Quantitative Easing and Wealth Inequality: The asset price channel

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Abstract

We assess the impact of the ECB's unconventional monetary policy, specifically of quantitative easing (QE), on the distribution of household wealth in nine euro area countries. For this purpose, we estimate the effects of a QE shock on housing and risky financial asset prices by means of local projections. We then use these estimates to carry out micro-simulations based on data from the Household Finance and Consumption Survey (HFCS). For the majority of the countries under review, expansionary QE via asset prices leads to net wealth inequality increases when measured using wealth indicators that are sensitive to changes at the tails of the wealth distribution. This finding contrasts with results based on the Gini coefficient which point to an equalizing impact of QE. One-third of the households in our sample holds neither housing nor financial wealth and is thus not directly affected by QE measures through the asset prices channel.

Keywords: Wealth, Inequality, Monetary Policy, Quantitative Easing
JEL codes: D14, D31, E44, E52, E58

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1 Introduction

Since the outbreak of the global financial crisis, major central banks have embarked on a long-lasting monetary policy easing cycle to underpin domestic demand and price growth. Compared to previous crises, many central banks opted for implementing a particular form of monetary policy, namely quantitative easing (QE). In the euro area, for example, the ECB started its QE program in 2014, to bring down long term yields and ensure broad based, easy financing conditions. At the end of June 2022, the stock of Eurosystem asset purchases stood at an impressive €3438 billion.[1] To date, there exists a vast literature that assesses the effectiveness of QE programs (see e.g., Ikeda et al., 2020; Fabo et al., 2021), but less is known about its potential side effects.

In this paper, we examine the impact of these asset purchase programs on the distribution of financial wealth among euro area households. For that purpose, we focus on the asset price channel and two important asset categories, risky financial assets (e.g., stocks) and housing wealth. The theoretical prediction of QE on wealth inequality is ambiguous. A fall in long-term rates and the associated boom in stock markets is likely to aggravate differences in wealth since only richer households tend to hold these assets. At the same time, this effect might be balanced out by the stimulating impact of QE on the housing market. As homeownership is usually more broadly distributed, the question arises whether and to which extent this positive distributional effect can compensate for rising inequality resulting from capital gains in financial assets. To estimate the effect of QE on household wealth, we collect data for nine euro area countries (Austria, Belgium, Germany, Finland, France, Italy, Netherlands, Portugal, and Spain). We then proceed in two steps. First, our study provides estimates of the country-specific, overall effect of QE on equity and housing prices using local projections and drawing on the quantitative easing measure of Altavilla et al. (2019). Second, we use these estimates to assess how household wealth in the euro area is affected. This is done by employing individual household data from the 2nd wave of the Household Finance and Consumption Survey (HFCS). The 2nd wave of the survey was used since it collected data in 2014 mostly before the ECB started its QE program.

There is scarce empirical literature examining the wealth effect of the asset price channel of QE for euro area countries. Adam and Tzamourani (2016) show that increases in equity prices significantly drive up net wealth inequality for all euro area countries, while increases in house prices generally benefit a broader range of households with large cross-country heterogeneity. The author show that the overall effect on the net wealth distribution of individual countries is exclusively determined by the respective wealth composition of households' portfolios, as a uniform exogenous asset price increase of 10% is assumed, not accounting for potential heterogeneity in the response of asset prices across countries. Guerello (2018) demonstrate that the effects of euro area monetary policy on income distributions differ strongly across euro area countries. Using microdata from household surveys conducted in six advanced economies (France, Germany, Italy, Spain, the UK and US), Domanski et al. (2016) argue that equity prices are the main drivers of rising inequality, which is only partly offset by rising housing prices. They therefore provide tentative evidence of the relative importance of monetary policy in affecting wealth inequality. Casiraghi et al. (2018) find that, for Italy, the negative distributional impact on gross wealth may, however, be mitigated due to lower liabilities of poorer households. Using a dynamic stochastic general equilibrium (DSGE) framework, Hohberger et al. (2020) show that the implementation of unconventional monetary policy (UMP) mitigates income and wealth inequality, except in the very short term. The study which is most similar to ours is Lenza and Slacalek (2018), who analyze the effect of quantitative easing on

[1]For a more detailed breakdown of these assets, see `https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html`.

income and wealth inequality in the four largest euro area countries by using a multi-country vector autoregression (VAR) approach.[2] Interestingly, their results show a more equal distribution of household wealth, but overall effects tend to be rather muted. This result, which is derived from changes in Gini coefficients, is mainly driven by the equalizing effect of increasing house prices. In a recent study, Evgenidis and Fasianos (2021) use the reverse approach of this study: first deriving measures of inequality (e.g., Gini) based on household data and then estimate the effects of unconventional monetary policy (proxied by shadow rates) on these measures for the UK. They find that the portfolio rebalancing channel through asset prices, as well as effects trough house prices, are the most important mechanisms that led to an increase in wealth inequality in the UK. This finding further lends support to the focus on equity and house prices in this study.

Our main findings are as follows. First, one-third of the households in our sample, most of which are in the lower third of the wealth distribution, hold neither housing nor financial wealth and therefore do not benefit directly from QE through the asset price channel. This holds particularly true for countries with low homeownership. Second, when inequality is measured in terms of wealth indicators that are sensitive to changes at the tails of the wealth distribution (such as the ratio of the 90th to the 10th percentile or the ratio of the 80th to the 20th percentile, as well as the share of the top 10%, and top 5%, in overall net wealth) the impact of QE on the joint distribution of housing and risky financial wealth results in an increase in wealth inequality for most countries. Third, looking at the change in the Gini coefficient, results are more mixed. In Italy, Belgium and Finland, the overall distributional effects are clearly negative (i.e., wealth inequality increases), in line with the results based on inequality measures sensitive to changes at the tails of the wealth distribution. In France, Austria, Germany and Portugal, we find only minimal or zero effects on the Gini coefficient. Whereas, in Spain and in the Netherlands, the more equalizing effect of rising housing prices more than offsets the negative distributional effects of rising risky financial asset prices, showing a decrease in inequality for these commonly used measure. Nevertheless, in light of the fact that in particular wealth distribution is highly skewed to the right and characterized by high values in the top decile(s), inequality measures that are more sensitive to movements in the tails of the distribution seem to be more appropriate than the Gini coefficient. The latter tends to camouflage changes that take place in the top tail of the wealth distribution.

The remainder of the paper is structured as follows. Section 2 introduces the household-level data. Section 3 derives the country-specific macroeconomic effects of QE on asset prices. Section 4 then applies these estimates to household data and assesses the impact on the inequality measures such as the Gini coefficient. Section 5 presents results for alternative specifications. Section 6 concludes.

2 Data and stylized facts

In this section, we present some stylized facts about the distribution of wealth in nine euro area countries, namely Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Portugal and Spain. We use the second wave of the Household Finance and Consumption Survey (HFCS), with reference year 2014 for most countries. The HFCS is a joint project of the national central banks of the Eurosystem and several national statistical institutes (ECB, 2009, 2013b,a). Data of the second wave of the HFCS is collected in an a priori harmonized way in 20 EU Member States, for a sample of more than 84,000 households. All variables are provided directly by the respondent of the survey.

[2] Throughout the paper, we refer to the strongly revised and latest version of Lenza and Slacalek (2018) from 2022, available from their webpage.

Similarly to the US Federal Reserve's Survey of Consumer Finances (SCF), the HFCS provides detailed household-level data on households' balance sheets and finances. The survey includes information about household' demographics, employment, income, consumption and savings. From the asset side, the survey reports assets/liabilities held/incurred by the households in current values, including those held abroad, such as property (real estates, vehicles, valuables, etc) and their financing (mortgages, non-mortgage debt, leasing, credit lines credit cards and private loans). Financial assets reported in the survey include: current and saving accounts, mutual funds, bonds and shares. Additional questions are asked regarding the bonds' type owned, type of mutual funds and shares. Nevertheless, the market value of mutual funds, bonds and shares is only asked for the broad categories (e.g. value of all funds together, total value of securities and total value of shares, without distinguishing between public and corporate bonds or different risk profiles). Finally, the wealth figures include the current value of households' private pension plans and life-insurance policies, but do not include the value of public and occupational pension schemes.[3]

As the focus of this paper is on the distributional impact of QE, we are particularly interested in housing and risky financial assets. To that end, we use the following classification throughout our study. "Housing" refers to the value of a given household's main residence and other real estate property; "risky financial assets" refer to mutual funds, bonds, non-self-employment private business, shares and managed accounts; "other" refers to other wealth positions, such as deposits, voluntary pension accounts, and vehicles. We include risky financial assets that are most likely to be influenced by QE. We do not include deposits or savings accounts, as we concentrate on the effect of asset price changes. We also exclude private pension funds, mostly because the effects QE has on private pension funds is not as well researched (with Boubaker et al., 2017, being a notable exception) and it is unclear at this point if private pension funds behave in a similar way as risky financial assets. Public pensions and occupational pension schemes, even though the implied wealth can be substantial (OECD, 2021), are not included in the survey (ECB, 2013b).[4]

Throughout this study, we will focus on results where households are grouped in gross wealth deciles. The reason why we opt for this representation is that we do not consider possible effects on debt. It should be kept in mind, though, that higher gross wealth deciles are usually associated with higher debt. To allow for comparability with most of the inequality literature, we use net wealth to calculate inequality measures.

Figures 1 and 2 show the average absolute and relative holdings of the three components of wealth across countries and gross wealth deciles: risky financial asset wealth, housing wealth and other wealth. These graphs reveal some distributional properties that will influence the effect of asset price changes on inequality. First, risky financial assets are almost entirely held at the top of the distribution. Second, housing wealth is an important wealth component especially for households at the center of the distribution. Third, there is considerable cross-country heterogeneity: For Austrian and German households, homeownership starts to matter, on average, at the 5th decile, while it is already prevalent in the third decile in Spain, Belgium or Portugal. In Portugal, wealth held in risky financial assets is less important than in Belgium

[3] For further details, see `https://www.ecb.europa.eu/pub/economic-research/research-networks/html/researcher_hfcn.en.html`.

[4] Public pensions and occupational pension plans are not considered in the HFCS, as the value of some public pensions and occupational pension plans can be difficult for households to assess. For the US, Boubaker et al. (2017) find that interest rates at the zero lower bound and asset purchase programmes induced an increase in risk-taking behavior of pension funds, especially from low-yield investments such as government bonds in favor of riskier investments. How this affects household wealth is a promising avenue for research, but beyond the scope of this paper.

or France. Forth, the lower half of the distribution only holds negligible amounts of wealth and is therefore, in absolute terms, only marginally affected by asset price changes. These distributional properties influence the effects of asset price changes (see Adam and Tzamourani, 2016, for a simulation of a uniform increase in asset prices). In particular, the relative importance of household wealth in the middle of the distribution as depicted in Figure 2 shapes the effect of house price changes on the Gini, as we will explore below.

3 The macroeconomic effects of unconventional monetary policy on asset prices

In this section, we study the effect of unconventional monetary policy on asset prices in the euro area. A broad literature provides evidence of significant effects of monetary policy on housing prices (see, among others, Jarociński and Smets, 2008; Bernanke and Gertler, 1995; Iacoviello and Minetti, 2008; Beraja et al., 2018). Yet only a few studies assess the effect of UMP on housing markets, focusing, at the same time, on the heterogeneity of this effect on euro area countries. Among the most recent studies, Lenza and Slacalek (2018) estimate the effect of a QE shock on house and stock prices and, ultimately, on wealth inequality in the four largest euro area countries. By contrast, Nocera and Roma (2017) study the effect of a standard contractionary monetary policy shock on house prices in all euro area countries up to 2014. Both papers find that monetary policy affects house prices more strongly in Spain than in Germany. Rahal (2016) examines the post-crisis period using a low-dimensional panel VAR to analyze the effect of QE (proxied by central bank total assets) on housing market developments in the euro area aggregate, US, Canada, Japan, Switzerland, Norway, Sweden and UK This study shows positive and significant mean group responses of housing prices for most countries, with country-level responses being very similar across countries,[5] except for the euro area, where responses of housing prices are less pronounced and turn negative after a few periods.

As for the effect of conventional and unconventional monetary policy on stock market prices, the literature uses a more diverse set of methodologies. Several authors analyze the effect of UMP on specific financial assets, such as bond yields and equity prices, by using event study approaches (see, among others, Altavilla et al., 2016; Fratzscher et al., 2016; Krishnamurthy and Vissing-Jorgensen, 2011; Ambler and Rumler, 2019). These studies find that the ECB's asset purchase programs significantly lowered long-term government bond yields especially in distressed countries (Altavilla et al., 2016; De Santis and Holm-Hadulla, 2020), and that they increased stock market prices. These effects are, however, estimated on impact or as short-term effects around the monetary policy announcement dates. Other studies use VARs to assess the effect of UMP on a range of macro and financial variables, such as stock market prices (Georgiadis, 2015; Feldkircher et al., 2020; Boeckx et al., 2017). For instance, Boeckx et al. (2017) estimate the effect of UMP on euro area-wide financial and banking variables from 2007 to 2014.[6] Their results show that, for the euro area as a whole, UMP decreased the spread between euro area and German sovereign bond yields and increased equity prices.

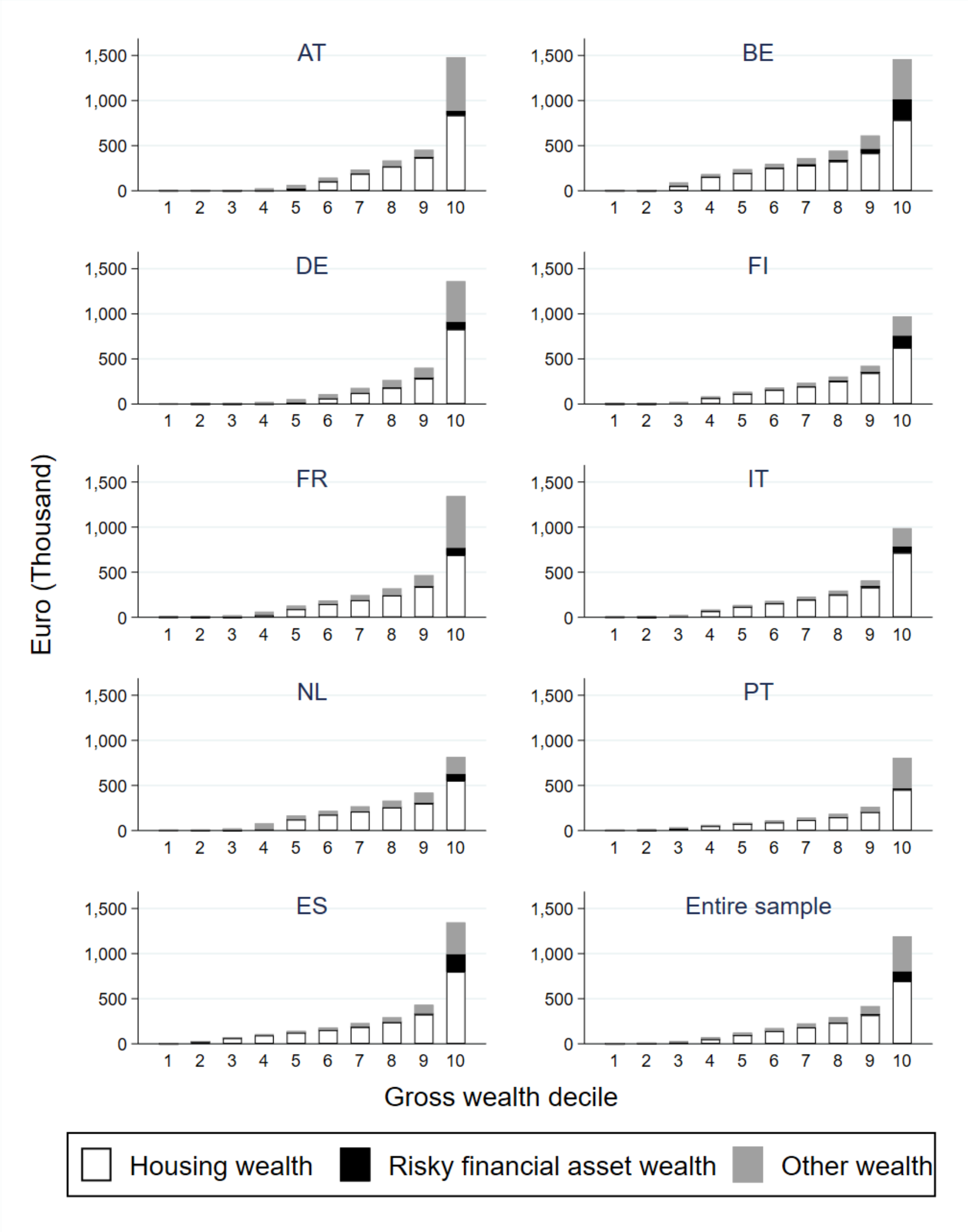
In our study, we follow a recent strand of the literature and assess the strength of monetary policy using local projections (Jòrda, 2005) and high-frequency measures of monetary policy.[7]

[5]The largest response in housing prices is observed in the USA and the UK where the stock of mortgage debt as a ratio of GDP is comparatively high and mortgage markets are more developed. This points to the fact that the significance of the credit channel depends on the institutional structure for mortgage finance (Rahal, 2016).

[6]Boeckx et al. (2017) rely on a balance sheet shock, as do Gambacorta et al. (2014) and Rahal (2016).

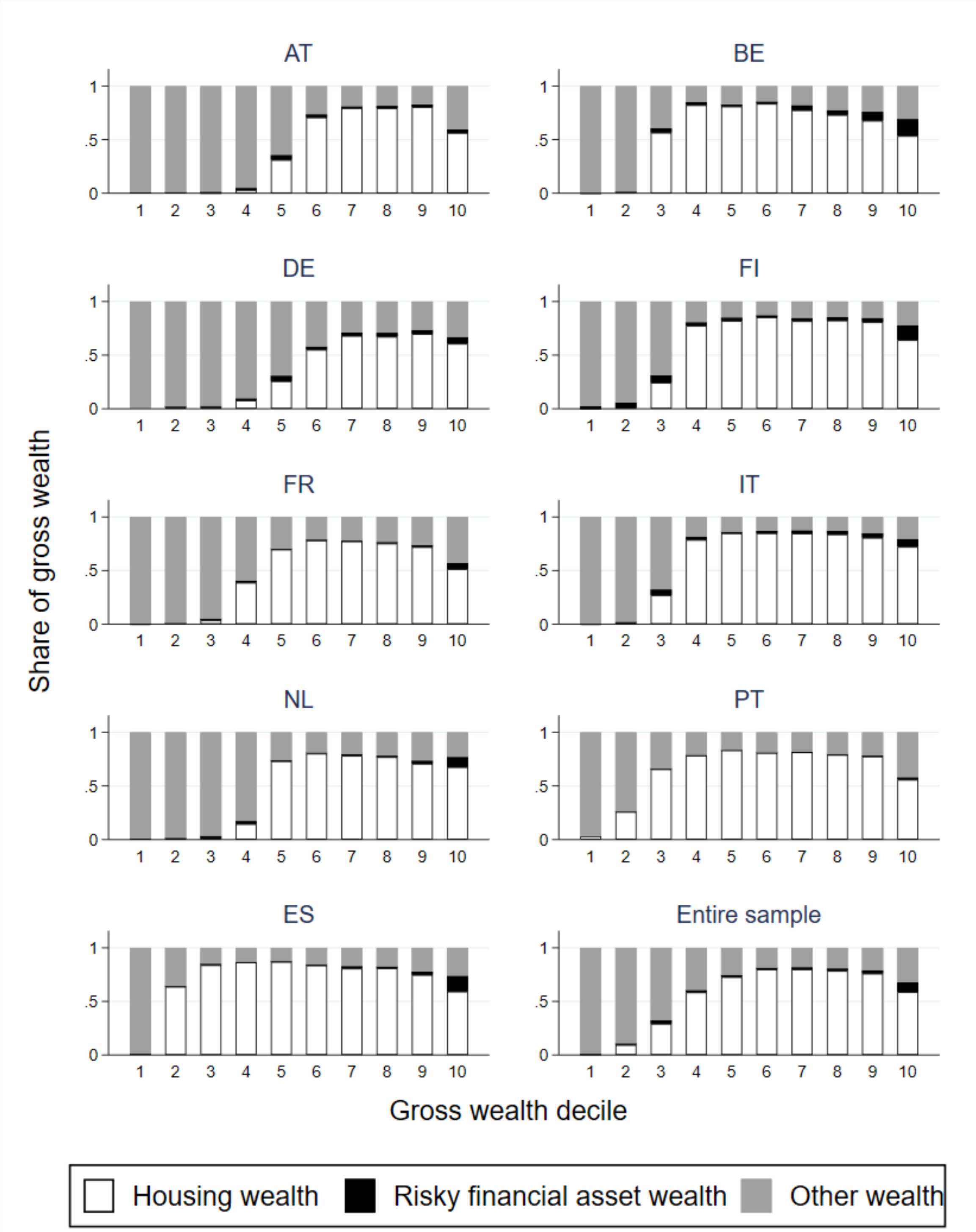
[7]In a previous version of this paper, we relied on vector-autoregressive (VAR) models instead of local projec-

Figure 1: Wealth distribution by gross wealth decile, average wealth per decile



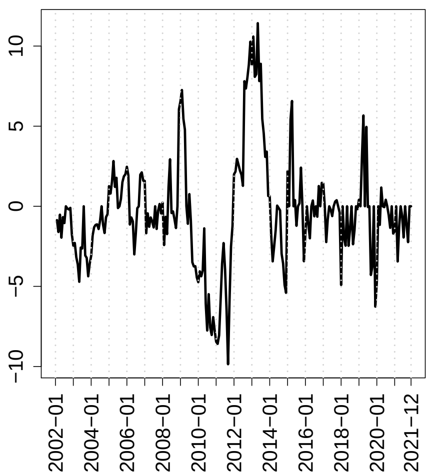
Note: The figure displays the mean wealth per gross wealth decile in each country in the sample. "Housing wealth" refers to households' main residences and other real estate property; "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts; "Other wealth" refers to vehicles, valuables, deposits, saving funds, voluntary pension / whole life insurance, other assets. Source: HFCS second wave, authors' calculations.

Figure 2: Wealth distribution by gross wealth deciles, relative average wealth per decile



Note: The figure displays the mean wealth per gross wealth decile, relative to mean gross wealth in each country in the sample. "Housing wealth" refers to households' main residences and other real estate property; "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts; "Other wealth" refers to vehicles, valuables, deposits, saving funds, voluntary pension / whole life insurance, other assets. Source: HFCS second wave, authors' calculations.

Figure 3: Updated QE factor of Altavilla et al. (2019)



To measure quantitative easing (QE), we construct a time series that is based on high-frequency changes in the yield curve around monetary policy announcements (Swanson, 2021). In particular, we follow the procedure outlined in Altavilla et al. (2019) which uses factor analysis on changes in yields of risk-free rates of different maturities and other assets to extract a QE factor. Altavilla et al. (2019) demonstrate that this factor loads most strongly on the longer end of the euro area yield curve and resembles quantitative easing. Similar approaches that use local projections coupled with high frequency identified measures of monetary policy comprise Blot et al. (2020) who investigate the effects of monetary policy on equity and housing prices and Hülsewig and Rottmann (2022) who assess the monetary and fiscal policy nexus.

We collect data on equity prices (eq_{it}) and house prices (hp_{it}) for 9 selected euro area member states. Equity price data stem from the OECD, is monthly and measured in months-on-months growth rates. House prices data refer to real house prices, seasonally adjusted and also stems from the OECD. The data are quarterly and correspondingly transformed as quarter-on-quarter growth rates. Since Altavilla et al. (2019) focus on the euro area as a whole, however, yields considered to extract the QE factor stem only from German, French and Italian data. Using the yield curve data change available in the Euro Area Monetary Policy Event-Study Database and the methodology outlined in Altavilla et al. (2019) we update the monetary policy measure to include observations until end of 2021.[8]

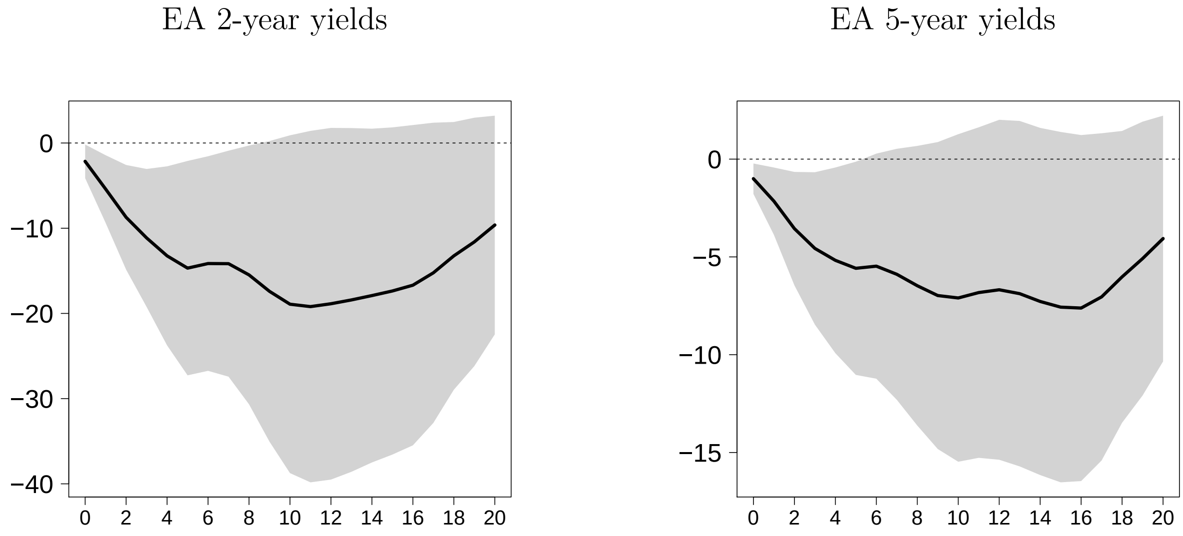
We transform the daily surprises to monthly surprises by first creating a cumulative daily surprise series and secondly taking monthly averages of this series. We use a cumulative shock series as advocated in Romer and Romer (2004) to ensure comparability with standard interest rate / bond yield shocks which typically enter the regression in levels (see Gertler and Karadi (2015) for an application using a first-differenced shock series). In a similar way, we calculate quarterly surprises when assessing the effect on house prices. The updated monthly QE factor is shown in Figure 3.

The availability of the QE factor (qe_t) determines our sample period which runs from 2002m1 (2002q1) to 2021m12 (2021q4). In principle, these data would suffice to estimate the effect of QE on our focal variables. To control for other forms of monetary policy, we further include

tions. See Plagborg-Moller and Wolf (2021) for a demonstration that both approaches yield the same impulse response functions.

[8]This is done using the R package hfdshocks.

Figure 4: Effect of QE on EA government bond yields (in bp)



Notes: The figure shows impulse responses of 2-year and 5-year euro area government bond yields to an expansionary QE shock on a monthly frequency. The responses are measured in basis points. Bounds respond to 90% confidence intervals.

two additional monetary policy measures, namely the timing (ti_t) and the target factor (tg_t) of Altavilla et al. (2019), transformed to monthly and quarterly series as described above. These country invariant control variables are collected in a $k_z \times 1$ vector $Z_t = (ti_t, tg_t)'$.[9]

Before assessing the effect of QE on asset prices, we provide the impulse responses of the QE factor on euro area 2-year government bond yields ($2gb_{ea,t}$) and 5-year government bond yields ($5gb_{ea,t}$). This should help to relate our overall results to the existing literature on QE in the euro area and is also essential to derive the elasticities needed for the microsimulation.

The results using $p = 4$ lags are based on the following local projections:

$$Y_{i,t+h} = \alpha_{i,h} + qe_t \cdot \theta_{i,h} + \sum_{j=1}^{p} Y'_{i,t-j}\Phi_{h,t-j} + \sum_{j=0}^{p} Z'_{i,t-j}\Gamma_{h,t-j} + \varepsilon_{i,t+h} \tag{1}$$

with $Y_{i,t+h}$ either containing 2-year or 5-year euro area government bond yields, qe_t denoting the quantitative easing shock variable and $h = 0, \ldots, 20$ denoting the impulse response horizon and $\varepsilon_{it} \sim N(0, \Sigma_i)$ a white noise process.

Figure 4 shows the impulse responses to an expansionary QE shock, measured by a one standard deviation shock in the QE factor by Altavilla et al. (2019) on a monthly frequency, on 2- and 5-year euro area government bond yields. We observe that QE significantly lowered both yields in the euro area, resulting in trough effects of about 15 bp (2-year yields) and 6 bp (5-year yields). Other event studies point at effects ranging from 20 to 100 bp on 10-year government bond yields in the EA.[10] In the appendix in Figure 13, we further show a cross-sectional analysis of the QE effect on local spreads of 10-year government bond yields over German yields. These results demonstrate that QE was indeed successful in bringing down long-term yields in the

[9] We provide in the appendix, estimations that consider in addition a control variable for US macroeconomic news, see Figure 12.

[10] See, among others, Altavilla et al. (2015, 2016) estimating the impact of OMT and APP to be between 20 bp and 100 bp, and 30 to 50 bp respectively, and Andrade and Ferroni (2016), estimating the total effect of APP in the EA to be 45 bp.

euro area and significantly so.

We now proceed by examining the effects of QE on equity price growth. For that purpose, we define the endogenous vector as $Y_{it} = (eq_{it}, 2gb_{ea,t})^{'}$ and estimate Equation 1 for each country separately. We include 2-year euro area bond yields to control for any potential feed-back effects. A robustness exercise, available upon request, shows that whether to include or exclude $2gb_{ea,t}$ in Y_{it} does not affect the results.

Figure 5 provides the responses on equity price growth. We show 90% confidence intervals and focus on a 20 months forecast horizon. We see that for most economies the responses are hump-shaped, implying a positive and front-loaded effect on equity price growth. Peak effects occur for most economies between 6 and 8 months. After 14 months, effects tend to peter out. By contrast, responses on the 2-year government bond yields (see, Figure 14 in the appendix) are more persistent and point to a trough effect of about 20 basis points after around 12 months.

There are several ways of calculating elasticities using these estimates.[11] If we focus on peak effects, for example, the results would imply that equity price growth in Austria increased by 0.2 percentage points in response to the QE shock (which decreased 2 year government bond yields by about 15 to 20 basis points). The cumulative effects until the peak imply that equity prices increased by about 0.5% (in Germany) to 1.6% (in Portugal). These results are in the ballpark of estimates provided by Altavilla et al. (2019) using a shorter sample and a daily vector autoregressive model, which pointed at a peak response of equity prices about 5% in a relation to 15 basis point reduction in the 2 year government bond yield.

Next, we estimate Equation 1 for growth rates in house prices on quarterly frequency, which implies that $Y_{it} = (hp_{it}, 2gb_{ea,t})^{'}$. The results are depicted in Figure 6. In contrast to results on equity price growth, results for housing prices are very country-specific. For example, in France, Spain and Portugal, results are front-loaded with positive peaks occurring within the first 8 quarters. By contrast, in Austria, Finland, Italy, Germany and the Netherlands, positive effects need more time to materialize with peak effects being recorded toward the end of the impulse response horizon. No significant response is obtained for Belgium, which could be related to several changes in housing taxes over the sample period as well as significant changes in supply.[12] Cumulating the values until the peak yields effects ranging from 0% (Belgium) to 2.4% (France).

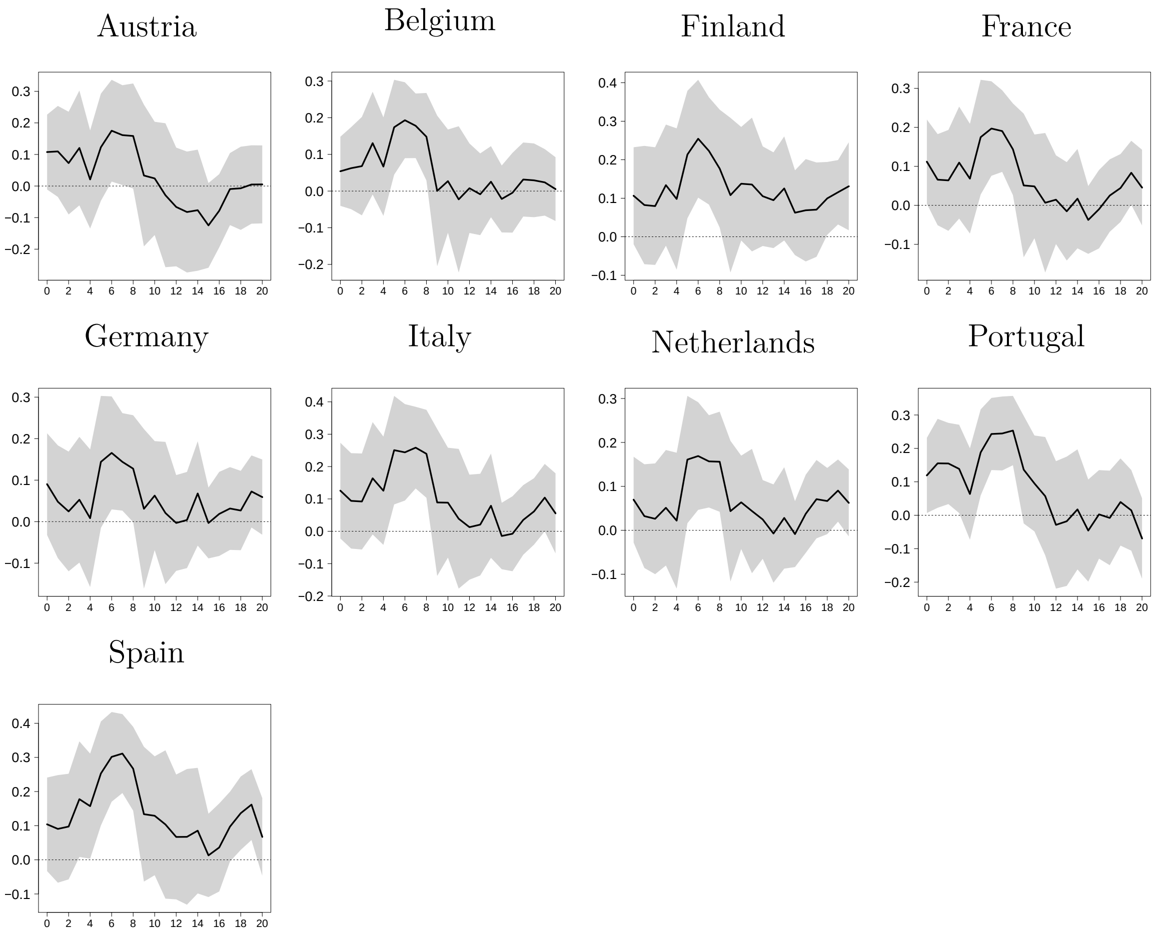
Table 1 summarizes the elasticities. As our baseline specification we choose effects that are cumulated until the (country-specific) peak value of the impulse response horizon for both variables. This information is provided in the column labeled ”Peak” with the number in brackets indicating the timing of the peak (in months for equity prices, in quarters for housing prices). This measure has the advantage that country-specific differences regarding the time it takes until asset prices are affected are taken into account.

Alternatively, we also provide cumulative values after 6-months and 1-year. Summing up and considering our benchmark elasticities, we find that an expansionary QE shock that brings down 2-year government bond yields by about 15 to 20bp led to a significant increase in both equity prices and house prices in most countries.

[11] For a recent meta-study on the effects of QE on inflation and output using similar ways of summarizing the main impacts, see Fabo et al. (2021).

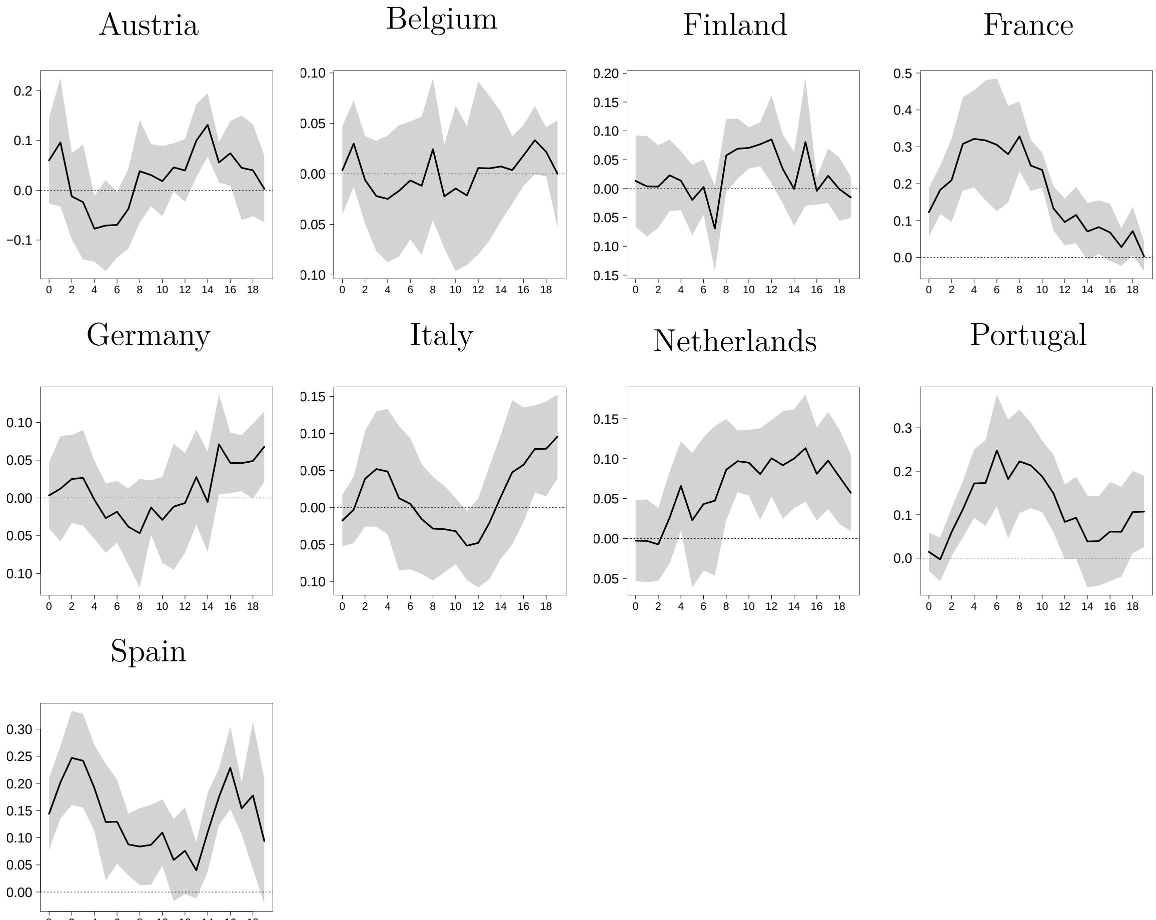
[12] More specifically, Belgian authorities changed the way taxes can be deducted for mortgage loans which may have a significant bearing on the real estate market unrelated to QE, as the tax advantages are likely to be capitalized into property prices.

Figure 5: Responses of equity price growth



Notes: The figure shows impulse responses of the months-on-months equity price growth rate (in percentage points) to an expansionary QE shock. Bounds respond to 90% confidence intervals.

Figure 6: Responses of house price growth



Notes:The figure shows impulse responses of the quarter-on-quarter house price growth rate (in percentage points) to an expansionary QE shock. Bounds respond to 90% confidence intervals.

Table 1: Estimated elasticities (in%)

	Equity (Ψ_i^{fin})			Housing ($\Psi_i^{housing}$)		
	Peak	6-months	1-year	Peak	6-months	1-year
AT	0.73 (7)	0.73	1.01	0.27 (15)	0.14	0.04
BE	0.75 (7)	0.75	1.09	-0.01 (18)	0.03	-0.02
FI	0.97 (7)	0.97	1.85	0.33 (13)	0.02	0.06
FR	0.79 (7)	0.79	1.25	2.38 (9)	0.51	1.14
DE	0.53 (7)	0.53	0.92	-0.03 (16)	0.04	0.06
IT	1.35 (8)	1.1	1.82	0.28 (20)	0.02	0.12
NL	0.53 (7)	0.53	1.02	0.96 (16)	-0.01	0.08
PT	1.56 (9)	1.06	1.82	0.78 (7)	0.07	0.36
ES	1.49 (8)	1.18	2.19	0.59 (3)	0.59	1.03

4 The effect of unconventional monetary policy on household wealth

In this section, we use the estimated impact of an expansionary QE shock on housing and risky financial asset prices derived from the previous section and analyze the effect on the wealth distribution of households in the nine selected euro area countries.

We perform the following partial equilibrium simulation:

$$W_{j,i}^{sim} = W_{j,i}^{housing} \cdot (1 + \Psi_j^{housing}) + W_{j,i}^{fin} \cdot (1 + \Psi^{fin}) + W_{j,i}^{other} \tag{2}$$

$W_{j,i}^{sim}$ being the total simulated wealth of household j in country i, $W_{j,i}^{housing}$ the housing wealth before the QE shock, $W_{j,i}^{fin}$ risky financial assets wealth before the QE shock, $W_{j,i}^{other}$ other wealth components and Ψ the corresponding coefficients provided in Table 1. Note that we use country-specific elasticities for housing wealth, whereas we use an aggregated (by market capitalizations) elasticity for financial asset wealth (we will relax this assumption in Section 5). We first focus on the effects via house and asset prices separately, in order to later evaluate the overall distributional effects. This allows us to disentangle the drivers of the shifts in the overall wealth distribution.

4.1 Housing wealth

First, we consider the distributional effects of the change in housing prices resulting from QE. Housing wealth enters the HFCS in the form of the value of a given household's main residence and other real estate property. The elasticities derived for each country indicate rather large cross-country heterogeneity, which points to significant divergence in the transmission of QE on housing wealth. Country-specific estimates of the reaction of housing prices to QE are reasonable because, contrary to financial assets, housing wealth is almost exclusively held in the households' country of residence. Moreover, most housing wealth is attributable to households' main residences. Hence distributional effects arising from property held by households outside their country of residence are negligible. We further assume that households do not change the composition of their portfolio. Given that a household's main residence is not liquid, this assumption is reasonable. Even for risky financial assets, there is evidence of considerable sluggishness in household portfolios (Calvet et al., 2009).

Figure 7 depicts the absolute changes in gross wealth that result from expansionary QE-induced changes in house prices. Households are grouped by gross wealth deciles at the country level.

French households benefit most, with the top 10% of households increasing their wealth by about 15,000€. For Austria, Finland, Italy, the Netherlands, Portugal and Spain, the effects are more muted with wealth increases under 5,000€. There are slightly negative but negligible wealth changes for Belgium and Germany.

Next, we analyze the effect on relative wealth, i.e. the changes relative to gross wealth, to get an idea of the impact in relation to households' total wealth. When we look at the gains or losses relative to gross wealth per household (Figure 8), we see that the relative impact is more evenly distributed for households with housing wealth (usually starting at the 4th or 5th decile). This reflects the fact that housing wealth is, relative to total wealth, more evenly distributed than risky financial wealth. For most of the sample, households in the middle of the distribution see their gross wealth increase by about 0.5%-2% on average.

4.2 Risky financial asset wealth

We now analyze the effects of QE on the wealth distribution via risky financial assets price changes. In contrast to residential property, we do not assume that households hold risky financial assets exclusively issued in their respective countries; rather, we assume that the effects of QE on households' equity are similar across countries. The HFCS does not provide information on where financial assets were issued, so we rely on the approximation that each household holds a risky financial asset portfolio according to the issuing countries' share in financial markets. We use the country-level reactions of equity prices to a QE shock, weigh them by relative market capitalization[13] and calculate the mean effect of QE on risky financial asset prices. This weighted average of the estimates in table 1 amounts to 0.93%. We apply this elasticity to the following risky financial assets according to the HFCS: mutual funds, bonds,[14] non-self-employment private business, shares and managed accounts. As described above, we assume that the impact on risky financial assets does not differ by country, so a difference in gains following a balance sheet shock only reflects the countries' underlying wealth distribution. Figure 9 shows the mean absolute gains by country following an expansionary QE shock. Risky financial assets are held almost exclusively by households in the upper decile and are thus far more unequally distributed than housing wealth. Accordingly, only households in the upper deciles benefit from the price increases of risky financial assets. Average gains per household in the top decile amount up to EUR 2,000 in Belgium. At the lower end of the distribution, gains are negligible.

The effect on relative wealth shows a much more-right skewed picture than for housing wealth. In terms of magnitude, relative gains are much smaller than for the housing price shock, reflecting smaller holdings of risky financial assets.

4.3 Total effects

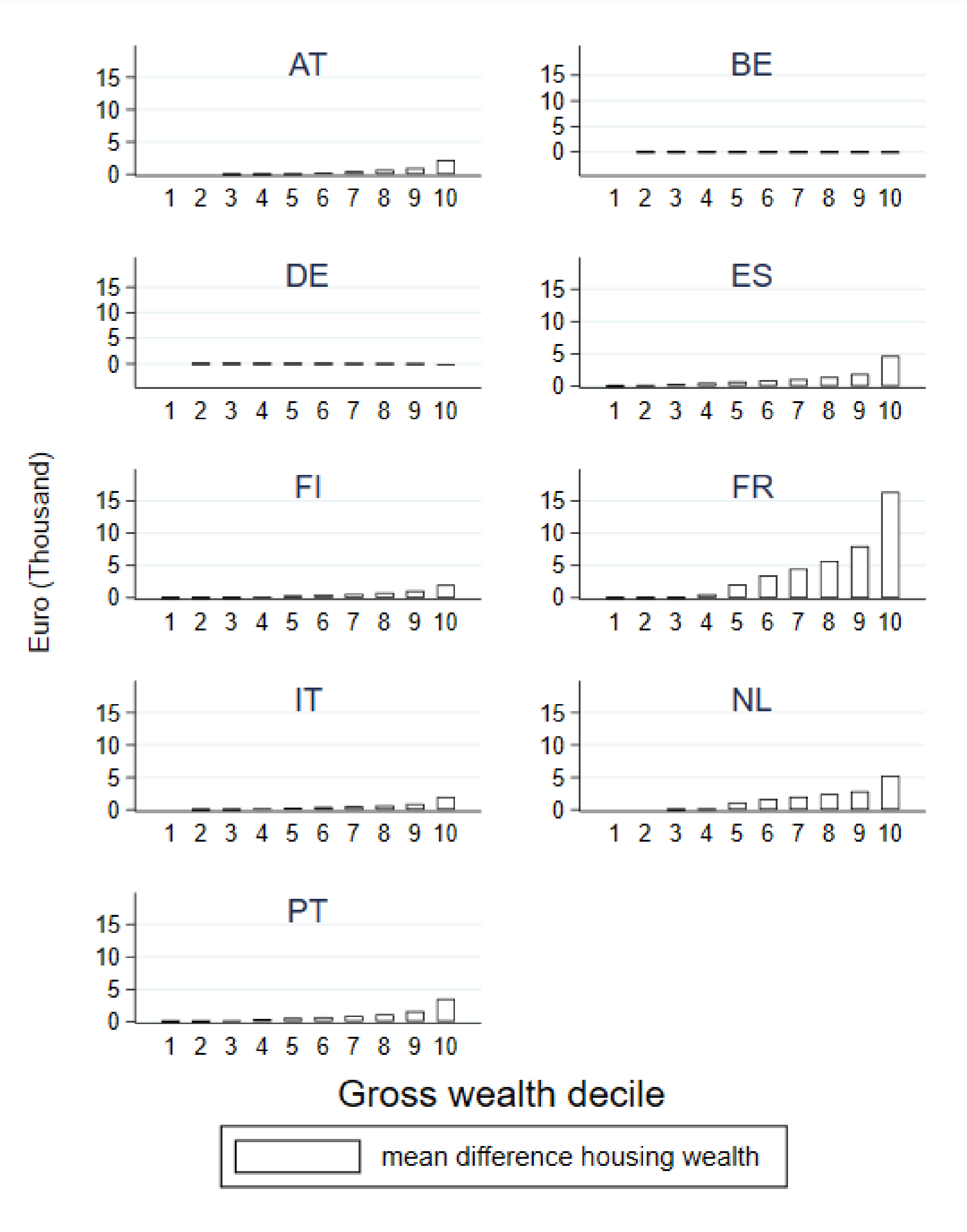
Figures 16 and 17 in Appendix B show the joint effect of movements in both asset classes on wealth. To illustrate the distributional effects in more detail, Table 2 shows various net wealth[15] inequality measures for the baseline distribution before the simulation, and changes

[13]Source: World Bank, Market capitalization of listed domestic companies in current U.S. dollars (Indicator code CM.MKT.LCAP.CD). Data are for 2017 except for Italy (2008).

[14]The HFCS data do not allow to distinguish between different types of bonds, such as government, bank or corporate bonds. While government bonds surely will not react in the same way as other bonds, the total bond wealth held by households is small compared to other risky financial assets, so the effect on our analysis will be minimal.

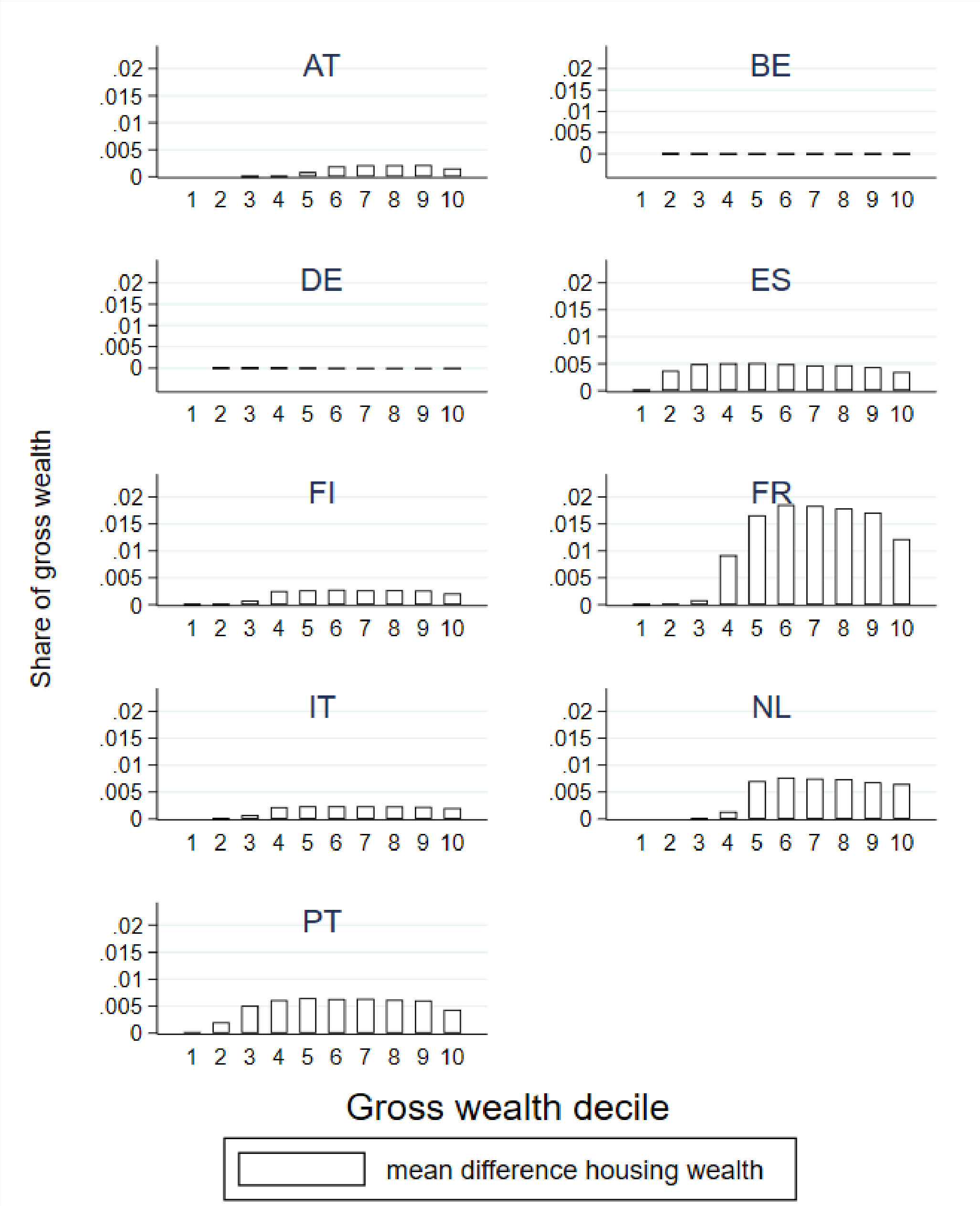
[15]While we use gross wealth deciles to depict the impact of QE on absolute and relative wealth changes across the gross wealth distribution (as the wealth changes can be observed more clearly and debt does not enter our analysis), we use net wealth to calculate the inequality measures to make the results comparable to the findings

Figure 7: Absolute changes in housing wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



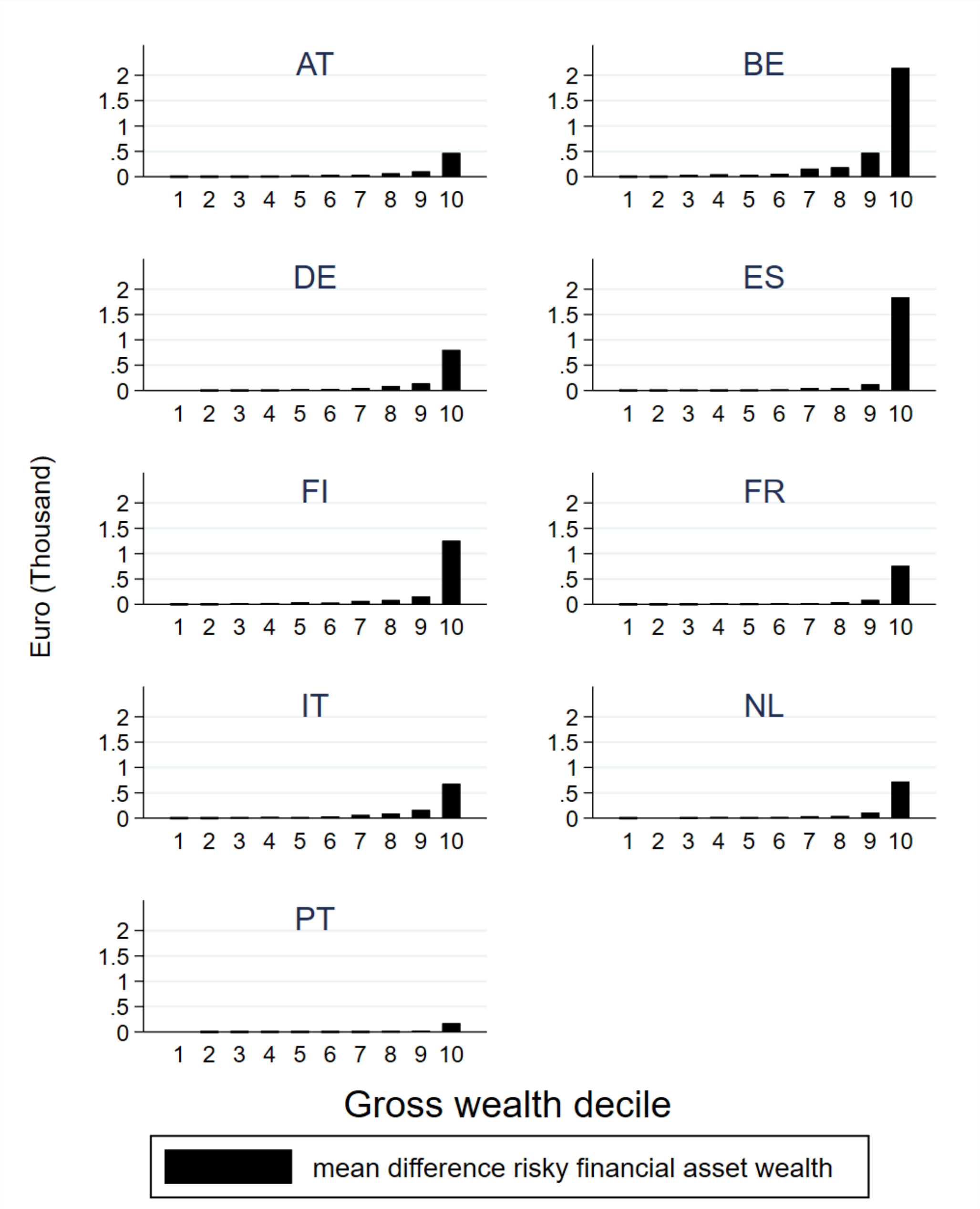
Notes: The figure displays the effect of the changes in housing prices from the analysis in section 3, per gross wealth decile in each country in the sample."Housing wealth" refers to households' main residences and other real estate property. Source: HFCS second wave, authors' calculations.

Figure 8: Relative changes in housing wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



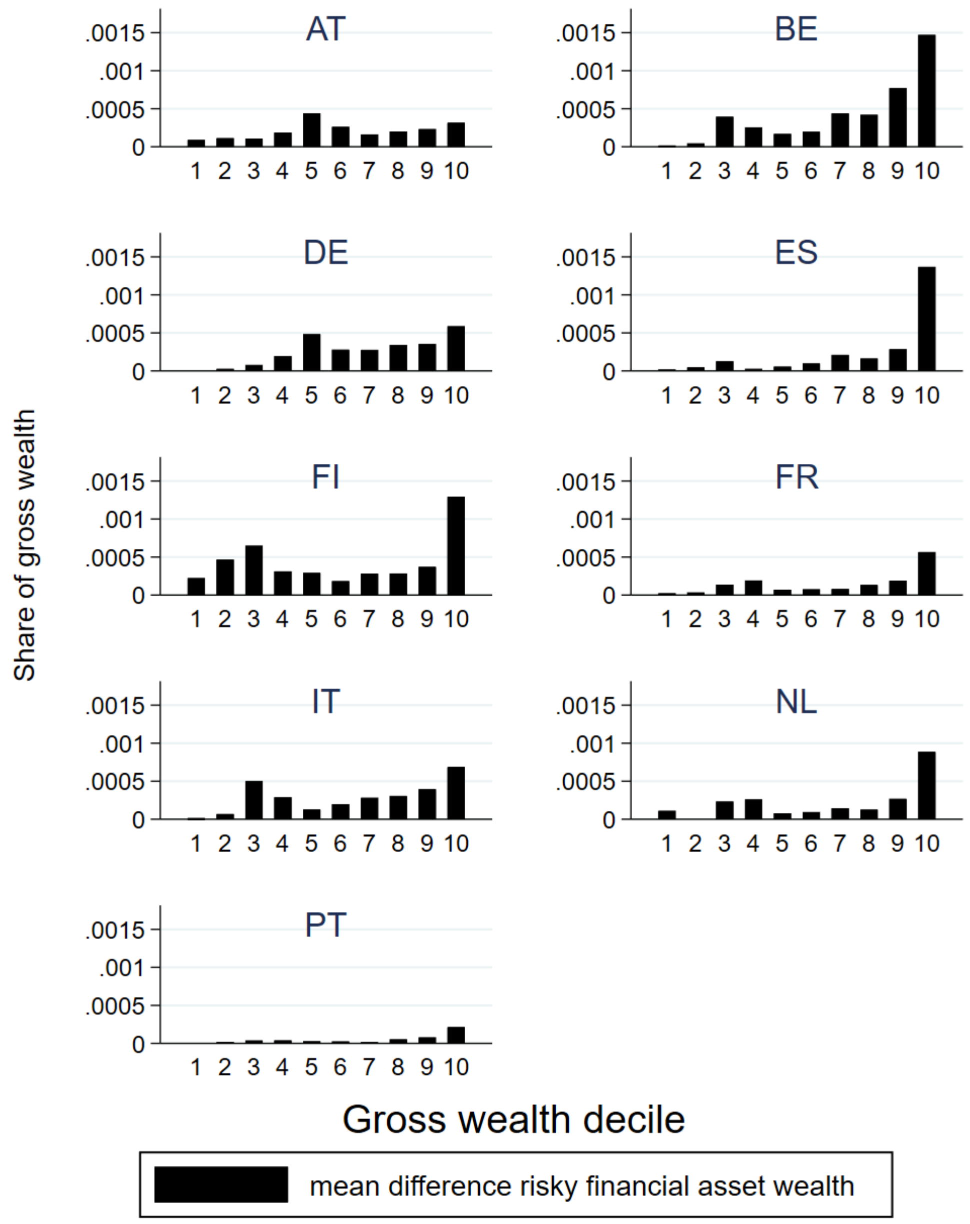
Notes: The figure displays the relative effect of the changes in housing prices from the analysis in section 3, per gross wealth decile in each country in the sample.“Housing wealth” refers to households’ main residences and other real estate property.Source: HFCS second wave, authors’ calculations.

Figure 9: Absolute changes in risky financial asset wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



Notes: The figure displays the effect of the changes in risky financial asset prices from the analysis in section 3, per gross wealth decile in each country in the sample. "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts. Source: HFCS second wave, authors' calculations.

Figure 10: Relative changes in risky financial asset wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



Notes: The figure displays the effect of the relative changes in risky financial asset prices from the analysis in section 3, per gross wealth decile in each country in the sample. "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts. Source: HFCS second wave, authors' calculations.

due to housing and risky financial asset price changes as well as the total effect. Some observations stand out: First, housing price increases decrease the Gini coefficient unambiguously.[16] By contrast, an increase in equity prices increases the Gini coefficient (with the exception of France). For the majority of countries in our sample, due to the fact that housing wealth is more prevalent, this translates to an overall decrease in the Gini coefficient.[17] Second, looking at other inequality measures that put more emphasis on the extremes of the distribution gives a more nuanced picture. Rising housing prices lead to an increase in the 50th to 10th percentile ratio, the 90th to 10th percentile ratio (with the exception of France and Portugal), and for most countries also to an increase in the 80th to 20th percentile ratio. The 90th to 50th percentile ratio and the share of the richest 5%/10% mostly decrease in line with the Gini. The total effect from both housing and financial asset price shock therefore points to an increase in inequality in the majority of countries in our sample for P90/10 and P50/10 ratios.

The comparison with other inequality measures shows that relying exclusively on the Gini coefficient risks to mask movements in wealth inequality. As noted by Atkinson (1970), the Gini coefficient is more sensitive to movements in the middle of the distribution. Hence, studies that find that asset price increases lead to a decrease in the Gini coefficient implicitly put a high weight on housing wealth, which is especially important for the middle of the distribution.

It is important to note that some of the distribution indicators do not adequately reflect the fact that households that own neither housing wealth nor risky financial assets are not affected by the balance sheet expansion due to the asset price channel of QE. 30% of households in our entire sample fall into this category. The country-specific values range from 14% in Spain to 44% in Germany. The participation rate in these two asset classes differs strongly among gross wealth deciles: In the first decile, 99% of households own neither housing wealth nor risky financial assets, and this percentage goes down to 59% (3rd decile), 175 (5th decile) and below 1% (9th and 10th decile).

Overall, the effects of quantitative easing on wealth inequality are rather muted. To put the effect sizes into context, consider for example Albers et al. (2022): For Germany, the Top 10% share for Germany has risen from 54% to 60% since 1993, that is an increase by about 11%. Our monetary policy shock increases the Top 10% share by 0.01%, so overall mechanisms other than QE seem to drive inequality considerably stronger. Similar dynamics can be observed for Italy and France (Acciari et al., 2021). Recent literature has also investigated the contribution of asset price dynamics on wealth inequality (Kuhn et al., 2020), and the overall effects are orders of magnitude larger than those in our estimation.

5 Heterogeneity in returns to risky financial assets

So far we have assumed that households benefit similarly from increases in risky financial asset prices across the wealth distribution. However, in a recent paper, Fagereng et al. (2020) show that individuals earn markedly different average returns on their net worth. The authors use a comprehensive database on Norwegian wealth using administrative tax records. We use these results to approximate how differently households across the wealth distribution can benefit from financial asset price increases.

Specifically, in the right panel of Figure 3 in Fagereng et al. (2020), the authors show the differences in returns on risky assets.[18] The return amounts to about 0.05 at the lower end of

of the prevailing literature on inequality.

[16]Recall that house prices for Belgium and Germany decrease slightly following an QE shock.

[17]In Italy, the two effects cancel each other out.

[18]Risky assets are defined in Fagereng et al. (2020) as: "(a) the market value of listed stocks held directly, (b)

Table 2: Effects on inequality measures

		Gini	P90/P10	P80/P20	P90/P50	P50/P10	Top 5%	Top 10%
AT	Baseline	0.73	521.09	56.93	6.03	86.42	0.44	0.56
	Housing wealth	−0.01 %	0.23%	−0.09 %	0.00%	0.23%	−0.12 %	−0.04 %
	Risky financial asset wealth	0.00%	0.00%	0.04%	0.00%	0.00%	−0.07 %	0.00%
	Total	−0.01 %	0.23%	−0.05 %	0.00%	0.23%	−0.12 %	−0.03 %
BE	Baseline	0.59	315.33	21.22	3.21	98.11	0.30	0.43
	Housing wealth	0.00%	−0.01 %	−0.01 %	0.00%	−0.01 %	0.00%	0.00%
	Risky financial asset wealth	0.03%	0.06%	0.07%	0.05%	0.01%	0.06%	0.08%
	Total	0.03%	0.06%	0.06%	0.05%	0.00%	0.07%	0.08%
DE	Baseline	0.76	*	111.36	7.71	*	0.46	0.60
	Housing wealth	0.00%	*	−0.02 %	−0.01 %	*	0.00%	0.00%
	Risky financial asset wealth	0.00%	*	0.01%	0.04%	*	0.07%	0.01%
	Total	0.01%	*	−0.01 %	0.03%	*	0.08%	0.01%
ES	Baseline	0.69	598.40	12.97	4.19	142.10	0.39%	0.52%
	Housing wealth	−0.11 %	0.40%	−1.44 %	−0.28 %	0.68%	−0.21 %	−0.13 %
	Risky financial asset wealth	0.03%	0.00%	−0.07 %	0.00%	0.00%	0.09%	0.08%
	Total	−0.08 %	0.42%	−1.50 %	−0.26 %	0.68%	−0.12 %	−0.07 %
FI	Baseline	0.65	9912.94	83.20	4.19	2175.86	0.32	0.46
	Housing wealth	−0.06 %	0.23%	0.26%	−0.19 %	0.42%	−0.10 %	−0.07 %
	Risky financial asset wealth	0.02%	0.12%	0.06%	0.08%	0.04%	0.12%	0.00%
	Total	−0.04 %	0.35%	0.31%	−0.10 %	0.45%	0.02%	−0.02 %
FR	Baseline	0.68	182.39	32.88	4.77	38.28	0.37	0.51
	Housing wealth	−0.26 %	−0.02 %	−0.18 %	−1.42 %	1.42%	−0.35 %	−0.26 %
	Risky financial asset wealth	−0.03 %	−1.52 %	−1.54 %	−0.71 %	−0.82 %	0.21%	0.13%
	Total	−0.25 %	−0.02 %	−0.18 %	−1.42 %	1.42%	−0.40 %	−0.26 %
IT	Baseline	0.60	202.76	30.54	3.45	58.80	0.30	0.43
	Housing wealth	−0.01 %	0.23%	0.21%	−0.01 %	0.24%	−0.03 %	0.08%
	Risky financial asset wealth	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.02%
	Total	0.00%	0.28%	0.21%	0.03%	0.25%	0.00%	0.00%
NL	Baseline	0.70	−47.54	69.23	4.66	−10.21	0.29	0.44
	Housing wealth	−0.42 %	6.15%	−3.95 %	−0.06 %	6.22%	−0.06 %	−0.60 %
	Risky financial asset wealth	0.01%	0.17%	0.05%	0.17%	0.00%	0.08%	−0.30 %
	Total	−0.41 %	6.29%	−3.98 %	0.07%	6.22%	0.02%	−0.67 %
PT	Baseline	0.69	701.90	23.68	4.23	166.14	0.41	0.53
	Housing wealth	−0.16 %	−3.85 %	−0.38 %	−0.34 %	−3.53 %	−0.29 %	−0.26 %
	Risky financial asset wealth	0.00%	0.04%	−0.05 %	0.04%	0.00%	0.01%	0.00%
	Total	−0.16 %	−3.85 %	−0.38 %	−0.33 %	−3.53 %	−0.28 %	−0.25 %

Notes: This table describes the effect of changes in housing and risky financial asset prices estimated above on the following inequality measures: P90/P10 (the ratio of the 90th to the 10th net wealth percentile), P80/P20, P90/P50, P50/P10, Top 5% (share of the top 5% of households in the entire net wealth distribution), Top10%, Gini coefficient. The changes are percentage changes relative to the baseline distribution before the shocks occurred. Source: HFCS second wave, authors' calculations.
* P10 for Germany is estimated to be 0, so no estimates for P90/P10 and P50/P10 can be calculated.

the financial wealth distribution, and to about 0.056 at the top of the distribution (about 12% higher). Fagereng et al. (2020) also note that returns are heterogeneous even within narrow asset classes. This allows us to interpret differences in returns as differences in the ability of reaping the returns arising from rising asset prices. Hence, we translate the differences in returns as differences in responses after a QE shock on risky financial assets.[19] Fagereng et al. (2020) discuss three possible reasons for differences in returns: difference in risk tolerance that shape portfolio compositions; a positive scale effect of wealth levels on returns; and financial sophistication. Our simple procedure allows all these interpretations to be valid, which translates in our partial equilibrium simulation as higher risky financial asset price increases for wealthier households. Specifically, we now let the price response to QE vary along deciles of the financial wealth distribution. Figure 18 in the appendix shows the heterogeneous price response in comparison to the baseline homogeneous response. Figure 11 shows how the effect of the heterogeneous price response in mean asset wealth gains (grey bars). Compared to the baseline simulation (black bars), the top of the wealth distribution gains slightly more, but the difference is small. The corresponding graph for relative changes can be found in the appendix (Figure 19).

Table 3 shows the corresponding changes in inequality measures. Since wealthier households now benefit more from financial asset price increases, inequality indicators mostly increase further. The difference to the homogeneous wealth response (Table 2) is relatively small.

Finally, we relax another assumption about financial assets we have used so far: that households hold a (market-capitalization weighted) average of equities of the sample country. We now assume the opposite, that households hold risky financial assets only from their own countries (due to home bias). Hence, our simulation exercise now takes this form:

$$W_{j,i}^{sim} = W_{j,i}^{housing} \cdot (1 + \Psi_j^{housing}) + W_{j,i}^{fin} \cdot (1 + \Psi_j^{fin}) + W_{j,i}^{other} \tag{3}$$

The difference to equation 2 is the subscript j in Ψ_j^{fin}, referring to country-specific elasticities regarding risky financial assets. These elasticities can be read directly from Table 1. The corresponding changes in risky financial asset wealth are the dashed bars in Figure 11. The differences for the baseline response are mostly small, with more pronounced discrepancy for Belgium, Spain and Italy.

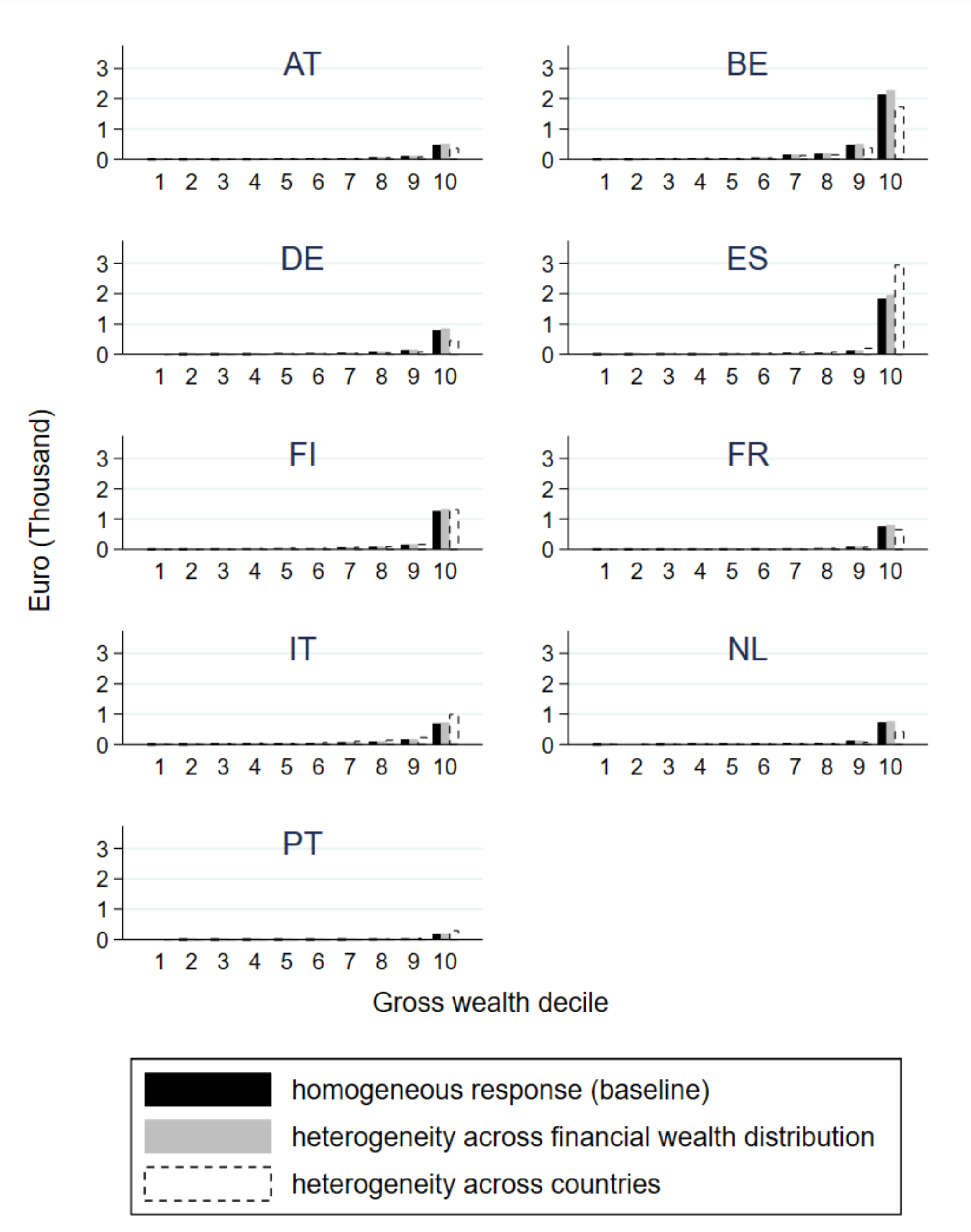
6 Conclusions

In this paper, we have analyzed the effects of quantitative easing (QE) via asset price changes on the distribution of household wealth for nine euro area countries. Our main results are as follows. First, one-third of households, most of which are in the lower third of the wealth distribution, are not affected at all by the balance sheet expansion because these households do not own housing wealth or risky financial assets. Second, housing wealth gains decrease the Gini coefficient, whereas risky financial asset wealth gains increase the Gini coefficient. In most countries, the decreasing effect of housing assets on the Gini coefficient more than offsets the increasing effect of risky financial assets, resulting in a small decrease in the Gini. Third, other inequality measures that are more sensitive to movements in the tails of the distribution compared to the Gini coefficient mostly indicate increasing wealth inequality. Overall, financial asset price increases almost exclusively benefit households in higher deciles.

the market value of listed stocks held indirectly through mutual funds, and (c) the value of other (non deposit) financial assets held abroad."

[19]Figure 18 in the appendix compares the original figure and the translation to our dataset.

Figure 11: Absolute changes in risky financial asset wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



Notes: The figure displays the effect of the changes in risky financial asset prices from the analysis in section 3, per gross wealth decile in each country in the sample. The black bars depict the baseline homogeneous price response, the grey bars the heterogeneous response across the financial wealth distribution, the dottet bars the heterogeneous response across countries. "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts. Source: HFCS second wave, authors' calculations.

That said, it should be noted that our analysis provides a partial assessment of QE on household wealth, as the impact on other financial wealth components, such as deposits, is not considered. Moreover, in this study we focus on the asset price channel of QE only. To assess the overall distributional effects of QE, it is necessary to analyze the interaction of this channel with other relevant distributional channels, such as the income heterogeneity channel that works via employment effects (see e.g., Lenza and Slacalek, 2018). As to the potential equalizing effect of housing price increases on the wealth distribution, it should be noted that this effect is only present when Gini coefficients are considered as a measure of inequality. Other inequality indicators suggest that overall inequality rises, notwithstanding the equalizing effect of house price increases.

This finding supports the notion that looking at the Gini coefficient alone poses the risk of hiding rich dynamics which are not captured by this inequality measure. It should also be noted that housing wealth, especially with regard to the main residence, is less liquid than financial assets. For this reason, it may be more difficult to directly benefit from price increases in the housing sector. Policymakers and researchers should also note that periphery countries do not benefit from risky financial asset price increases very much given low initial levels of such assets.

Future research in the field of QE and its distributional effects is much needed and might consider the following issues: (i) a more granular research focusing on heterogeneous housing market reactions to QE, jointly with mortgage finance markets, which could be very fruitful in explaining diverging patterns across euro area countries; (ii) a more detailed analysis of the link between property prices and rents, as the effects of rising housing rents could be economically significant, especially for low-income renter households that suffer from rising rents following a QE-induced increase in housing prices.

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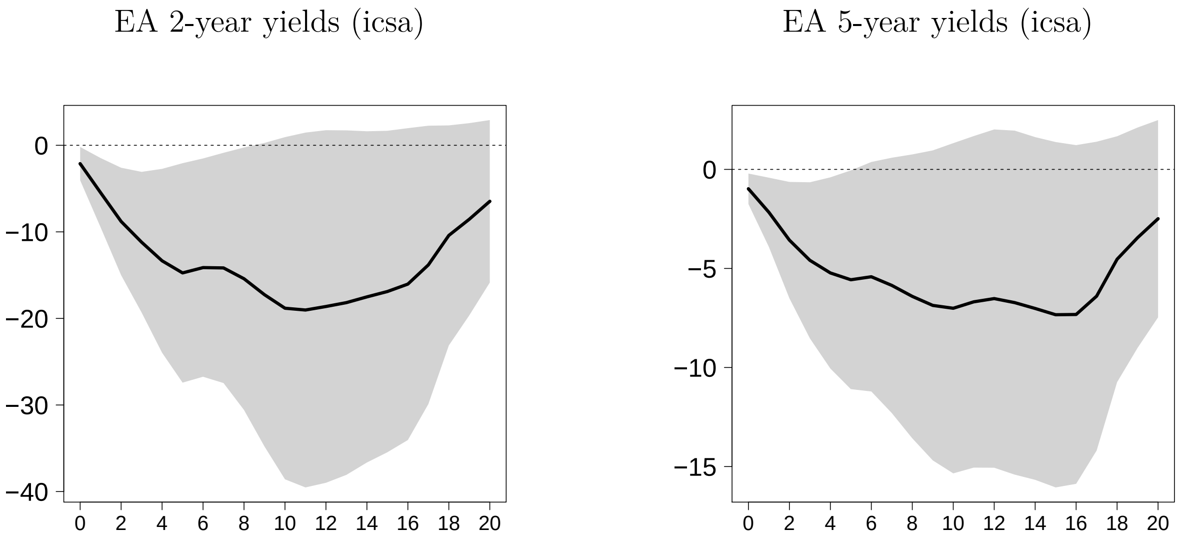
A Appendix

To assess the robustness of our results, we further control for macroeconomic news from abroad by including data on the US initial unemployment claims (ijc_t) in $Z_t = (ti_t, tg_t, ijc_t)^{'}$.[20] US initial unemployment claims could potentially confound the quantitative easing measure since the US data release calendar often overlaps with the ECB event windows (Altavilla et al., 2019). The results are provided in Figure 12 and show no difference to our benchmark results provided in the main text.

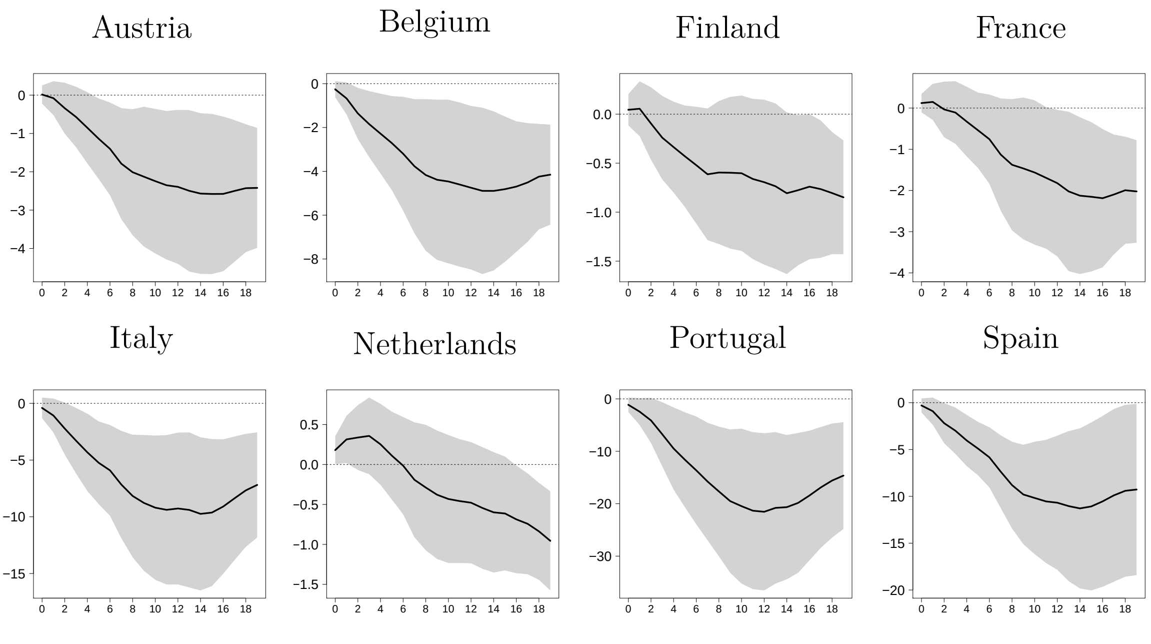
[20] An initial claim is a claim filed by an unemployed individual after a separation from an employer. Source: US Employment and Training Administration, Initial Claims (ICSA), retrieved from FRED, Federal Reserve Bank of St. Louis; `https://fred.stlouisfed.org/series/ICSA`.

Figure 12: Effect of QE on EA government bond yields (in bp)



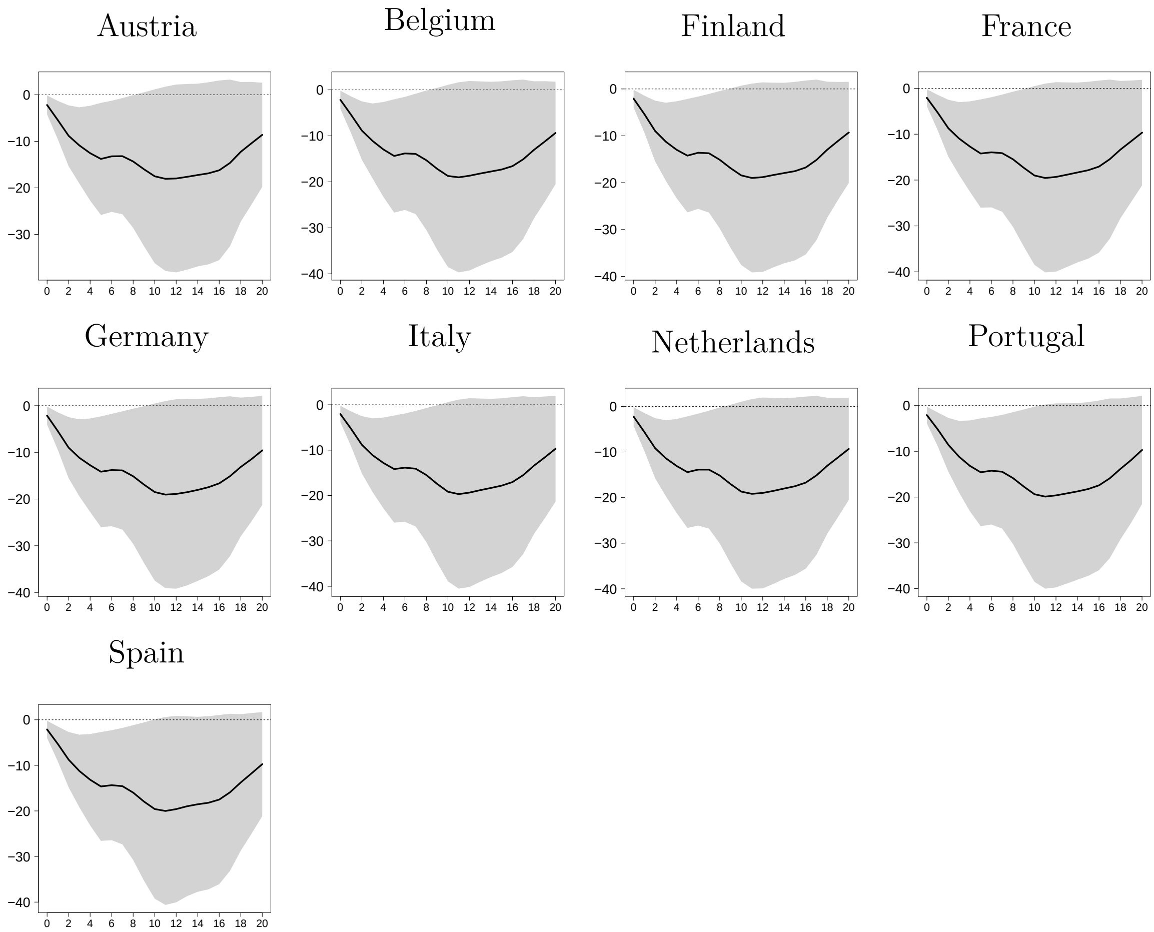
Notes: The figure shows impulse responses of 2-year and 5-year euro area government bond yields to an expansionary QE shock controlling for US initial job claims (icsa). The responses are measured in basis points. Bounds respond to 90% confidence intervals.

Figure 13: Responses of government bond yields over German yields



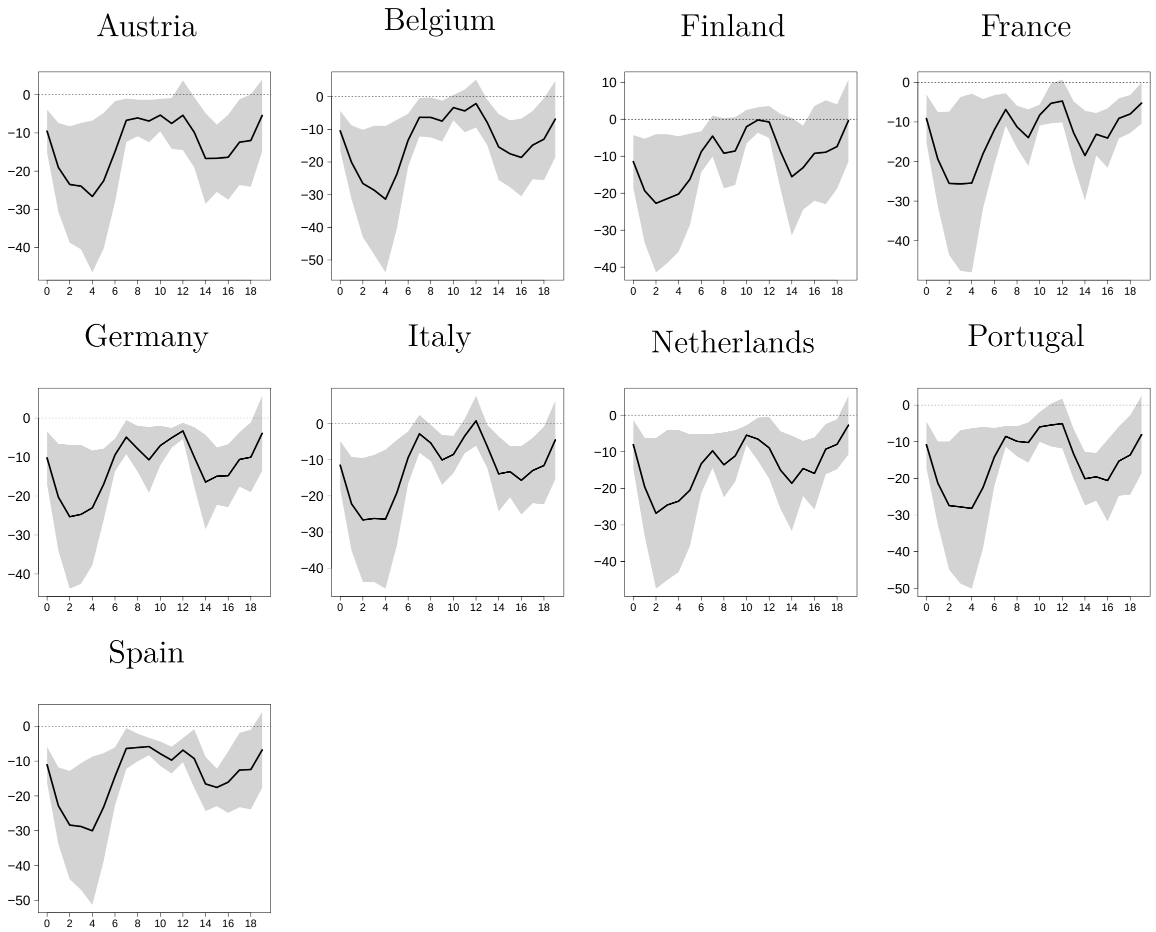
Notes:The figure shows impulse responses of the difference between 10-year government bond yields and German 10-year government bond yields (in bp). Bounds respond to 90% confidence intervals.

Figure 14: Responses of EA 2y-government bond yields controlling for local equity prices



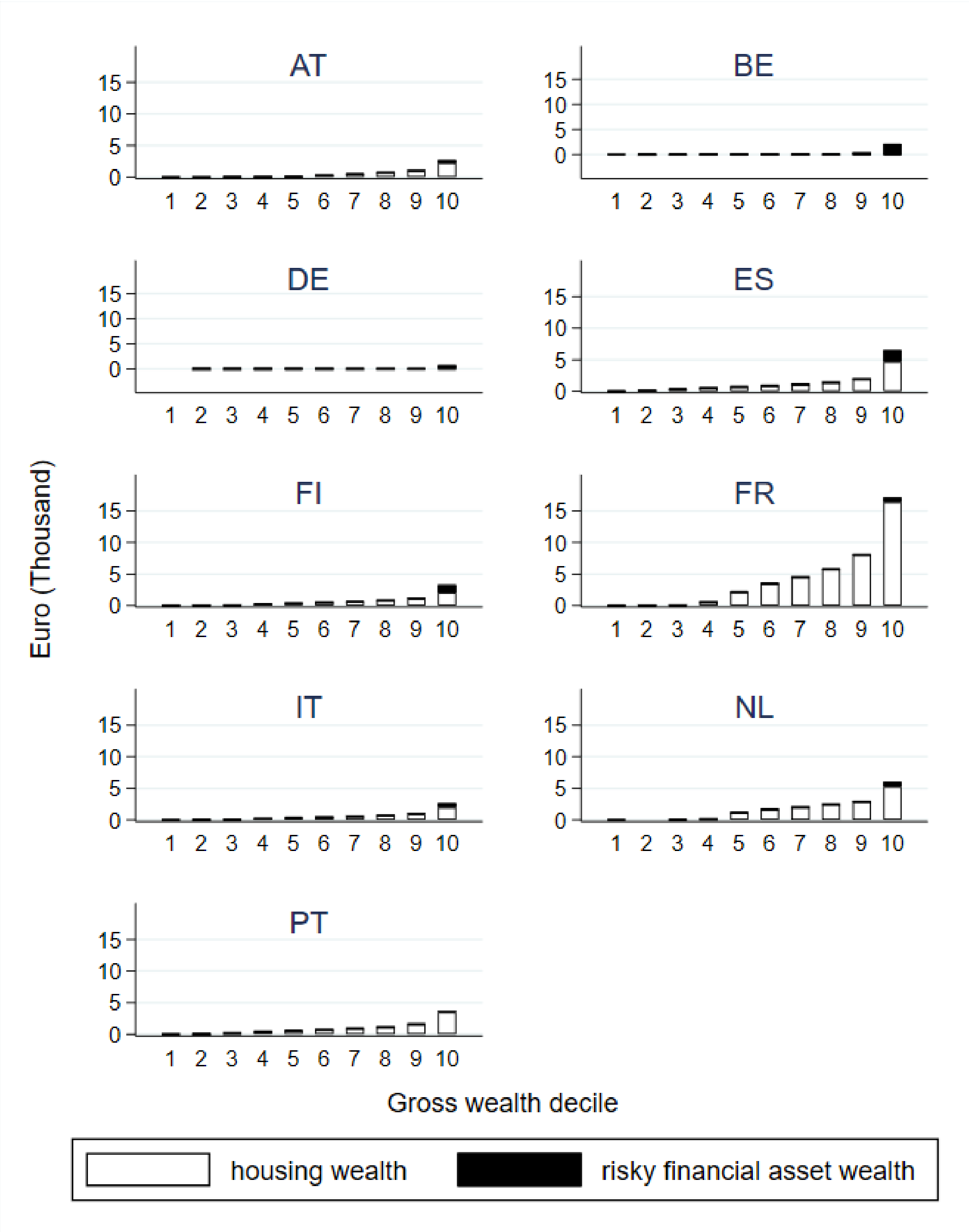
Notes:The figure shows impulse responses responses of 2-year euro area government bond yields (in basis points) to an expansionary QE shock controlling for local equity price growth. Data are on monthly basis and bounds respond to 90% confidence intervals.

Figure 15: Responses of EA 2y-government bond yields controlling for local house prices



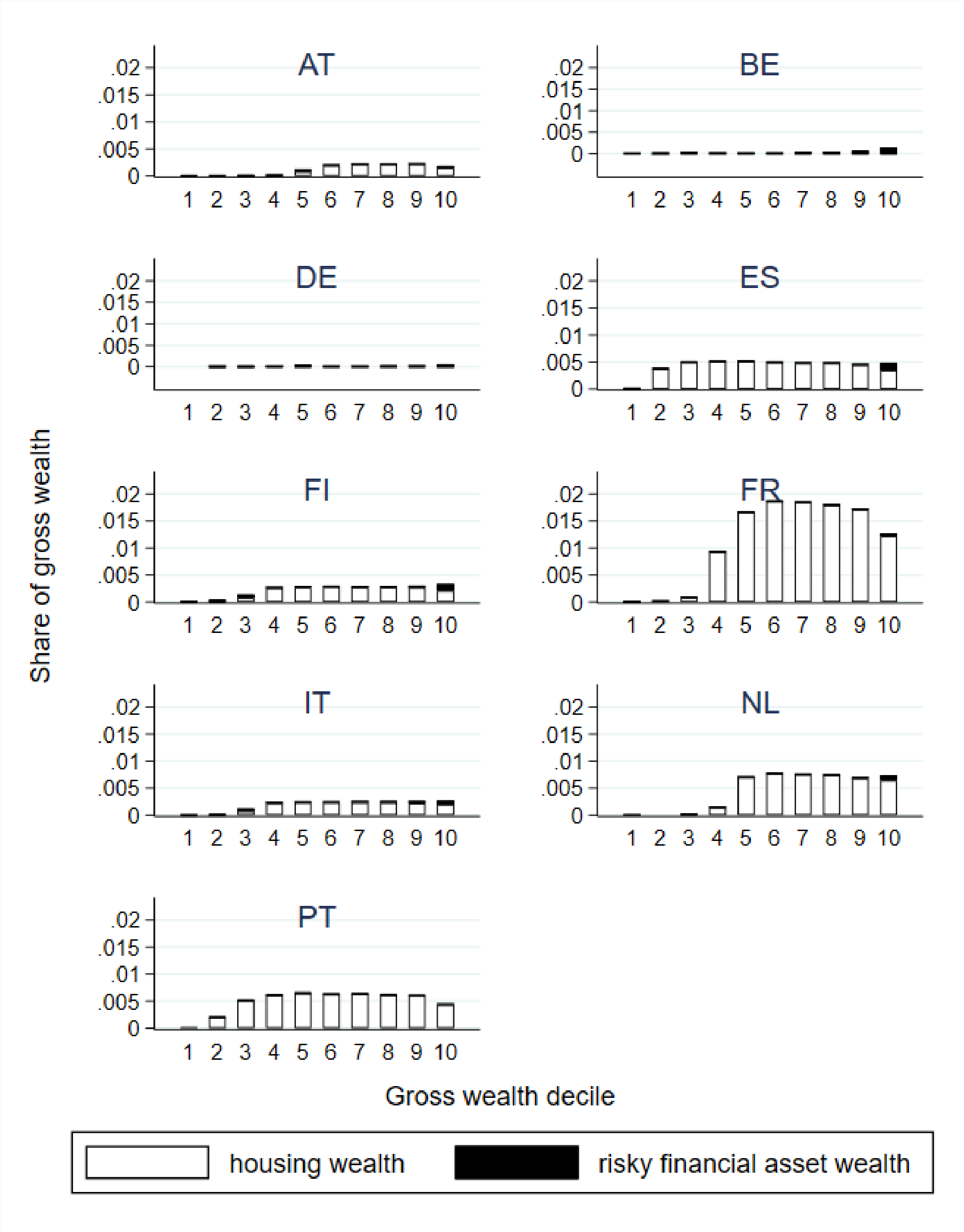
Notes:The figure shows impulse responses responses of 2-year euro area government bond yields (in basis points) to an expansionary QE shock controling for local house price growth. Data are on quarterly basis and bounds respond to 90% confidence intervals.

Figure 16: Changes in housing and risky asset wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



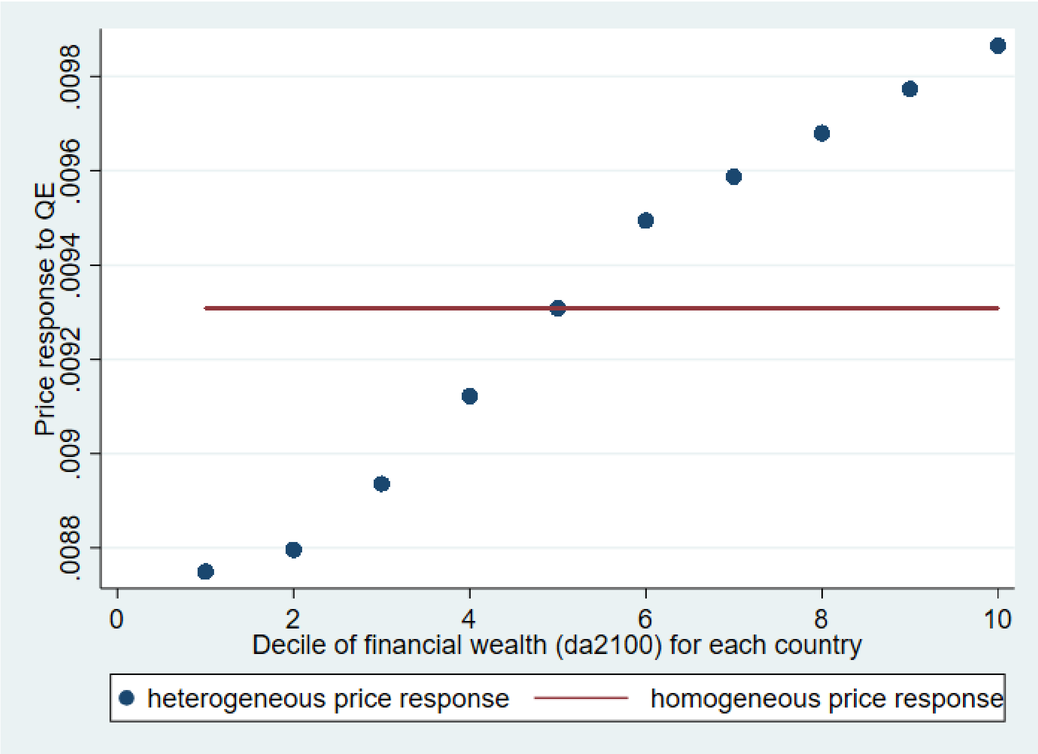
Notes: The figure displays the effect of changes in housing and risky financial asset prices from the analysis in section 3, per gross wealth decile in each country in the sample. "Housing wealth" refers to households' main residences and other real estate property. "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts. Source: HFCS second wave, authors' calculations.

Figure 17: Relative changes in housing and risky asset wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile



Notes: The figure displays the effect of the relative changes in housing and risky financial asset prices from the analysis in section 3, per gross wealth decile in each country in the sample. "Housing wealth" refers to households' main residences and other real estate property. "Risky financial assets" refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts. Source: HFCS second wave, authors' calculations.

Figure 18: Heterogeneous risky financial asset price responses



Notes: The figure shows our attempt at mimicking the correlation in the right panel of Figure 3 in Fagereng et al. (2020): the scatterpoints depict the correlation of financial wealth and the price response to QE. The line shows, for comparison, the homogeneous response as in our baseline specification.

Table 3: Effects on inequality measures - heterogeneous financial asset price effect

		Gini	P90/P10	P80/P20	P90/P50	P50/P10	Top 5%	Top 10%
AT	Risky financial asset wealth	0.00%	0.00%	0.04%	0.00%	0.00%	−0.07 %	0.00%
	Total	−0.01 %	0.22%	−0.05 %	−0.01 %	0.22%	−0.12 %	−0.02 %
BE	Risky financial asset wealth	0.04%	0.07%	0.07%	0.06%	0.01%	0.07%	0.09%
	Total	0.04%	0.06%	0.07%	0.06%	0.00%	0.07%	0.09%
DE	Risky financial asset wealth	0.00%	*	0.01%	0.05%	*	0.07%	0.01%
	Total	0.01%	*	−0.01 %	0.03%	*	0.08%	0.01%
ES	Risky financial asset wealth	0.03%	0.00%	−0.07 %	0.00%	0.00%	0.10%	0.02%
	Total	−0.08 %	0.42%	−1.50 %	−0.26 %	0.68%	−0.11 %	−0.07 %
FI	Risky financial asset wealth	0.02%	0.14%	0.06%	0.10%	0.05%	0.12%	0.00%
	Total	−0.03 %	0.35%	0.31%	−0.10 %	0.45%	0.03%	−0.02 %
FR	Risky financial asset wealth	−0.03 %	−1.52 %	−1.54 %	−0.70 %	−0.82 %	0.21%	0.14%
	Total	−0.25 %	−0.02 %	−0.18 %	−1.42 %	1.42%	−0.40 %	−0.26 %
IT	Risky financial asset wealth	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.02%
	Total	0.00%	0.30%	0.23%	0.03%	0.27%	0.00%	0.00%
NL	Risky financial asset wealth	0.01%	0.18%	0.06%	0.18%	0.00%	0.09%	−0.30 %
	Total	−0.41 %	6.30%	−3.97 %	0.08%	6.22%	0.02%	−0.66 %
PT	Risky financial asset wealth	0.00%	0.04%	−0.05 %	0.04%	0.00%	0.01%	0.00%
	Total	−0.16 %	−3.86 %	−0.38 %	−0.32 %	−3.54 %	−0.28 %	−0.25 %

Notes: This table describes the effect of changes in risky financial asset prices as in Subsection 5 following inequality measures: P90/P10 (the ratio of the 90th to the 10th net wealth percentile), P80/P20, P90/P50, P50/P10, Top 5% (share of the top 5% of households in the entire net wealth distribution), Top10%, Gini coefficient. The changes are percentage changes relative to the baseline distribution before the shocks occurred. Source: HFCS second wave, authors' calculations.
* P10 for Germany is estimated to be 0, so no estimates for P90/P10 and P50/P10 can be calculated.

Figure 19: Relative changes in risky financial asset wealth following an expansionary QE shock by gross wealth deciles, mean effect per decile

Notes: The figure displays the effect of the relative changes in risky financial asset prices from the analysis in section 3, per gross wealth decile in each country in the sample. The black bars depict the baseline homogeneous price response, the grey bars the heterogeneous response across the financial wealth distribution, the dotted bars heterogeneous response across countries. “Risky financial assets” refer to mutual funds, bonds, business (non-self-employment), shares, managed accounts. Source: HFCS second wave, authors’ calculations.