneous-Agent New Keynesian (HANK) models, which enrich the DSGE framework by introducing household heterogeneity and financial frictions. In these settings, differences in income, wealth, and liquidity constraints alter the way monetary shocks propagate through the economy. For instance, Kaplan et al. (2018) emphasise the role of “wealthy hand-to-mouth” households—agents with high illiquid but low liquid wealth whose consumption responds strongly to changes in disposable income, amplifying monetary policy effects through the earnings and interest rate exposure channels. Similarly, Luettkie (2021) highlight that heterogeneity in portfolio composition crucially shapes the distributional consequences of monetary shocks. By incorporating these forms of heterogeneity, HANK models improve our understanding of the redistribution mechanisms of monetary policy. However, they typically focus on one or two transmission channels in isolation (Auclert 2019), lacking the full set of interactions and feedback loops that occur in real economies, including those among different transmission channels.

To address these limitations, a growing body of research uses Agent-Based Models, which provide a more flexible, bottom-up alternative to the equilibrium approach. ABMs consist of interacting, boundedly rational agents, such as households, firms, banks, and financial firms, whose heterogeneity can be explicitly modelled in terms of income sources, indebtedness, portfolio composition, and labour-market status. Through simulation, ABMs can reproduce nonlinear propagation mechanisms, feedback effects, and contagion dynamics that are often abstracted from in DSGE and HANK settings. This modelling strategy has been increasingly used to study the interaction between monetary policy, inequality, finance, and macroeconomic dynamics. For instance, Botta et al. (2024) analyse the macroeconomic and distributional effects of leaving a low-interest rate environment in a financialized economy, emphasising the interaction between monetary tightening, inequality, and financial fragility. More specifically, Coccia and Russo (2025) examine how monetary policy affects income and wealth inequality through income composition, earnings heterogeneity, saving redistribution, portfolio composition, and household debt channels in a macro agent-based model. Similarly, Boitani et al. (2026) show that the distributional effects of contractionary monetary policy depend on household heterogeneity in income sources, portfolio preferences, wealth composition, labour share, and unemployment benefits. These contributions suggest that ABMs are particularly suited to analyse monetary policy transmission in economies characterised by heterogeneous agents, financial interactions, and multiple redistribution channels.

While HANK models can study specific channels by introducing selected forms of heterogeneity, ABMs go further by incorporating multiple heterogeneities simultaneously and capturing how various transmission channels, such as earnings, income composition, debt, and portfolio channels, interact and reinforce one another. For instance, a change in policy rates could affect employment, household wages, debt-servicing costs, returns on financial assets, disposable income, consumption choices, asset accumulation, and indebtedness, thereby influencing disposable income and

employment once more. Such complex interdependencies are difficult to capture within equilibrium-based frameworks.

Unlike empirical and structural analyses, which typically assess single transmission mechanisms (Mumtaz and Theophilopoulou 2017; Casiraghi et al. 2018; Alves and Silva 2020; Slacalek et al. 2020; Zungu and Greyling 2022), ABMs provide a simulation-based environment in which multiple feedback loops emerge endogenously. This makes ABMs a more comprehensive framework for studying the inequality–monetary policy nexus. Their capacity to integrate diverse heterogeneities and behavioural interactions provides scholars and policymakers with deeper insights into the distributional implications of monetary policy interventions.

## 6 Concluding remarks

This literature review presented an overview of the main transmission channels of monetary policy. We highlighted various factors contributing to the rise in income inequality, such as wage stagnation for typical workers, declining union membership, policies regarding the real minimum wage, and reductions in redistributive fiscal policies. Wealth inequality, instead, was found to be influenced by income concentration, differences in financial asset returns, investment portfolios, and progressive taxation.

The transmission of monetary policy was identified as a crucial factor shaping income and wealth inequality. Different channels were explored, including income composition, earnings heterogeneity, interest rate exposure, inflation tax, balance sheet, portfolio composition, and household debt.

Following the income composition and earnings heterogeneity channels, expansionary monetary policy can reduce income inequality by stimulating employment and wage growth if low-skilled workers, who are usually among the poorest households, are the most employed; however, it may simultaneously increase inequality if capital and asset incomes rise faster than labour income or if the most employed workers are high-skilled. Under the savings redistribution channel, lower policy rates reduce debt-servicing costs for leveraged households while decreasing interest income for savers. This mechanism initially redistributes resources from rich to poor households.

The inflation tax channel redistributes wealth from lenders to borrowers by reducing the real value of nominal assets and debt; however, at the same time, it erodes purchasing power, especially among low-income households unable to hedge against inflation.

The portfolio composition channel plays a crucial role in wealth redistribution. Changes in interest rates affect the assets on household balance sheets, and the impact depends on the heterogeneity of portfolios. Typically, expansionary monetary policy can increase wealth inequality, unless housing is equally distributed among households. It also depends on the new accumulation of wealth by households after the policy is implemented. The household debt channel examines the impact of monetary policy on household indebtedness: households that start with a high level of debt may react to expansionary monetary policy by raising their debt level, or may be less willing to borrow further, improving or worsening their balance sheets.

In addition, the study investigated the distributional impacts of unconventional monetary policies, such as quantitative easing (QE). First, it reports the effect of unconventional measures on bond interest rates and asset prices, and then reviews their possible effects on income and wealth inequality.

The main positive effect of unconventional measures on the economy is related to an increase in consumption and investment due to the rise in wealth for households holding these securities and the reduction in borrowing costs for firms. The negative effects, instead, rely on the increase in wealth being limited to higher-income households with a lower marginal propensity to consume, which can hamper economic growth.

The work also emphasised the importance of the effects of monetary policy on inequality in the context of a modern, complex financial system. It was noted that monetary policy and inequality contribute to the proliferation of the shadow banking system, which can exacerbate inequality and affect the transmission of monetary policy.

In conclusion, the mechanisms linking monetary policy and inequality are complex and mutually reinforcing, requiring analytical tools capable of incorporating heterogeneity and interdependence among agents. While existing studies based on DSGE, HANK, VAR, or econometric frameworks (Hohberger et al. 2020; Casiraghi et al. 2018; Alves and Silva 2020) have provided important insights, they often treat transmission channels in isolation. Models based on direct agent interaction, such as agent-based models (ABMs), offer a more flexible approach to capturing both the individual and joint effects of transmission channels in a heterogeneous, financialised economy (Botta et al. 2021; Kaplan et al. 2018).

From a policy perspective, these findings have important implications. Policymakers should approach monetary policy with caution, as it does not affect the entire population in the same way. The same intervention may reduce inequality in some contexts while amplifying it in others, depending on the structure of household income, wealth, indebtedness, portfolio composition, and access to credit. For instance, an expansionary monetary policy may support employment and wage income for low- and middle-income households, but it may also increase asset prices and capital gains, disproportionately benefiting wealthier households with larger and more diversified portfolios. Similarly, lower interest rates may ease debt-servicing costs for indebted households, while at the same time reducing interest income for savers and encouraging further leverage.

Therefore, before implementing new measures, monetary authorities should carefully consider pre-existing heterogeneities in income, wealth, debt positions, and financial portfolios. Distributional outcomes also depend on institutional and macro-financial conditions, such as the prevalence of fixed- or variable-rate mortgages, the degree of financial market participation, the distribution of homeownership, the strength of welfare systems, and the role of the shadow banking sector. These elements shape the way monetary impulses are transmitted and determine whether policy effects are mainly channelled through labour income, debt-service relief, asset-price revaluation, or financial intermediation.

Ultimately, it is crucial that policymakers draw on academic research, particularly studies using agent-based models, because these models can capture not only individual transmission channels but also their combined and feedback effects. By explicitly incorporating heterogeneous households, financial institutions, portfolio choices, debt dynamics, and direct interactions among agents, agent-based models can help identify the conditions under which monetary policy mitigates or reinforces inequality. This would support the design of more inclusive and effective monetary strategies that take distributional consequences seriously, while also improving the coordination between monetary policy, macroprudential regulation, and redistributive fiscal policies.

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