APPENDIX

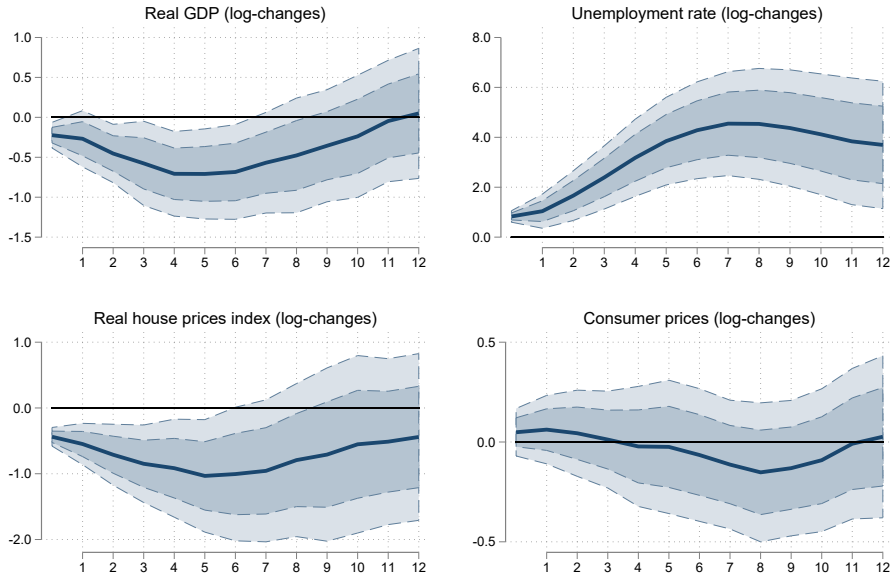
A. Robustness

Here, we detail a number of robustness checks we performed to assess the validity of our estimation technique and results.

A.1. Response of macroeconomic variables in our model

Firstly, because our results shown above are in some cases completely new, and some of them may not seem intuitive, we want to make sure that our specification captures effects of monetary policy on macroeconomic variables as previously found in the literature: this would increase confidence in the estimation. We estimate the same model as per Equation 1, including in terms of periods covered and frequency, and shock, with four macro variables as dependents.[32] Figure A.1 shows that using this model we find familiar signs and magnitudes for all these variables in response, with the exception of a lack of significance for the effects on prices.

Figure A.1: *IRFs: effect of a contractionary moentary policy shock on selected macroeconomic variables.*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

For the effects of the same shocks at a monthly frequency and over a longer time frame and for more variables, which we cannot replicate with the short time series and quarterly frequency of our data, we refer back to results reported in Jarocinski and Karadi (2020) and Miranda-Agrippino

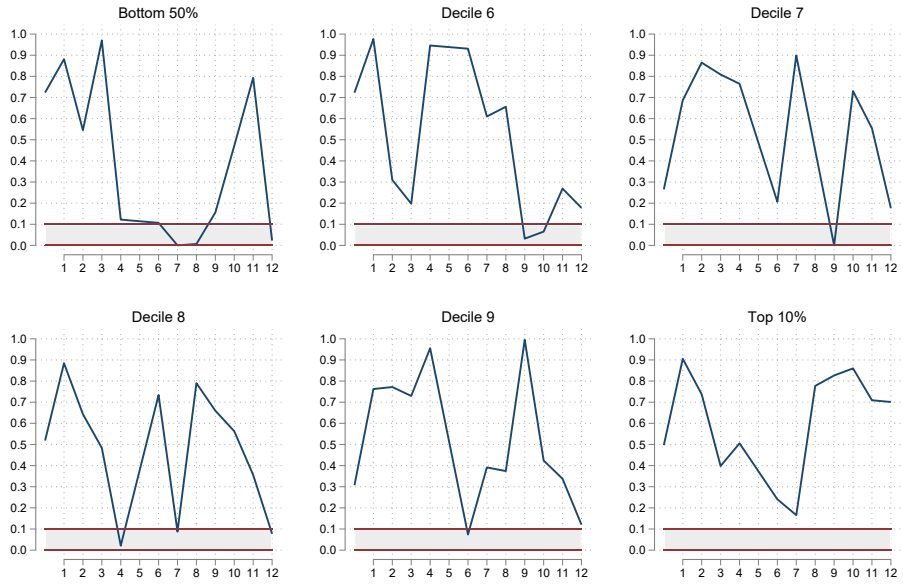
[32] We remove a variable from the controls when it is the dependent.

and Ricco (2021), showing that estimations of macro responses to the shock we use in our local projections are in line with established findings.

A.2. Panel heterogeneity

We proceed to test whether the local projections responses identified for each country in our panel display significant heterogeneity. In order to do so, we estimate our model for each individual country at each horizon, and perform an test that all estimated coefficients of interest are equal. Campello et al. (2019) discusses how estimates from the fixed-effect OLS model imply the assumption of homogeneous slope coefficients across panel groups and may thus be biased. In order to assess slope heterogeneity we apply a test (Pesaran and Yamagata, 2008; Bersvendsen and Ditzen, 2021) based on a standardized version of Swamy (1970). We note, however, that the intrinsic features of our data imply a limited time dimension of our panel.

Figure A.2: *Test of panel heterogeneity*



Notes: Dark blue line: *p-value* of the Pesaran and Yamagata (2008) slopes heterogeneity test.

The *p-value* of each of these repeated tests (by household group and projection horizon) is reported in Figure A.2. As displayed, the null hypothesis of homogeneous coefficients across countries can only rarely be rejected at the standard 10% confidence level.

A.3. State-dependence

We further wish to assess whether our responses may significantly depend on existing macroeconomic conditions ("states") at the time of the shock. Recent literature on state-dependent local

projections (Gonçalves et al., 2024) outlined how the local projections estimator is able to recover the population response when the state is exogenous. However, if the state depends on macroeconomic shocks it may only recover the conditional response to an infinitesimal shock. In order to assess whether our data falls under the latter case, we run a conditional fixed-effect logit model using the shocks series as explanatory variable. We perform this exercise for the following two possible states of the economy:

- High-inflation: if the yearly rate of inflation is greater than the indicative 2% ECB target;
- Economic downturn: if the country is in a recession period (here indicatively identified using the rule-of-thumb of two consecutive quarters of negative real GDP growth).

In both cases, the estimated coefficients are not significant at the standard 10% confidence level.

In order to address potential concerns of endogeneity, we also consider the *opposite* relationship between states and shocks (i.e., whether the monetary policy surprises may depend on the economic condition). The estimated coefficients are once again not statistically significant.

In practical terms, we follow Gonçalves et al. (2024), Tenreyro and Thwaites (2016), Alpanda et al. (2021), Alpanda and Zubairy (2019) among others, and model state-dependence by including interaction terms in our specification. As a result, our local projections Equation 1 becomes:

$$\hat{y}_{c,g,t+h} = (y_{c,g,t+h} - y_{c,g,t-1}) = \alpha_h + \delta_c + \mathcal{S}_t(\beta_h s_t + \gamma_h \mathbf{X}_{c,t}) + (1 - \mathcal{S}_t)(\beta_h s_t + \gamma_h \mathbf{X}_{c,t}) + v_{c,g,t+h} \quad (5)$$

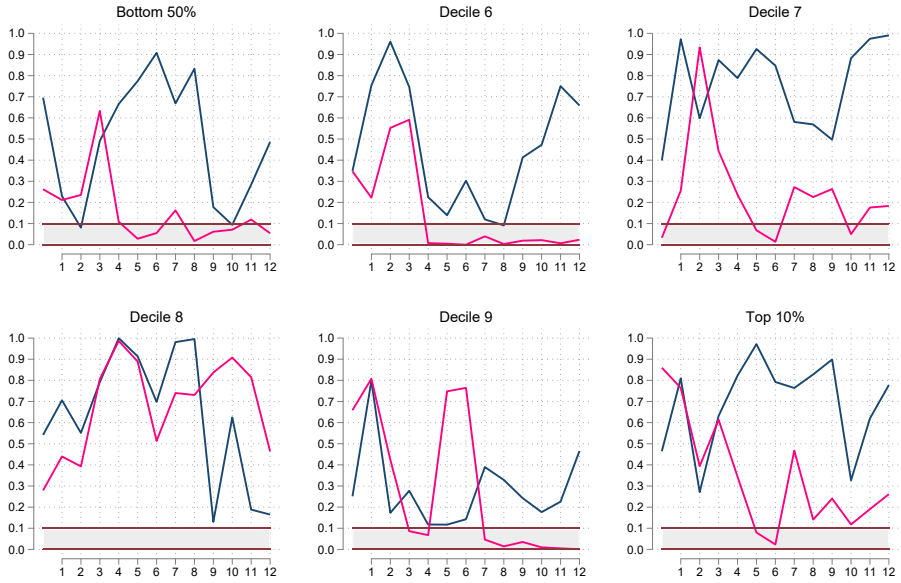
where $\mathcal{S}_t$ indicates if the economy is in a given state or not (we use the same states as above: high vs. low inflation, and recession vs. expansion phase). We then test whether the coefficients of interest associated with each state are statistically different from one another (i.e., $\mathcal{S}_t\beta_h s_t \neq (1 - \mathcal{S}_t)\beta_h s_t$). Figure A.3 displays the *p-values* of this test, for each household group, at each horizon. With the exception of the bottom 50% and decile 6, these tend to be largely above the indicative 10% confidence threshold. Thus, in most cases, it is not possible to reject the null hypothesis of the coefficient of interest being equal in both states of the economy.

B. Results over tenancy and working status breakdowns

We have shown how the impact of monetary policy on the wealth of different households depends on the size and composition of their balance sheet at the time of the shock. DWA data shows that households differ in these aspects depending on where they are positioned within the wealth distribution. Similarly, households with different employment and home-ownership status also have heterogeneous balance sheet compositions. Thus, it is possible to apply the same empirical strategy introduced in section 3 and discuss analogous results for work and tenancy breakdowns.

It should be noted that employment and tenancy breakdowns are fundamentally different than net wealth deciles. The number of households within a specific group is, in fact, not fixed, whereas net wealth deciles in each country all contain approximately one tenth of the total. Furthermore,

Figure A.3: *Test of state-dependence*



Notes: Dark blue line: *p-value* of the coefficients equality test for the recession vs. expansion state. Fucsia line: *p-value* of the coefficients equality test for the high vs. low inflation state.

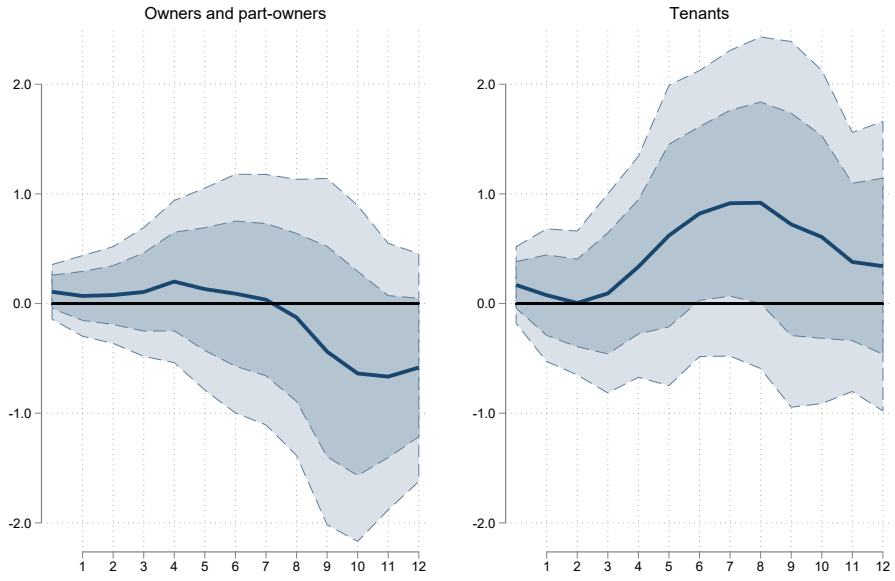
individual households may "switch" from one group to the other and cause issues in correctly isolating the evolution of each breakdown. For instance, if a tenant household takes up debt to acquire their main residence it would be recorded as an *increase* in debt on the side of home-owners in the following period, as it would then become part of the other group (meaning that this behaviour would not be visible from the tenants group's perspective, despite being the origin of this movement). In other words, it is partly unclear whether changes in one group are entirely due to households originally included in that very group or not.[33]

B.1. Home-ownership breakdown

Households are classified as either "owners or part-owners" of their main residence dwelling, or as "tenants". In the euro area, homeowners account for the large majority of all wealth types (with percentages often surpassing 90%), and are significantly richer, both overall and on a per-capita basis. Furthermore, the wealth composition of the two groups differs notably. Tenants have a more diversified portfolio, as lack of housing assets prevents the concentration of wealth in this item (as it is otherwise found on the balance sheet of home-owners). Housing still accounts for about 25%

[33]The same issue of households "moving" from one group to the other is also present when considering net wealth deciles breakdowns. However, the constraint of having the same, fixed, amount of households in each group largely prevents this from being a relevant problem, as this only interests households that are at the very "edge" of two groups, whereas it could potentially affect all households when considering employment or tenancy characteristics.

Figure B.1: *IRFs: cumulative percent changes in households' net wealth following a contractionary monetary policy shock, by tenancy status*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

of tenant's total assets,[34] while risky and non-risky financial assets altogether account for around 60%. The weight of business assets and debt liabilities (as a share of total assets) is similar between tenants and homeowners.

Figure B.1 shows the percent change of overall net wealth after a contractionary monetary policy shock for the two groups. The responses are statistically non-significant for both groups, but the point estimates indicate opposing directions for the two groups at the end of the projections horizon. Indeed, this is also reflected in the changes for the share of overall wealth held by each group (Figure B.2), which displays a non-significant increase in concentration for tenants and a contextual decrease for home-owners.

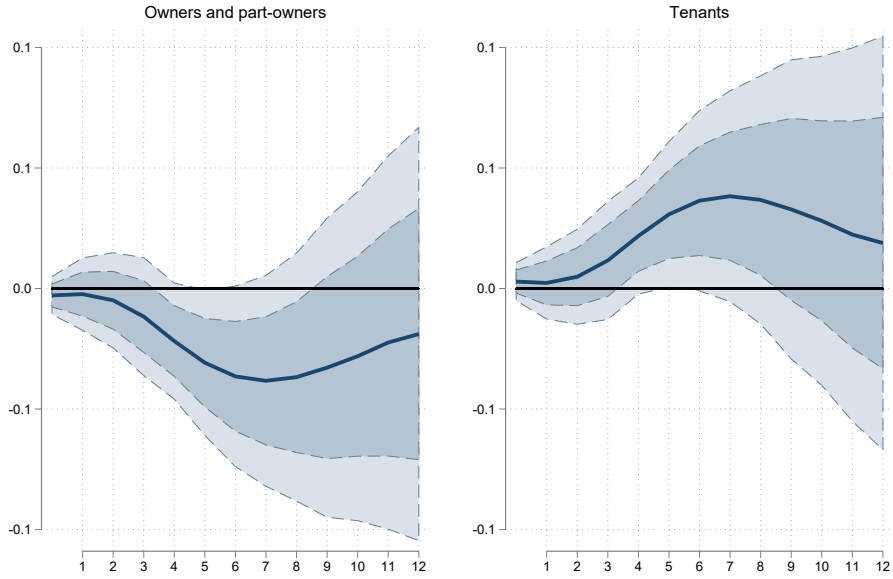
The change in portfolio shares for non-risky financial assets differ between the two groups (Figure B.3). For tenants, it tends to fall much more strongly due to the higher weight this instrument has in their portfolios. Overall, however, the movement for both groups is largely statistically non-significant.

B.2. Employment breakdown

We now provide some insight into the behaviour exhibited by euro area households broken down by their employment status. Our data distinguishes five categories, according to the working status

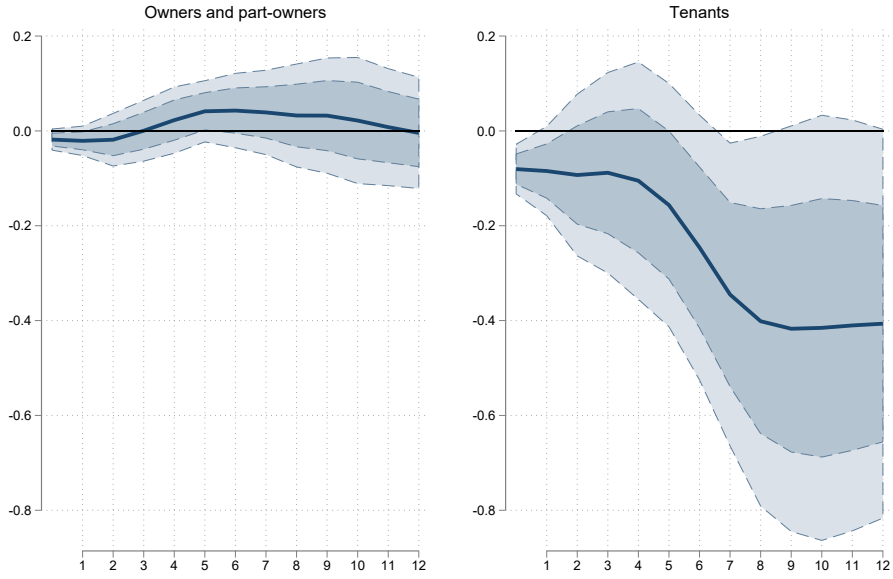
[34]Meaning that some tenant households own housing assets they do not live in. It is due to the limited wealth of tenants as a category overall that these assets end up having a rather significant weight.

Figure B.2: *IRFs: cumulative percentage-point change in the share of overall net wealth following a contractionary monetary policy shock, by tenancy status*



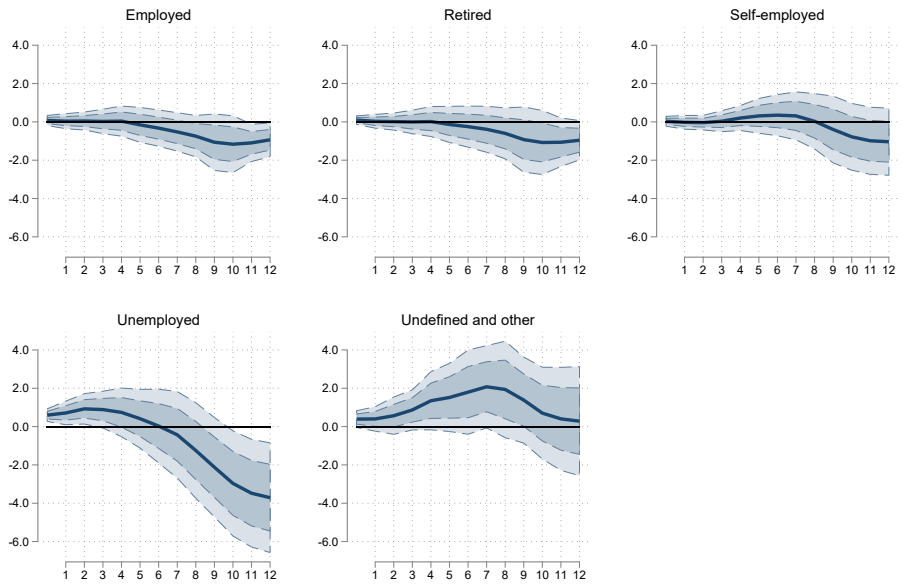
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure B.3: *IRFs: cumulative percentage-point change in non-risky financial assets as a share of total assets following a contractionary monetary policy shock, by tenancy status*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure B.4: *IRFs: cumulative percent changes in households' net wealth following a contractionary monetary policy shock, by employment status*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

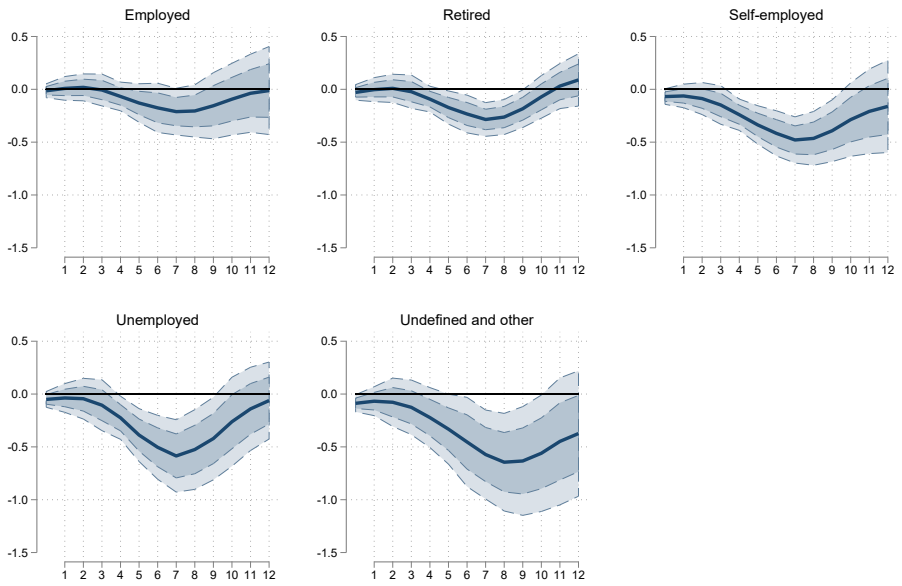
of the main income earner of the household: employed, retired, self-employed, unemployed or "undefined and other". Overall, employees and retirees account for the two largest (and very similar) shares of total net wealth in the euro area, followed by self-employed households. However, the concentration of specific wealth instruments within certain groups differs notably. For instance, employees alone account for about 60% of total debt in the euro area (as retired households have largely repaid their mortgages by the time they stopped working), and the largest part of total business wealth is held by self-employed households.

The distribution of wealth by employment breakdown is less unequal than by net wealth decile or tenancy status, and the portfolio composition across clusters is more similar. It is therefore expected that the impulse response functions estimated by our model will exhibit somewhat similar movements across groups. This is the case for employees and retirees, who have almost identical IRFs for percent changes of net wealth, displaying negative changes by the end of the projections horizon (Figure B.4). The self-employed, typically wealthier and with more business assets, also show a similar (yet clearly non-significant) response. Conversely, unemployed households show a large (around -4%) and significant decrease in net wealth as a result of a monetary policy shock. This appears to be driven by a contextual decrease in housing assets for this group.[35]

Our results indicate that the portfolio share of housing tends to fall substantially for unemployed,

[35]Similar to tenants, unemployed households own a very modest amount of housing overall, but since their total wealth is lower than that of the other groups, it may still account for a sizeable proportion of their wealth.

Figure B.5: *IRFs: cumulative percentage-point change in housing assets as a share of total assets following a contractionary monetary policy shock, by employment status*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

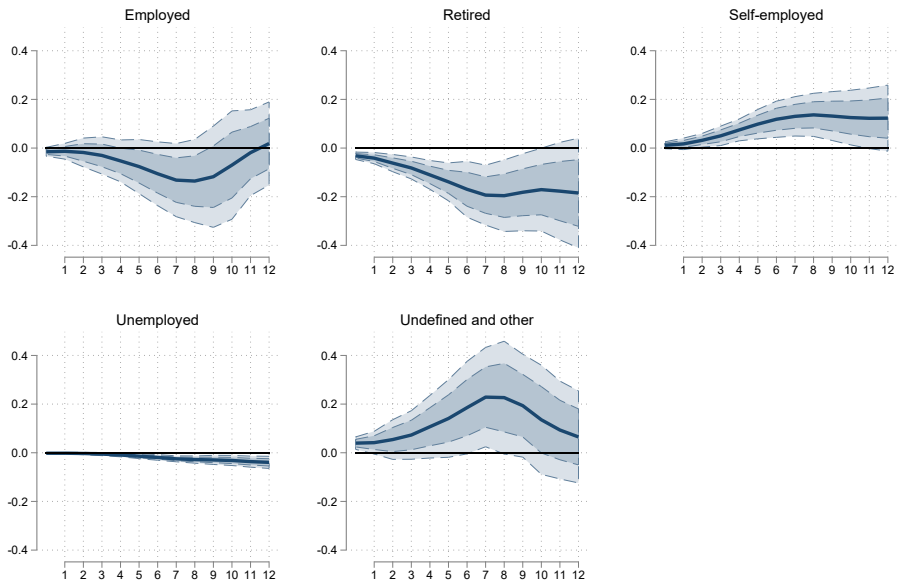
self-employed and retirees households, as shown in Figure B.5. The response for employees is similar in direction, but non-significant. This implies that for all households, there is a tendency to "re-balance" their wealth composition towards financial assets, at the expense of housing assets.

This is broadly in line with the results observed when grouping households by their level of net wealth, but with greater similarity in the response of different employment groups. By considering the work status dimension we are gain further insight into the different responses of heterogeneous households in response to monetary policy shocks (with the caveat mentioned above regarding group compositions).[36]

While the decline in wealth for employees and retirees in response to a contractionary shock is minimal and similar between the two groups, we can see from Figure B.6 that the change in their overall share of net wealth in the country differs. Employed households display a non-significant change over the projections horizon, while retired households decrease their share by around 0.2 percentage points (although this becomes non-significant in the last couple of projected quarters). Self-employed (and, with less statistical significance, "undefined") households conversely tend to increase their share of wealth. Since these categories include households generally placed in the upper section of the wealth distribution, this is consistent with the results presented in subsection 4.4.

[36]Consider also the issue of movements across groups, again. Technically, an increase in unemployment generated by monetary policy might lead to an increase in the assets of the "unemployed" group simply due to the fact that the group is growing in size, while what researchers would be more interested in investigating is whether the households who were already unemployed before the shock are now worse or better off.

Figure B.6: *cumulative percentage-point change in the share of overall net wealth following a contractionary monetary policy shock, by employment status*

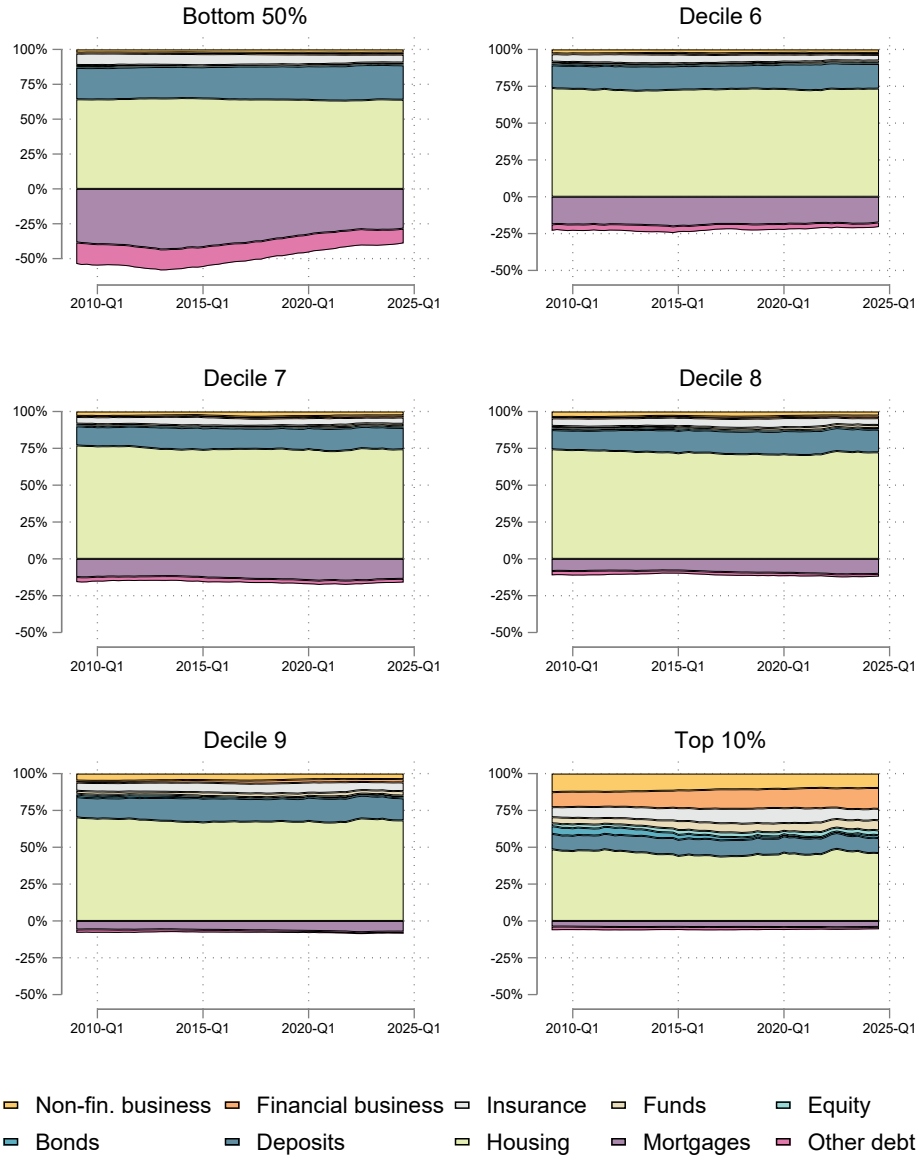


Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Unemployed households display a marginal negative change in their overall share of net wealth after the shock, due to the extremely limited amount they own relative to the country's total wealth.

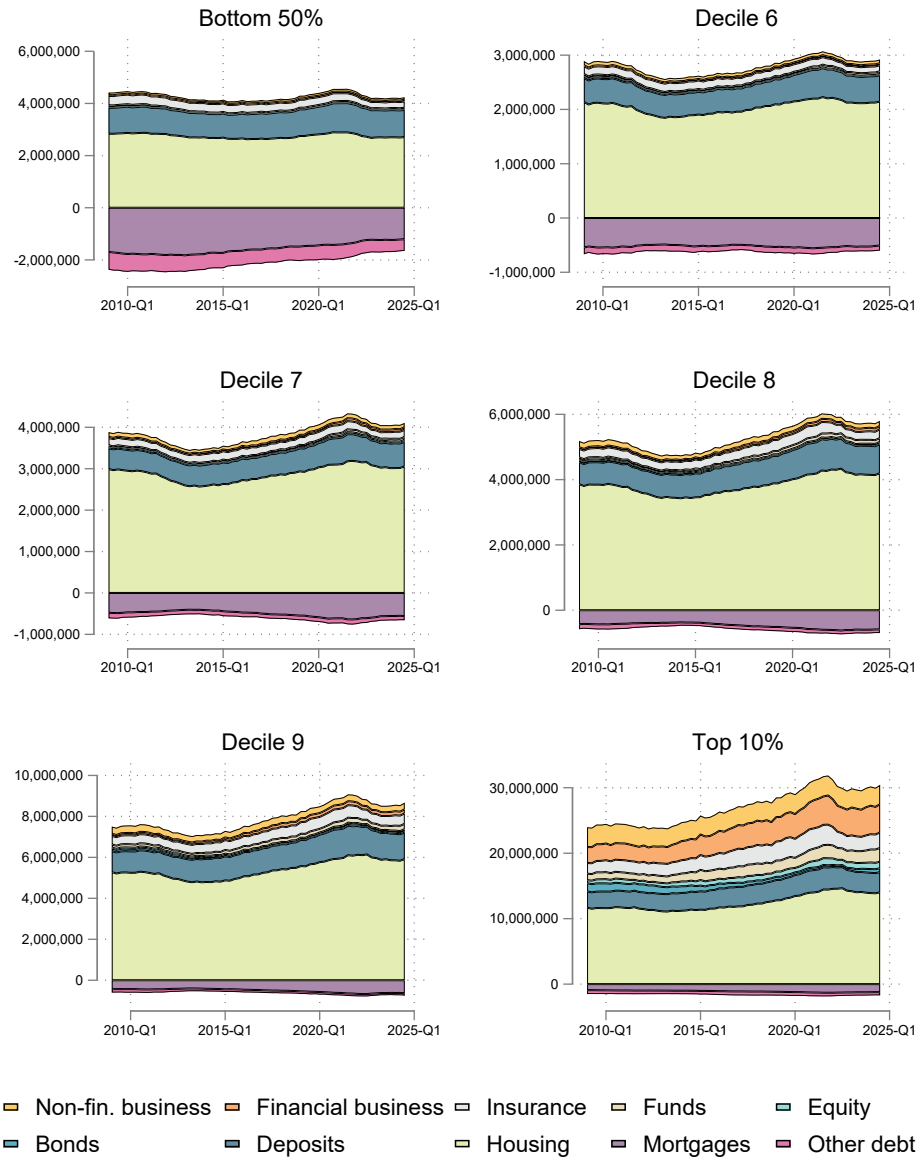
C. Additional charts

Figure C.1: *Composition of household portfolios (detailed breakdown) in the euro area, by net wealth decile.*



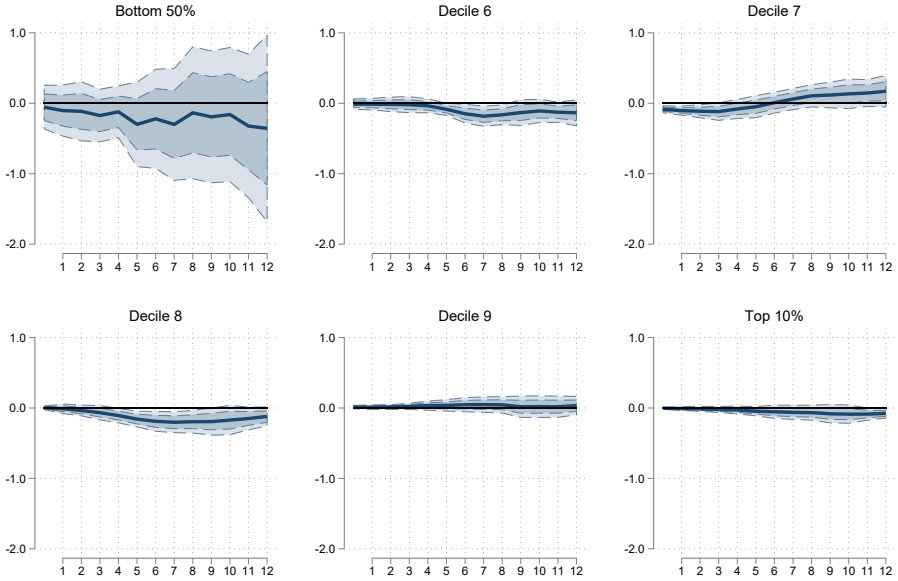
Source: Distributional Wealth Accounts.

Figure C.2: *Composition of household portfolios (detailed breakdown) in the euro area, by net wealth decile.*



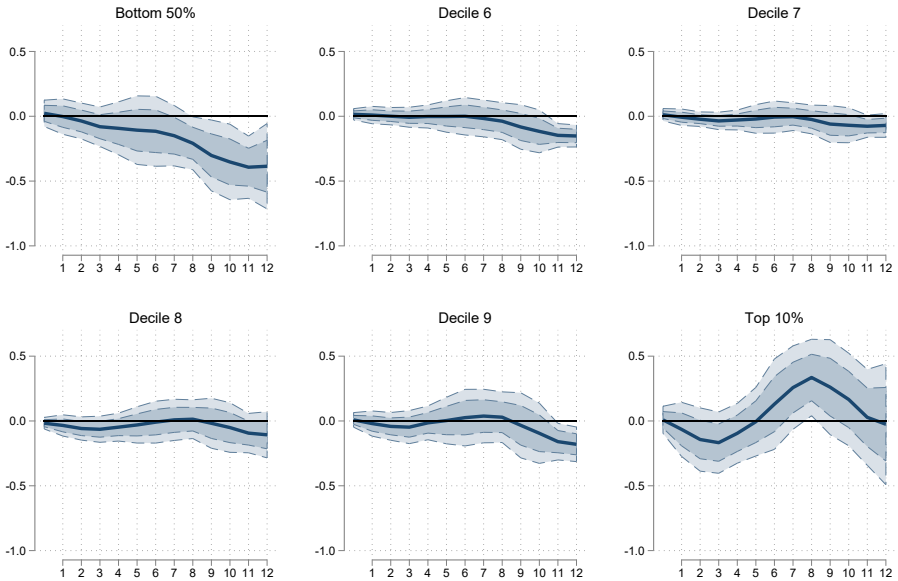
Source: Distributional Wealth Accounts.

Figure C.3: *IRFs: cumulative changes in households' debt liabilities (as a percentage of net wealth in $t-1$) following a contractionary monetary policy shock, by net wealth group*



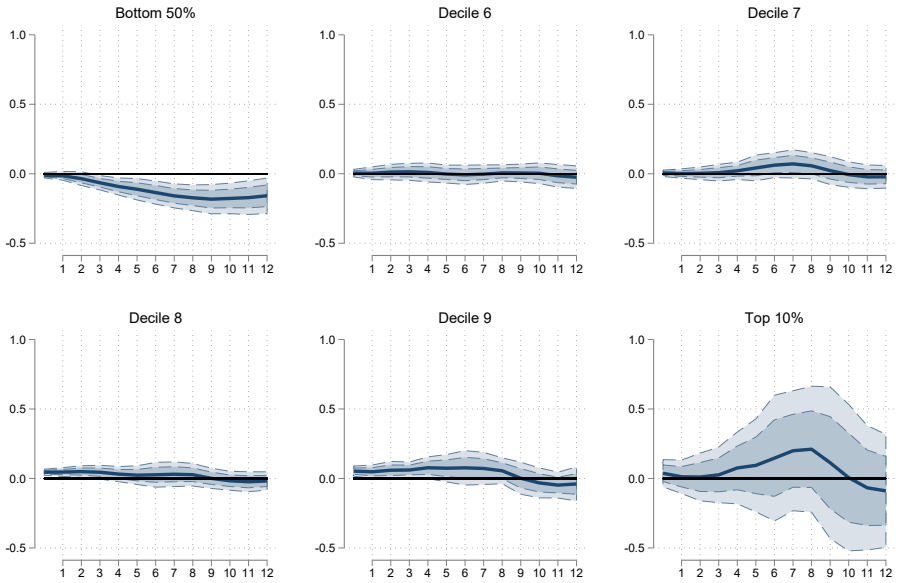
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.4: *IRFs: cumlative percent changes in households' risky financial assets (as a percentage of net wealth in $t-1$) following a contractionary monetary policy shock, by net wealth group*



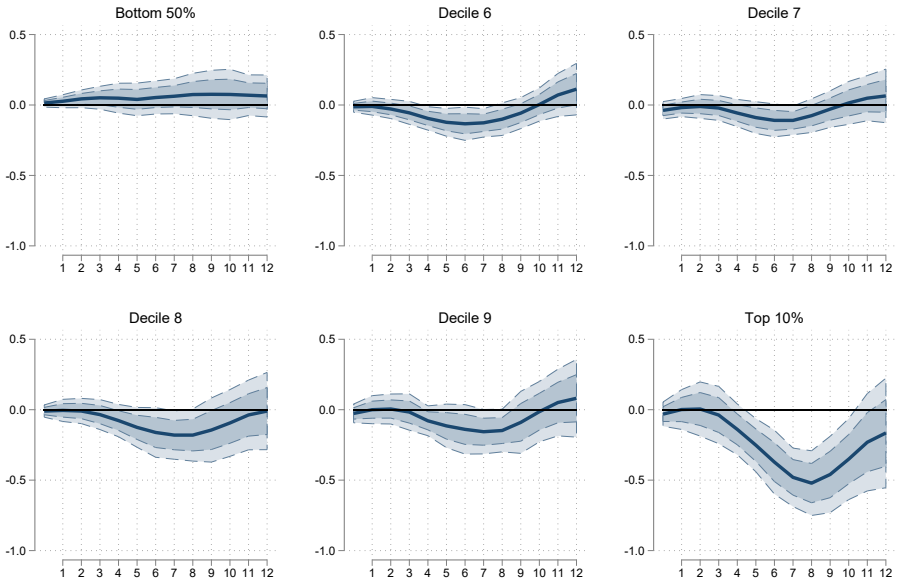
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.5: *IRFs: cumulative percent changes in households' business assets (as a percentage of net wealth in $t-1$) following a contractionary monetary policy shock, by net wealth group*



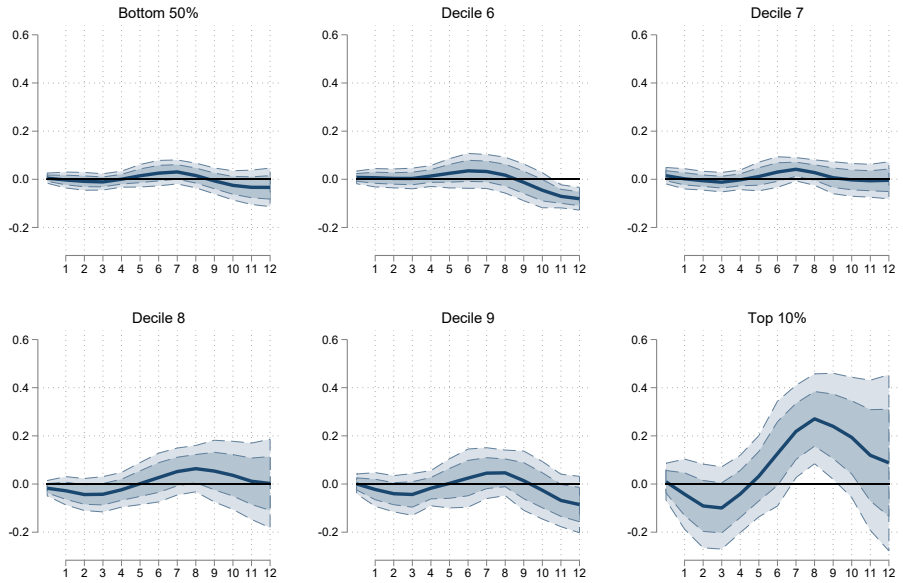
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.6: *IRFs: households' portfolio share of housing assets following a one-standard-deviation contractionary monetary policy shock, by net wealth decile*



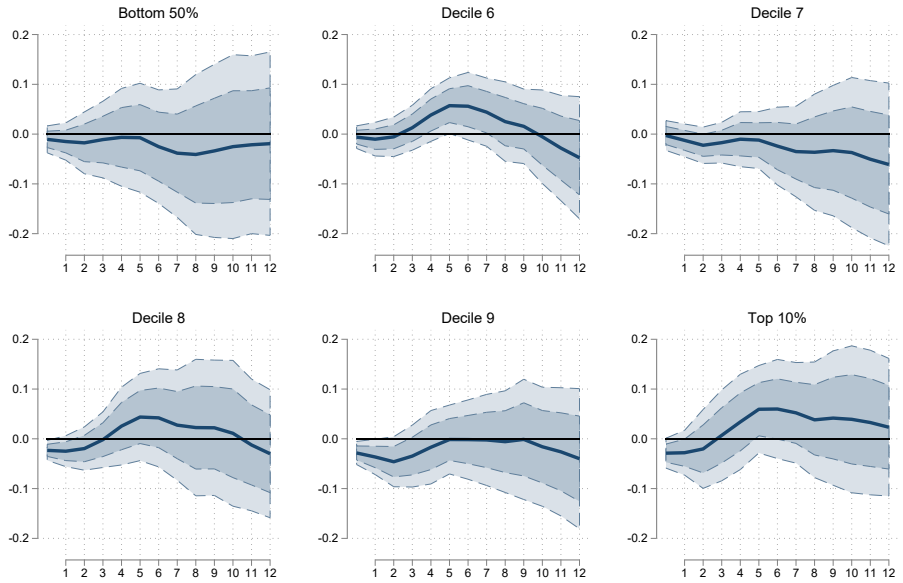
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.7: *IRFs: households' portfolio share of risky assets following a one-standard-deviation contractionary monetary policy shock, by net wealth decile*



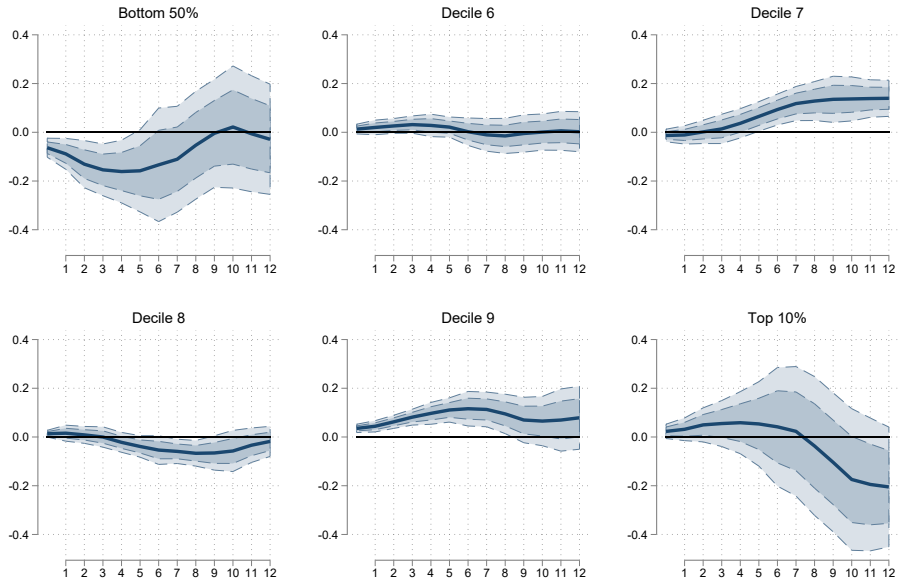
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.8: *IRFs: households' portfolio share of non-risky financial assets following a one-standard-deviation contractionary monetary policy shock, by net wealth decile*



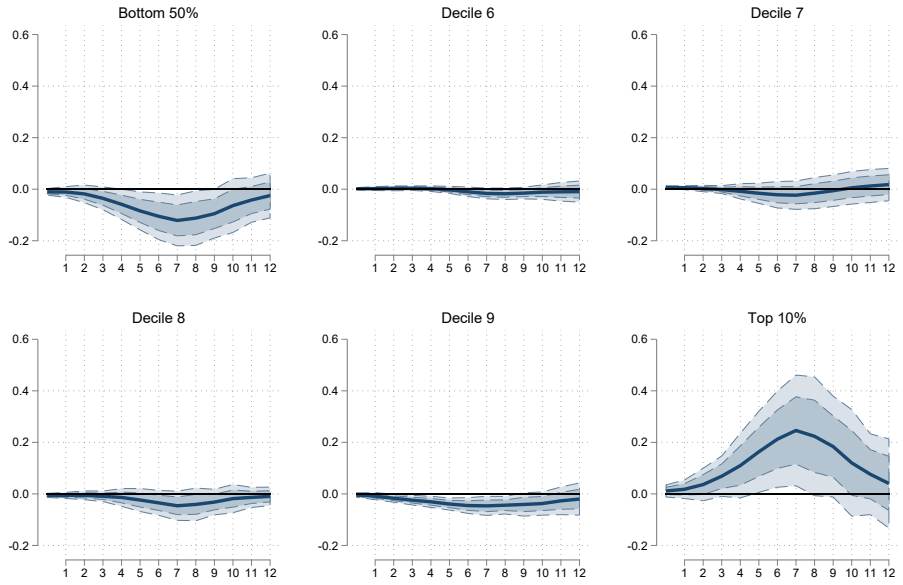
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.9: *IRFs: household group's share of country's debt liabilities following a one-standard-deviation contractionary monetary policy shock*



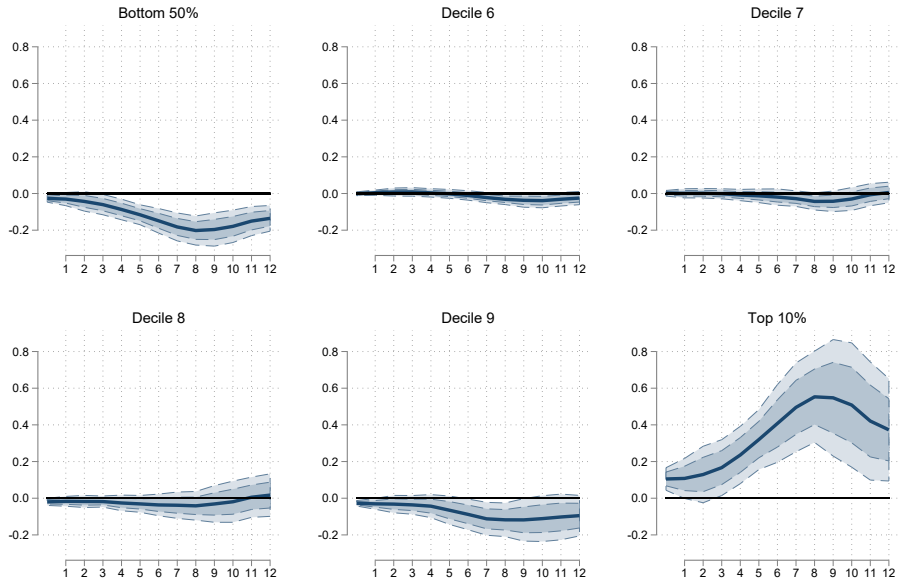
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.10: *IRFs: household group's share of country's non-risky financial assets following a one-standard-deviation contractionary monetary policy shock*



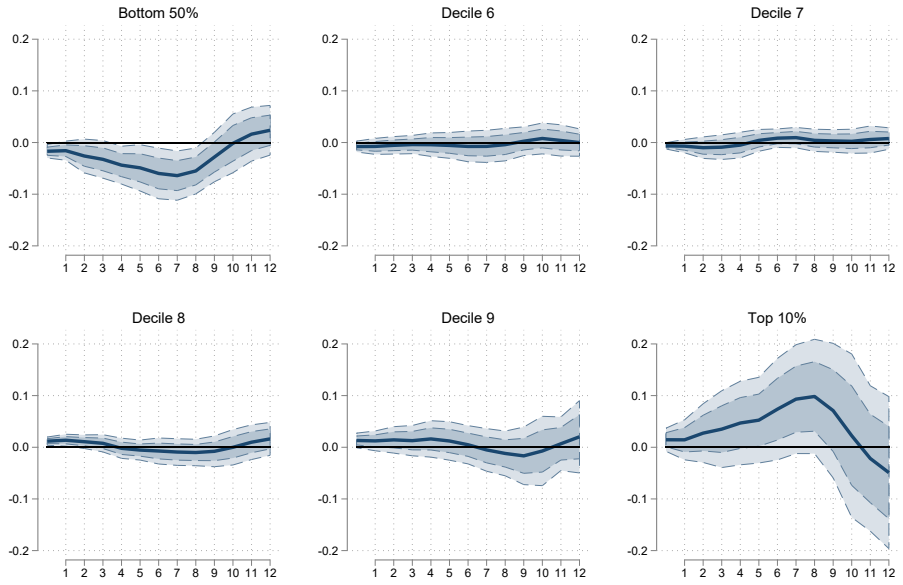
Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.11: *IRFs: household group's share of country's risky financial assets following a one-standard-deviation contractionary monetary policy shock*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.

Figure C.12: *IRFs: household group's share of country's business assets following a one-standard-deviation contractionary monetary policy shock*



Notes: Dark-shaded area: one-standard-deviation Driscoll-Kraay confidence interval. Light-shaded area: 90% Driscoll-Kraay confidence interval. Solid line: local projection moving-average-smoothed IRF.