Journal of Economic Policy Reform

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/gpre20

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To cite this article: Juan-Francisco Albert & Nerea Gómez-Fernández (2022) Monetary policy and the redistribution of net worth in the U.S, Journal of Economic Policy Reform, 25:4, 420-434, DOI: 10.1080/17487870.2021.1895778

To link to this article: https://doi.org/10.1080/17487870.2021.1895778

JOURNAL OF ECONOMIC POLICY REFORM
2022, VOL. 25, NO. 4, 420–434
https://doi.org/10.1080/17487870.2021.1895778

Monetary policy and the redistribution of net worth in the U.S

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ABSTRACT
This paper aims to study the distributive effects of monetary policy on wealth inequality in the US. Combining macro and micro data, we find that wealth inequality increases after an expansionary monetary policy shock, especially in the long run. Specifically, we find that an expansionary monetary policy shock substantially increases the net worth of the richest and the poorest households, while the middle class tends to benefit the least. A remarkable policy implication of our work is that, considering the post-pandemic situation, forthcoming monetary policy should be designed to avoid these unwanted effects on wealth inequality.

ARTICLE HISTORY
Received 18 April 2019
Accepted 23 February 2021

KEYWORDS
Monetary Policy; wealth inequality; proxy SVAR; household survey

JEL CLASSIFICATION
E52; E58; E21; D31

1. Introduction

With the arrival of the Great Recession and more recently the crisis resulting from the COVID-19 pandemic, the main central banks around the world have applied non-standard monetary policy measures (Cheng, Skidmore, and Wessel (2021); Curdia (2020)). In addition, it is expected that these expansionary monetary policy actions will continue to be necessary in the coming years in a post-pandemic world characterized by low interest rates and low inflation expectations. While such policies can be effective in helping to stabilize the business cycle, the view that expansionary monetary policy can exacerbate both income and wealth inequality by increasing asset prices has become increasingly popular. In this regard, a growing body of literature has assessed the effects of monetary policy on income inequality. These studies mostly conclude that expansionary monetary policy could reduce inequality primarily through job creation (see a survey by Colciago, Samarina, and Jakob (2019)). However, the relationship between monetary policy and wealth inequality remains ambiguous.

Focusing on the United States (U.S.), this paper seeks to document and quantify the distributional implications on household wealth associated with changes in monetary policy. For that purpose, we first build a simple framework to explore the distributional implications of monetary policy measures. Specifically, we develop a model proposed by Meade (1964) which offers a simple framework for analysing wealth distribution. Our model identifies various channels through which monetary policy may have a distributional impact on wealth distribution. For the empirical part

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Supplemental data for this article can be accessed here.

of our paper we proceed in two steps. First, we estimate the aggregate effects of monetary policy on a set of relevant financial and macroeconomic variables. In order to do so, we estimate a proxy SVAR model developed by Gertler and Karadi (2015) which combines high-frequency identification (HFI) as external instruments with a classic SVAR (Stock and Watson (2012); Mertens and Ravn (2013)). Using this methodology we find that a monetary policy shock increases stock prices, housing prices and bond prices, as well as increases the price level and reduces the interest rate, dividends and the bond yield, according to the standard theory. However, the magnitude of the responses differs among these variables.

In a second step, using micro data from the Survey of Consumer Finances (SCF), we simulate the effects of the possible drivers of wealth inequality based on our results from the aggregate analysis. This simulation focuses on the impact of changes in interest rates and asset prices on wealth inequality, abstracting from active portfolio shifts by households, and computed according to our theoretical framework. Subsequently, we calculate the changes in the Gini coefficients for the net wealth distribution due to changes in the variables affected by the monetary policy shock. We also compute the gains of net worth by deciles of net worth. For this end, we follow the approach of Domanski, Scatigna, and Zabai (2016) and Adam and Tzamourani (2016) but expanding the variables of the analysis and using the responses we obtained after the monetary policy shock.

Considering the whole distribution, our results show that expansionary monetary policy could increase wealth inequality in the U.S. Nevertheless, when we include in our analysis the retirement accounts, dividends and bond yields, the effect of monetary policy on wealth inequality is mitigated. In the analysis by deciles of net worth, we find that an expansionary monetary policy shock substantially benefits both the richest and poorest households, with the middle class benefiting the least. This result is explained by the unequal concentration of financial assets and liabilities across households and the heterogeneous impact of monetary policy on financial and real variables.

The remainder of the paper is structured as follows. Section 2 presents our simple framework. Then, section 3 presents and discusses the macro empirical facts that are used in the subsequent simulations. Section 4 describes the methodological approach followed in our micro simulations and presents the results of the empirical analysis. Lastly, section 5 concludes with the final considerations.

2. Simple framework

In this section, we develop the simple framework introduced by Meade (1964) and Davies and Shorrocks (2000) for analysing wealth distribution based on the accounting identity. We consider two households' net worth, a small one W_1 and a large one W_2, being w_i the growth rate of W_i. If $w_1 > w_2$, relative inequality will decrease over time.

Developing the model of Meade (1964), the growth rates of wealth for each household (w_i) could be expressed as:

$$w_i = s_i(\frac{Ei}{Wi} + r_i^W \frac{Wi}{Wi} + \frac{Ii}{Wi} + \frac{\tau_i}{Wi}) \tag{1}$$

where s_i is the average rate of saving and the first term of the equation $s_i \frac{Ei}{Wi}$ represents the rate of accumulation of net worth for income coming from labour,being E_i the earned income or wage of each household i net of taxes and transfers. The second term of the equation $s_i(r_i^W \frac{Wi}{Wi})$ represents the rate of accumulation of net worth for each household i from revaluation of existing wealth, being r_i^W the average net nominal return of the net worth for each household. The third term $s_i \frac{Ii}{Wi}$ represents the rate of accumulation of net worth for income coming from inheritances, being Ii gifts and bequests received by each household i net of taxes and transfers. Finally, the term $s_i \frac{\tau_i}{Wi}$ represents the rate of accumulation of net worth for income coming from public sector transfers, being τ_i the lump-sum transfers made by the government to each household. We can disaggregate each household's net wealth into different assets and liabilities:

$$W_i = St_i + H_i + B_i + TA_i - L_i \tag{2}$$

$$A_i = St_i + H_i + B_i + TA_i \tag{3}$$

$$W_i = A_i - L_i \tag{4}$$

being $St_i, H_i, B_i, TA_i, L_i$ the stocks, housing, bonds, transaction accounts and liabilities, respectively, that each household i owns. A_i represents the total assets of each household i and W_i the net worth for each household i. The concept of wealth used in this paper is marketable wealth. Therefore, we exclude social security wealth or pension wealth, as well as consumer durables. For simplicity, we define net worth in Equation (2) as the sum of stocks, housing, bonds and transaction accounts minus the household debt, since these are the four assets more likely to be affected by changes in monetary policy as the portfolio channel predicts (Domanski, Scatigna, and Zabai (2016); Adam and Tzamourani (2016)). If we assume that the return differs between the different assets, then:

$$r_i^W = r_i^{st} \frac{ST_i}{W_i} + r_i^h \frac{H_i}{W_i} + r_i^b \frac{B_i}{W_i} + r_i^{ta} \frac{TA_i}{W_i} - i_i^l \frac{L_i}{W_i} \tag{5}$$

where r_i^{st} is the nominal stock return, r_i^h is the nominal housing return, r_i^b is the nominal bond return, r_i^{ta} is the nominal transaction accounts return and i_i^l is the average interest rate that each household has to pay for its liabilities. Therefore, considering this heterogeneity of returns in equation (1), we get:

$$w_i = s_i(\frac{Ei}{Wi} + (r_i^{St} \frac{STi}{Wi} + r_i^h \frac{Hi}{Wi} + r_i^b \frac{Bi}{Wi} + r_i^{ta} \frac{TAi}{Wi} - i_i \frac{Li}{Wi}) + \frac{Ii}{Wi} + \frac{\tau_i}{Wi}) \tag{6}$$

where $r_i^{St} \frac{STi}{Wi} + r_i^h \frac{Hi}{Wi} + r_i^b \frac{Bi}{Wi} + r_i^{ta} \frac{TAi}{Wi} - i_i^l \frac{Li}{Wi}$ represents the rate of accumulation of net worth from revaluation of existing wealth considering the heterogeneity of returns between assets and liabilities.

Finally, we can represent the average net wealth of household i at time t in real terms in the following way:

$$\frac{W_{it}}{P_t} = \frac{(1 + w_{it}) W_{it_1}}{(1 + \pi_t) P_{t-1}} \tag{7}$$

where P_t is the price level and π_t represents the inflation rate.

2.1. Monetary policy and wealth inequality

Considering equation (6) and (7) and the channels that the previous literature has explored (see the seminal work by Coibion et al. (2017)), it can be concluded that monetary policy could affect wealth distribution mainly through the following channels:

The earnings heterogeneity channel: monetary expansions tend to increase labour earnings, but the distribution of these gains is likely to be unequal. This divergence between labour earnings is empirically supported by Carpenter and Rodgers (2004), Heathcote, Perri, and Violante (2010) or Mumtaz and Theophilopoulou (2017) among others.

Focusing on the equation (6) and assuming that the saving rate is equal between two households ($s_1 = s_2$), we see that if $\Delta E_1 > \Delta E_2$ after an expansionary monetary policy shock, then $\Delta w_1 > \Delta w_2$ and $\Delta W_1 > \Delta W_2$, which implies distributive wealth effects.

The fiscal channel of monetary policy: monetary policy affects government revenues, government deficit and government debt through changes in interest rates and inflation (Dahan (1998)). This may affect the decisions of fiscal policy, thus leading to distributive effects (Albert, Peñalver, and Perez-Bernabeu (2020)). However, we should consider that these potential distributive effects are not direct and depend on the fiscal decisions made by policy makers.

Focusing on the equation (6) and assuming again ($s_1 = s_2$), if $\Delta\ \tau_1 > \Delta\ \tau_2$ is caused by an expansionary monetary policy shock, then we get $\Delta w_1 > \Delta w_2$ and $\Delta W_1 > \Delta W_2$, this leading to changes in the wealth distribution. This could happen for instance if an expansionary monetary policy shock leads to a reduction in the debt interest servicing and policy makers decide to use this additional income to create a financial aid program for supporting households located at the bottom part of the wealth distribution.

The Portfolio channel: The conventional and unconventional monetary policy measures recently introduced in the U.S. have been related to strong movements in a number of important market prices. This is well documented by event studies which have provided the strongest evidence about the effect of monetary policy on financial asset prices as stocks and bonds (see Gürkaynak, Sack, and Swansonc (2005); Bernanke, Boivin, and Eliasz (2005); Rogers, Scotti, and Wright (2014), among others). Some authors point out that monetary policy could increase income and wealth inequality because asset price increases tend to benefit the top part of the net worth distribution, where stock ownership is more prevalent (Saiki and Frost (2014); Albert, Gómez-Fernández, and Ochando (2019)). However, other authors consider that this effect is mitigated when we consider the housing price increases caused by the same expansionary monetary policy shock, since middle class and the bottom part of the net worth distribution own on average a higher proportion of their wealth in housing (Domanski, Scatigna, and Zabai (2016); Adam and Tzamourani (2016); Doepke and Schneider (2006)). This compensatory effect through housing prices increases is *the housing channel.* Additionally, a reduction in the policy rate decreases interest payments for households with outstanding debts as long as their loans are at a variable interest rate or they can refinance their debts, this is *the debt channel*. Hence, these households could benefit more after an expansionary monetary policy shock, in terms of income as well as in terms of wealth, as long as they save a part of this “unexpected income”. Finally, transaction accounts also may be particularly susceptible to changes in inflation and short-term interest rates.

Focusing on the equation (6) and assuming again ($s_1 = s_2$), we can study the portfolio channel paying attention to the next term $r_i^{St}\frac{STi}{Wi} + r_i^h\frac{Hi}{Wi} + r_i^b\frac{Bi}{Wi} + r_i^{ta}\frac{TAi}{Wi} - i_i^l\frac{Li}{Wi}$. If monetary policy affects in a heterogeneous way the return of each different asset $r_i^{St}, r_i^h, r_i^b, r_i^{ta}, i_i^l$, the nominal growth of the net wealth of each household i will differ depending on the composition of assets and liabilities of each household. For instance, if as a consequence of an expansionary monetary policy shock $r_i^{St} > r_i^h$ capital gains of stocks increase more than capital gains of housing, the households that will benefit most will be those with the highest proportion of stocks in their net wealth ($\frac{STi}{Wi} > \frac{Hi}{Wi}$). In a similar way, if the expansionary monetary policy shock reduces i_i^l, households who own more outstanding debt over their net wealth will benefit the most.

Finally, we find the inflation effect or *the Fisher effect*. This channel focuses on how unexpected changes in inflation affect the real value of nominal assets and liabilities held by households (Fisher (1933); Auclert (2019)). This channel has been empirically explored by Doepke and Schneider (2006) in the U.S. and by Adam and Zhu (2015) in the Eurozone. The two studies show that indebted households tend to benefit from an unexpected hike in the inflation rate, while savers are harmed. In this vein, Doepke and Schneider (2006) point out that the redistributional effects of inflation depend not only on the size of the nominal positions but also on the maturity structure of the assets and liabilities. Considering equation (7), we can see the inflation effect on wealth. If $\pi_t > 0$, the real net worth will be reduced for each household i if $W_i > 0$, while if $W_i < 0$ the real value of net worth will be increased for each household i.

Therefore, according to our model, there are several channels through which monetary policy could have distributive effects on wealth. It is important to note that there are additional channels to those previously explained, but which are considered to have more subtle effects. For instance, monetary policy could also have different effects on s_i among different households. In this sense, an expansionary monetary policy shock could increase the marginal propensity to consume of those households that benefit most from an accommodative monetary policy (Tobin (1982); Auclert (2019)). According to equation (6), this will involve differences on the saving rates and on the net worth accumulation rate among households. However, this is considered to be a subtler channel of wealth distribution.

In our empirical exploration, we focus on the most direct channels that could lead to distributive effects on wealth: portfolio channel, housing channel, debt channel and the Fisher effect. We assume that wealth distribution is not affected by the earnings heterogeneity channel and the fiscal channel. This is because these two channels are important for analyzing income distribution, but based on our model they would only affect wealth distribution indirectly. Additionally, we also conduct several robustness checks to consider the possible differences in savings rates among households according to their net worth, evaluate the effect on retirement accounts and the effect on dividends and bonds yield. Therefore, in our empirical analysis we focus on the direct channels through which monetary policy can affect wealth distribution, but without forgetting that there are other channels with more subtle effects but which could also explain changes in wealth inequality.

3. Aggregate analysis. Empirical evidence

In this section, we show empirical evidence on the effects of a monetary policy shock on financial and macroeconomic variables that, based on our simple framework, can affect the distribution of wealth. To do so we estimate a proxy SVAR following Gertler and Karadi (2015). The key of this strategy is the use of an instrumental variable, which is correlated with the monetary policy shock, but not with the other macroeconomic shocks. Therefore, the basic idea of this approach is to identify the surprise component due to a monetary policy announcement. This identification strategy relies in the plausible assumption that in the short window of time around a monetary policy announcement (normally thirty minutes), it is very likely that the most important shock hitting the economy is the monetary policy shock. Based on this, we chose to use as an instrument the change in the three-month ahead futures rate during a 30-minute window around announcements made by the Federal Open Market Committee (FOMC). We obtained this data directly from Gertler and Karadi (2015). Next, these shocks are used as external instruments in the SVAR using the methodology developed by Stock and Watson (2012) and Mertens and Ravn (2013) (more details in appendix A).

Following Gertler and Karadi (2015) we propose a similar baseline model composed by: the one-year government bond rate as the policy indicator, the log of consumer price index, the log of industrial production, and the excess bond premium which is a control variable that captures the variation in the average price of bearing U.S. corporate credit risk developed by Gilchrist and Egon (2012). Then, we employ different specifications for the endogenous variables. To this end, we use the baseline model variables and an additional variable that is our variable of interest and can capture movements on wealth distribution according to our simple framework. As an additional variable, we use: the log of nominal stock price index (S&P 500); the log of consumer price index of housing prices (CPI-housing); the log of Barclays U.S. aggregate bond price index (bond price index), which is weighted according to the market size of each bond type; the log of the 30-year fixed rate mortgage average (mortgage rate), which is used as an indicator of the debt interest rate; the log of 3-month rates and yields of certificates of deposit (deposit rate) which is used as an indicator of the deposit rates; the log of S&P 500 dividend yield (dividends); and the log of Moody's BAA index (bond yield) as an indicator of bond yields. All these data are collected from Datastream .[1]

This identification strategy is a suitable strategy to estimate the response of financial variables, as well as the price level, because it assumes that monetary policy shocks may have contemporaneous effects on financial variables. In addition, using this strategy we avoid the "price puzzle" and we get more consistent results with the standard theory. These are novel findings, in themselves, which motivate the study of the distributional effects of monetary policy (Sterk and Tenreyro (2018)).

We use data in monthly frequency starting from July 1979 to September 2019, although the instrument is only available from January 1990 to June 2012. The reduced form of the VAR is estimated with a lag order of twelve as is usual in monthly VARs. Shaded areas are 68 and 90% bootstrapped confidence bands obtained with 10,000 replications. We use the wild bootstrap of Goncalves and Kilian (2004).

The estimated IRFs of the financial and economic variables of interest are depicted in Figure 1. The monetary expansion, consisting of a 100 basis point drop in the one-year

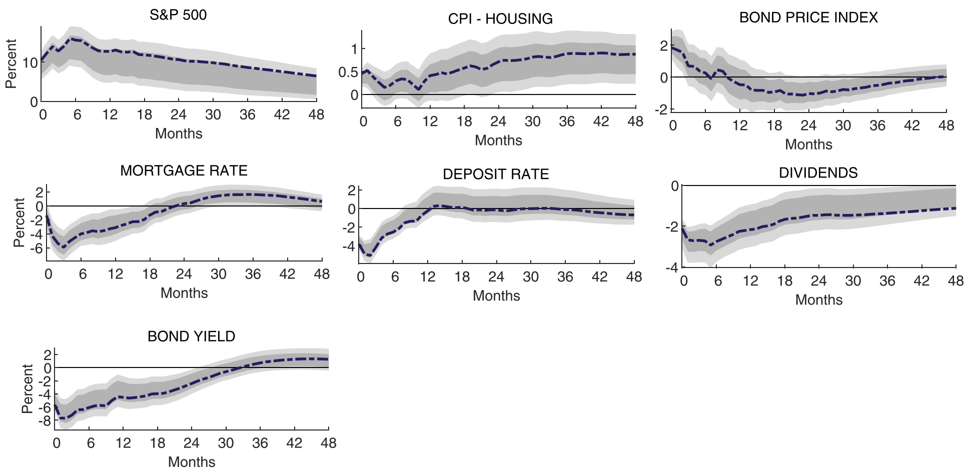

Figure 1. Responses to an Expansionary Monetary Policy Shock in the interest variables. Note: Responses to an expansionary monetary policy shock. The shock is normalised to induce a 100 basis point decrease in the 1-year rate. Sample 1979:07–2019:09. Shaded areas are 68% and 90% bootstrapped confidence bands.

rate, leads to a sharp increase in the stock prices, reaching increases of aroung 15% six months after the shock. This effect on the stock prices is statistically significant during the entire period under consideration. Regarding housing and bond prices, we find a slight increase in both. The response of bond prices is not statistically significant since three months after the shock. On the other hand, the mortgage rate and the deposit rate experience a large and significant decline. Specifically, the mortgage rate and the deposit rate decline about 4% and 3%, respectively, 6 months after the shock. Finally, we also find a significant reduction in dividends and bond yields. All these results on financial and economic variables are consistent with the conventional monetary theory and with the channels explained in the previous section. Furthermore, these results are qualitative in line with those obtained by event studies (Gürkaynak, Sack, and Swansonc (2005); Rogers, Scotti, and Wright (2014) or Rosa (2012)) and qualitative and quantitative in line with those obtained by SVAR approaches as Paul (2020) or Jarocinski and Karadi (2018) in the U.S. and Peersman and Smets (2001) in the Eurozone.

Additionally, we perform a series of robustness tests to ensure the results of the aggregate analysis. First, we use other financial indicators for the interest variables. Second, we restrict our sample from February 1984 to September 2019. We carry out this robustness test because Bernanke and Gertler (1995) identify February 1984 as the end of the Volcker disinflation. Third, we consider that Ramey (2016) and Miranda-Agrippino and Ricco (2018) point out that for short samples, VAR methods may produce responses that compound the estimation bias over the horizons. While a potential solution may be to adopt Local Projection methods (LP), since it is potentially robust to misspecification, LPs has also been criticized due to deliver imprecise estimates. Therefore, both methods could lead misleading responses and lack of robustness. According to Miranda-Agrippino and Ricco (2018) both problems could be solved by adopting Bayesian estimation techniques. Specifically, a Bayesian approach to Local

Projection (BLP) retains the flexibility of LP, while at the same time efficiently deals with estimation uncertainty. To assess our general model and responses of the interest variables we carry out three different specifications: a Local Projection, a standard Bayesian VAR and a Bayesian version of the Local Projection developed by Miranda-Agrippino and Ricco (2018). The BVAR and BLP are estimated with Bayesian techniques and standard macroeconomic priors. The tightness of the prior is set as in Giannone, Lenza, and Primiceri (2015). Overall, the results of all the robustness checks are qualitatively consistent across methods and are in line with those found in our main model. The results of these robustness checks and the specific effects of the monetary shock on our interest variables for different time horizons are shown in the appendix B.

4. Micro empirical simulations

In this section, we simulate the impact that the changes we have obtained in the previous section's IRFs on interest rates, asset prices, and the rate of inflation have on wealth inequality.

To do so, using microdata from the Survey of Consumer Finances, we follow the approach of Adam and Zhu (2015) for the Eurozone and Domanski, Scatigna, and Zabai (2016) for several advanced economies but expanding the analysis measuring the effects of asset prices, interest rate, and inflation rate following our formal model introduced in section 2. Furthermore, we use the results obtained from our aggregate empirical analysis to simulate the effects of monetary policy on net worth distribution.

4.1. Methodology and data

To conduct the simulations we use the Survey of Consumer Finances (SCF) 2016. The SCF is a triennial cross-sectional survey sponsored by the United States Federal Reserve board in cooperation with the U.S. treasury department. It includes information on U.S. families' balance sheets, pensions, income, and demographic characteristics. The selection technique of the sample attempts to select families from all economic strata and ensures the representativeness of the study (see Kennickell (2005)). In 2016, a total of 6.500 families participated in the interviews.

Our research focuses on the following seven variables: stocks, bonds, housing, transaction accounts, retirement accounts, debt, and net worth. The definition of these variables and a descriptive analysis of the data are detailed in appendix C. As shown by previous literature, we observe two important facts. First, net worth is highly concentrated (Gini coefficient of 0.86) and, second, financial assets are highly concentrated in the top of the distribution while debt over net worth is more concentrated in the bottom of the distribution.

Considering these variables, we then follow equation 6 of our simple framework to get the average net worth nominal return for each household. With this purpose, we first obtain the ratios representing the weight of stocks, bonds, housing, transaction accounts, retirement accounts and debt over total household wealth. After that, we multiply the resulting ratios by the elasticities obtained in the IRFs for each variable in the different simulation scenarios (for more details, see table B1 and B2 of the appendix).

Finally, following equation 7 of our simple framework, we divide the inflation responses of table 1 to scale the new net worth of households. By doing so, we obtain the changes in inequality in absolute terms. If $\pi_t > 0$, the real net worth will be reduced for all the households if $W_i > 0$, and the real value of net worth will increase for all the households if $W_i < 0$. By conducting this analysis, we are implicitly assuming that households do not adjust their portfolios in response to monetary policy. As Domanski, Scatigna, and Zabai (2016) asserts, this assumption can be justified by thinking of our simulation as a partial equilibrium exercise. However, we can assume this since it is supported by the empirical evidence on considerable inertia in household portfolios (Wolff (2016); Ameriks and Zeldes (2004); Lenza and Slacalek (2018)). Furthermore, one of our simulation scenarios is the first period after the shock (1 month), when households are more likely not to adjust their portfolios.

As previously mentioned, it is important to note that our main simulations only consider the direct effects that monetary policy may have on the distribution of wealth through the portfolio channel, housing channel, debt channel and the Fisher effect. Therefore, in our main simulations, we are not considering other channels that might also have effects, albeit much more subtle ones, on the distribution of wealth, such as changes in wages, fiscal policy or saving rates. In order to consider some of these additional channels and test the robustness of our results, we conducted a series of robustness tests that complement our main simulations.

4.2. Simulation results

As an example, Figure 2 depicts the distribution of the net worth growth rate after an expansionary monetary policy shock considering a time horizon of 1 month after the shock.[2] We show the distribution of these gains across household percentiles ranked by net wealth. The distribution is ordered from left to right, with the lowest 10% located in

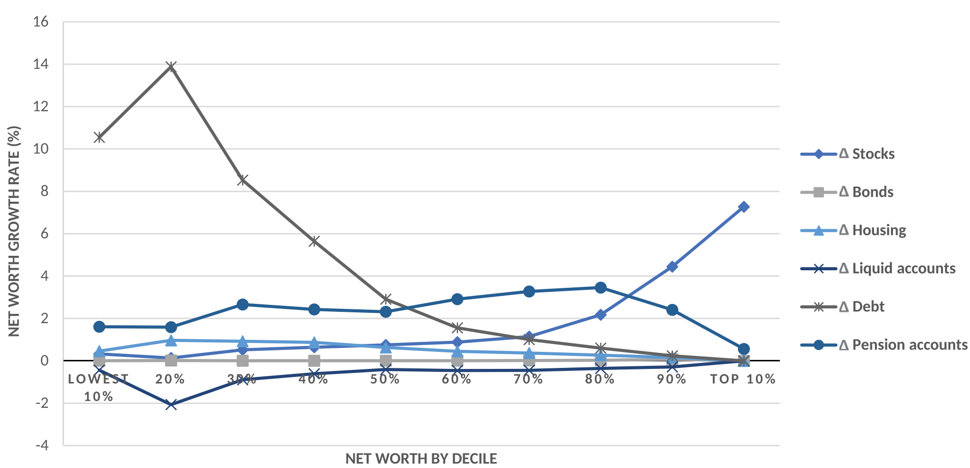

Figure 2. Net Worth growth rate 1 month after the shock.

the left extreme representing the "the poorest households", and the top 10 located in the extreme right representing "the richest households".

Figure 2 shows that the change in bond prices and housing prices is modest across the different deciles. This can be explained by the lower effect of monetary policy on these variables we found in the macro analysis. In this vein, Kuttner (2014) points out that the impact of interest rates on housing prices appears to be quite modest. However, the rest of the variables exhibit more important variations. For instance, the effect of the deposit rate on liquid accounts further reduces the net worth growth rate of the poorest households (specially, the decile 20%). This is explained because this group of households concentrates a greater share of their net wealth in the form of transaction accounts. Focusing on the stock price increase, we observe that the net worth of the households in the upper part of the distribution is clearly increased more. This is because stocks are highly concentrated among the richest households. The situation differs noticeably when we consider the effect of the interest rate of debt. The reduction of the interest rate experienced 1 month after the shock greatly benefits the poorest households by increasing the net worth of the lowest 20% by about 14%. This effect dissipates as we move into richer households. This can be explained because the poorest households tend to be the group with the highest proportion of their wealth in the form of debt.

Finally, we can assume that the retirement accounts are invested in the stock market and consequently, can be affected by a monetary policy shock. By assuming this, the effect of the increases in stock prices on pension accounts has a hump shape. This result is explained because among the poorest households there are few households with retirement accounts, and among the richest households, the retirement accounts represent a small proportion of their net wealth, with stocks and bonds holdings being more important. Therefore, those households that benefit most from an increase in the value of retirement accounts are those located in the middle part of the distribution, the middle class, and within them especially the upper middle class.

Figure 3 shows the accumulated growth rate of net worth for the four different time horizons. We observe that an expansionary monetary policy shock tends to benefit more the poorest and richest households in the short and medium run. For instance, if we consider the 6-month horizon after the shock, we find increases in net worth of more

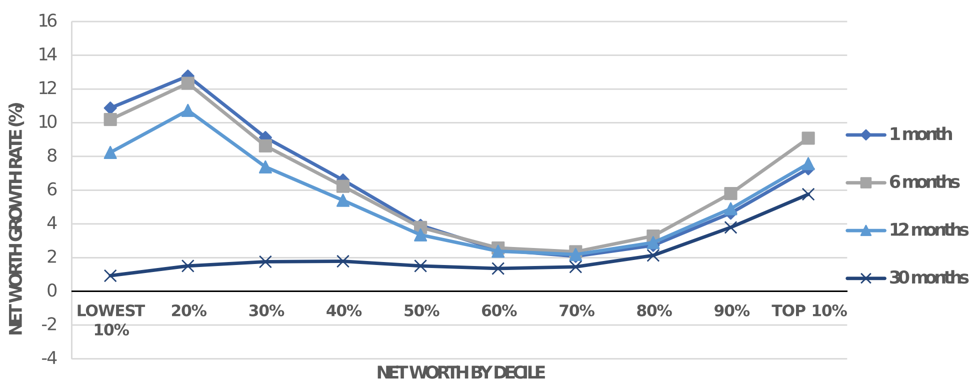

Figure 3. Net worth growth rate in all scenarios (without pensions accounts).

than 8% for the top 10% and increases of about 12% for the lowest 20%. The middle class is notably the least benefited, especially the upper middle class whose net worth barely increases around a 2%. If we focus on the effects of monetary policy on the long run (30 months after the shock), the figure shows that households in the top of the distribution experience a significant increase in their net worth (by around 6%), but the households in the bottom part only show a small increase (by around a 1% for households in the first decile). These results indicate that, whereas in the long run an expansionary monetary policy would tend to increase net worth inequality, in the short and medium run the impact is not so clear since the two groups that benefit most from the shock are located in the two opposite tails of the wealth distribution.

We conduct several robustness checks for the simulations.[3] First, we considered in our simulations the impact of an increase in the value of the retirement accounts resulting from the change in stock prices caused by a monetary policy shock. We find that the inclusion of the retirement accounts into the analysis tends to equalize the net worth gains since the upper-middle class is the most benefited by this increase.

Second, we conduct an additional robustness test by applying the elasticities obtained in the Bayesian Local Projection approach. Overall, for the short and medium run, the results are similar to those of the main analysis, being the two tails of the distribution the most affected by the monetary policy shock. However, if we consider the increase in the net worth growth rate 30 months after the shock, the results account for a flatter slope across net worth groups.

Third, we consider that, according to the standard theory, the effect of monetary policy on stock and bond capital gains could be mitigated when we consider the effect of monetary policy shock on dividends and interest payments on bonds. As the impulse reaction functions show in section 3, an expansionary monetary policy shock increases stock and bond prices, but it reduces the dividends and the interest payments on bonds. Considering the total return of stocks and bonds we conduct a robustness check to assess whether the simulations made in the previous analysis display substantial changes. Overall, the results show that the richest households increase less their net worth than in the main analysis. Despite that, monetary policy still benefits more both tails of the distribution, being the middle class the less benefited.

Fourth, given that in our empirical analysis, we have assumed that the saving rates by deciles of households ranked by wealth are equal, we conduct a robustness test applying different savings rates noted by previous literature. In this vein, Dynan, Skinner, and Zeldes (2004), in an empirical analysis for the U.S. economy, find that richer households save a higher fraction of their permanent income. Similar results are found by Bozio et al. (2017) who evidence a positive relationship between the rate of private wealth accumulation and levels of lifetime earnings. In a recent research using Norwegian administrative data, Fagereng et al. (2019) find that the relation between saving rates and wealth depends on whether saving includes capital gains. Specifically, the authors suggest that without accounting capital gains, saving rates are roughly constant across the wealth distribution. However, including in the analysis of capital gains, saving rates increase notably with wealth. In our robustness test, we apply different saving rates found by previous literature. First, we apply the saving rates noted by Dynan, Skinner, and Zeldes (2004) for the U.S. Second, we conduct a similar exercise, but applying the saving rates found by Fagereng et al. (2019) for Norway. Unsurprisingly, the results show a positive relationship between the net worth growth rate and deciles of wealth distribution, since the top deciles of the distribution save more than the bottom.

Fifth, to check the results found in our main simulations, we estimate in our proxy SVAR three different wealth shares available from the World Inequality Database.[4] These are the top 10%, the middle class (share of wealth owned by top 50–90% families) and the bottom 50%. The results obtained are in line with those found in the main simulations and show that both tails of the distribution benefit the most after the shock, being the middle class the less benefited.

Finally, we simulate and compare the Gini coefficients of wealth, both relative and absolute, before and after the monetary policy shock. The objective of this exercise is to use a measure that effectively summarizes the whole distribution, rather than just focusing on one location in the distribution. Considering different saving rates across wealth groups, the results show that an expansionary monetary policy shock tends to increase both relative and absolute net worth inequality in all the periods of time.[5]

5. Conclusions

While recent studies have documented the relationship between monetary policy and income inequality, there are few studies that explore the nexus between monetary policy and wealth inequality. This research aims to fill this gap by empirically examining the redistributive implications of monetary policy on wealth inequality.

Our results suggest that wealth inequality increases after an expansionary monetary policy shock, specially in the long run. Overall, we find that increases in stock and bond prices significantly increase wealth inequality, while increases in housing prices and the value of retirement accounts, and declines in interest rates tend to reduce wealth inequality. Similarly, increases in the inflation rate tend to reduce absolute wealth inequality, but do not compensate for the increase in wealth inequality produced by an increase in the stock prices.

If we focus on the analysis of wealth distribution by deciles, our results show that an expansionary monetary policy shock substantially increases the net wealth of the richest and poorest households in terms of wealth, while the middle class benefits the least. This result is explained because the effects of monetary policy on the stock prices and the interest rate of debt are the most important drivers of increases in wealth, and stock and debt are concentrated in the richest and poorest households, respectively.

Nevertheless, important warnings apply when interpreting these results. First, our simulations focus only on the direct effects of monetary policy on wealth distribution, leaving aside other subtler channels of distributional effects, such as changes in fiscal policy or labour earnings. Second, the value of future Social Security benefits that households can receive upon retirement is not included in our study due to a series of conceptual challenges. Finally, changes in capital gains do not necessarily imply improvements in welfare (e.g. primary residences).

Understanding the effects of monetary policy on wealth inequality is not only valuable for expanding knowledge about distributive implications, but also for a better understanding of the transmission mechanism of monetary policy to consumption and the effectiveness of monetary policy itself. The economic crisis resulting from the COVID-19 pandemic is forcing central banks around the world to take more non-standard measures. Conventional theory suggests that both conventional and unconventional expansionary measures based on changes in interest rates are necessary to stabilize the economic cycle. However, as it has been shown these same measures can have adverse effects on wealth inequality and consequently lose effectiveness. In light of these problems, a recent and growing line of research calls for closer coordination between fiscal and monetary authorities to improve policy effectiveness and avoid unwanted effects at the same time. In a post-pandemic world with growing inequalities, low inflation expectations and the interest rates at the effective lower bound, new designs of monetary policy in coordination with fiscal authorities can be of great help to improve the transmission of monetary policy to the real economy while avoiding undesired distributive effects.

Notes

1. In a robustness check we use other financial indicators for the interest variables and we find similar responses- i.e. Dow Jones index and Wilshire 5000 total market index for stock prices, S&P/Case-Shiller national home price index for home prices, and the Moody's AAA and BAA index corporate bond and 3-month U.S. inter-bank rates as indicators of the interest rate. The results of the baseline model and the robustness checks are shown in the appendix B.
2. The results for the other time horizons (6, 12 and 30 months after the shock) simulations can be found in appendix D.
3. All the results and figures are exposed in the appendix D.
4. The wealth shares from World Inequality Database are only available up to 2014.
5. The tables with the results and further explanation can be found in Appendix E.

Acknowledgements

The authors thank the journal editor, the associate editors of the special issue and the anonymous reviewers for their suggestions and contributions. The authors also thank the Cañada Blanch Centre of the London School of Economics for allowing a research stay where this research was partially conducted.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Juan Francisco Albert is grateful for the financial support given by the Spanish Ministry of Science, Innovation and Universities (grant FPU16/04571).

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