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Monetary policy and economic inequality: a literature review

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Abstract

Recently, economic inequalities in many countries have markedly increased. We reviewed more than 40 recent research papers related to the impact of monetary policy on economic inequalities and analysed income and wealth inequalities along with conventional and unconventional monetary policies. The results of the literature review indicate that: (1) the employment response to a policy shift serves as the crucial aspect in determining distributional effects, (2) housing wealth acts as a mitigating factor when accounted for as net wealth, (3) the stock market exposure of households significantly affects the impact of monetary policy on inequality, (4) the impact on inequality of corporate bonds or equities purchases remains unexplored, (5) most of the studies based on survey data indicate lower inequality from policy easing, whereas most of the studies based on tax data or national accounts point in the opposite direction, and (6) estimated changes in inequality measures appear relatively modest.

Keywords: income inequality, wealth inequality, monetary policy, quantitative easing

JEL: E52, E58, I30, G51

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1. Introduction

This paper reviews the recent literature on the impact of monetary policy on economic inequalities and seeks to discuss the key findings of this. As far as we know, no previous studies have investigated such a broad cross-section of literature on this topic in such a detailed manner.[1] We reviewed more than 40 recent research papers related to the impact of monetary policy on economic inequalities and separately analysed the issue of income and wealth inequalities as well as conventional and unconventional monetary policies. Regarding unconventional monetary policy, we also explored the unconventional toolbox. The review also includes some of the latest comprehensive studies on this topic published in 2020 and 2021. In addition, reviewed studies frequently give conflicting results, which is why this review attempts to explain where the differences originated from and which aspects appear crucial in reaching decisive conclusions.

In the past several decades, monetary policy has played an essential role in designing the global economic environment. Some research even points to the era of central bank dominance (Henning 2015; Tucker 2018; Mabbett, Schelkle 2019). Major central banks have responded heavily to the Global Financial Crisis (GFC), the European sovereign debt crisis, and the Covid-19 recession, as well as the usual slowdowns during economic cycles. Central banks have cut interest rates, sometimes even below zero, or launched large scale asset purchases. These actions resulted from direct and indirect central bank targets: positive but low and stable inflation, a higher employment rate and stronger economic growth. However, despite the enormous monetary stimulation following the GFC, economic growth and inflation has remained low relative to former standards. So low, in fact, that some have defined the latest economic environment as secular stagnation (Summers 2014). Meanwhile, economists have argued about the potential driving forces behind too-low inflation and slower growth. In particular, research studies have focused on globalisation (Popović 2018), technological progress (Gordon 2015), demographics (Bobeica et al. 2017) or financial cycle drag after the GFC (Borio 2017). However, the last few years have revealed new evidence about other potential factors dragging down growth and inflation – inequality. Berg et al. (2018) estimated that the level of inequality is a strong and powerful force behind lower medium-term growth. The authors argued that higher economic inequality is associated with lower investments in human and physical capital and impacts growth through its effects on education, life expectancy and fertility.[2]

Unfortunately, many hypotheses regarding the potential drivers of inequality appear to be disputable and difficult to estimate (Nolan, Richiardi, Valenzuela 2019). However, the commonly investigated sources include some of those mentioned above, such as globalisation (Jaumotte, Lall, Papageorgiou 2013; Dabla-Norris et al. 2015; Peters, Volwahsen 2017) and technological change (Peters, Volwahsen 2017). Furthermore, recent theoretical developments and empirical research have revealed other forces that may drive inequality higher: migration (Peters, Volwahsen 2017; Orrenius, Zavodny 2018), institutional structures (OECD 2011), corporate taxation (Hager et al. 2020), monopoly markets (Hager et al. 2020),

[1] See also Colciago, Samarina and de Haan (2019), who also reviewed the recent literature on central bank policies and income and wealth inequality, but from a more methodological angle.

[2] Furthermore, Islam and McGillivray (2020) estimated that wealth inequality has significant adverse effects on cross-country economic growth, whereas Nolan and Valenzuela (2019) argued that inequality hurts economic growth by compressing the income of middle- and lower-income households and by undermining social solidarity and trust, leading to rising support for populist parties. These findings are not particularly new as more than 20 years ago Aghion, Caroli and Garcia-Penalosa (1999) argued that inequality harms growth. However, they do add robust empirical evidence to the growing body of related literature.

monopsony markets (Nolan, Richiardi, Valenzuela 2019) and monetary policy (Adam, Tzamourani 2016; El Herradi, Leroy 2019; Andersen et al. 2021).

If monetary policy must respond to slower growth and inflation resulting from higher inequality, then it is vital that it does not itself reinforce higher inequality, i.e. one of the causes of the policy action. The remainder of the article is therefore structured as follows. Section 2 reviews recent trends in economic inequalities and Section 3 reviews the up-to-date literature on monetary policy's impact on income and wealth inequalities. Alongside this review, we describe the distributional channels of monetary policy. We conclude by summarising our main findings and underlining future research propositions.

2. Income and wealth inequalities

Inequality is increasingly becoming a vital factor in economics. Almost all the available recent data and research has shown that inequality has been on the rise in developed countries in recent decades. Although globally more countries have witnessed a decline in the inequality level, higher inequality has been visible in the most populous countries, including the United States and most of Europe (Gradin 2020).[3] In addition, the trend remains the same whether it is related to income or wealth inequality. If we refer to the data for the Gini coefficient for disposable income for 20 OECD countries based on the Standardized World Income Inequality Database (SWIID) revised by Solt (2020), we see that, as shown in Figure 1, after the initial drop in inequality in 1960–1980, most of the countries subsequently experienced an increase in Gini coefficients. Although most of the shift happened before the 21st century and most countries have experienced a plateau since then, some countries have maintained this trend, with the US economy in the lead.

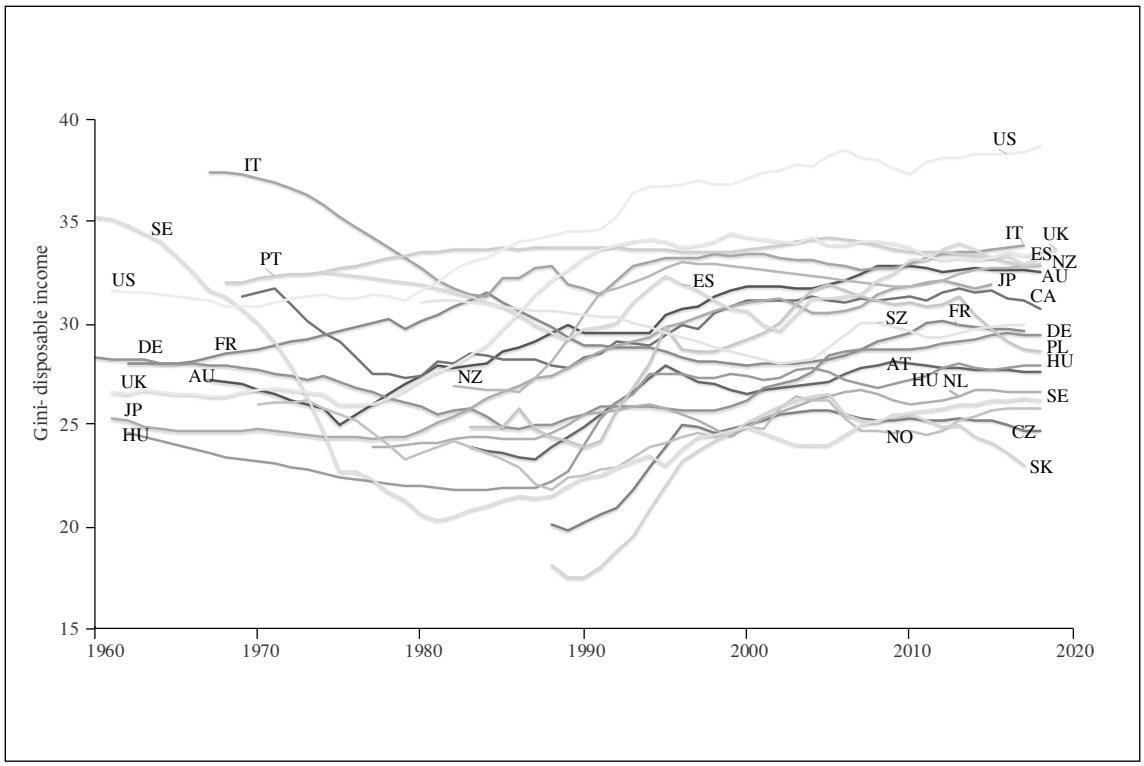
Empirical research on income and wealth inequalities typically use similar sources of data. Apart from the previously mentioned SWIID, the World Inequality Database (WID) or the Survey of Consumer Finances (SCF), there is also the Household Finance and Consumption Survey (HFCS) for European data and the Consumer Expenditures Survey or the Current Population Survey for the United States. However, careful attention is needed when interpreting results. Data quality is also always of concern in terms of income and wealth inequality. Self-reported survey-based data often underestimate real income or net wealth values. This problem is more pressing for wealth inequality as household surveys do not capture all assets and, furthermore, do not even appear in government registers.[4] Assessing wealth concentration using self-report survey data or even tax return data may be flawed as the wealthy have access to many opportunities or unique structures that allow them to avoid or even evade taxation (Zucman 2019). For instance, Zucman (2019) estimated for Norway that adding hidden assets increases the wealth of the top 0.01% by more than 25%.[5] In light of this, we can examine the WID for 1987–2017 (Alvaredo et al. 2018). The average world wealth per adult increased by 1.3% annually, whereas the top 1% grew by 2.6% and the top 0.1% by 4.7% annually. Consequently, the top 1% share of wealth has increased from 28% in 1980 to 33% today, whereas the bottom 75% share has oscillated around 10%. The United States has experienced the most dramatic increase in wealth concentration, whereby the top 1% ownership of wealth has increased to above 40% of total wealth.

[3] On average, inequality has fallen in emerging markets while rising in developed markets.

[4] A growing gap emerges between the net wealth data collected by private corporations (such as Google, Facebook, Visa or Mastercard) and what is available in public statistical data (Saez, Zucman 2020).

[5] On tax evasion and inequality see also Alstadsæter, Johannesen and Zucman (2019).

Figure 1
Evolution of the Gini coefficients for disposable income, 20 OECD countries



Source: own elaboration based on Solt (2020), which used SWIID data.

However, as previously mentioned, considerable attention must be paid when measuring wealth inequality. While research has been mainly focused on overall net wealth inequality, an additional problem may arise when including equity in owners' primary housing residence in calculations. Many experts contend that an increase in the price of the home in which one lives does not significantly change the household's financial situation (Skinner 1989; Buiter 2008). Including housing data in the calculation may, in turn, again decrease the effectiveness of wealth inequality measures. This can be seen, for example, in the WID's data for France (Alvaredo et al. 2018). When excluding housing wealth, some European countries saw a material increase in wealth inequality as measured by the top 1% share in overall wealth (the top 1% in the United Kingdom and Spain experienced an increase from roughly 25% to 33% of ex-housing share in total wealth). As all previously mentioned wealth inequality measures account for relative wealth ownership, it is also worth exploring inequality data in real terms. US median financial resources in real terms, measured as net wealth and excluding equity in the owner's occupied primary residence housing, were lower in 2019 than in 1989 (Wolff 2021). However, the mean real financial resources increased from 221,600 USD in 1969 to 576,400 USD in 2019. The median financial resources barely moved from 19,800 USD in 1969 to 20,100 USD in 2019 (Wolff 2021).[6]

[6] Using data mainly from the SCF from the Federal Reserve Board of Washington.

3. The impact of monetary policy on economic inequalities

Research on the impact of monetary policy on inequality usually requires empirical data analysis or economic modelling. In terms of empirical research, microsimulation, local projections, vector autoregressive (VAR) or structural VAR (SVAR) models are often used to model the relationship.[7] The microsimulation method has been increasingly used in economic analysis in the past decades, especially in public policy or redistributive policy assessments (Bourguignon, Spadaro 2006). Because of the heterogeneity of the features of the agents applied in the model, this method allows the effects of a policy to be modelled on a sample of economic agents (Figari, Paulus, Sutherland 2015). Local projections, however, provide for a point estimate of the impulse response, which helps estimate the impact of monetary policy on the economy. A variety of macroeconomic research has used this particular method since its introduction by Jordà in 2005.[8] However, modelling usually takes the form of dynamic stochastic general equilibrium (DSGE) models, which in the last few years have developed into the heterogeneous agent New Keynesian model (HANK).[9] The HANK approach offers an accurate representation of the cross-section of household portfolios, wealth distribution and consumption behaviour in the economy (Kaplan, Moll, Violante 2018), including the issues of changes in the average consumption gap between constrained and unconstrained households, the difference in consumption patterns within the subset of unconstrained households, and changes in the share of constrained households (Debortoli, Galí 2017). HANK models, which incorporate heterogeneity and uninsurable idiosyncratic risk into the New Keynesian models, have become one of the primary tools in assessing a monetary policy and its impact on the economy (Acharya, Dogra 2020).

3.1. Transmission channels

Monetary policy uses several critical transmission channels to impact an economy. Through various channels of influence such as interest rates, asset prices, exchange rates, credit and expectations, central banks can alter domestic and external demand for goods and services, thereby impacting domestic prices and inflation (Mishkin 1996). Furthermore, unconventional policies feature two additional transmission channels: the signalling effect and the portfolio balance channel (Cecioni, Ferrero, Secchi 2011). As a by-product of the channels described above, distributional effects emerge. A growing body of literature has examined the numerous distributional effects of monetary policy. By combining the work of Coibion et al. (2017) and Auclert (2019), we can summarise these distributional channels as follows:

- Interest rate exposure channel – assets and liabilities held by households and businesses have different maturity profiles or coupon types. The value of a 5-year adjustable-rate mortgage changes differently to the value of a 30-year fixed-coupon mortgage when interest rates fall. Similarly, an asset's value, such as a short-term deposit, reacts much less to an interest rate hike than a 10-year fixed coupon bond. The duration (interest rate risk) exposure of assets and liabilities determines the distributional impact of monetary policy on the economy.

[7] More elaboration on local projections can be found in Barnichon and Brownlees (2019) and on microsimulation in Mitton, Sutherland, Weeks (2000).
[8] For example, research on fiscal policy (see Auerbach, Gorodnichenko 2012) or welfare studies (see Acemoglu et al. 2019).
[9] For more on HANK and monetary policy shocks, see Alves et al. (2021).

- Income composition channel – each household relies on a different composition of income. This heterogeneity determines the distributional impact of monetary policy. When labour is the primary source of income, a household is much more dependent on labour market strength, whereas a household relying primarily on financial income or business income is considerably more dependent on interest rates from assets owned or business profits. Furthermore, transfers such as unemployment benefits or child benefits account for a much greater income share for low-income households than for high-income households. Consequently, an expansionary monetary policy that lowers the public sector cost of borrowing may create room for such policies and decrease inequality. The extent to which monetary policy impacts capital gains income and business profits relative to labour income and transfers determines the distributional impact on the economy.
- Financial segmentation channel – households more involved in financial markets usually receive more significant benefit from monetary policy expansion as they benefit from the first-round effects of policy easing and the forward-looking nature of the markets. Usually, these households also earn a higher income or possess higher wealth. Hence, monetary policy expansion creates a distributional impact through this channel.
- Portfolio composition channel – households hold different assets in their portfolios. Their value or income stream behaves differently in response to monetary policy actions. Low-income households usually hold currency/cash in bank deposits, whereas high-income households hold equities or real estate assets (Domanski, Scatigna, Zabai 2016). The inflationary environment resulting from a central bank's actions creates a distributional impact by transferring resources of low-income households to high-income households. However, this relationship is not linear and is subject to assumptions.[10]
- Savings redistribution channel / Fisher effect – the inflationary environment and interest rate changes also change borrowers' and savers' relative financial situation, but in a different direction than in the portfolio composition channel. A lower income from interest-bearing assets or higher inflation decrease the real value of assets held by savers and increase the real disposable income and real net wealth of borrowers. These effects then revalue nominal balance sheets, with nominal creditors gaining and nominal debtors losing.
- Earnings heterogeneity channel – different segments of a labour market may react differently to a monetary policy change. Low-income agents may benefit disproportionately more from increases in aggregate income or, conversely, disproportionately less when the price of capital falls significantly relative to labour and encourage more automatisation in the economy. Wage rigidities across the income distribution may also amplify this channel's effect.

Each channel has a different impact on income and wealth inequalities. Income composition or earnings heterogeneity has a stronger impact on income differentiation across households, whereas interest rates exposure channel, financial segmentation, portfolio composition and savings redistribution has a stronger impact on wealth inequality. However, all the channels usually intersect with each other and, therefore, estimating the effects of monetary policy on economic inequality is, in general, challenging to assess ex-ante (Coibion 2017). The studies conducted so far have usually avoided differentiating the individual channels' strength in different monetary policy regimes. The directional, distributional impact of these channels is assumed to be broadly the same under both conventional and unconventional monetary policies after hitting the effective lower bound. However, some

[10] On non-linear inflation-inequality dynamics, see Monnin (2014).

channels may have a greater or lesser impact on unconventional policy episodes. For example, whereas the interest rate exposure channel has a significant effect on inequality by lowering the cost of floating--rate mortgage debt for first-time home buyers, this effect ceases to impact these households' relative situation after hitting the effective lower bound (ELB) on interest rates. Simultaneously, unconventional policy tools may amplify the power of other channels, such as the portfolio composition channel.

3.2. Conventional monetary policy and income inequality

Economic research on the impact of conventional monetary policy on income inequality dates back to the 1990s (Romer, Romer 1998). Studies have used various approaches to analyse this issue across this period. This review, however, focuses on the most recent studies as these take advantage of much better analytical tools and data sets.

One of the most recent well-established studies addressing the problem of conventional monetary policy and income inequality is by Coibion et al. (2017). Using the local projections method and data from The Consumer Expenditure Survey (CEX) for the US economy, the authors found that a restrictive conventional monetary policy has a statistically significant positive impact on income inequality (higher inequality). The CEX is a monthly survey conducted by the Bureau of Labor Statistics of approximately 1,500–2,500 US households and is also used to construct the US Consumer Price Index (CPI) inflation basket. It covers approximately 95% of standard household spending. For the period 1980–2008, the authors decomposed the income data into labour income, financial income, income from doing business and transfers from the state. For monetary policy data, the authors used estimates of "monetary shocks" compiled by Romer and Romer (2004). The authors also decided to include in the research model variables such as a technological shock (Gali 1999), supply shocks in the crude oil market (Kilian 2009) and tax shocks (Romer, Romer 2010). Coibion et al. (2017) revealed an aspect of heterogeneity of different income sources to monetary policy changes and different weights of income sources in particular household groups. Namely, a restrictive monetary shock causes an asymmetrical relative decrease in the work income of low-income families with a simultaneous relative increase in the labour income of high-income households (earnings heterogeneity channel), a significant increase in financial income (interest rate exposure channel; savings redistribution channel), a decrease in income from running a business (income composition channel), and has a relatively neutral impact on social transfers. The authors highlight the different distributional channels and argue that in a monetary tightening shock, the earnings heterogeneity channel and savings redistribution channel play a decisive role in increasing income inequality. However, the significant drawback of this study is that the CEX data does not include the very upper end of the income distribution.

Furceri, Loungani and Zdzienicka (2018) analysed the impact of monetary policy on economic inequalities. The authors used unexpected monetary policy changes from 1990–2013 for 32 developed countries and data on income inequalities from SWID and the World Top Incomes Database (WTID). In the case of monetary policy surprises, the authors created their time series based on the approach used by Auerbach and Gorodnichenko (2013) for fiscal shocks and then constructed the impulse response function based on the methodology of Jordà (2005).[11] They concluded that the unexpected

[11] The forecast error of the policy rates (actual vs yearly consensus forecast from Consensus Economics) is regressed against similarly calculated forecast errors for inflation and output growth.

monetary policy tightening leads to a long-term increase in income inequality. An unexpected increase in the base rate by 100 basis points raises the Gini index by 1.25% in a short period up to one year and by 2.25% in the medium term, calculated as five years after the shock. However, the authors noted significant asymmetry in the response of inequality to unexpected monetary policy changes. Whereas the unexpected tightening of monetary policy leads to a statistically significant increase in inequality, the medium-term impact of negative shocks (monetary policy easing) is insignificant. Furthermore, according to the authors, there are also significant differences between countries in the study, depending on the original level of inequality or the share of labour income in total income. Moreover, the impact of monetary policy on income inequality is most vital in a positive shock (unexpected monetary policy tightening) during economic expansion. However, at the country level, the most substantial effect can be observed in countries with a relatively higher share of labour income to total income and nations with a more modest redistribution policy. However, expected monetary policy tightening resulting from a better economic outlook reduces income inequality. Although the study of Furceri, Loungani and Zdzienicka (2018) is extensive, it does not examine different income sources in different monetary policy environments as it refers only to total household disposable income.

Another recognised study is that of Mumataz and Theophilopoulou (2017). The authors analysed the impact of monetary shocks on earnings, income and consumption inequalities in the United Kingdom over 1969–2012. Notably, there is an exceptionally long period of data used in the study. The authors also assessed both conventional and unconventional monetary policy episodes. Regarding conventional monetary policy and income inequality, the authors showed, using the SVAR model, that restrictive conventional monetary policy has a significant contribution to a growing level of income inequality. The study primarily used the Family Expenditure Survey. This annual survey provides data on available income, gross wages, total household consumption, and non-durable goods consumption for an average of 7,000 people. In each of the four empirical models developed by Mumtaz and Theophilopoulou, the results were similar. The Gini coefficient increased in response to interest rates hikes. This study, however, also excluded the top 1% of income distribution.[12]

Other latest studies claiming that a restrictive (expansive) conventional monetary policy increases (decreases) income inequality include Bivens (2015), Guerello (2016), Ampudia et al. (2018), Cloyne, Ferreira, Surico (2020), Samarina, Nguyen (2019), Aye, Clance, Gupta (2019), Ma (2019), Hohberger, Priftis, Vogel (2020), Martín, Fuentes, Moreno (2020) and Mimir, Mæhlum, Torstensen (2021). Ampudia et al. (2018) divided eurozone households into three types – poorer hand-to-mouth, wealthier hand-to--mouth and non-hand-to-mouth – based on the HFCS.[13] By using the research and data of Lenza and Slacalek (2018), the authors claimed that hand-to-mouth households benefit directly from a reduction in interest rates whereas non-hand-to-mouth households, in contrast, are negatively affected by the shock through a loss of financial income. Hohberger, Priftis and Vogel (2020) presented a similar approach and conclusions. By dividing households into asset owners and hand-to-mouth households and using the two-agent New Keynesian (TANK) model, the authors claimed that expansionary monetary policy increases demand for labour and, hence, real wages, and it simultaneously somewhat decreases the relative income from financial assets. Consequently, liquidity constrained households benefit more from a policy easing as wages are their primary income source. Samarina and Nguyen (2019), however, used the SWIID monetary policy surprises as measured by Jarociński and Karadi (2018) and the PVARX

[12] Both tails (the bottom 1% and the top 1%) have been removed from the study as advised by Brewer et al. (2016).
[13] For more elaboration on hand-to-mouth, see Aguiar, Bils and Boar (2020).

model, and claimed that an expansionary monetary policy reduces income inequalities, especially for peripheral eurozone countries.[14] According to the authors, this effect is noticeable mainly through increased employment and wages, increasing overall labour income (earnings heterogeneity channel, income composition channel). Bivens (2015) also reached similar conclusions, but for the US economy following the GFC. According to Bivens, expansionary monetary policy lowered unemployment and boosted wages at the bottom and middle levels of the wage ladder, significantly reducing income inequality. In contrast, Cloyne, Ferreira and Surico (2020) focused on the real estate market. By dividing US and UK households into three groups: mortgagors, outright owners and renters, the authors claimed that expansionary monetary policy raises household income for all groups but translates into higher consumption only for those households with low liquid wealth. Ma (2019), however, shed new light on distributional channels of monetary policy by proposing the heterogeneous labour supply elasticities channel. In his analysis based on a quantitative HANK model, Ma (2019) claimed that as the labour supply elasticity is remarkably high for poor households and close to zero for rich ones, an expansive monetary policy reduces income inequality by significantly increasing employment in low-income families.

In addition, by using data on inequality obtained from Coibion et al. (2017) and impulse responses from the local projection method, Aye, Clance and Gupta (2019) claimed that a one percentage point increase in the monetary policy shock series increases inequality in general. However, of even more interest is that the authors claimed that their results suggest that monetary policy may be a more effective tool in reducing inequality than tax cuts. Meanwhile, Guerello (2016) took a new look at inequality data by investigating the European Commission's Business and Consumer Survey (ESI). The author used the net percentage of positive responses to the question "How has the financial situation of your household changed over the last 12 months?" and constructed the Gini Index, the Top-Bottom ratio and the Theil coefficient for income dispersion as well as a VAR model based on the above data and monetary policy shocks determined by Cholesky decomposition.[15] They concluded that conventional monetary policy easing decreases income dispersion in the short run. However, the results showed high heterogeneity across eurozone countries, with the main point of differentiation being households' connection to financial markets. Martín, Fuentes and Moreno (2020) also proposed a new source of data. The authors analysed the impact of monetary policy on income inequality for eleven eurozone countries through 2007–2016 using data from the European Union Statistics on Income and Living Conditions (EU-SILC) and employed a Bayesian vector autoregressive model. They divided EU-SILC respondents into four groups: low class (below 75% of the median income), low--middle class (75–125% of the median income), upper-middle class (125–200%) and upper class (above 200%), and analysed impulse response from a monetary policy shock defined as a change in each groups' share in total income. The authors concluded that a positive monetary policy shock (policy easing) stimulates economic activity and employment and reduces income inequality in the short run. However, monetary policy tends to be nearly neutral in the long run. The authors showed that the middle class (upper and lower) benefit the most from monetary policy easing, whereas the lower class cannot take advantage of increasing labour demand, and their share stays broadly flat. The upper-class share is lower in response to the higher middle class share. These results offer

[14] An extension of the basic panel VAR (see Canova, Ciccarelli 2013).

[15] Cholesky decomposition and the following variables: GDP, inflation rate, short run interest rate, ECB balance sheet, stock market index and inequality data. For the Theil entropy index and other inequality indices, see Williams and Doessel (2006).

compelling evidence for the importance of the earnings heterogeneity channel. However, according to the model, all the impacts reported above disappear in the eleventh quarter after the shock. Of further note is that Martín, Fuentes and Moreno (2020) excluded from the sample households whose disposable income comes only from transfer payments.

One of the latest and most extensive studies was conducted by Mimir, Mæhlum, and Torstensen (2021), who analysed the impact of monetary policy on income and wealth inequalities for Norway between 1993 and 2015 and used far-reaching data sets, including data on all sources of income, debt and wealth, as well as age, education and employment history.[16] For the reference year of the analysis, the sample covered about 2.1 million households. Using that data set, a large scale DSGE model for the Norwegian economy and a bottom-up approach, Mimir, Mæhlum and Torstensen (2021) quantified the impact of monetary policy on the labour market and asset prices and analysed the distribution of these estimated changes across different households. The authors concluded that a positive monetary policy shock (policy easing) reduces income inequality. According to the model, in response to interest rates cuts, younger groups benefit significantly from higher net interest income (lower net interest expense) at the cost of older groups. In addition, younger and especially less-educated groups benefit relatively more from high labour income and transfers. Although better educated and older cohorts benefit relatively more from higher other capital income, in aggregate, those above 69 years of age are worse off after the monetary shock, whereas the better-educated aged 20–39 observe the highest gains.[17] Moreover, those groups benefit the most from the monetary policy easing because they have relatively higher debt-to-income ratios. Furthermore, the authors showed that an increase in after-tax labour income is most visible in the younger, less-educated group (20-year-old), which may contradict the results of Martín, Fuentes and Moreno (2020). To summarise, Mimir, Mæhlum and Torstensen (2021) estimated that in response to a monetary policy shock, the Gini coefficient, the share of the top 10%, the p90/p50 ratio and the mean/p50 ratio all fall, with the share of the top 10% seeing the most remarkable improvement (lower share). However, as the poorest households have little debt, they benefit very little from lower rates and the economy sees the p50/p10 ratio rising slightly.

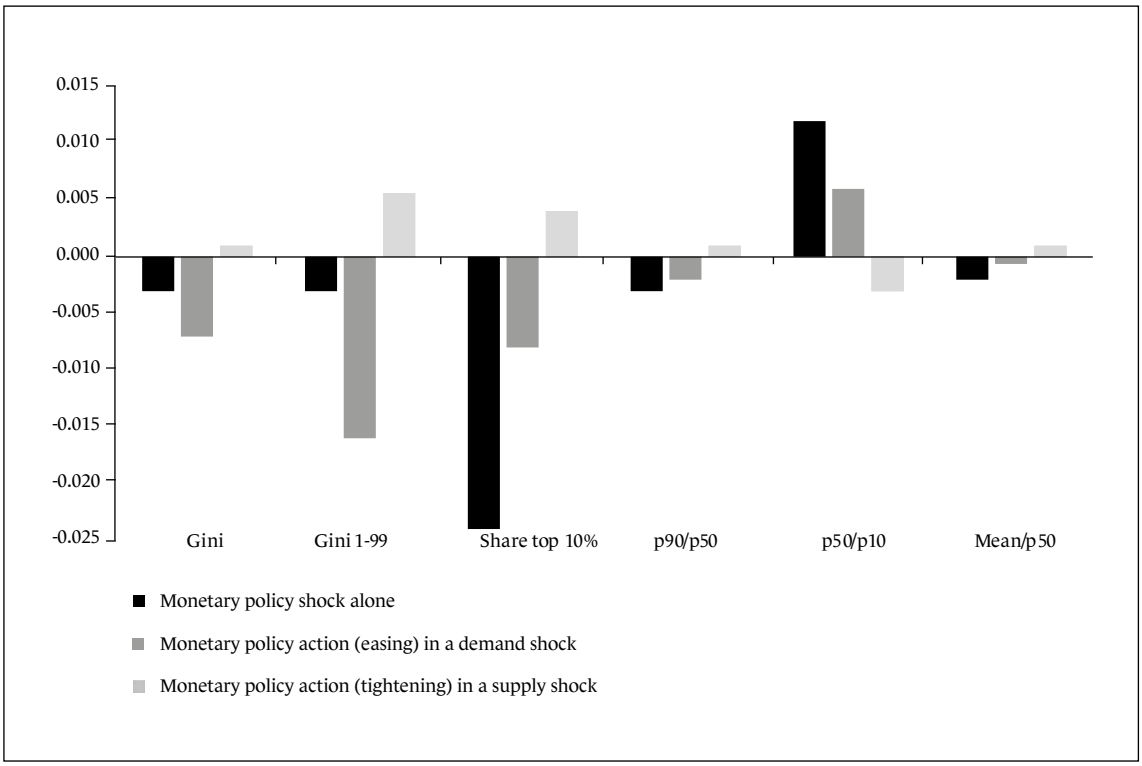
Mimir, Mæhlum and Torstensen (2021) also offered a unique and innovative approach to analysing the impact of monetary policy on inequality. The authors analysed how income and wealth inequalities would look like in the case of supply and demand shocks, with and without the impact of monetary policy. This study is interesting in several ways as it allows us to look at this issue from an entirely new perspective, showing an alternative scenario. In the event of a demand shock, monetary policy action (easing) improves the situation of all agents.[18] However, as with the study with monetary policy shocks alone, the youngest and lower-income households observe the highest gains. As monetary policy action reduces real yields, households with a higher debt-to-income ratio and lower labour income and government transfers benefit the most. Consequently, the Gini coefficient falls, as shown in Figure 2.

[16] Tax registry data were used for income, debt and wealth data as they provide data on all financial assets, including deposits, stocks, bonds, houses, or even holiday homes, cars and boats. National Registry data were used for the information on birth year and the number of children and their age, while the National Education Database provided the data for the education level (Mimir, Mæhlum, Torstensen 2021).

[17] In response to a monetary policy shock, labour income and transfers as well as other capital income increases for all agents (younger, older, less educated, more educated), and net interest income increases for all groups except those above 69 years, both less and more educated (Mimir, Mæhlum, Torstensen 2021).

[18] Asset prices, wages and inflation fall, whereas the unemployment rate and the real rate rise. Monetary policy cuts the key policy rate in response (Mimir, Mæhlum, Torstensen 2021).

Figure 2
Changes in income inequality measures*



* In: 1) a monetary policy shock, 2) a demand shock when monetary policy is used relative to the lack of monetary policy action, 3) a supply shock when monetary policy is used relative to the lack of monetary policy action.
One-year time horizon.

Source: own compilation based on Mimir, Mæhlum, Torstensen (2021).

Furthermore, the magnitude of the fall is even higher than in the monetary policy shock scenario alone, especially for the Gini 1-99 coefficient. In the case of a supply shock, monetary policy action (increasing real yields) worsens the income situation of all agents.[19] Although the distributional impact of monetary policy action in a supply shock is much smaller than in other analysed scenarios, most of the inequality measures slightly reverse their decrease which resulted from the shock.[20] Therefore, to summarise, Mimir, Mæhlum and Torstensen (2021) found that the distributional effects from the business cycle are more significant without systematic monetary policy actions. Hence, monetary policy stabilises income inequality more in the long-term and is determined by other factors. However, the authors analysed systematic monetary policy actions, and their analysis does not refer to the scenario of permanently falling real rates.

[19] Higher inflation, which reduces the real interest rate. Monetary policy increases the key policy rate in response (Mimir, Mæhlum, Torstensen 2021).

[20] The Gini coefficient, the 1-99 Gini coefficient, the share of the top 10, the p90/p50 and the mean/p50 fall slightly as the supply shock decreases real yields with no monetary policy action (Mimir, Mæhlum, Torstensen 2021).

However, the results of several studies differ significantly from those reported above. One of the most extensive is that of Dolado, Motyovszki and Pappa (2021). The authors analysed the labour market implications of monetary policy changes by using the New Keynesian model with built-in asymmetry in search-and-matching frictions (SAM) by less and more qualified (and consequently better-paid) employees, and different complementarity and substitutability for the capital of this group of workers (capital-skill complementarity; CSC).[21] The authors questioned theories that an expansionary monetary policy lowers income inequality through higher employment and higher wages in low-income households and stated that an unexpected monetary easing increases inequality in the labour market. The increase in inequality occurs through disproportionately higher relative wage increases for better-qualified workers. According to the authors, monetary easing, which stimulates aggregate demand, increases labour demand. However, due to the asymmetry in SAM, it rewards more qualified employees through their significantly higher relative wage growth, whereas the change in employment of both groups (low- and high-income) does not show significant differentiation. Furthermore, by significantly lowering the cost of capital and increasing investments, more skilled workers become complementary to capital, whereas less-skilled workers become a substitute for capital. Thus, unexpected monetary easing increases inequality by unequally distributing its benefits, favouring, to a large extent, the most skilled workers. Having concluded this, the authors outlined that despite the increase in inequality, both groups in the labour market are in a better position in absolute terms than before an unexpected monetary easing. Furthermore, similar effects of labour market modelling using the CSC effect are also visible in other external shocks which increase aggregate demand, such as increasing the budget deficit or changing productivity, but on a smaller scale than in the case of a monetary policy shock. The authors also noted that the proposition that monetary tightening reduces labour market inequalities is accurate unless we assume that higher-skilled workers seek jobs in the low-skilled job segment, pushing less-skilled workers out of the market. Although Dolado, Motyovszki and Pappa (2021) is not an empirical study and only theoretically models the relationship between monetary policy and labour market inequality, some empirical research (Martín, Fuentes, Moreno 2020; Merrino 2020) has backed its findings.[22] Furthermore, the study only addresses the labour market without mentioning other monetary policy channels of influence on income inequality.

Another study questioning the proposition that monetary policy easing reduces income inequality is El Herradi and Leroy (2019). The authors focused on the highest percentile of income distribution and found that monetary tightening significantly reduces the share of the top 1% in total aggregate income, which contradicts most other studies on the subject, which claim that a tighter monetary policy increases income inequality. El Herradi and Leroy (2019) used the exceptionally long-term data series for 1920–2015 and 12 developed market economies. The data source used in the study is also notable. According to the authors, survey data underestimates inequality due to its failure to capture the highest income percentiles, and especially the impact of business profits and capital gains on this group.[23] The authors were also sceptical of the Gini coefficient, arguing that this indicator places excessive importance on the middle of the income distribution. Therefore,

[21] Search-and-matching frictions are the difference in the relative cost, duration of recruitment and the bargaining power of an employee. See more on HANK models that integrate SAM frictions in Ravn and Sterk (2021). For capital-skill complementarity see Lindquist (2004) and Krusell et al. (2000).

[22] However, Mimir, Mæhlum and Torstensen (2021) found that, for Norway, after-tax labour income increase the most for the youngest groups in response to a positive monetary policy shock.

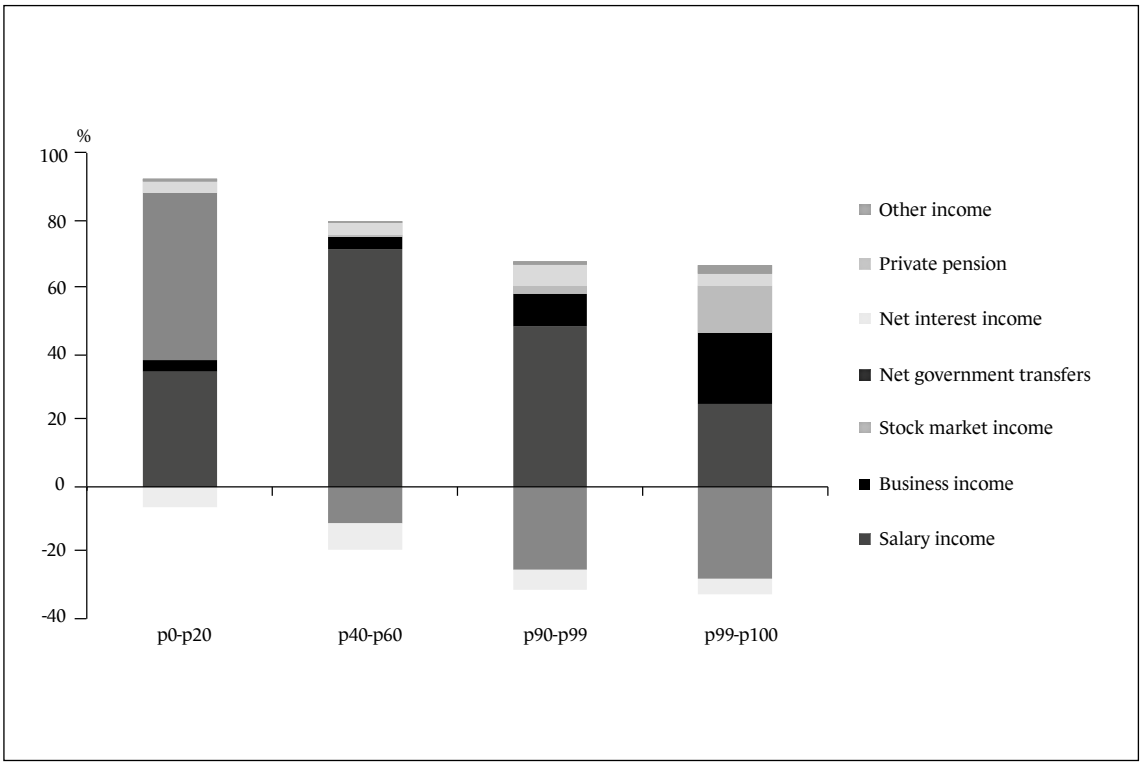
[23] See Wolff and Zacharias (2009), Atkinson, Piketty and Saez (2011), Burkhauser et al. (2012) and Yonzan et al. (2018).

they used the WID for the highest income groups before tax, focusing primarily on the share of the last percentile (P1) and the last decile (P10) in total aggregate income. Later in the study, they also included the data for the top 0.1% and the top 0.01%.[24] Monetary policy data, however, relied on local projections, i.e. the dynamic response of the highest income shares to exogenous changes in short--term interest rates according to the methodology of Jordà (2005) and Jordà et al. (2019). The authors combined in the model the WID data, the Jordà et al. (2019) database and variables such as CPI, real GDP, real consumption, government spending to GDP, real estate prices, stock prices, credit to GDP and openness to international trade. In addition, the authors used US data on patent applications to determine technological progress in the model and WTI crude oil prices as a controlling variable for a global economic cycle. They concluded that an unexpected monetary policy tightening reduces the share of national income received by the top 1%, particularly through the lower asset prices channel (mainly stocks) and vice versa.

Other recent studies stating that an expansionary (contractionary) conventional monetary policy increases (decreases) income inequality are Taghizadeh-Hesary, Yoshino and Shimizu (2018), Kronick and Villarreal (2019), Alves and Silva (2021), Andersen et al. (2021) and Israel and Latsos (2020). Alves and Silva (2021) analysed the eurozone income and wealth disparities resulting from the monetary policy changes. The authors focused mainly on the income composition channel, the portfolio composition channel and the earnings heterogeneity channel. By using the Gini coefficient for disposable income and the Gini coefficient of market income retrieved from the SWIID (Solt 2020) combined with the feasible general least squares regression with numerous modifications, the authors concluded that an increase in equity prices resulting from a monetary policy easing is a significant explanatory variable behind the rise in income inequality. However, the authors also claimed that monetary policy easing leading to lower unemployment could reduce the scope of an inequality increase. Therefore, they validated the negative impact of the earnings heterogeneity channel on income inequality (lower inequality) in the eurozone despite the overall positive effects in aggregate (higher inequality). However, Andersen et al. (2021) came to different conclusions in their study using data from Denmark. Nevertheless, it is worth mentioning that Denmark has not pursued an entirely independent monetary policy for decades as its currency has been pegged to the German mark and later to the euro since 1987. Notwithstanding this, the authors claimed that an expansionary monetary policy has increased income inequality in Denmark. Namely, a 100 bps interest rate cut increased the top 1% share in aggregate disposable income by 3% over the analysed two-year horizon. The study used the local projection method, according to Jordà (2005), and covered income from tax returns from 1987–2014. According to the study, higher dividends, capital gains and business income resulting from the monetary policy easing at the higher end of income distribution outpaced higher wages and lower interest expenses at the lower end. It is also worth noting that the impulse response for salary income (from monetary policy easing) shows a negative to zero response for P0–P10, which might be consistent with Dolado, Motyovszki and Pappa (2021). The study also revealed some exciting data regarding disposable income composition for different income percentile groups. Counterintuitively, the higher-income groups, and even the top 1%, did not have a positive net interest income, as shown in Figure 3.

[24] Using Atkinson and Piketty data (see Atkinson, Piketty 2014).

Figure 3
Composition of disposable income for Denmark over 1987–2014 by percentiles



Source: own compilation based on Andersen et al. (2021).

Another study stating that monetary policy increases inequality by shifting resources away from lower-income households is Kronick and Villarreal (2019) for Canada. Using quarterly data from 1992–2015 and a SVAR model, the authors claimed that gross operating surplus increased more than wages in response to an unanticipated expansionary monetary policy shock. Hence, a negative gap emerges as higher-income households exhibit significantly higher business ownership. The authors used the Gini coefficient of monthly income from the Canadian Labour Force Survey adjusted according to Villarreal (2016) and monetary policy shocks for Canada estimated by Champagne and Sekkel (2018). Meanwhile, Taghizadeh-Hesary, Yoshino and Shimizu (2018) analysed the impact of monetary policy and tax policy on income inequality in Japan. The authors stated that the Bank of Japan's zero interest rate policy also significantly increased income inequality through the rise in asset prices, which mainly benefited the wealthy income groups. The authors used the Family Income and Expenditure Survey, the average household earning for the top 10% over the average household earning of the bottom 10% as an inequality measure, and the vector error correction model. Another study focusing on Japan is Israel and Latsos (2020). Using Japanese Household Survey Data and linear panel regression models, the authors stated that an expansionary monetary policy lowers the gender pay gap, increases the education pay gap and has no significant impact on the age pay gap.

In the literature, we can also distinguish research studies that indicate a marginal or non-significant impact of monetary policy on income inequality. The most well-known is O'Farrell, Rawdanowicz, and Inaba (2016), who used microsimulation and distributional data on income and interest-paying assets and liabilities, and assessed the impact of monetary policy on inequality in eight developed market economies. This study's results were mixed as monetary policy easing reduced income inequality in Canada, the Netherlands, and the United States, but increased it in the other countries (Belgium, France, Germany, Italy and the United Kingdom). All the distributional changes, however, were reported as small. According to the authors, this was because the interest rate channel had only a tiny impact on households' income distribution, and other channels that contribute to greater macroeconomic stability – and hence higher employment – mitigated any additional adverse effects. However, it is again worth noting that the study only used survey data. Another work claiming that monetary policy shocks do not influence income inequality is the Japanese study by Inui, Sudou, and Yamada (2017). Using micro-level data on Japanese households from 1981–2008 from the Survey of Household Finances, the authors estimated that monetary policy shocks do not significantly impact Japanese households' inequality in a stable manner. Although they found that before 2000, expansionary monetary policy shocks increased income inequality through a rise in earnings inequality, data for the most recent periods, however, do not exhibit such a relationship.[25] The authors concluded that the final distributional effect of monetary policy on income inequality depends heavily on how a labour market responds to the monetary policy shock.

Bunn, Pugh and Yeates (2018) is also an extensive and well-established study on the distributional impact of monetary policy. The authors used panel data from the ONS Wealth and Assets Survey (WAS) on households' characteristics and balance sheet positions and analysed the monetary policy easing in the United Kingdom between 2008 and 2014. They used the Bank of England's (BoE) primary forecasting model to estimate the impact of monetary policy on the economy and subsequently used the WAS data to redistribute monetary policy effects across households. The authors focused mainly on the monetary policy effects on net interest income via interest receipts and payments, labour market response, financial asset prices, effects of inflation on the real value of debt and deposits, house prices, and pension wealth. The counter-factual analysis estimates of monetary policy easing in 2008–2014 assumed that real GDP, employment and real wages per capita would be 7%, 4.5% and 5% lower, respectively, without monetary policy easing.[26] In addition, the cumulative effect of no implementation of quantitative easing (QE) and rate cuts would have averaged around 25% and 20% lower than their actual values in 2014 for the stock market and real estate prices respectively.[27] The authors offered comprehensive data on the distributional consequences of both conventional and unconventional monetary policy easing, as well as the distributional impact estimates for households across age, geographical region, education, employment status or housing tenure. They further claimed that conventional monetary policy easing after the GFC had a negligible impact on income inequality in the United Kingdom. However, the authors did estimate that the favourable impact of conventional easing was skewed towards higher-income households. Furthermore, they estimated that the effects of the interest rate cut needed to boost GDP by 1% a year would decrease cumulative real income for the bottom 10% and increase it for the top 10%. The authors also calculated that employed

[25] And when only employed agents were included in the study.
[26] The Bank of England cut rates from 5.5% to 0.5% and undertook a large scale QE programme (Bunn et al. 2018).
[27] In real terms.

agents benefit the most from the policy easing, whereas retirees lose out. Despite these findings, they concluded that the Gini coefficient for income inequality did not increase after the monetary policy easing and that the overall effect of monetary policy on standard relative measures of income inequality has been negligible.[28]

Amberg et al. (2021) analysed the Swedish LISA data – large-scale individual-level administrative data – to determine the distributional income effects of conventional monetary policy easing.[29] The authors used an econometric model to determine a set of responses to monetary policy shocks, including the heterogeneity due to the different sensitivity of a given income component.[30] LISA data cover the period from 1990 to 2018 and include demographic variables such as age and gender, labour market, days of unemployment, and total income and its components. The study results account for the distributional impact of a 25-basis-point monetary policy expansion over a two-year horizon. Amberg et al. (2021) estimated that conventional monetary policy does not increase inequality, as measured by the Gini coefficient. However, critical distributional consequences emerge. The Gini coefficient changes very little because significant effects in the top and the bottom of the income distribution mostly offset each other. Namely, the bottom 20% receives a higher total income resulting from higher employment and wages (earnings heterogeneity channel), whereas the top 1% sees a higher capital income (income composition channel) mainly from realised capital gains. Consequently, the p90/p10 and the p50/p10 fall, but the p90/p50 increases after the policy shock. The effects of conventional monetary policy shocks are then U-shaped. Interestingly, study results show a similar U-shape pattern when 2007–2010 (the GFC) is excluded from the sample. However, income gains are smaller at the bottom and slightly higher at the top. This might suggest that the distributional consequences of conventional policy easing differ depending on the magnitude of the economic downturn.

In recent years, various approaches have been proposed to analyse the impact of conventional monetary policy on income inequality. Although studies differ in data sources, research methods and conclusions, they form a relatively coherent picture. First, most studies acknowledge that an expansionary monetary policy increases income inequality through higher asset prices. The portfolio composition channel (Mumtaz, Theophilopoulou 2016; Coibion 2017; Taghizadeh-Hesary, Yoshino, Shimizu 2018; El Herradi, Leroy 2019; Alves, Silva 2021; Andersen et al. 2021; Amberg et al. 2021) and financial segmentation channel (Guerello 2016) both play a decisive role here. Second, lower interest rates decrease income inequality through the interest rate exposure channel and savings redistribution channel (Ampudia et al. 2018; Bunn, Pugh, Yeates 2018; Cloyne, Ferreira, Surico 2020; Alves, Silva 2021; Hohberger, Priftis, Vogel 2020). Third, most studies agree that a conventional expansionary monetary policy stimulates wages and employment (Bivens 2015; O'Farrell, Rawdanowicz, Inaba 2016; Bunn, Pugh, Yeates 2018; Samarina, Nguyen 2019; Ma 2019; Alves, Silva 2021; Martín, Fuentes, Moreno 2020; Mimir, Mæhlum, Torstensen 2021; Amberg et al. 2021). However, the distribution of these labour market gains and the strength of an earnings heterogeneity channel are questionable (Martín, Fuentes, Moreno 2020). For example, Dolado, Motyovszki and Pappa (2021) found that an expansionary monetary policy increases income inequality in the labour market when accounting for SAM and CSC. Recent literature on the topic of the impact of conventional monetary policy on income inequality shows that the following factors are crucial to assessing the final effect of conventional monetary

[28] Including both rates and QE (Bunn, Pugh, Yeates 2018).
[29] LISA refers to the Longitudinal Integrated Database for Health Insurance and Labour Market Studies (Amberg 2021).
[30] Based on Guvenen et al. (2017).

policy easing or tightening on income inequality: the labour market's response (Inui, Sudou, Yamada 2017), households' leverage (mortgage debt, debt-to-income; Mimir, Mæhlum, Torstensen 2021) and households' portfolio equity exposure (Alves, Silva 2021). In addition, income inequality analysis should also use other indicators in addition to the Gini coefficient as distributional consequences may exhibit U-shaped results (Amberg et al. 2021).

Table 1
Research assessments of the impact of conventional monetary policy easing on income inequality

Conventional monetary policy and income inequality			
Survey data	**Non-survey data**	**DSGE**	**Other**
Coibion et al. (2017)	*Fuceri et al. (2018)*	*Hohberger, Priftis, Vogel (2020)*	*Bivens (2015)*
Mumtaz, Theophilopoulou (2017)	*Samarina, Nguyen (2019)*	*Ma (2020)*	Bunn, Pugh, Yeates (2018)
Ampudia et al. (2018)	**Herradi, Leroy (2019)**	*Mimir, Mæhlum, Torstensen (2020)*	
Aye, Clance, Gupta (2019)	**Alves, Silva (2021)**		
Cloyne, Ferreira, Surico (2020)	**Andersen et al. (2021)**		
Guerello (2018)	**Kronick, Villarreal (2019)**	**Dolado, Motyovszki, Pappa (2018)***	
Martín, Fuentes, Moreno (2020)	Amberg et al. (2021)**		
Taghizadeh-Hesary, Yoshino, Shimizu (2018)			
Israel, Latsos (2020)			
O'Farrell, Rawdanowicz, Inaba (2016)			
Inui, Sudou, Yamada (2017)			

Notes:
Studies implying a lower degree of inequality from monetary policy easing are shown in italics, whereas those implying a higher degree of inequality appear in bold. Those in normal font imply no material impact or no decisive conclusions from the study.
* Based only on the labour market income inequality.
** The p90/p50 increases from the policy shock.

Source: own compilation.

It is also worth mentioning that most studies based on survey data have concluded that monetary policy easing lowers income inequality, whereas most studies based on tax data or national accounts signal the opposite. One of the reasons behind the difference in results may be the drawbacks of survey-based data such as survey design, respondents' inability to recall information correctly, the lack of

responses, proxy respondents, interviewer effects, attrition in panel studies, and coding error or top-coding practices (Kim, Tamborini 2012) that may contribute to severely downward-biased inequality estimates. By comparing survey and administrative data, Valet, Adriaans and Liebig (2019) found that respondents both at the lower and upper end of the earnings distribution were more likely not to report or misreport their earnings, whereas Meriküll and Room (2022) concluded that the non-response issue underestimated the Gini coefficient for wealth inequality in Estonia by six percentage points. Therefore, the results reported above may be reconciled in the future when harmonised cross-country inequality estimates based on joint data from household surveys, tax returns and national accounts become available. Data sources could also be a promising avenue for further research on monetary policy and inequality. Table 1 summarises recent studies, with a breakdown per category of data sources and types of analytical models.

3.3. Conventional monetary policy and wealth inequality

Initial work in the field of monetary policy and wealth inequality focused primarily on the unexpected impact of inflation on household wealth. The primary, well-known study on this topic is Doepke and Schneider (2006). Their study of the United States showed that the main losers from unexpected higher inflation are rich and old households because they hold relatively more bonds in their portfolio. In further research, Meh, Ríos-Rull and Terajima (2010) and Adam and Zhu (2016) came to similar conclusions.[31] Cao et al. (2021) confirmed these conclusions and showed that inflation costs might be lower due to financial innovation. However, all these studies analysed only the impact of unexpected inflation and not the monetary policy actions.[32] As there can be many sources of inflation, we focus here only on monetary policy decisions and wealth inequality. There has been some exciting work in this area published in recent years.

One of the most recent and well-established research studies on the impact of monetary policy on wealth inequality is Domanski, Scatigna and Zabai (2016). This study focused on analysing wealth inequalities through net wealth changes resulting from assets and liabilities' valuation effects. The authors created synthetic household balance sheets for six advanced economies (France, Germany, Italy, Spain, the United Kingdom, and the United States) from survey data and then calculated the net wealth changes resulting from the return on those assets and the costs of underlying liabilities.[33] The returns used in the simulation included three-month interest rates for bank deposits; domestic total return indexes for bonds, equities and mutual funds; and percentage price changes for residential properties. The study used the fixed composition of assets and liabilities. For the inequality measure, the authors chose the fifth quintile ratio to the second quintile of the wealth distribution. The analysis showed that wealth inequality has increased significantly since the beginning of the 21st century, with a dramatic rise in wealth inequality in the United States and France, a considerable one in Italy

[31] Meh, Ríos-Rull and Terajima (2010) analysed the inflation impact in both the inflation targeting and the price level targeting regimes for Canada. They concluded that households and foreigners lose from inflation whereas the government gains. Adam and Zhu (2016) also showed that households are net losers in the eurozone, whereas the government is a net winner from higher inflation. Within the household sector, however, wealthy and older households are the biggest losers.

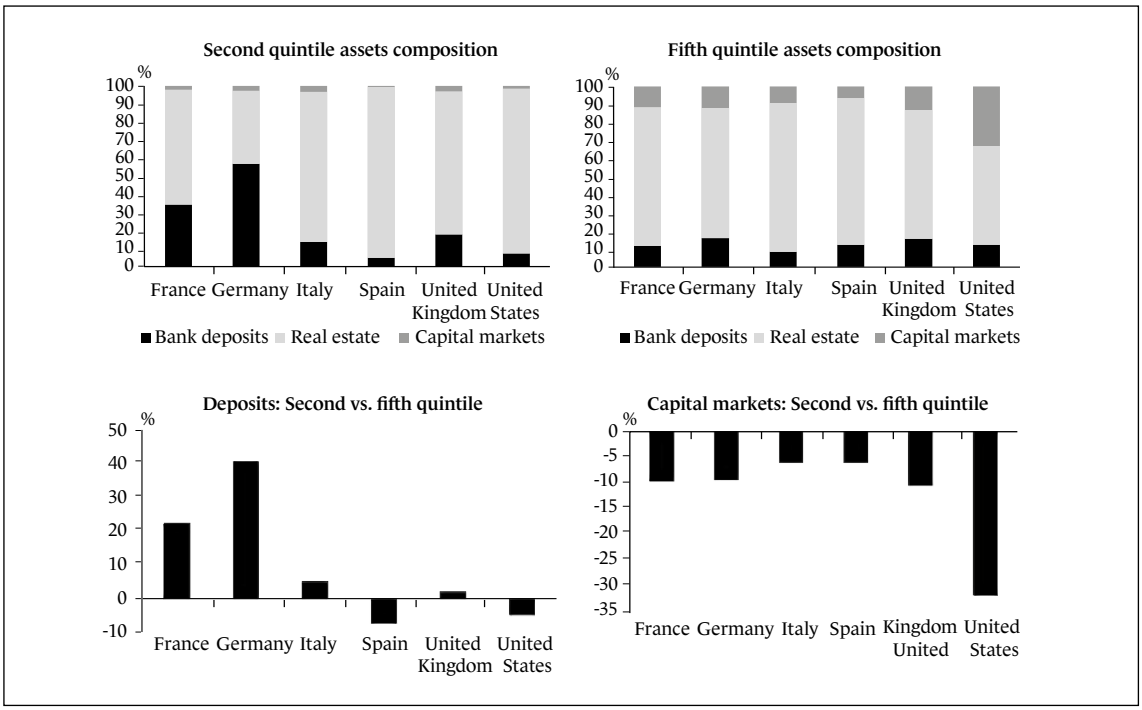
[32] For more research on (expected) inflation impact on inequality, see Erosa and Ventura (2002) or Albanesi (2007).

[33] ECB Household Finance and Consumption Survey Wave 1 (2013); Federal Reserve Board, Survey of Consumer Finances (2013); UK Office for National Statistics, Wealth and Assets Survey Wave 3 (2015).

and Germany, and a mild one or non-existent in Spain and the United Kingdom. The authors also found that it is mainly stocks and housing ownership that drive wealth inequality. One exception was Germany, where an extraordinarily high share of bank deposits impacted inequality measures through declining interest rates on bank deposits. A significant drawback of this study is that it does not establish a direct link between wealth inequality and monetary policy, and only offers some loose interpretations. However, the authors claimed that the simulation results indicate a low distributional effect on wealth from conventional monetary policy. Higher bonds or higher residential property prices resulting from interest rates cuts do not significantly impact wealth distribution as the difference in the holdings of fixed income and real estate assets between wealth quintiles is relatively small. Furthermore, expansionary conventional monetary policy contributed to lower borrowing costs, although rising equity prices may have increased wealth inequality.

Beyond the question of increasing inequality, the study also revealed interesting data on the structure of assets owned by different households in different countries. It is worth noting how different asset allocation can be depending on the country. In Germany, the second quintile holds more than 57% of assets in bank deposits, whereas in Spain, more than 94% of assets account for real estate. In the United States, as shown in Figure 4, capital markets allocation (stocks, bonds, mutual funds) account for less than 2% for the second quintile and more than 33% for the fifth. This study reveals that if conventional and unconventional monetary policy boosts capital markets relatively more than other assets, wealth inequality increases.

Figure 4
Asset ownership shares



Note: capital markets allocation accounts for stocks, bonds and mutual funds.
Source: own work based on Domanski, Scatigna, Zabai (2016).

A similar simulation was run for the eurozone countries by Adam and Tzamourani (2016). Their conclusions, however, differed from those proposed by Domanski, Scatigna and Zabai (2016). Adam and Tzamourani (2016) studied the distributional consequences of equity price, housing price and bond price increases for the eurozone households using data from the HFCS. They built an assets portfolios for the lowest 20%, the mid 20–70%, the upper 70–95% and the top 5%, and used Peersman and Smets' (2001) estimates for asset price responses for the eurozone monetary policy shock.[34] The authors stated that an unexpected easing of monetary policy leads to disproportionately large gains at the top end of the net wealth distribution. The top 5% of households gain, on average, about five times more than the remaining 95%. The authors, however, found remarkably similar distributional effects from asset price changes to those found by Domanski, Scatigna and Zabai (2016). According to Adam and Tzamourani (2016), bond price increases do not materially alter the wealth distribution. Housing price appreciation significantly reduces net wealth inequality, and equity price appreciation significantly increases net wealth inequality in the eurozone. The difference in the final conclusion compared to Domanski, Scatigna and Zabai (2016) must, then, arise from the different assumptions regarding the magnitude of assets price changes. By using estimates of Peersman and Smets (2001), which point to higher gains for stock prices than for bonds or housing prices, Adam and Tzamourani (2016) estimated significantly higher distributional impact from monetary policy and higher wealth inequality. The results were consistent, robust and applied similarly to individual eurozone countries. However, some heterogeneity did exist. In countries where poor households have relatively higher housing ownership (and higher mortgage debt), the resulting wealth inequality increases were lower.

Bielecki, Brzoza-Brzezina and Kolasa (2021) offered an alternative approach to analysing the effects of monetary policy on wealth inequality. By using the New Keynesian model with overlapping generations of finitely-lived households, the authors investigated the distributional consequences of monetary policy across generations.[35] The DSGE model set monetary policy according to the Taylor rule and used three types of assets: housing, nominal financial assets and real financial assets. The authors claimed that a monetary policy shock (interest rates cut) brings about a wealth transfer from older to younger generations, with the dividing line being the 50-years old cohort.[36] The younger (below 50 years of age) benefit from higher labour income and higher nominal asset returns (lower cost of debt), whereas the older lose in aggregate as the lower nominal assets returns outweigh the other positive effects significantly (including real assets gains). Of further note is that the authors questioned some past hypotheses about the impact of housing on wealth inequality (Adam, Tzamourani 2016; O'Farrell, Rawdanowicz, Inaba 2016). Specifically, Bielecki, Brzoza-Brzezina and Kolasa (2021) claimed that house price appreciation resulting from conventional monetary policy expansion is negative for most of the population as households usually accumulate this type of asset due to the life cycle motives (family needs, having more kids); therefore, they have an implicit liability for housing and this particular asset class (Sinai, Souleles 2005).[37] As younger cohorts' net worth is considerably lower (Bhutta et al. 2020), it can be said that, according to Bielecki, Brzoza-Brzezina and Kolasa (2021),

[34] An exogenous 25 bps reduction in the policy rate points to the 1.8% increase in stock prices, no movement in the long-term bond price, and a 0.025% increase in housing prices over the subsequent 4 quarters (Peersman, Smets 2001).

[35] Finitely-lived agents models assume households live according to the overlapping-generations scheme, have stochastic finite lifetimes and assign greater economic value to near term events (Júlio, Maria 2021). See more on the distribution of wealth in economies with finitely lived agents in Benhabib, Bisin, and Zhu (2011).

[36] Corresponding to the expected remaining lifetime (Bielecki, Brzoza-Brzezina, Kolasa 2021).

[37] See more on implicit liability for housing in Sinai and Souleles (2007).

expansionary monetary policy decreases wealth inequality. However, similarly to Dolado, Motyovszki, Pappa (2021) and Hohberger, Priftis, Vogel (2020), Bielecki, Brzoza-Brzezina, Kolasa (2021) is not an empirical study and only theoretically models the relationship between monetary policy and economic inequalities. Furthermore, Bielecki, Brzoza-Brzezina and Kolasa (2021) assume in their DSGE model that nominal interest rates are set according to a Taylor-like rule, whereas Kahn (2010) showed that actual monetary policy often deviates from the Taylor rule.[38]

Greenwald et al. (2021) also analysed the impact of low interest rates on wealth inequality. According to the authors, a persistent decline in real interest rates in the last 40 years has led to a rise in financial wealth inequality. The authors used a standard endowment economy model and showed a strong negative correlation between financial wealth inequality and long-term real interest rates as rich households hold higher duration assets, which gain more as real interest rates fall.[39] Notably, they further claimed that the duration effect explains all of the increase in financial wealth inequality. The authors included life cycle profiles and age, race, gender and education differentiation in the study and accounted for human wealth.[40] Consequently, they concluded that as human wealth accounts for most of the total wealth, the impact of an expansionary monetary policy on overall wealth inequality is small, albeit positive (higher inequality), and borne by the youngest cohorts and low-wealth households, even when considering their higher human wealth when rates decline. Younger people are worse-off from falling real interest rates as they must save for retirement for a relatively more extended period, and the loss in compound interest is most meaningful for them. Low-wealth households, however, have low financial duration as their higher share of deposit-like assets is relatively higher. These results vary considerably from Bielecki, Brzoza-Brzezina and Kolasa (2021), who showed that monetary policy easing benefits younger generations. Nonetheless, Bielecki, Brzoza-Brzezina and Kolasa (2021) assumed that real interest rates stay unchanged in the longer run, whereas Greenwald et al. (2021) precisely analysed the situation of permanently falling real rates.[41]

The other studies touching on the impact of conventional monetary policy on wealth inequality are some of those mentioned in Section 3.2 (conventional monetary policy and income inequality). Ampudia et al. (2018), in their research for the eurozone, found that the conventionally accommodative monetary policy shock decreases wealth inequality, although the reduction is only slight. The authors highlighted the leverage (mortgage) used in poorer households' housing purchases. As house prices go up (and mortgage debt stays constant), the net wealth increases significantly in percentage terms. For this reason, according to the authors, the estimated Gini coefficients decrease less in countries accompanied by low loan-to-value ratios or where the homeownership rate is low. The authors used the European Central Bank's (ECB) Basic Model Elasticities for house prices and 0.75% elasticity for stock prices. In addition, Hohberger, Priftis and Vogel (2020) found similar conclusions to Ampudia et al. (2018) and claimed that expansionary conventional monetary policy shocks do not increase but rather mitigate wealth inequality. There is, however, some controversy surrounding this conclusion. Hohberger, Priftis and Vogel (2020) showed that the persistent fall in bond yields resulting from

[38] Kahn (2010) showed that actual monetary policy in the United States during 1987–2010 often deviated from the Taylor rule by four to eight percentage points (depending on the inflation measures used or different modifications of the rule).

[39] See more in Bewley (1986).

[40] Human wealth is the value of future labour income (Greenwald et al. 2021).

[41] In response to a monetary policy shock, the real ex-post return on bonds decreases in the first two years, but converges to the initial value after 5 years, whereas the real ex-post return on capital increases above the reference value in the first year, decreases below the reference value in year two and converges to marginally below from the steady state after year four (Bielecki, Brzoza-Brzezina, Kolasa 2021).

monetary policy expansion leads to a decumulation of non liquidity constrained (NLC) households' assets compared to the baseline scenario over the longer term. However, Hohberger, Priftis and Vogel (2020) also mentioned that, in the short run, any appreciation of NLC households' assets increases wealth inequality as liquidity constrained households have zero financial wealth. Moreover, this effect is not negligible in quantitative terms. Nevertheless, according to the authors, as the monetary shock decays, the wealth effect proves temporary and recedes. O'Farrell, Rawdanowicz and Inaba (2016) also presented a more balanced view on the influence of monetary policy on wealth inequality. The authors claimed that asset price changes resulting from monetary policy actions are unlikely to significantly affect net wealth inequality. According to O'Farrell, Rawdanowicz and Inaba (2016), as housing ownership is higher in the middle deciles of wealth distribution, any resulting house price increases mitigate the distributional effects from those resulting from equity markets gains. The authors also conducted an empirical study for the wealth inequality changes after the GFC. The main differentiating factor for the countries in question was the difference between real estate and equities ownership.

Other extensive studies from Section 3.2, which also analysed the impact of monetary policy on wealth inequality, are Andersen et al. (2021) for Denmark, Alves and Silva (2021) for the eurozone, Mimir, Mæhlum and Torstensen (2021) for Norway and Bunn, Pugh and Yeates (2018) for the United Kingdom. Andersen et al. (2021) estimated that monetary policy easing increases wealth inequality, mainly through unequally distributed stock market gains. Moreover, the authors found that although housing gains are more equally distributed across households, house prices increase slightly more at the top than at the bottom of households' distribution. In summary, a one percentage point decrease in the policy rate increases asset values by around 20% of disposable income at the bottom of the income distribution and by around 75% of disposable income at the top of the income distribution over the two--year horizon.[42] Alves and Silva (2021) also attempted to analyse the impact of monetary policy on wealth inequality. Although the authors attempted to create their measure of wealth inequality, they pointed to the lack of available data.[43] Consequently, their measure leaned more towards income inequality and is not counted here as a research study covering the impact of conventional monetary policy on wealth inequality. Mimir, Mæhlum and Torstensen (2021), however, claimed that conventional monetary policy easing reduces wealth inequality. In their analysis of Norway based on the DSGE model, the authors found that interest rate cuts decrease wealth inequality, mainly through the house prices channel (portfolio composition channel), as the young and less educated hold a relatively higher share of their wealth in housing. The study results differ little regarding the demand shock scenario analysis. The net wealth of all agents improves (decreases less) as the monetary policy easing is implemented. However, again, the youngest and the low net-wealth households benefit the most because of the housing channel. Consequently, the Gini coefficient, or the share of the top 10% fall, as shown in Figure 5. The distributional impact of monetary policy tightening in a supply shock scenario is less severe, although this also points to higher wealth inequality measures. Therefore, similar to their conclusion about income inequality, Mimir, Mæhlum and Torstensen (2021) found that the distributional effects from the business cycle are more significant without systematic monetary policy actions. However, they focused only on the cyclical, short-term effects of monetary policy (one-year horizon). Bunn, Pugh

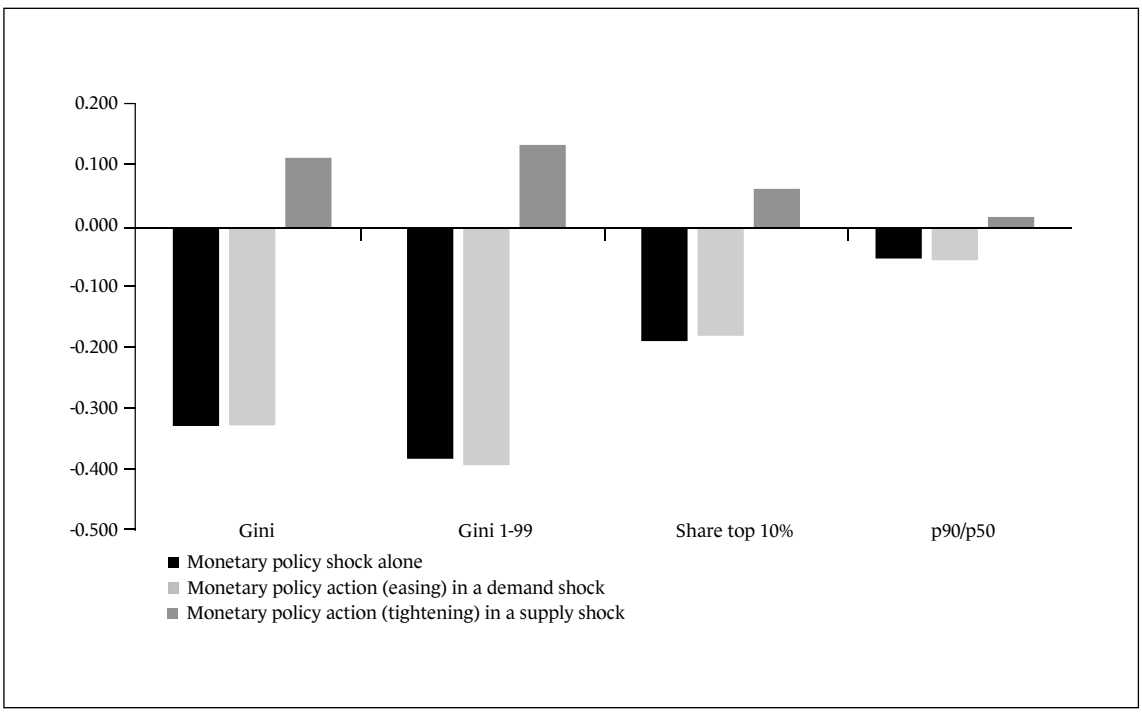
[42] Andersen et al. (2021) measured wealth inequality in terms of households' disposable income.

[43] WII includes an annual measure of unequal distributed savings, which might serve as a proxy for the amount of monetary wealth accumulated in a given year (Alves, Silva 2021).

and Yeates (2018), however, estimated that the conventional interest rate cuts required to boost UK GDP by 1% a year after the GFC would have lowered the net wealth Gini coefficient by 1.7 percentage points. The Gini coefficient reduction came from the higher housing wealth and inflation effect on debt (lower real debt) for the lowest income deciles. Regarding employment status, the gains were more or less evenly distributed between the employed, the unemployed or the retired, as opposed to income inequality.

Research on the impact of conventional monetary policy on wealth inequality is not as extensive as that for income inequality. Perhaps this is due to the lack of adequate data (Inui, Sudou, Yamada 2017; Alves, Silva 2021), a more difficult analytical approach or just lower interest as studies on unconventional measures have been more popular in recent years. In part, this may be understandable, as unconventional monetary policy tools have been at the forefront in the last decade. Notwithstanding this, a proper analysis of the impact of unconventional policies should begin with a complete understanding of conventional interest rate policies.

Figure 5
Relative changes in wealth inequality measures*



Notes:
* In: 1) a monetary policy shock, 2) a demand shock when monetary policy is used relative to the lack of monetary policy action, 3) a supply shock when monetary policy is used relative to the lack of monetary policy action. One-year time horizon.
Changes are shown in percentage point difference. For example, -0.30 implies that the wealth Gini coefficient falls from 63.6 to 63.3.

Source: own compilation based on Mimir, Mæhlum and Torstensen (2021).

When examining the analysed studies, one point remains indisputable: conventional monetary policy easing boosts asset prices (Domanski, Scatigna, Zabai 2016; Adam, Tzamourani 2016; Ampudia et al. 2018; Andersen et al. 2021; Bielecki, Brzoza-Brzezina, Kolasa 2021; Greenwald et al. 2021; Mimir, Mæhlum, Torstensen 2021). The main factor differentiating the research results, in turn, is the share of each asset class in the distribution of household wealth in each country (portfolio composition channel). Household wealth distribution in countries with a higher share of bank deposits and lower share of housing (such as Germany) changes differently from countries where net wealth is predominantly held in real estate (Domanski, Scatigna, Zabai 2016). However, the fundamental question remains whether housing wealth should count as a part of net wealth (Skinner 1989; Buiter 2008). For almost all studies claiming that conventional monetary policy easing does not increase wealth inequality (Domanski, Scatigna, Zabai 2016; O'Farrell, Rawdanowicz, Inaba 2016; Ampudia et al. 2018; Bunn, Pugh, Yeates 2018; Hohberger, Priftis, Vogel 2020; Mimir, Mæhlum, Torstensen 2021), higher housing wealth (and lower mortgage debt in real terms) is a central argument for the thesis. However, not all studies have shown the positive impact of raising house prices. The approach of Bielecki, Brzoza-Brzezina and Kolasa (2021) to consider the effective maturity of housing assets reverses the positive wealth effect of house price appreciation for most cohorts.[44]

In addition, the distribution of equity ownership is an essential variable in assessing the impact of monetary policy (Adam, Tzamourani 2016). However, the scale of this impact on stock prices remains a point of contention, and different assumptions may lead to different conclusions (Adam, Tzamourani 2016; Ampudia et al. 2018). In this context, it is also worth mentioning the aspect of assets and liabilities duration (interest rate exposure channel). Households in possession of higher duration assets, such as stocks, long bonds, and housing benefit more from monetary policy easing than households with lower duration assets, such as bank deposits or short maturity bonds (Greenwald et al. 2021). The vital element that differentiates the described studies is also the inclusion of human wealth (Bielecki, Brzoza-Brzezina, Kolasa 2021; Greenwald et al. 2021). When included, conventional monetary policy easing lowers wealth inequality when monetary policy is run according to the Taylor-like rules (Bielecki, Brzoza-Brzezina, Kolasa 2021) but increases wealth inequality when real rates permanently fall (Greenwald et al. 2021). Furthermore, Mimir, Mæhlum and Torstensen (2021) presented a new approach to analysing the impact of monetary policy on inequality by offering a study of alternative scenarios, showing that conventional monetary policy easing reduces wealth inequality in the short term. According to several studies, this is due to higher household indebtedness (savings redistribution channel) at the bottom of the net wealth distribution (Bunn, Pugh, Yeates 2018; Ampudia et al. 2018; Bielecki, Brzoza-Brzezina, Kolasa 2021; Mimir, Mæhlum, Torstensen 2021). Although some common ground has been reached from the analysed studies, further work is required to establish more constructive conclusions. On a broader level, future studies on the topic should aim for better data quality because most of the recent studies have used survey data, which may severely distort asset ownership statistics (Meriküll, Room 2022; Zucman 2019). The research studies described above also raise questions about the treatment of housing wealth in a net wealth calculation. Furthermore, an alternative scenario approach proposed by Mimir, Mæhlum and Torstensen (2021) should serve as an essential reference point for future research. Table 2 summarises the recent studies, with a breakdown per type of analytical models.

[44] Most households are in the process of accumulating housing due to life cycle motives (implicit liability for housing; Sinai, Souleles 2007) even if their current stock of this asset is high (Bielecki, Brzoza-Brzezina, Kolasa 2021).

Table 2
Research assessments of the impact of conventional monetary policy easing on wealth inequality

Conventional monetary policy and wealth inequality	
Empirical studies	**Theoretical studies**
Ampudia et al. (2018) [eurozone] **Andersen et al. (2021) [Denmark]** **Adam, Tzamourani (2016) [eurozone]** O'Farrell et al. (2016) [eight developed countries] Domanski, Scatigna, Zabai (2016) [six developed countries]	*Bielecki, Brzoza-Brzezina, Kolasa (2021) [theoretical euro-area country]* *Mimir, Mæhlum, Torstensen (2021) [Norway]* *Bunn, Pugh, Yeates (2018) [UK]* **Greenwald et al. (2021) [theoretical model country]** Hohberger, Priftis, Vogel (2020) [theoretical euro-area country]

Notes:
Studies implying a lower degree of inequality from monetary policy easing are shown in italics, whereas those implying a higher degree of inequality appear in bold. Those in normal font imply no material impact or no decisive conclusions from the study.
Source: own compilation.

3.4. Unconventional monetary policy and income inequality

Unconventional monetary policy measures may seem new, but they have been discussed and applied for decades. In 1933, John Maynard Keynes suggested using Operation Twist to lower the long-term interest rates in the United States.[45] In addition, the yield curve control policy was officially established in the United States in 1941 during World War II (Amamiya 2017).[46] However, due to the lack of data, or interest, distributional studies on unconventional monetary policy measures date back only to the recent decade and the onset of the GFC, when many developed economies launched substantial asset purchase programmes.[47] Some of these programmes have been consistently running for almost 20 years in some countries, e.g. Japan. For this reason, Japan serves as an important data source for research on unconventional monetary policy.

Saiki and Frost (2014) was one of the first well-established studies on the impact of unconventional monetary policy on income inequality. The authors analysed households income and expenditure survey data for Japan from the Japanese Cabinet Office and two unconventional monetary policy episodes: 2002–2006, which covered the first round of QE, and 2008–2013, which covered the central bank's response to the GFC at the beginning and the first arrow of Abenomics at the end of the subset. The authors used a VAR framework and measured inequality by the Gini coefficient or Theil statistics. The endogenous variables included GDP, headline CPI, monetary base, stock process and

[45] Operation Twist involves a central bank selling its short-term bonds holding and purchasing medium- to long-term bonds instead (Amamiya 2017). Swanson, Reichlin and Wright (2011) estimated that Operation Twist has a similar impact on the bond market as QE and leads to approximately 15 basis points lower long-term yields.
[46] For more on yield curve control, see Hattori and Yoshida (2020) and Kuroda (2016).
[47] For unconventional measures taken after the GFC, see Ashworth (2016) and Gagnon and Hinterschweiger (2013).

Gini coefficient. The authors concluded that unconventional monetary policy tends to increase income inequality, and that upper-income groups benefit more from the higher capital income resulting from holding relatively more equities in their portfolios. For both sample periods, the impulse response function from the VAR analysis showed a higher Gini coefficient in response to a higher monetary base. However, the study for the entire period (2002–2013) showed a marginally negative Gini coefficient impulse response. The main drawback of the study is that there is still considerable uncertainty regarding the direct relationship between the monetary base and the stock market. However, Azad and Serletis (2020) showed that an unanticipated increase in money growth (broader measure than monetary base) leads to a rise in share prices.

Other studies on Japan include Taghizadeh-Hesary, Yoshino and Shimizu (2018) and Israel and Latsos (2020). Taghizadeh-Hesary, Yoshino and Shimizu (2018) developed a vector error correction model and showed that an increase in money stock through QE and quantitative and qualitative easing (QQE) significantly increased income inequality in Japan. The authors claimed that the rise in financial assets (financial segmentation channel) mainly benefited the wealthy income groups. Meanwhile, Israel and Latsos (2020) provided empirical evidence for Japanese labour income inequality. The authors concluded that prolonged unconventional monetary policy easing could have redistribution effects, although it appears QE prevents economic downturns in the face of financial crises.

Casiraghi et al. (2018) also analysed the distributional implications of non-standard monetary policy measures. The authors used Banca d'Italia's Survey of Household Income and Wealth in Italy. The survey covered age, gender, education, employment, income and balance sheet data for Italian households. Casiraghi et al. (2018) assessed the impact of monetary policy on households' income through changes in labour income, business profits and pensions (households' non-financial income), changes in the average interest rates on bank deposits, government bonds, and loans (financial income) and capital gains. The model study focused on the expansionary policies implemented by the ECB in 2011–2012 (the Securities Markets Programme, the Outright Monetary Transactions, the Longer--Term Refinancing Operations) and 2015 (Asset Purchase Programme, APP). According to Casiraghi et al. (2018), unconventional policy tools decrease income inequality as households at the bottom of the income distribution gain from higher economic activity and employment. The total income for the bottom 10% increases the most in response to unconventional monetary policy actions. However, the estimated Gini coefficient remained unchanged in both unconventional episodes, whereas the estimated p90/p10 and the p75/p25 decreased for the 2011–2013 episode and increased slightly for the 2015 APP. Those changes, however, appear negligible compared to the historical volatility of those measures. The study also revealed intriguing differences between market stress regimes. Casiraghi et al. (2018) specified that the 2011–2012 easing was conducted under market stress, whereas the 2015 easing assumed no market stress.[48] The aggregate total income gains were much higher in the stress easing scenario, whereas in the no stress scenario, only the bottom 20% and the p50–p60 benefited (through higher income) from the unconventional monetary policy easing. Therefore, this study adds new evidence to the debate surrounding the varying effectiveness of unconventional monetary policy tools in different market regimes (Eser, Schwaab 2013; Dell'Ariccia, Rabanal, Sandri 2018) and their distributional implications. The major drawback of Casiraghi et al. (2018) is the use of Banca d'Italia's model estimates for the macroeconomic and financial effects of

[48] No market stress scenario assumes only deflation risk.

unconventional tools.[49] These estimates might be biased upwards as Banca d'Italia conducted these operations as part of the ECB. However, this problem was also apparent in Bunn, Pugh and Yeates (2018), which used BoE counter-factual estimates. In addition, Banca d'Italia's Survey of Household Income and Wealth (2010) showed that the bottom 10% of income distribution have an 11.7 net wealth to income ratio, and the bottom 10% have more than 40% of their net wealth in ownership of firms and more than 20% in financial shares and other equities. Consequently, the bottom 10% also included some relatively wealthy households with low income. Therefore, any conclusions regarding inequality must be approached with some scepticism.

Montecino and Epstein (2015) also compared the pre-QE and post-QE income distributions. The authors analysed data from the Fed's SCF for the United States. They examined three influence channels of QE policy on income inequality: the employment channel, the asset price inflation channel and the mortgage refinancing channel. Montecino and Epstein (2015) used the recentered influence function (RIF) and concluded that QE only slightly increases income inequality, despite having some positive effects on employment and mortgage refinancing.[50] According to the authors, the asset appreciation and return channel, mostly from equities, increase overall income inequality. Bond price changes, however, have little distributional impact. In aggregate, the authors estimated that three channels (employment, asset price inflation, mortgage refinancing) contributed over 14 percentage points to the increase in the p99/p10 ratio and four percentage points to the increase in the p90/p10 ratio. The main difference between the two inequality measures came from a much lower contribution from equity gain for p90 than p99. To assess the direct QE contribution, the authors used the counter--factual scenarios analysis and drew estimates for the QE effects on macroeconomic and financial variables from the literature. Consequently, they concluded that QE likely increased the p99/p10 ratio by 1.1 percentage points, i.e. a 13% of the total p99/p10 increase. However, similar to Casiraghi et al. (2018), the study results were susceptible to the assumptions about QE effects on macroeconomic and financial variables.

Lenza and Slacalek (2018) proposed the VAR model approach to analyse the influence of unconventional monetary policy on income inequality. The authors used data on unemployment, wage growth, interest rates, real estate prices and stock prices for the four largest eurozone countries (Germany, France, Spain and Italy) and implemented a Bayesian VAR to identify the direct effects of unconventional monetary policy shocks at the aggregate level. Subsequently, they undertook a microsimulation to distribute these aggregate effects on individual households. The study used the HFCS. At the aggregate level, the authors estimated that an expansionary asset purchases shock decreases the term spread and that the term spread is negatively correlated with the real GDP.[51] To estimate the income response at the household level, they used a series of figures with impulse responses implied by the micro-simulation for each country. For example, the impulse response for wages showed a positive response in Germany, Italy and France, but a negative one in Spain. However, the unemployment response showed a significant impulse response for Spain and a more negligible but still negative one (lower unemployment) in Germany. Overall, the authors estimated QE impulse

[49] Model estimates assumed GDP, employment, wages, and profits higher by 2.7%, 0.6%, 2.7% and 5.9% respectively in unconventional expansion under market stress and by 2.7%, 0.6%, 4.3% and 8.2% in unconventional expansion without market stress (Casiraghi et al. 2018).

[50] For more on RIF, see Firpo, Fortin and Lemieux (2009).

[51] Term spread defined as the difference between a 3-month Euribor and a 10-year eurozone government benchmark bond yield (Lenza, Slacalek 2018).

responses for employee income, self-employment income and unemployment to employment flow, assuming that income from pensions, rental income from real estate property and income from financial investments remained unchanged. Under these assumptions and estimates, they concluded that nonstandard monetary policy easing decreases income inequality. According to the authors, the unconventional easing compresses the income distribution because many unemployed agents find jobs and, hence, receive a higher income (earnings heterogeneity channel). Specifically, they estimated that the Gini coefficient for income falls modestly by 0.2 percentage points one year after the easing. In all the analysed scenarios, the effect of the earnings heterogeneity channel – in this case, the unemployment to employment flow – outweighs any other distributional channels of monetary policy. However, the fact that transitions from unemployment to employment account for approximately 75% of the QE effect on mean income across households is the main drawback of this study as its results may differ significantly when the QE labour market response for lower-income households is smaller.

One of the most recent and extensive studies on the impact of unconventional monetary policy (QE) on income and wealth inequalities is Lee (2020). The author built a HANK model with an ELB, forward guidance (FG), QE, household portfolio choice, wage and price rigidities, endogenous unemployment, and frictional financial intermediation. For model calibration, they used data from the SCF from 2007 and proposed three income categories: labour income, capital income and transfer income.[52] To estimate the distributional effects of QE, they offered a counterfactual scenario analysis, similar to Mimir, Mæhlum and Torstensen (2021). The aggregate QE effects in the model post the GFC (compared to no unconventional monetary policy intervention) were as follows: output and consumption were approximately 1% higher, investments and profits were approximately 3% higher, equity prices were 1% higher, and unemployment was approximately 1.4% lower. Real wages, however, stayed almost constant. According to the author, these implied effects are similar to conventional monetary policy expansion and thus mitigate the adverse effects of the ELB constraints. The distributional results of the effects mentioned above were that unconventional monetary policy easing modestly reduces income inequality, as measured by the Gini coefficient. To the greatest extent, this is due to lower unemployment (earnings heterogeneity channel). However, according to Lee (2020), higher profits and equity prices (relative to real wages growth) offset almost 80% of this improvement. A further part of the study reveals an interesting development with the Gini coefficient. Even though the coefficient decreased and points to lower income inequality, the top 10% and the top 1% increased in aggregate income. Furthermore, the bottom 10% of income saw no improvement at all. To summarise, Lee (2020) concluded that unconventional monetary policy easing (QE) reduces income inequality as measured by the Gini coefficient but increases the top 10% and the top 1% share of income.

As far as we know, Lee (2020) is also the first study to assess the distributional impact of the FG policy[53] by estimating different income share distributions between the case of QE and QE accompanied with the FG using the HANK model. According to the author, forward guidance strengthens the distributional effects of central banks' unconventional easing. The top 10% income share increases at the expense of the middle quintile. However, the Gini coefficient falls, as in the case of QE without FG, as described above.

Other recent studies analysing unconventional monetary policy easing and household income inequality include Albert, Gómez-Fernández and Ochando (2019), Lester, Mau and Rinz (2020) and

[52] Labour income includes wages and salaries, capital income includes business income and financial assets income, and transfer income includes transfers, social security benefits, and pensions (Lee 2020).

[53] For more on forward guidance (pledge about future interest rates path) see McKay, Nakamura and Steinsson (2016), Campbell et al. (2019) and Hagedorn et al. (2019).

Tsiaras (2020). Albert, Gómez-Fernández, and Ochando (2019) analysed the effects of unconventional monetary policy on income and wealth distribution in the United States between 2008 and 2013 and in the eurozone between 2009 and 2016. The authors used a VAR model and a Cholesky decomposition methodology based on three variables: base money, HICP inflation rates and stock market indices. They concluded that unconventional monetary policy has undesired effects on income distribution through the portfolio composition channel in the United States, but not in the eurozone.[54] The main weakness of Albert, Gómez-Fernández and Ochando (2019) is that they did not attempt to include other distribution channels and focused only on the stock market response. However, Lester, Mau and Rinz (2020) estimated that the effect of unconventional monetary policy (asset purchases) on inequality is ambiguous. They used a two-agent New Keynesian model with the financial sector.[55] However, the authors also offered several interesting features that might determine the distributional impact of unconventional easing. They concluded that the contribution of unconventional monetary policy to higher inequality is lower when interest rates are at the zero lower bound, but higher when a central bank is slow to unwind its asset position.[56] Tsiaras (2020) also proposed a New-Keynesian model to analyse the distributional impact of QE. They built and calibrated a dynamic general equilibrium TANK model with sticky wages, limited assets market participation, financial frictions and QE for the eurozone. According to the author, unconventional monetary policy (QE) is stimulative and reduces income inequality when the assets market participation level is sufficiently high (at the eurozone average). However, when financial market participation is low, QE may be contractionary, especially when wages are flexible.[57] This is a key finding, indicating the importance of the financial segmentation channel and emphasising the essential need for fiscal and monetary policy cooperation when using unconventional monetary policy.

Other studies analysing the impact of unconventional monetary policy on income inequality have been mentioned in the previous sections: Bivens (2015), Mumataz and Theophilopoulou (2016), Ampudia et al. (2018), Bunn, Pugh, Yeates (2018), and Guerello (2018). Bunn, Pugh and Yeates (2018) estimated that a QE programme boosting GDP by 1% a year from mid-2008 to mid-2014 would have had a negligible impact on income inequality. However, the authors estimated that the gains were marginally skewed towards the higher-income households. Ampudia et al. (2018), however, argued that unconventional measures reduce income inequality. Yet, in contrast to the study on conventional methods, this thesis is not supported by any empirical research. Compared to Lenza and Slacalek (2018), the authors concluded that QE boosts real GDP as it compresses the term spread. In addition, Ampudia et al. (2018) outlined that as households have more floating- than fixed-rate exposure, non--standard measures such as QE may be relatively less powerful than conventional monetary policy tools. Hohberger, Priftis and Vogel (2020) estimated that unconventional policy easing (QE) has a very similar impact on the economy as conventional monetary policy easing and mitigates income inequality through labour market gains. Bivens (2015) also claimed that unconventional monetary policy strongly reduces inequality through lower unemployment and higher wages at the bottom and middle

[54] Possibly because of the excessive banking in the eurozone and the smaller role of capital markets in the portfolio composition channel (Albert et al. 2019).

[55] The TANK model, which analysed the implications of changes in the federal funds rate on consumption inequality. See more in Debortoli and Galí (2017).

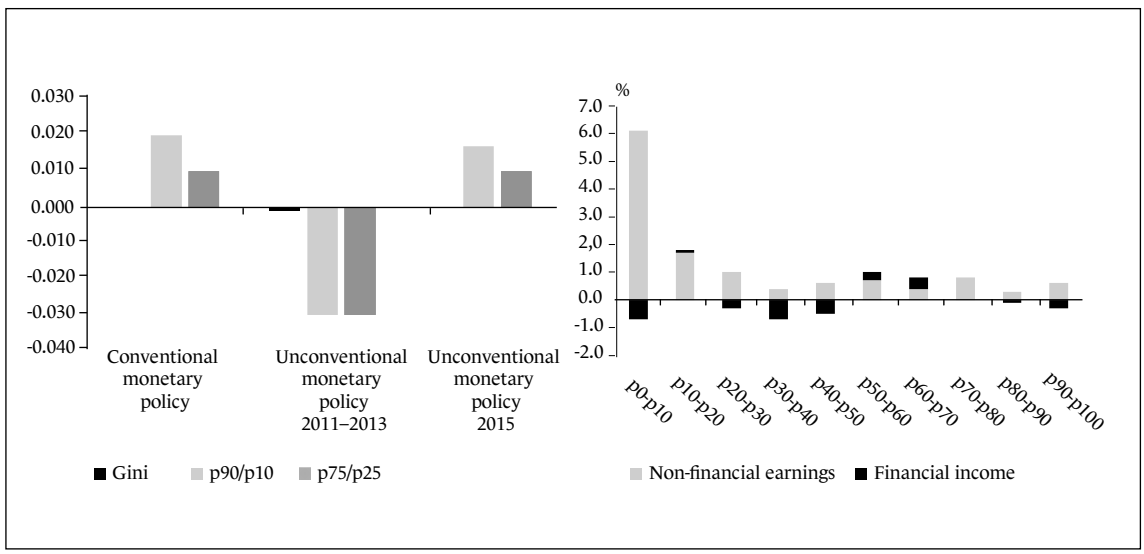
[56] As an unconventional monetary policy shock is inflationary and short-term rates are at the lowest, the short-term real interest rate falls and reduces inequality (Lester, Mau, Rinz 2020).

[57] The contractionary QE effect in the model could be mitigated by fiscal policy – a redistribution of profits from the firm owners to the hand-to-mouth consumers (Tsiaras 2020).

of the wage distribution. However, Mumataz and Theophilopoulou (2016) estimated that QE might increase income inequality. The authors claimed that higher-income households have access to financial markets and hold relatively more financial assets, which benefit more from the unconventional monetary policy easing (financial segmentation channel). Guerello (2018) provided an empirical analysis of unconventional monetary policy and households income distribution for the eurozone. Guerello (2018) also pointed to the critical role of the financial segmentation channel. According to the author, eurozone countries with households more closely connected to financial markets typically experience higher income dispersion after an unconventional monetary policy easing (defined as the central bank balance sheet expansion).

Figure 6

Changes in income inequality measures (percentage point differences) in various market conditions (left) and changes in income sources from the 2011–2013 unconventional monetary policy episode (right)



Source: own compilation based on Casiraghi et al. (2018).

There has been growing interest in research on unconventional monetary policy and income inequality in recent years, with the main focus on QE programmes. Empirical research studies and large-scale econometric modelling have been conducted for Japan, the United States, the United Kingdom and the eurozone. In aggregate, these results appear to suggest that unconventional monetary policy easing stimulates economic activity (Bivens 2015; Bunn, Pugh, Yeates 2018; Casiraghi et al. 2018; Guerello 2018; Lenza, Slacalek 2018; Albert, Gómez-Fernández, Ochando 2019; Hohberger, Priftis, Vogel 2020; Lee 2020; Lester, Mau, Rinz 2020; Montecino, Epstein 2015; Mumtaz, Theophilopoulou 2017; Tsiaras 2020), usually in a manner similar to conventional monetary policy tools (Hohberger, Priftis, Vogel 2020; Lee 2020).[58] However, channels of influence, and consequently distributional effects, appear to differ from conventional monetary policy. By boosting economic activity, unconventional monetary policy tools stimulate employment and wages (Bivens 2015; Montecino, Epstein 2015, Casiraghi et al. 2018; Lenza,

[58] Nevertheless, the economic benefits from QE may be lower under lower market stress (Casiraghi et al. 2018).

Slacalek 2018) but also significantly impact asset prices (Saiki, Frost 2014; Montecino, Epstein 2015; Mumataz, Theophilopoulou 2016). Consequently, many studies have indicated the essential role of the financial segmentation channel (Mumataz, Theophilopoulou 2016; Guerello 2018; Taghizadeh-Hesary, Yoshino, Shimizu 2018; Tsiaras 2020).

Table 3
Research assessments of the impact of unconventional monetary policy easing on income inequality

Unconventional monetary policy and income inequality		
Sovereign bonds APP	**Term funding facilities**	**Forward guidance**
Casiraghi et al. (2018) *Lenza, Slacalek (2018)* *Hohberger, Priftis, Vogel (2020)* *Bivens (2015)* *Lee (2020)**	*Casiraghi et al. (2018)* **Albert, Gómez-Fernández, Ochando (2019)**** Bunn, Pugh, Yeates (2018)	*Lee (2020)**
Saiki, Frost (2014) **Montecino, Epstein (2015)** **Mumtaz, Theophilopoulou (2017)** **Taghizadeh-Hesary, Yoshino, Shimizu (2018)** **Israel, Latsos (2020)** **Guerello (2018)**		
Bunn, Pugh, Yeates (2018) Albert, Gómez-Fernández, Ochando (2019) Lester, Mau, Rinz (2020) Tsiaras (2020)		

Notes:
Studies implying a lower degree of inequality from monetary policy easing are shown in italics, whereas those implying a higher degree of inequality appear in bold. Those in normal font imply no material impact or no decisive conclusions from the study.
* Unconventional monetary policy easing and FG reduce income inequality measured by the Gini coefficient but increase the top 10% and the top 1% share of income (Lee 2020).
** Albert, Gómez-Fernández and Ochando (2019) focused mainly on the portfolio composition channel.
Source: own compilation.

Furthermore, unconventional monetary policy measures (asset purchases) do not lower mortgage costs in countries with a floating rate debt culture, which may have a significantly different impact on income distribution than conventional interest rate cuts (Ampudia et al. 2018). Consequently, the final assessment of the distributional impact of unconventional monetary policy measures on income inequality depends on assumptions about the labour market response, financial assets' price inflation, and the connection of households to financial markets. Therefore, the conclusions may significantly differ between countries where exposure to the financial market is common and where only the top

income groups participate in the investment markets (Guerello 2018). It is also worth noting that although the majority of studies have shown that the impact of unconventional monetary policy easing on the labour market is positive, in some studies, this was, however, only the case for the higher wage cohorts (Lee 2020).

In conclusion, much work on the labour market response to QE has been carried out, yet some critical issues remain to be resolved and may determine the final assessment of unconventional tools on income inequality. In addition, most studies have analysed only QE programmes defined as sovereign bonds asset purchase programmes. However, new instruments have emerged in recent years, of which the impact on income inequality remains unexplored.[59] Table 3 summarises the recent studies, with a breakdown per type of unconventional policy tool.

3.5. Unconventional monetary policy and wealth inequality

Studies examining unconventional monetary policy and wealth inequalities are less numerous than income inequality. Access to reliable data sources remains a perennial problem here. However, some extensive and exciting studies have been published in recent years. Most of these have already been described in previous sections.

A study not yet described, and one of the first on the subject of unconventional monetary policy and wealth inequality, is the work of Bell et al. from 2012. The authors analysed the BoE's QE programme launched in 2009 after the GFC. They estimated that QE had increased prices of a wide range of assets, including equities.[60] Consequently, unconventional policy easing boosted households' financial wealth. However, survey data analysis revealed that these gains were skewed towards wealthier households. In fact, the top 5% of households held 40% of the assets boosted by QE. Overall, the authors concluded that wealth effects resulting from QE accrue to households holding the most financial assets (financial segmentation channel, portfolio composition channel). However, a significant drawback of Bell et al. (2012) is that the study does not touch on housing wealth (Ampudia et al. 2018) or alternative scenarios assuming no policy actions (Mimir, Mæhlum, Torstensen 2021).

Other studies analysing the impact of unconventional monetary policy on wealth inequality have been mentioned in previous sections: Bivens (2015), Domanski, Scatigna, Zabai (2016), Ampudia et al. (2018), Bunn, Pugh, Yeates (2018), Casiraghi et al. (2018), Lenza and Slacalek (2018), Albert, Gómez-Fernández, Ochando (2019), Hohberger, Priftis, Vogel (2020) and Lee (2020). Ampudia et al. (2018) estimated that unconventional monetary policy easing slightly decreases wealth inequality as households at the bottom of the wealth distribution benefit from high leverage (housing purchases).[61] The authors showed that the median net wealth increased the most for the lowest quintile for the eurozone aggregate after unconventional policy easing.[62] Therefore, the results are the same as in the case of conventional policy easing. Hohberger, Priftis and Vogel (2020), however, claimed that expansionary QE does not have a permanent effect on wealth inequality, even though unconventional monetary policy boosts asset prices and favours asset holders. Nevertheless, the authors stated that central bank asset purchases depress bond returns and mitigate wealth inequality over

[59] Such as corporate bonds purchases, stock market exchange-traded funds purchases, term funding facilities.
[60] Asset purchases increased equity prices by at least as much as they pushed up bonds prices (Bell et al. 2012).
[61] A 30-basis-point drop in the term spread for one year (Ampudia et al. 2018).
[62] The total for the four large countries: Germany, Spain, France and Italy (Ampudia et al. 2018).

the medium term. Bivens (2015), by contrast, argued that large scale asset purchases (LSAP) only have a modest impact on wealth inequality over longer-time horizons because asset returns have important fundamental drivers not related to monetary policy. In addition, Bivens (2015) claimed that pension wealth, which is concentrated in the bottom 90%, should see a valuation boost from LSAP similar to gains from business equity, concentrated in the top 1%. However, no empirical evidence was provided to back these theses. To the contrary, Albert, Gómez-Fernández and Ochando (2019) estimated that the portfolio composition channel resulting from unconventional monetary policy easing increased wealth inequality in the United States, but not in the eurozone.[63] The authors used the monetary base as a proxy for measuring unconventional monetary policies.[64]

Domanski, Scatigna and Zabai (2016) argued that unconventional monetary policies rely more on wealth effects than conventional policy measures.[65] Consequently, unconventional monetary policies may significantly impact wealth inequality through equity and house price changes.[66] According to Domanski, Scatigna and Zabai (2016), the net distributional effect of unconventional monetary policy depends on the policy's impact on the relative price of housing assets (more evenly distributed) and equities (concentrated at the top). In turn, Casiraghi et al. (2018) provided extensive estimates of the impact of unconventional monetary policy on wealth inequality based on data for Italy. The authors estimated that the ECB's non-standard policy measures somewhat decreased wealth inequality as the p90/p10 and the p85/p25 ratios fell, whereas the Gini coefficient remained broadly unchanged. Furthermore, Casiraghi et al. (2018) argued that the response of households' wealth is moderately U-shaped as households at the top of the wealth distribution benefit from higher equity prices whereas households at the bottom of the wealth distribution gain significant advantage from housing gains due to their higher leverage. Lenza and Slacalek (2018) presented similar findings in their study for the four largest eurozone countries. According to the authors, the ECB's unconventional monetary policy easing contributed to marginally lower net wealth inequality as QE positively impacts housing wealth.

Bunn, Pugh and Yeates (2018) also analysed unconventional monetary policy easing (QE) and wealth inequality. The authors assessed the distributional effect of the QE change necessary to boost GDP by 1% a year and estimated that unconventional policy easing boosts wealth the most in the middle of the age distribution (30–59 years old). Those households benefit the most from higher financial asset prices, higher house prices and the inflation effect on mortgage debt. Although the youngest cohort benefit from the macro effects on the labour income, they do not yet have any housing wealth. However, older groups do not benefit from higher labour income (because they have already retired) and lose from inflation on bank deposits and bond holdings.[67] Bunn, Pugh and Yeates (2018) also offered an intriguing alternative study incorporating future housing costs. The study estimated the average cumulative real impact of policy changes since 2007 as of 2012–2014 by income and

[63] A plausible explanation might be the excessive banking in Europe and the weaker role of the portfolio channel in the eurozone (Albert et al. 2019).

[64] Bagchi, Curran and Fagerstrom (2019a) argued that the growth in the base money supply exhibits a significant positive relationship with wealth inequality in OECD countries. For more on the base money and wealth inequality, see Bagchi, Curran, Fagerstrom (2019b).

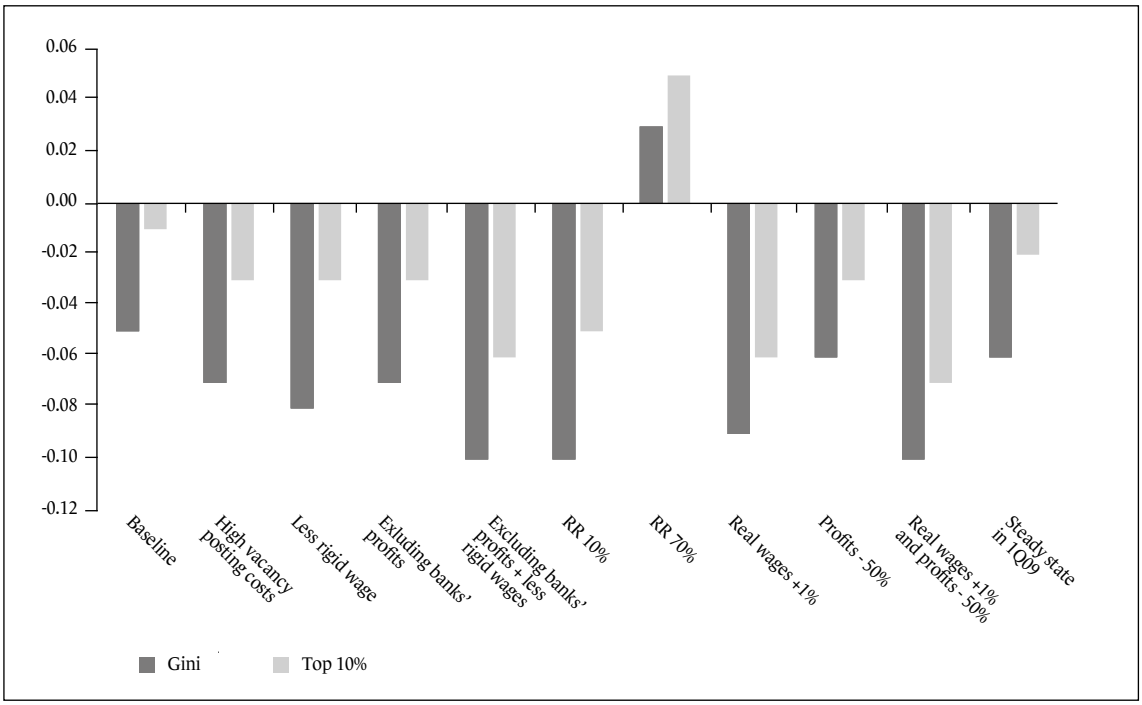
[65] Supported also by Bernoth et al. (2015), who argued that asset valuation effects are likely more important for unconventional monetary policy easing than for conventional interest rate cuts and that the distributional effects of both policies differ significantly.

[66] For more on unconventional monetary policy and house prices, see Gabriel and Lutz (2014).

[67] Whereas they still benefit from higher financial assets and house prices. All groups benefit in the nominal net wealth terms from the QE (Bunn, Pugh, Yeates 2018).

wealth factors and the age of the household's head.[68] According to the authors, the youngest group (25–29 years old) were net losers from policy easing because of the future housing costs, although they benefited from higher wages, higher inflation and lower interest rates. However, it should be noted that all the changes described above are in nominal terms (although deflated to the 2013 price level), not in percentage points. In addition, Bunn, Pugh and Yeates (2018), unlike Bielecki, Brzoza-Brzezina and Kolasa (2021), do not provide a life-cycle analysis of monetary policy. Overall, Bunn, Pugh and Yeates (2018) argued that the impact of unconventional monetary policy easing on wealth inequality is negligible.

Figure 7
Changes (percentage points differences) in the wealth Gini index and the top 10% share of wealth in response to QE versus the counterfactual scenario



Notes:
RR stands for the replacement ratio for the unemployment benefits.
Baseline and robustness checks.

Source: own compilation based on Lee (2020).

Lee (2020) also analysed the impact of unconventional monetary policy on wealth inequality. Regarding QE, they estimated that it slightly reduces the wealth Gini coefficient versus the counterfactual case. Although, according to the author, QE increases business profits and equity prices, as in the growing body of literature, the Gini coefficient falls because of the higher job-

[68] Including both conventional and unconventional monetary policy easing.

-finding rate.[69] Higher employment helps households maintain their liquid wealth or prevents them from taking on new debt, leading to lower wealth inequality.[70] Moreover, contrary to findings on income inequality, Lee (2020) argued that QE also lowers the top 1% and the top 10% share of wealth due to the aforementioned balance sheet effects. Concerning robustness checks, only one out of ten alternative scenarios leads to higher wealth inequality resulting from QE, as shown in Figure 7.[71] When unemployment benefits are relatively high, income gains from finding a job are lower and, hence, QE seems to increase wealth inequality in that scenario. This finding might be intriguing regarding the unusually high unemployment benefits during the Covid-19 recession. Regarding estimates of the FG, Lee (2020) claimed that FG lowers wealth inequality, as in the case of income inequality. According to the author, FG increases employment, which reduces the wealth gap between the bottom 10% and the middle. Lee (2020) concluded that unconventional monetary policy has weaker distributional consequences than conventional monetary policy tools.

This section investigated the literature on the impact of unconventional monetary policy on wealth inequality. In general, these results appear to suggest that unconventional monetary policy boosts net wealth on average. However, the distributional impact heavily depends on certain crucial assumptions or limitations. Studies based on a static approach and excluding housing leverage (Bell et al. 2012; Albert, Gómez-Fernández, Ochando 2019) suggest that unconventional monetary policy increases wealth inequality, mainly through the portfolio composition channel and the financial segmentation channel.[72] However, static studies including home equity in net wealth calculation suggest that unconventional policy easing decreases wealth inequality due to higher leverage (mortgage debt, the savings redistribution channel) in the bottom of the net wealth distribution (Ampudia et al. 2018; Casiraghi et al. 2018; Lenza, Slacalek 2018). Housing is more evenly distributed across net wealth distribution than other asset classes (Domanski, Scatigna, Zabai 2016). However, when future housing costs are included in the study, the youngest cohort (25–29 years old) may lose from the unconventional monetary policy easing (Bell et al. 2012). A dynamic but theoretical study was proposed by Lee (2020). The author estimated in the HANK model that unconventional monetary policy easing (QE and FG) decreases wealth inequality due to the substantial positive wealth response from higher employment resulting from the policy easing. However, the study results depended heavily on the unemployment to employment flow.

To summarise, the assumption regarding whether or how to include housing wealth in the net wealth calculation and the assumption about the labour market response from policy easing appear crucial in determining the distributional impact of unconventional monetary policy. The picture, however, remains incomplete as the distributional impact of certain unconventional tools remains unexplored. What might be of particular interest is the impact of central banks' corporate bonds buying and equity purchases as access to capital is increasingly being explored with reference to market power (Nolan, Richiardi, Valenzuela 2019) and market power as a possible reason for higher inequality (Ennis, Gonzaga, Pike 2019). Table 4 summarises the recent studies with a breakdown per type of the unconventional policy tool.

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[69] There is no housing in the model (Lee 2020).
[70] The model assumes that households adjust their liquid savings to smooth consumption (Lee 2020).
[71] In the baseline, the replacement ratio for the unemployment benefits equals 40% (Lee 2020).
[72] In the exact point of time, excluding any higher wealth generated by higher income in the future.

Table 4
Research assessments of the impact of unconventional monetary policy easing on wealth inequality

Unconventional monetary policy and wealth inequality		
Sovereign bonds APP	**Term funding facilities**	**Forward guidance**
Casiraghi et al. (2018)	*Casiraghi et al. (2018)*	*Lee (2020)*
Lenza, Slacalek (2018)		
Hohberger, Priftis, Vogel (2020)	**Albert, Gómez-Fernández, Ochando (2019)***	
Bivens (2015)		
Lee (2020)		
Ampudia et al. (2018)	Bunn, Pugh, Yeates (2018)	
Bell et al. (2012)		
Albert, Gómez-Fernández, Ochando (2019)*		
Domanski, Scatigna, Zabai (2016)		
Hohberger, Priftis, Vogel (2019)		
Bunn, Pugh, Yeates (2018)		

Notes:
Studies implying a lower degree of inequality from monetary policy easing are shown in italics, whereas those implying a higher degree of inequality appear in bold. Those in normal font imply no material impact or no decisive conclusions from the study.
* Albert, Gómez-Fernández and Ochando (2019) focused mainly on the portfolio composition channel.

Source: own compilation.

4. Conclusions

We reviewed more than 40 research papers related to the impact of monetary policy on economic inequalities. The review provides a broad overview of the relationship of monetary policy with inequality and several key factors that influence and differentiate the research conclusions. In this manner, we aimed to bring coherence to the academic and policy debates and facilitate further research. Table 5 outlines all the research papers described and analysed in the review. Although the picture is still incomplete, we can nonetheless summarise several findings on the impact of monetary policy on income and wealth inequalities.

First, the labour market response from a monetary policy easing is crucial in determining the distributional effects of policy easing. Although monetary policy boosts asset prices significantly, the unemployment to employment flow may mitigate not only the impact of higher asset prices on inequality, but also outweigh it. Therefore, it is crucial to further investigate the impact of monetary policy, especially unconventional monetary policy, on the labour market for the lowest earners. This observation may also help determine the appropriate monetary policy stance in an environment of already low unemployment.

Second, housing wealth acts as a mitigating factor. Housing is generally more equally distributed across households, and its price appreciation may reduce inequality, especially for levered households. However, some experts argue that net wealth calculations should not include the equity value of a house in which the individual lives; principally, when future housing costs (e.g. a larger dwelling because of family reasons) are considered. Future research could and should better acknowledge and embrace the home equity issue and concerns about future housing costs.

Third, the heterogeneity of the portfolio composition of households across countries significantly affects the impact of monetary policy on inequality. This effect relates mainly to the portfolio composition channel and financial segmentation channel. Countries with households more involved in financial markets and higher stock market exposure usually exhibit less inequality as a result of policy easing. A better understanding of this issue could prove decisive in any research on inequality.

Fourth, some relatively new unconventional monetary policy tools (corporate bond purchases, equity purchases, forward guidance amendments) remain unexplored regarding their impact on inequality. Going forward, the monetary policy measures related to the COVID-19 recession globally should serve as a valuable area of research.

Fifth, the source of data matters. Most of the studies based on survey data concluded a negative impact of monetary policy easing on inequality (lower inequality), whereas most of the studies based on the tax data or national accounts point in the opposite direction. Consequently, it is difficult to reach a clear scientific consensus on this matter. Data sources, therefore, could be a promising avenue for further research on economic inequalities and monetary policy.

Finally, most of the estimated changes in inequality measures appear be relatively modest. For the Gini coefficient, monetary policy impact estimates ranged between -0.3 and 0.3 percentage points. Other measures, however, such as the share of the top 1%, top 10% or the p90/p10 index, exhibit higher volatility.[73] In the case of these measures, there was more than a 3 percentage point difference for the highest positive estimates.[74] These results suggest that monetary policy does impact inequality but may not be a key driver of changes in economic inequality over time.

[73] This may be the case because the Gini index puts greater weight on observations in the middle of the distribution than on those located at the tails (El Herradi, Leroy 2019).

[74] Simulated percentage change in each income group's share of total disposable income resulting from a one percentage point decrease in the policy rate according to Andersen et al. (2021).

Table 5
Research assessments of monetary policy impact on inequality

Coibion et al. (2017)	*Ampudia et al. (2018)*	Conventional
Samarina, Nguyen (2019)	*Bielecki, Brzoza-Brzezina, Kolasa (2021)*	
Hohberger, Priftis, Vogel (2019)	*Mimir, Mæhlum, Torstensen (2021)*	
Furceri, Loungani, Zdzienicka (2018)	*Bunn, Pugh, Yeates (2018)*	
Mumtaz, Theophilopoulou (2017)		
Cloyne, Ferreira, Surico (2020)	**Adam, Tzamourani (2016)**	
Ampudia et al. (2018)	**Andersen et al. (2021)**	
Aye, Clance, Gupta (2019)	**Greenwald et al. (2021)**	
Bivens (2015)		
Ma (2019)	Domanski, Scatigna, Zabai (2016)	
Guerello (2016)	O'Farrell, Rawdanowicz, Inaba (2016)	
Martín, Fuentes, Moreno (2020)	Hohberger, Priftis, Vogel (2019)	
Mimir, Mæhlum, Torstensen (2021)		
El Herradi, Leroy (2019)		
Dolado, Motyovszki, Pappa (2021)*		
Israel, Latsos (2019)		
Taghizadeh-Hesary, Yoshino, Shimizu (2018)		
Alves, Silva (2021)		
Andersen et al. (2021)		
Kronick, Villarreal (2019)		
O'Farrell, Rawdanowicz, Inaba (2016)		
Inui, Sudou, Yamada (2017)		
Bunn, Pugh, Yeates (2018)		
Amberg et al. (2021)**		
Income	**Wealth**	

Table 5, cont'd

Lenza, Slacalek (2018)	*Ampudia et al. (2018)*	
Casiraghi et al. (2018)	*Bivens (2015)*	
Hohberger, Priftis, Vogel (2020)	*Lenza, Slacalek (2018)*	
Bivens (2015)	*Casiraghi et al. (2018)*	
*Lee (2020) ****	*Lee (2020)*	
Saiki, Frost (2014)	**Bell et al. (2012)**	**Unconventional**
Montecino, Epstein (2015)	**Albert, Gómez-Fernández, Ochando (2019) ******	
Guerello (2018)		
Mumtaz, Theophilopoulou (2017)	**Domanski, Scatigna, Zabai (2016)**	
Taghizadeh-Hesary, Yoshino, Shimizu (2018)	**Hohberger, Priftis, Vogel (2019)**	
Israel, Latsos (2020)	**Bunn, Pugh, Yeates (2018)**	
Bunn, Pugh, Yeates (2018)		
Albert, Gómez-Fernández, Ochando (2019)		
Lester, Mau, Rinz (2020)		
Tsiaras (2020)		
Income	**Wealth**	

Notes:
Studies implying a lower degree of inequality from monetary policy easing are shown in italics, whereas those implying a higher degree of inequality appear in bold. Those in normal font imply no material impact or no decisive conclusions from the study.
***** Based only on the labour market income inequality.
****** The p90/p50 increases from the policy shock.
******* Unconventional monetary policy easing and forward guidance reduce income inequality measured by the Gini coefficient but increase the top 10% and the top 1% share of income (Lee 2020).
******** Albert, Gómez-Fernández and Ochando (2019) focused mainly on the portfolio composition channel.

Source: own compilation.

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Polityka pieniężna i nierówności ekonomiczne: przegląd literatury

Streszczenie

Celem artykułu jest przedstawienie możliwego wpływu polityki pieniężnej na nierówności ekonomiczne. W ostatnich dekadach istotnie wzrosły bowiem nierówności dochodowe i majątkowe w krajach rozwiniętych. W rezultacie zainteresowanie tematem nierówności w badaniach ekonomicznych również się zwiększyło. Pojawiły się także badania wskazujące na negatywny wpływ zwiększonych nierówności ekonomicznych na wzrost gospodarczy. Polityka pieniężna, w ramach swojej funkcji reakcji, wielokrotnie wykorzystuje dane dotyczące wzrostu gospodarczego. Kluczowe staje się więc przeanalizowanie możliwego wpływu polityki pieniężnej na nierówności ekonomiczne.

Na potrzeby artykułu przeanalizowano ponad 40 prac badawczych poruszających wpływ konwencjonalnej i niekonwencjonalnej polityki pieniężnej. Artykuł został podzielony na cztery główne części, które analizują literaturę dotyczącą wpływu: konwencjonalnej polityki pieniężnej na nierówności dochodowe, konwencjonalnej polityki pieniężnej na nierówności majątkowe, niekonwencjonalnej polityki pieniężnej na nierówności dochodowe oraz niekonwencjonalnej polityki pieniężnej na nierówności majątkowe. Podczas prac nad literaturą zidentyfikowano również główne kanały oddziaływania polityki pieniężnej na nierówności: kanał stopy procentowej, kanał struktury dochodu rozporządzalnego, kanał segmentacji finansowej, kanał składu portfela majątkowego, kanał redystrybucji oszczędności oraz kanał różnorodności źródeł dochodu.

Wyniki przeglądu literatury wskazują, że: (1) reakcja zatrudnienia na zmiany w polityce pieniężnej stanowi kluczowy aspekt określania finalnych efektów dystrybucyjnych, (2) majątek gospodarstw domowych posiadany na rynku mieszkaniowym może działać jako czynnik łagodzący wzrost nierówności, jeżeli jest zaliczany do majątku netto, (3) ekspozycja gospodarstw domowych na rynek akcji znacząco wpływa na oddziaływanie polityki pieniężnej na nierówności ekonomiczne, (4) wpływ zakupów przez banki centralne obligacji korporacyjnych i akcji na nierówności ekonomiczne pozostaje niezbadany, (5) większość badań opartych na danych ankietowych wskazuje na zmniejszenie nierówności w reakcji na łagodzenie polityki pieniężnej, podczas gdy większość analiz opartych na danych podatkowych lub rachunkach narodowych wskazuje na odwrotny kierunek oddziaływania, (6) szacowane całkowite zmiany miar nierówności w reakcji na zmiany w polityce pieniężnej można ocenić jako stosunkowo niewielkie.

Słowa kluczowe: nierówności dochodowe, nierówności majątkowe, polityka pieniężna, luzowanie ilościowe