Unconventional monetary policy and households' financial portfolio choices*

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Job Market Paper
December 3, 2018
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Abstract

I use survey data on Italian households' financial portfolios to examine how the unconventional monetary policies (UMPs) implemented by the European Central Bank (ECB) affect households' asset allocation choices. I first disentangle any household change in financial wealth into its active saving component (rebalancing) and its passive saving component (capital gains) using financial indexes. Then, I estimate the impact of unconventional measures on portfolio rebalancing decisions focusing on two asset categories, Italian government bonds and risky assets (equity, corporate bonds and mutual funds). The empirical analysis finds that ECB's actions exerted a substantial effect on the size and composition of households' financial portfolios, inducing a pro-cyclical, positive investment into both government bonds and risky assets, although only for households at the top of the income distribution. Thus, the results illustrate how, consistent with the confidence channel of unconventional monetary policy, ECB's unconventional tools since 2007 have contributed to restoring households' confidence in the financial system, reviving the appetite for some of the financial segments mostly hit by the crisis.

JEL-Classification: D12, E21, E58.

Keywords: Unconventional Monetary Policy, European Central Bank, Households' Portfolio Choices, Household Finance.

*I thank Stefania Albanesi, Kit Baum, Michael Berlemann, Kerstin Bernoth, Franziska Bremus, Andrea Delitala, Marcel Fratzscher, Mathias Klein, Angela Maddaloni, Maria Luisa Magli, Dieter Nautz, Hedwig Plamper, Valentina Raponi, Barbara Rossi, Dorothea Schäfer, Ulrich Schneider, Paolo Sodini, as well as participants in the DIW PhD internal seminar, Berlin; DIW Macro internal seminar, Berlin; FU Seminar Empirical Macroeconomics, Berlin; RES Symposium 2018, Brighton; Workshop in Econometrics, Tornow; SSES 2018, St Gallen; IAAE 2018, Montreal; EEA 2018, Cologne for very useful comments and suggestions. All remaining mistakes are mine.

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1 Introduction

The unconventional monetary policies (UMPs) introduced by the European Central Bank (ECB) with the aim of restoring confidence in the European financial system have spurred an intense public and academic debate about their financial and real implications on different economic agents. In particular, the discussion on whether ultra-loose monetary policy impacts income and wealth inequality has caught the attention of the public and policy-makers in the Eurozone (Draghi, 2015; Panetta, 2015; Draghi, 2016; Constâncio, 2017). Among other concerns, commentators point out that expansionary measures that positively affect the price of financial assets would only benefit the owners of financial wealth, thus increasing the gap between households that invest in financial markets and those who do not. In order to analyze the issue in depth, Adam and Tzamourani (2016), Casiraghi et al. (2018), Ampudia et al. (2018), and Lenza and Slacalek (2018) perform simulation exercises where they focus on the UMP's effects on financial wealth through capital gains. These papers, though, assume that households are only passively affected by monetary policy through its impact on asset prices but that this effect does not translate into an active choice of portfolio rebalancing. However, this view is hard to reconcile with the fact that unconventional tools are also expected to work by affecting investors' portfolio allocation choices (e.g., through the *portfolio rebalancing channel* or the *signalling channel* of monetary policy) and investors' risk appetite (e.g., through the *confidence channel*), both domestically (Krishnamurthy and Vissing-Jorgensen 2011; Krishnamurthy et al. 2017) and internationally (Fratzscher et al., 2018).

This paper analyzes how unconventional tools affect households' portfolio choices, addressing a specific case: the impact of ECB's unconventional policies on Italian households' financial choices between 2006 and 2016. The contribution of this work is threefold. First, this is the first paper to focus on, and emphasize, the role that unconventional monetary policy plays in households' portfolio rebalancing decisions. Second, I use survey data on Italian households' portfolio composition and augment it with extra financial data to construct a novel dataset that, for each household and financial asset class, disentangles any change in financial wealth into its capital gain and active rebalancing components. Third, this work brings new evidence to the limited literature that evaluates UMPs effect on Italy, one of the so-called peripheral countries heavily affected by the crisis and, thus, most suitable for evaluating the effectiveness of ECB's actions.

Understanding how unconventional tools shape households' financial choices is important from several points of view. First, households hold an important stock of financial wealth and their investment decisions may have a significant impact on asset prices (Kogan et al., 2006; Kumar and Lee, 2006) and even on the macroeconomy (Korniotis and Kumar, 2010). To give an example, between 2007 and 2014, Italian households invested on average EUR 3,7 trillion in financial assets, of which EUR 205 billion in Italian government securities, financing roughly 10% of the government debt.[1] Thus, their rebalancing decisions can have important consequences at both the financial and real economy levels. Second, it provides new insights into the effectiveness and the transmission channels of unconventional measures in a country that was at the core of the sovereign crisis. Third, this paper contributes to the debate on inequality by pointing toward an under-explored additional channel through which UMPs might affect wealth inequality: the one stemming from investors' heterogeneous reaction to monetary stimulus. An extended literature documents that richer and better educated households (the so-called sophisticated investors) rebalance their portfolio more frequently (Vissing-Jorgensen, 2002; Campbell, 2006; Calvet et al., 2009b; Bilias et al., 2010) and make smaller investment mistakes (Calvet et al., 2007, 2009b). Thus, only a small group of households might decide to shape their investment decisions so to take better advantage of the new unconventional environment. This could have serious consequences on the wealth distribution, as it might exacerbate inequality.

I use the micro data contained in the Bank of Italy Survey on Household Income and Wealth (SHIW) for the 2006-2016 period. This dataset gathers data every other year on wealth and other aspects of households' economic and financial behavior. Each wave includes roughly 8,000 households. This data allows constructing financial portfolios, but it does not include any additional information that can be used to distinguish whether a change in financial wealth is due to valuation effects (passive saving component/capital gains) or to an active reallocation (active saving component/active rebalancing). This distinction is crucial for this paper, as the aim of this study is to capture how UMPs shape households' financial decisions, i.e. how much households actively and voluntarily decide to rebalance their portfolio. Following Guiso et al. (2002b), Berben et al. (2006), and Juster et al. (2006), I approximate the return on several asset classes included in the survey with financial indexes. This allows me to isolate the active saving component of the ten most important Italian asset classes (four types of government bonds, equity, corporate bonds, liquidity funds, flexible funds, bond funds, and equity funds). Furthermore, the richness of the financial wealth information included in the SHIW and the possibility to isolate the pure rebalancing component supports the choice of focusing on the Italian case.

One of the challenges of this paper is the identification of the causal relationship between UMPs and households' portfolio rebalancing due to the low frequency of the household data and concerns over simultaneity and omitted variable bias. Therefore, I employ a two step approach. First, I follow Altavilla et al. (2014), and Fratzscher et al. (2018) by using an event-study approach to estimate the impact of monetary policy shocks. UMP shocks are proxied by announcements and measured through their valuation impact on the return of the financial indexes used to

[1] Bank of Italy, Supplement to the Statistical Bulletin, Household wealth in Italy in 2014. https://www.bancaditalia.it/pubblicazioni/ricchezza-famiglie-italiane/2015-ricchezza-famiglie/en_suppl_69_15.pdf?language_id=1.

construct the dataset. This gives a clear picture of the effects that UMPs have on the asset classes I include in the analysis. The choice of a high-frequency, financial market-driven procedure ensures that any change in the indexes around the time of any unconventional monetary policy announcement can be only attributed to the unexpected component of monetary policy revealed by the announcement itself, while the magnitude of the shock is extracted directly from the financial indexes' response. Then, I exploit households' cross sectional heterogeneity in their exposure to unconventional monetary policy due to their heterogeneous stock of financial investment to sharpen the identification. The intuition is that the more financial wealth households hold, the more they are affected by monetary policy changes due to the valuation effect. Comparing the behavior of households expected to be more affected with those less affected should shed light on the effects of UMPs. This two step procedure allows for a straightforward interpretation of the identification: it isolates the portion of capital gains due to exogenous UMP-valuation effects. Thus, the empirical analysis estimates how much of this exogenous change in financial wealth is passed through to portfolio rebalancing.

My main result is that unconventional tools directly affect households' portfolio composition. In line with the literature finding that portfolio rebalancing is positively correlated with income and wealth, this is true only for households in the top 25% of the income distribution. An accommodative ECB announcement that increases return of financial indexes by 1% induces, on average, a positive investment of EUR 5000, of which one third in government bonds and two thirds in risky assets. These findings speak in favor of ECB's ability to restore household confidence in the financial system and are consistent with the confidence channel of unconventional monetary policy. Further evidence supporting this channel comes from limiting the estimation sample to the end of 2014. Excluding the last rounds of unconventional measures - initiated to sustain economic growth and inflation rather than to relieve sovereign stress and fight the redenomination risk - quantitatively increases households' response to unconventional shocks. Moreover, the empirical finding that only top income earners rebalance after a UMP shock can be interpreted as a first evidence that unconventional monetary policy could amplify the (financial) wealth inequality between sophisticated and non-sophisticated investors. This idea is corroborated by the results of a simulation exercise (Section 6) finding that, when considering both UMP-induced valuation and rebalancing effects, rich households' portfolio return, cumulated over the 2006-2016 period is ten times higher than that of low/middle income investors. The simulation also finds that this difference is only attributable to portfolio rebalancing. This paper does not consider the total financial portfolio but only some of the asset classes households invest in. Thus, it is not possible to draw direct conclusions about financial wealth inequality. Nevertheless, my findings point toward the heterogeneity of portfolio rebalancing as important channel through which unconventional monetary policy can affect wealth inequality.

This paper relates to different strands of literature. Few works evaluate the impact and transmission channels of ECB programs on the Italian financial markets and macroeconomic variables (see, among others, Altavilla et al., 2014; Fratzscher et al., 2014; Falagiarda and Reitz, 2015; Casiraghi et al., 2016; Krishnamurthy et al., 2017). They all find that ECB policies are positively associated with an increase in financial prices, real activity, and credit. Most closely related to this paper is the study by Casiraghi et al. (2016), who assess the impact of the main unconventional measures on the Italian economy. In line with this paper, they first use a high-frequency event study approach to estimate the UMP's direct effects on financial markets and then estimate the impact of UMPs on the main Italian macroeconomic variables using a much lower frequency model. They find that UMPs have, to varying degrees, served to counteract the increase in government bond yields and had a large positive effect at the macro level. My findings are in line with theirs and, in addition, I show that the ECB was not only effective in sustaining Italian financial segments, but also in restoring confidence to private investors.

There is a flourishing literature showing that households' risk aversion is time-varying and that macro/financial events affect portfolio decisions through their impact on households' wealth. This literature is nicely connected to this work not only because several papers find that unconventional tools negatively affect agents' risk aversion (Fratzscher et al., 2014; Falagiarda and Reitz, 2015), but also because I identify UMP shocks as an exogenous change in wealth induced by monetary policy on portfolio rebalancing. There are no studies linking unconventional (or conventional) monetary policy shocks to households' portfolio rebalancing, but a few papers consider the relationship between financial fluctuations and portfolio rebalancing in the context of the 2007-2009 financial crisis. Bucher-Koenen and Ziegelmeyer (2013) show that crisis episodes might have a negative impact on households' participation in financial markets both in the short- and long-run. This is especially true for households with lower levels of financial literacy. Interestingly, the authors point out that for financially illiterate households, this behavior might have serious consequences regarding wealth distribution, as they would fail to benefit from market resurgence in the short-run and from equity premium in the long-run. Guiso et al. (2018) also find that, after the 2008 drop in stock prices, Italian investors rebalanced their portfolio in a way consistent to a fear model (i.e. selling stocks). On the contrary, using Dutch data, Hoffmann et al. (2013) find that individual investors continue to trade actively and do not de-risk their investment portfolios. Consistent with the first three papers, I show that households respond to an exogenous increase in financial wealth (thus, to a positive shock) driven by unconventional measures by buying more assets. However, this is only true for richer households, as for the bottom 75% of income distribution "*inertia seems to be the main driver of portfolio allocation*" (Brunnermeier and Nagel, 2008).

Finally, this paper contributes to the growing literature that uses detailed balance sheet data to estimate the distributional effects of unconventional monetary policy on wealth inequality. Bivens (2015) for the US, Domanski et al. (2016) for a set of advanced countries, and Ampudia et al. (2018) for the Euro Area, provide data-driven simulation exercises. On the one hand, they find that, given the initial distribution of financial wealth, unconventional tools mainly accrue wealthiest investors. On the other, this negative effect is outweighed by UMP ability to sustain economic activity, employment, and house prices, which is especially beneficial for low-income households. They conclude that unconventional tools tend to reduce income and wealth inequality. Casiraghi et al. (2018) (on Italian data) and Bunn et al. (2018) (on UK data) use elasticities from a large-scale econometric model of the Italian and UK economy, respectively, and reach the same conclusions. My work is complementary to this literature and uncovers an additional channel through which UMP exacerbates wealth inequality.

The paper proceeds as follows. Section 2 reviews ECB's main policy actions during the crisis and UMPs main transmission channels. Section 3 describes the data and the construction of the dataset. Section 4 discusses unconventional monetary policy, the empirical framework, and the results. Section 5 presents robustness checks. Section 6 quantifies the heterogeneous UMPs impact on financial wealth along the income distribution. Section 7 concludes.

2 The crises, ECB's unconventional monetary policy, and its transmission channels

Between 2008 and 2016, the ECB faced three different crisis phases (Praet, 2018). The first phase coincides with the liquidity crisis triggered by the onset of the global financial cycle and the collapse of Lehman Brothers. The principle ECB response was to lower its main refinancing rate to 1% (May 2009), expand the number of eligible collateral for refinancing operations, and provide liquidity to the banking sector. The second phase is the sovereign debt crisis of 2011-12. Italy and the other GIPS countries (Greece, Ireland, Portugal, and Spain) saw large increases in their government bond yields. The ECB's main policy response included the direct purchases of government bonds through the Securities Market Program (SMP, May 2010), two three-year refinancing operations (LTROs, December 2011 and February 2012) and the announcement of the conditional Outright Monetary Transactions (OMT, August 2012). The explicit aim of these programs was to reduce the perception of redenomination risk and financial market anomalies, such as fragmentation and illiquidity. Although the extraordinary injection of liquidity proved useful, acting as powerful circuit breaker stopping the downward spiral, by mid-2014, a credit crunch was looming and the economic recovery was losing momentum. With the risk of low inflation and de-anchored inflation expectations on the rise, the ECB decided to ease its monetary stance further by directly intervening across the whole range of interest rates affecting the financing conditions of the economy. First, it implemented a negative interest rate policy, lowering the interest rate paid on the deposit facility to -0.1% (2014). Then it promoted two rounds of longer-term refinancing operations (TLTROs, September 2014 and March 2016), in order to support bank lending to the private sector. Finally, they introduced the asset purchase programme (APP, January 2015) for both private and public sector securities. These policies helped to compress further premia along the yield curve.

There is a growing literature analyzing possible channels through which UMPs might impact financial markets (for an extensive literature review, see Haldane et al. 2016), but less is known about the mechanisms through which they affect households' portfolio decisions. In this paper, I focus on the two possible transmission channels that are the most likely to affect the households' portfolio rebalancing choices: the confidence channel (and the closely connected sovereign credit risk channel) and the portfolio rebalancing channel. These two channels have opposite implications for active rebalancing following an increase in asset prices driven by UMPs valuation effect. Although the empirical strategy does not allow me to directly test them, in the discussion of the results (Section 4.2) I still argue whether the empirical findings are consistent with one channel or the other.

The first channel is the *confidence channel*. It affects and influences the perception of risk and uncertainty, restoring agents' confidence in the financial system. Consequently, risk premia decline and asset prices increase (Bluwstein et al. 2016; Fratzscher et al. 2018). It was heavily stressed, especially during the first and the second phases of the crisis. A very connected channel is the so-called *sovereign credit risk channel*. One of the key goals for UMPs in the second phase of the crisis was to reduce sovereign risk premia of peripheral counties, considered excessive and not in line with fundamental but more reflecting unfounded fears of Eurozone break-up. Given Italy's peculiar role during the period of crisis, these two channels predict that investors would respond in a pro-cyclical manner to price changes. Thus, accommodative unconventional monetary policy should increase households' investment toward all asset classes, including government bonds.

The second channel is the *portfolio rebalancing channel*. Many commentators indicate it is one of the main transmission mechanisms (see, among others, Bernanke et al. 2010; Bernanke 2012; Gagnon et al. 2010; Joyce et al. 2012; Draghi 2014, 2015). The main idea is that central bank purchases affect risk premia and yields of key financial segments, inducing investors to rebalance their portfolio away from assets not directly affected by unconventional stimulus and toward investments with higher return. Thus, this channel prescribes that investors would respond in a counter-cyclical manner to price changes, selling government bonds and buying riskier assets.

3 Data Description and portfolio composition

The empirical analysis in Section 4 requires disaggregated and detailed data of a representative sample on households' portfolio composition, wealth, and demographics. For this reason, I make use of the Bank of Italy's Survey of Households Income and Wealth. In this chapter, I provide an overview of the dataset and of the methodology I apply to distinguish between active and passive saving components. The features of the data are illustrated in greater details in Appendix A.

3.1 Data sources

The main dataset is obtained from the Survey of Households Income and Wealth (SHIW), a large-scale household survey run by Banca d'Italia every second year. It contains detailed information on demographic, consumption, labor supply, income, real wealth, and financial wealth characteristics of a stratified random sample of the Italian population. SHIW is conducted since 1960 and the sample used in most recent years comprises about 8,000 households; as I focus on the unconventional monetary policy period, I rely on the waves from 2006 through 2016. Their contents, methodology, and variable definition are broadly homogeneous. The survey contains a rotating panel component and in each wave around half of the households are participating for at least their second time. This panel component proves very useful for the determination of the change in wealth active saving component needed for the analysis. Balance-sheet entries are reported as of the end of the previous year (for example, December 31st, 2006), while flows of income and consumption refer to the previous year. The unit of observation is the household.[2]

In the empirical analysis, I focus only on the rebalancing of the financial portfolio. In fact, although for the majority of Italians the residence is the only held asset, it is acquired mainly for living necessities rather than as an investment. For this reason, throughout the paper it is assumed that housing is a highly illiquid asset and that it is not rebalanced in a strategic manner. Nonetheless, it will be used as a control in the empirical analysis. The same applies to deposits: I assume that increases or decreases in saving and checking accounts are linked to liquidity reasons, unrelated to investment policies. For this reason, they are also excluded from the analysis. In the SHIW questionnaire, households are presented with a fixed list of forms of financial saving and investment and they are asked if the household held any of them on December 31st of the previous year. If the answer is positive, they are asked to provide the approximate value. Table A.1 in the appendix contains an overview of all asset classes among which the households can choose for the years 2006 to 2016.

The asset classes included in the analysis are: Italian government bonds (bot, btp, cct, ctz), Italian mutual funds (liquidity funds, mixed funds, bond funds, equity funds), Italian equity and Italian corporate bonds.[3] [4] The other asset classes are excluded for the following reasons:

[2] The household is defined to include all persons residing in the same dwelling who are related by blood, marriage, or adoption. Individuals selected as partners or other common-law relationships are also treated as households.

[3] The asset class mixed funds is given by the sum of balanced funds, balanced bond funds, balanced equity funds and flexible funds.

[4] For a detailed description of the asset classes included in the analysis, as well as the final classification with respect to the analysis, see Table A.2 in the Appendix.

1. It is not possible to calculate the active saving component due to lack of extra information. As described later in this paragraph, this calculation is done using data available on Bloomberg. If the data provider does not have any information about these asset classes they are dropped. This is the case of shares of unlisted and private companies, shares of partnerships, other government bonds, managed portfolios, and loans to cooperatives.

2. The percentage of households holding the asset class is very low. This is the case of bonds, government bonds, shares, other assets and investment funds issued by non-residents.

3. The asset class does not appear in all waves. This is the case of shares in privatized listed companies indexed funds and non-harmonized funds.

Table 1 shows the percentage of households holding each asset class included in the SHIW. The table is divided in two, the upper part reporting the holding of the asset classes included in the analysis while the bottom part showing the excluded ones. Most asset classes are held by only a small fraction of households. This can be partially due to a problem of underreporting, but it is mostly to be attributed to the fact that several Italian financial markets are thin. Moreover, the table shows that, on average, between 2006 and 2016 the share of households holding financial assets decreased, implying that during the years of crisis households have partially abandoned financial investments. This trend is visible not only in the asset classes included in the analysis (with the main exception of mutual funds), but also in the excluded markets. Table 1 also shows that the share of households directly investing in assets issued by non-residents has not increased over time (it has decreased, if possible), suggesting that there has been no rebalancing between domestic and foreign markets, but, most likely, a general reduction of financial investment. Moreover, Figure 1 shows that, in times of crisis, Italians have not drastically changed the composition of their financial portfolio, and this pattern is consistent across different groups of households along the income distribution (Group 1, Group 2, and Group 3, including households in the bottom two quartiles, third quartile and top quartile, respectively). All groups exhibit the stronger reduction in government bonds in favor of other assets between 2010 and 2012, the period of higher stress for Italian markets, but the trend starts reversing already in 2014. Moreover, both the percentage invested in foreign asset and in other assets is constant over time. Interestingly, the figure also shows that, contrary to expectations, low income earners do not invest higher share of their portfolio in government bonds compared to other households.

3.2 Passive and active rebalancing of portfolio

To understand the impact of UMPs on the portfolio rebalancing of household it is necessary to isolate the change in financial wealth due to an active decision of rebalancing (either positive or negative). An asset can change in value for two reasons: either some of it is sold or purchased (active saving or rebalancing) or the price of the asset changes (passive saving or capital gain). Thus, by definition the change in the financial wealth composition between two points in time is always given by the sum of the active rebalancing and the passive saving

$$\underbrace{X_{i,t}^j - X_{i,t-1}^j}_{\text{change in wealth}} = \underbrace{x_{i,t}^j p_{i,t}^j}_{\text{active rebalancing}} + \underbrace{X_{i,t-1}^j r_{i,t}^j}_{\text{capital gains}} \tag{1}$$

where $X_{i,t}^j$ describes again the stock of money held by household i in asset j, $x_{i,t}^j$ describes the flow of asset j, $p_{i,t}^j$ denotes the price of asset j at time t paid by household i and $r_{i,t}^j$ is the annual return between $t-1$ and t of asset j. Unfortunately, SHIW does not contain questions about purchases or sales of assets. Moreover, it does not include any information about asset prices and returns. This implies that Equation (1) cannot be used directly to compute the active saving component. To solve this problem I first rearrange Equation (1) to obtain the expression for active saving:

$$x_{i,t}^j p_{i,t}^j = X_{i,t}^j - X_{i,t-1}^j - X_{i,t-1}^j r_{i,t}^j; \tag{2}$$

then, I approximate the missing variables. In fact, for each wave the survey provides me with the money invested in several asset classes ($X_{i,t}^j$ and $X_{i,t-1}^j$). Thus, the only thing that is missing in order to calculate the active saving is the return on assets, $r_{i,t}^j$.

I replace the return on each of the ten asset classed included in the analysis j with the return of financial indexes that summarize the behavior of the asset segment.[5] Then, I can finally apply Equation (2) and obtain ten active rebalancing components. It is important to notice that to use Equation (2) it is necessary to follow the same household for at least two consecutive waves, and that is where I make use of the rotating panel component of the SHIW. This procedure is applied to the ten classes included in the analysis (bot, btp, cct, ctz, liquidity funds, mixed funds, bond funds, equity funds, equity and corporate bonds). Moreover, it is also important to stress that my final dataset does not have a panel structure, but that it is constituted by repeated cross sections. The list of the indexes use to approximate the returns, together with a short description, is contained in Table 2. They are plotted in Figure 2.

Finally, the active saving components are aggregated further more into two final categories that are then used for the empirical analysis, the government bonds active saving component (including btp, bot, ctz, and the cct) and the risky asset active saving component (including corporate bonds, equities, and mutual funds). This procedure also allows obtaining the capital gain components of the two asset categories. This classification between government bonds and risky assets is maintained throughout the entire paper.

I impose some requirements for households to be considered in the analysis. First, only

[5] The return on the asset class mixed funds is given by the average of the balance funds and flexible funds indexes returns, $r_t^{\text{mixed funds}} = \frac{1}{2}(r_t^{\text{balanced funds}} + r_t^{\text{flexible funds}})$.

households followed for at least two consequent waves are included in the analysis for the aforementioned reason. Second, both net wealth and income must be positive. Third, all positive rebalancing of risky or government bonds assets smaller than 500 Euro is considered a mistake of the household reporting of its financial variables and it is replace with a rebalancing equal to zero.[6] Pooling all waves together, I am left with a sample of around 20,000 households.

Figure 3 shows the cross-section distribution of the newly created stock of active rebalancing variables.[7] Table 3 reports the summary statistics when considering the full sample and different groups of households along the income distribution (Group 1, Group 2, and Group 3, including households in the bottom two quartiles, third quartile and top quartile, respectively) over the 2006-2016 period. Both mean and median of the active rebalancing are negative for both asset categories and across all groups of households. The same results emerge when considering the evolution over time of the same two summary statistics (Figure 4). To conclude, it appears that in the decade under analysis households have progressively reduced their financial investement in the two asset categories under analysis.

4 Empirical Analysis

In this section, I first present the identification strategy. Then I proceed describing the empirical framework. Finally, I discuss the baseline results.

4.1 The Identification of Unconventional Monetary Policy

The identification of unconventional monetary policy in this context poses several issues. First, unlike in conventional times, in the unconventional period there is not a clean single indicator of the overall stance of monetary policy. Moreover, using low frequency data could lead to endogeneity issues and omitted variable bias. Not only could the responses that follow the central bank intervention be attributed to other changes in the economy around the same time, but monetary policy could also be responding to important news affecting both monetary policy itself and the other variables under investigation (Gürkaynak et al., 2005).

In order to construct a UMPs measure and achieve identification, I build on the literature that estimates the impact of a monetary policy changes using high frequency data. Here the effect of unconventional tools is extracted directly from the high frequency response of financial

[6] The idea is the following. Assume that household i has not rebalance its portfolio between $t-1$ and t. If i does not take into account the valuation effect of its investment when reporting its investment value in t, the application of Equation (2) will result in an active saving different from zero. For this reason, rebalancing lower than 500 Euro are considered here as misreporting and not as an investment or disinvestment of small amounts.

[7] For a plot of the distribution of households's active rebalancing across different years and household groups, please refer to the Appendix 8 and 9, respectively.

markets to unconventional announcements. Many authors rely on announcements as a source of UMPs identification, using an event study approach or structural VAR models (see, among others, Wright 2012; Gertler and Karadi 2015; Rogers et al. 2016; Hachula et al. 2017). The idea is that any high frequency financial indicator (indexes, prices, yields, etc...) close before a monetary announcement has already priced in the endogenous response of monetary policy to the state of the economy. Thus, any variations that occurs in a (small enough) window around a monetary policy announcement must reflect only the unexpected component of monetary policy revealed by the announcement itself and it is interpreted as exogenous with respect to the economy. Second, I borrow from the literature evaluating the impact of UMPs on banks. Here the heterogeneity across banks is exploited to assist with the identification (see, among others, Albertazzi et al. 2016; Chakraborty et al. 2017; Acharya et al. 2018). The idea is that some banks are expected to be more affected than others (due to a different composition of their balance sheet) and their different reaction to monetary shocks can, in turn, help identify the causal effect of monetary policy. The same reasoning can be applied to households: it is possible to exploit their financial portfolio composition to assess their exposure to unconventional monetary. Then, comparing the behavior of more and less affected HHs, allows shedding light on the effects of unconventional measures on portfolio rebalancing choices. In particular, I employ as exposure measure the stock of assets invested in $t-1$ in both the categories under analysis, risky assets and government bonds.

In order to have a clear understanding of the effects of UMPs on the asset classes included in the analysis, I estimate the effect of unconventional monetary policy announcements on the ten indexes used to approximate the returns (see Section 3.2). Following, among others, Fratzscher et al. (2018) and Altavilla et al. (2014), I employ the following univariate model

$$r_{j,t} = \alpha_j + \sum_{a=1}^{A} \beta_a D_{a,t} + \gamma \Delta \text{Eonia}_t + \sum_{n=1}^{N} \delta_n z_{n,t} + \eta_{j,t} \tag{3}$$

where $r_{j,t}$ is the daily return of financial index j at time t; $j=$ bot index, btp index, ctz index, cct index, equity index, corporate bond index, liquidity funds index, mixed funds index, bond funds index, and equity funds index; α_j is the index specific constant; $D_{a,t}$ is a dummy variable equal to 1 if the unconventional monetary policy announcement $a = 1, .., A$ takes place, zero otherwise. The event dummies reflect the major unconventional monetary policy announcement-related events that occurred between 2007 and 2016. The events are chosen following Hachula et al. (2017) and listed in Table C.2; the Eonia in first difference, ΔEonia_t accounts for conventional monetary policy; $z_{n,t}$ is the release of macro news for Italy, Euro Area, and the US. See Appendix C.1 for a list of all included macro surprises. The coefficients of interest are the $\beta_{a,j}$, as each of them captures the change in the return $r_{j,t}$ in response to the ECB announcements a.

After estimating Equation (3), the following procedure is applied:

1. The estimated vector $(\beta_{j,1}, .., \beta_{j,A})^T$ is transformed into a daily binary variable $m_{\beta,j,t}$ that takes value 0 on non-announcement days and value β_a on the day of announcement a.

2. The vector $m_{\beta,j,t}$ is then aggregated into a bi-yearly series, $ump_{j,t}$, by summing within two years. Thus, each one of the five data points (2008, 2010, 2012, 2014, 2016) composing the vector $ump_{j,t}$ is the cumulated impact of UMPs announcements on asset j in the previous two year window.

3. Finally, two UMPs impact measures, one for risky assets and one for government bonds, are constructed by averaging out the single UMPs impact measures

$$\text{UMP impact measure}_t^{(f)} = UMP_t^{(f)} = \sum_{j=1}^{J} \frac{ump_{j,t}^{(f)}}{J}$$

where f={gov, risky} and j= bot index, btp index, ctz index, cct index if f=gov bonds and j= equity index, corporate bond index, liquidity funds index, mixed funds index, bond funds index and equity funds index if f=risky. For a plot of UMP_t^{gov} and UMP_t^{risky}, see Fig. 5.

After having constructed the (common) UMPs impact measures, I interact them with the household-specific financial investment in government bonds and risky assets at time $t-1$ and construct the UMPs variable,

$$\text{UMP Var}_{i,t} = UMP_t^{gov} \times \text{gov bonds}_{i,t-1} + UMP_t^{risky} \times \text{risky}_{i,t-1}.$$

The way the UMP Var$_{i,t}$ variable is constructed allows for a straightforward interpretation. It captures the realized capital gains on the two asset categories in t due to unconventional monetary policy. Referring again to the decomposition in Eq. (1) and assuming $Y_{i,t}$ is household i total portfolio, y is i' total inflow/outflow of assets, p the price of assets and r the total portfolio return, then

$$\begin{aligned}
\underbrace{Y_{i,t} - Y_{i,t-1}}_{\text{change in wealth}} &= \underbrace{y_{i,t}p_{i,t}}_{\text{active rebalancing}} + \underbrace{Y_{i,t-1}r_{i,t}}_{\text{capital gains}} \\
&= \underbrace{y_{i,t}p_{i,t}}_{\text{active rebalancing}} + \underbrace{Y_{i,t-1}r_{i,t}^{non-UMP}}_{\text{capital gains}^{non-UMP}} + \underbrace{Y_{i,t-1}r_{i,t}^{UMP}}_{\text{capital gains}^{UMP}} \\
&= y_{i,t}p_{i,t} + Y_{i,t-1}r_{i,t}^{non-UMP} + \underbrace{UMP_t^{gov} \times \text{gov bonds}_{i,t-1} + UMP_t^{risky} \times \text{risky}_{i,t-1}}_{\text{capital gains}^{UMP}}.
\end{aligned}$$

Thus, this paper estimates the UMP-induced financial wealth effect on household portfolio choices, i.e. how much of the exogenous change in the value of assets (windfall gains) due to

UMPs is passed through to financial inflows or outflows. The two component of the UMPs variable, UMPs-exposure through government bonds and risky assets are included separately in the empirical model (see 4.2). First, households might react differently different realized UMPs-capital gains, implying a different wealth effect for different asset categories. Second, including only one UMPs- capital gains, for example, the UMPs-exposure through the government bonds, I would impose *a priori* that the UMP transmission happens only through government bond exposure, and, in turn, that households only invested in risky assets would not be affected by the ECB monetary action.

4.2 Econometric framework and results

This section addresses the empirical question of whether UMPs affects household portfolio rebalancing. Following Juster et al. (2006) and Calvet et al. (2009a), I employ the following univariate model:

$$\begin{aligned} as_{i,t}^{(f)} &= c^{(f)} + \alpha \text{HHs Controls}_{i,t-1}^{(f)} + \beta_1 UMP_t^{\text{gov}} \times \text{gov bonds}_{i,t-1}^{(f)} \\ &\quad + \beta_2 UMP_t^{\text{risky}} \times \text{risky}_{i,t-1}^{(f)} + \delta_t + \eta_{i,t}^{(f)} \end{aligned} \tag{4}$$

where i denotes the household, $t = 2006 - 2016$, $f = \{\text{risky, gov}\}$ asset categories; j= bot index, btp index, ctz index, cct index if f=gov and j= equity index, corporate bond index, liquidity funds index, mixed funds index, bond funds index, and equity funds index if f=risky; $as_{i,t}^{j}$ indicates the (stock of) active saving of category f between $t-1$ and t; the interactions $UMP_t^{gov} \times \text{gov bonds}_{i,t-1}$ and $UMP_t^{risky} \times \text{risky}_{i,t-1}$ capture the effect of unconventional monetary policy on the dependent variable. The vector HHs $\text{Controls}_{i,t-1}^{(f)}$ contains one period lagged household financial and demographic characteristics (so to mitigate the impact of reverse causality) that reflect factors likely to shape rebalancing decisions. The first category includes disposable income, net wealth, and a dummy equal to 1 if the household has a mortgage. The second category includes a dummy for post high-school education, dummies for the sex and marital status, as well as the age of the household head and the family size. HHs $\text{Controls}_{i,t-1}^{(f)}$ also contains the lag investment in government bonds and risky assets, the two variables included in the interaction terms and the capital $\text{gains}^{non-UMP}$, i.e. the total portfolio capital gains minus the portion that is to be attributed to UMPs. Moreover, I include dummies capturing the household head's attitude toward risk.[8] The effect of UMP_t^{risky} and UMP_t^{gov} are absorbed by the time fixed effect δ_t. The coefficients of interest are β_1 and β_2, the interaction of the UMPs impact measures with the

[8] In SHIW, households are asked, "In managing your financial investments, would you say you have preferences for investments that offers: 1) A very high returns, but with a high risk of losing part of the capital; 2) A good return, but also a fair degree of protection for the invested capital; 3) a fair returns with a good degree of protection for the invested capital; or 4) low returns with no risk of losing the invested capital." The answers are used to construct dummies capturing the household head's attitude toward risk.

households (idiosyncratic) exposure. Finally, all financial variables are trimmed at the bottom and top 1%.

Table 4 includes the baseline results for risky assets (Column 1) and government bonds (Column 2). Only some coefficients are reported. For the extended version of the table, see Appendix D.1. In general, a positive sign indicates an increase in investment (purchases), while a negative sign indicates a disinvestment (sales). Moreover, based on the way the variables UMP^{gov} and UMP^{risky} are constructed, the coefficients attached to the interactions are the effect of an accommodative unconventional monetary policy announcement that increases the return of, respectively, risky assets and government bonds by 1%. Column (1) and (2) show that unconventional monetary policy has a positive impact on the rebalancing of both asset classes. In particular, a positive UMP shock induces a positive investment in risky assets (6.3%) and government bonds (4.6%), for an increase in the total portfolio of roughly 11%. Considering the average investment in risky assets (41000 EUR), it implies a positive investment of 2600 EUR in risky assets and 1900 EUR in government bonds. The results can also interpreted through the lens of the confidence channel of monetary policy: by reducing the amount of volatility in markets or uncertainty about both financial and real variables outlook, UMPs are able to boost financial investment in those segments that were mostly affected by the crisis. Table 4 also shows that the UMPs wealth effect happens only through risky assets. One possible explanation is that, given that the average investment in government bonds amounts to roughly 27000 EUR, the gains induced by UMPs are too little to trigger a wealth effect. This explanation in line with households' inertia in portfolio rebalancing.

For both asset categories the rebalancing is negatively affected by the initial investment in the same category and positively by the other one, implying that, in line with Calvet et al. (2009b), the initial investment has a quantitative effect on the active change and that, after a shock, the investment might gradually revert to a long-term mean and that the ratio between risky assets and government bonds is (partially) re-adjusted. In line with previous findings (Juster et al., 2006; Calvet et al., 2009a,b; Bilias et al., 2010), household financial characteristics are positively correlated with the portfolio rebalancing. In general, all other controls have the expected sign, but the capital gain variables deserve some deeper considerations. Following Calvet et al. (2009b) and Juster et al. (2006), the relationship between active and passive saving components is expected to be negative, but in this context the magnitude of the coefficient is mechanically inflated by the relationship between the two. Households' financial wealth is measured with error, as are passive and active savings. Measurement error introduces bias due to the method used to construct capital gains and active rebalancing. In fact, for a given change in wealth, a positive error in the passive saving necessarily lowers active rebalancing by an equal amount, artificially inducing a negative correlation between the two (Juster et al., 2006). This explains the strong effect of capital gains on risky asset rebalancing. Finally, it is worth noting that financial and demographic characteristics, including risk attitude, play a more important role in risky asset rebalancing decisions compared to government bonds, implying that for the latter category other factors might be partially affecting the active saving choices, like the traditional precautionary saving motive.[9]

One possible concern is that the outcome might differ for different groups of households. Thus, the analysis splits the sample into three groups: "poor households," defined as those in the bottom 50% of the income distribution, "middle class households," defined as the third quartile, and "rich households," defined as the 25% richest households according to the income distribution. Results are reported in Table 5 for risky assets and in Table 6 for government bonds (for the extended version of the tables, see Appendix D.2 and D.3). For ease of comparability, the tables also report the baseline results. For both asset categories, the full sample results is driven by the behavior of the rich households, with the UMPs being significant only for HHs in the third group. This finding is consistent with the well-established literature finding that richer, better educated households (the so-called sophisticated households) better diversify their financial investments (Vissing-Jørgensen and Attanasio, 2003; Calvet et al., 2007) and rebalance more frequently (Vissing-Jorgensen, 2002; Campbell, 2006; Calvet et al., 2009b; Bilias et al., 2010) than other households. Finally, more sophisticated agents tend to be more aware of financial products (Guiso and Jappelli, 2005), invest more aggressively, and make smaller mistakes (Calvet et al., 2007, 2009b). According to Table 5 and 6, UMPs induce a rebalance of the total portfolio of roughly 10% (6.6% and 3.16% towards, respectively, risky assets and government bonds). Considering that, for this group, the investment in risky assets ranges from 1000 EUR to 418000 EUR (with an average investment of 50000 EUR), it implies a rebalancing of total portfolio that ranges between 100 and 41000 EUR. As in the baseline results, the impact of UMPs happens only through the exposure to risky assets. Moreover, it appears that the effect of financial covariates on the rebalancing is similar across household groups, although the opposite is true for demographic characteristics.

Another possible concern is that the second and the third phase of unconventional tools might have different impacts on rebalancing. Unlike the previous phase, which sought to relieve financial and sovereign stress and fight redenomination risk and financial markets' geographical fragmentation triggered by crises, after Summer 2014 ECB action was designed to support economic growth and inflation. Specifically, in this third phase, the ECB introduced the Asset Purchase Programme (APP) for private and public sector securities with the aim of further depressing the term structure of interest rates, not only in those market segments where there is a direct intervention, namely covered bonds, asset-backed securities (ABS), sovereign and corporate bonds, but also into non-targeted markets through the portfolio rebalancing channel (Praet, 2017). Due to data limitations, it is not possible to directly compare the UMPs impact

[9] Unfortunately it is not possible to capture the precautionary saving motive due to data limitation.

on rebalancing in the two different phases, but it is possible to re-run the analysis excluding data after 2014. Results for risky assets and government bond rebalancing are in Tables 7 and 8, respectively.[10] The two tables show that excluding the last rounds of unconventional monetary policy increases rich households rebalancing of risky and government bonds by roughly 20% and 45% , respectively. This is further evidence on the effectiveness of ECB's policy in restoring markets' confidence and that, while the positive rebalancing in the period before the end of 2014 is driven by the confidence channel of monetary policy, after 2014 other channels, such as the portfolio rebalancing channel, might be attenuating (or even reversing) the sign of the rebalancing.

5 Robustness Checks

This section reports a series of robustness checks to the results. First, I employ a two-step model to correct for possible sample-selection bias. Second, I construct the UMPs impact measures using panel techniques. Third, I use a two day window rather then a one day around the policy announcements. Fourth, I include sampling weights to correct for survey data construction. Finally, I control for the quality of survey answers. All sensitivity tests report results quantitatively and qualitatively similar to the baseline findings.

5.1 Robustness checks to the model

In the portfolio allocation literature, it is well established that not all households invest in risky asset markets. Furthermore, this literature also finds that the decision whether to participate or not in risky markets and how much to invest are correlated. This, in turn, creates a problem of self-selection into investing that should be taken into account in the empirical analysis. The same issues may apply when considering the choice of rebalancing. In fact, the investment and the rebalancing decision problems are very similar; with the latter analyzing in terms of (financial investment) flows what the former analyzes in terms of (financial investment) levels. In presence of self-selection, the use of OLS would lead to inconsistent parameter estimates. For this reason, in this section I make use of a latent variable model with a probit selection equation (Guiso et al., 2000, 2002a,b; Guiso and Jappelli, 2005). I deal with the joint decision of whether to rebalance and how much to rebalance using a Heckman selection model (Heckman, 1979). I estimate a probit model for the binary choice of rebalancing conditioning on not being invested in the asset category in $t-1$ (extensive margin decision) and then a rebalancing equation for the participants accounting for selection between $t-1$ and t. Formally, the model is the following:

[10] For the extended version of the tables, please see D.4 and D.5, respectively.

$$as^{(f)}_{it} = \beta_2 x_{2,i,t-1} + \rho_{12}\lambda(\hat{\beta}_1 x_{1,i,t-1}) + e^{(f)}_{2,i,t}$$

with $as_{it} \neq 0$ is the rebalancing of asset category $f = \{\text{risky, gov}\}$, $\lambda = \phi(\hat{\beta}_1 x_{1,i,t-1})/\Phi(\hat{\beta}_1 x_{1,i,t-1})$ is the inverse Mills ratio, ϕ is the normal density and $\hat{\beta}_1$ is obtained by estimating the first-stage probit model

$$\begin{aligned}\Pr(P^{(f)}_{it-1} = 1|x_{1,i,t-1}) &= \Pr(\beta_1 x_{1,i,t-1} + e^{(f)}_{1,i,t-1} > 0) \\ &= \Phi(\hat{\beta}_1 x_{1,i,t-1})\end{aligned}$$

where $P^{(f)}_{it-1}$ is a dummy variable equal to 1 if HH i holds asset category f in $t-1$, 0 otherwise. The error terms are both normal, $e^{(f)}_{1,it-1} \sim \mathcal{N}(0,\,1)$ and $e^{(f)}_{2,it} \sim \mathcal{N}(0,\,\sigma)$, and $\rho_{12} = Cov(e_{1,t-1}, e_{2,t})$.

Thus, I employ the following two-step model:

$$\begin{aligned}as^{(f)}_{i,t} &= c^{(f)} + \alpha \text{HHs Controls}^{(f)}_{i,t-1} + \beta_1 UMP^{\text{gov}}_t \times \text{gov bonds}^{(f)}_{i,t-1} \\ &\quad + \beta_2 UMP^{\text{risky}}_t \times \text{risky}^{(f)}_{i,t-1} + \delta_t + \eta^{(f)}_{i,t} \\ P^{(f)}_{i,t-1} &= c^{(f)} + \alpha \text{HHs Controls}^{(f)}_{i,t-1} + +\gamma R^{(f)}_{i,t-1} + \delta_{t-1} + \mu^{(f)}_{i,t-1}\end{aligned} \tag{5}$$

The first equation is identical to the linear model in Equation (4) in Section 4.2. $P^j_{i,t}$ is a dummy equal to zero if the household has not rebalanced between $t-1$ and t conditional that it did not hold asset j in $t-1$ or 1 otherwise; $Z_{i,t-1}$ contains households' financial and demographic characteristics; $R_{i,t-1}$ is the vector that includes the exclusion restrictions needed to identify the model, i.e. variables that impact only the binary decision of rebalancing. I employ the use of on-line banking, the ownership of a brokerage account, and the fact that at least one member of the household works in the financial industry. A well established literature finds that entry costs, trading costs, and information costs have a primary role in explaining the (low) rate of risky asset ownership (see, among others, Vissing-Jorgensen (2002) and Bertaut (1998)). I argue that these three variables have a positive impact on the aforementioned costs, by lowering the fixed (brokerage account), trading (on-line banking), and information costs (one member of the household works in the financial industry).

Results are shown in Table 9 (for the extended version of the results, see Appendix D.6). Columns (1) and (3) report the second stage for the risky asset and government bonds rebalancing. The first stage regressions are reported in Columns (2) and (4). The significance of the inverse Mills ratio indicates that for both asset categories, the first and the second stages are not independent. Nonetheless, comparing these estimates with the baseline regressions, it is possible to notice that they are quantitatively very similar, implying that the bias introduced by not taking into account the sample selection is negligible.

5.2 Robustness checks to the identification

To assess whether the results are driven by the model used to estimate the effects of ECB's unconventional announcements on the financial indexes, in this section I employ a panel technique. Thus, the empirical model is as follows:

$$r_{j,t}^{(f)} = \alpha_j^{(f)} + \sum_{a=1}^{A} \beta_a D_{a,t} + \gamma \Delta \text{ Eonia}_t + \sum_{n=1}^{N} \delta_n z_{n,t} + \eta_{j,t}^{(f)} \tag{6}$$

where $r_{j,t}$ is the daily return in the financial index j at time t; f={risky, gov} and j= bot index, btp index, ctz index, cct index if f=gov and j= equity index, corporate bond index, liquidity funds index, mixed funds index, bond funds index, and equity funds index if f=risky. The two UMPs impact measures, $UMP_{t,panel}^{risky}$ and $UMP_{t,panel}^{gov}$, are then derived applying points 1) and 2) of the procedure described in Section 4.1. The first two columns of Table **??** report the outcome of this robustness test. The results are comparable to the baseline specification, with only the interaction between risky investment in $t-1$ and $UMP_{t,panel}^{risky}$ being significant. In terms of the magnitude, it appears that the UMPs impact on rebalancing is quantitatively and qualitatively similar to the baseline results, although slightly stronger. Furthermore, a general limitation associated with event-study analyzes is that the choice of the event window around the announcement is crucial. It involves a trade-off between keeping the interval narrow enough to make sure it only captures the impact of the monetary policy news and choosing a window wide enough to fully account the reaction of market participants. Thus, I test the robustness of the baseline results by extending the event window to two-day and, following Hachula et al. (2017), I employ the following univariate model

$$r_{j,t} = \alpha_j + \sum_{a=1}^{A} (\beta_a^1 D_{a,t} + \beta_a^2 D_{a-1,t}) + \gamma \Delta \text{Eonia}_t + \sum_{n=1}^{N} \delta_n z_{n,t} + \eta_{j,t} \tag{7}$$

where the dummy $D_{a-1,t}$ is equal to 1 if announcement a happens in $t-1$ and 0 otherwise. The coefficient of interest is $\beta_{a,j} = \beta_a^1 + \beta_a^2$. The two UMP impact measures, $UMP_{t,two-day}^{risky}$ and $UMP_{t,two-day}^{gov}$, are then derived applying the procedure described in Section 4.1. As shown in Table 10, results are quantitatively and qualitatively similar to the baseline case (see Table BLA). For a plot of the two newly constructed UMP impact measures and for the extended table, see Figure 6 and Table D.7, respectively.

5.3 Robustness checks to the estimation sample

Finally, the sensitivity of the baseline results is tested across different estimation samples.[11] First, the analysis is repeated including sampling weights. Sampling weights denote the inverse of the probability that each observation is included in the sample, in order to correct for the sampling design, nonresponse or sample selection. In fact, if, according to the selection process, all the elements of the population have an unequal chance to be included in the sample, then not correcting for sampling weights might lead to biased estimates. On the other hand, using weights increase the sampling variance, especially in small samples (for an exhaustive discussion about this trade-off, see Solon et al. 2015). Second, I control for the quality of the survey data. For each household, the interviewer is asked to rate the reliability of the information on saving and financial investments provided by the respondent on a scale from zero to ten. All households with a score below eight are eliminated from the sample. Column (1) and (2) of Table 11 report the results when using the weighted sample, while Column (3) and (4) show results when cutting the sample. In both cases the findings are similar to the baseline results. For the extended table, see Appendix D.8.

6 The impact of UMP-induced portfolio rebalancing on households' financial portfolios

In this Section, I simulate the impact of unconventional monetary policy on households' financial portfolios across the income distribution. In order to do so, I use the information on investment in government bonds and risky assets that refer to December 31, 2006 (Table 12). This allows me to evaluate unconventional monetary policy effects across all years included in previous empirical analysis and to avoid the possibility that financial wealth distribution in later waives might already embed unconventional monetary policy effects. Then, I impose the valuation and rebalancing effect induced by unconventional monetary policy between 2006 and the end of 2016. Finally, I compare the value of the initial and the final portfolio, so to calculate the UMPs-induced financial return.

The empirical analysis in Section 4.2 finds that 1) only households in the top quartile rebalance their portfolio following unconventional stimulus (while the UMP's valuation the effect is common for all); and 2) the active rebalancing is expressed as a fraction of household's previous year investment in risky asset: an accomodative announcement that increases risky asset return by 1% leads to a $6.62\% * \text{risky}_{i,t-1}$ and to a $3.16\% * \text{risky}_{i,t-1}$ positive rebalancing of, respectively, risky assets and government bonds. Thus, the value of total the portfolio on December 31 2016

[11]Sampling weights are provided for all SHIW waves directly by the Bank of Italy.

is, calculated as follows:

$$\text{Tot Port}_{2016,1} = \begin{cases} \sum_{t=2008}^{2016} \text{gov}_{t-1,i}(1+\text{UMP}_t^{gov}) + \text{risky}_{t-1,i}(1+\text{UMP}_t^{risky}), & \text{if Perc} \leq 75\% \\ \sum_{t=2008}^{2016} (\text{gov}_{t-1,i} + 3.16\% * \text{risky}_{t-1,i})(1+\text{UMP}_t^{gov}) + \\ \text{risky}_{t-1,i}(1+6.62\%)(1+\text{UMP}_t^{risky}) , & \text{if Perc} > 75\% \end{cases} \tag{8}$$

where $\text{Port}_{16,i}$ is the value of the total portfolio of family i at the end of 2016; $\text{gov}_{t-1,i}$ and $\text{risky}_{t-1,i}$ are the stocks of investment in government bonds and risky assets; UMP_t^{gov} and UMP_t^{risky} are the bi-yearly vectors containing the UMPs-induced valuation effect estimated in Section 4.1; if household i belongs to the top quartile of the income distribution, the equation contains also the rebalancing effect ($3.16\% * \text{risky}_{t-1,i}$ for the government bonds and $6.62\% * \text{risky}_{t-1,i}$ for the risky assets). Finally, I calculate the portfolio return of household i over the 10 year period under analysis, $\text{Tot Port Ret}_{2016,i} = \frac{\text{Tot Port}_{2016,i} - \text{Tot Port}_{2006,i}}{\text{Tot Port}_{2006,i}}$. Thus, the total portfolio return is a function of the initial portfolio composition in terms of percentage investment in the two categories, valuation effect and rebalancing.

Figure 7 shows the average total portfolio return in 2016 for twenty different groups of households, ordered from left to right according to the quintile of income distribution they belong to. The graph contains two different scenarios. The solid blue line is the graphical representation of Equation (8), i.e it depicts the portfolio rate of return when including the active portfolio rebalancing. The red dashed line is its counterfactual and considers the portfolio rate of return when the portfolio rebalancing component is shut down. By construction, the two lines differ only for households in the top quartile. From Figures 7, it emerges the portfolio return between the lower three quartiles and the upper ends of the income distribution varies considerably, but that this difference has to be attributed only to the rebalancing effect. Even more striking, the dashed red line shows that, without considering the rebalancing, the portfolio return for the top 5% households would be lower than the bottom 5%. This result is in contrast to previous research that finds that only a fairly small subset of the population benefits from capital gains in bond and equity markets (e.g., Adam and Tzamourani 2016), but it is rooted in the very poor performance of the Italian stock market in the crisis years (left panel of Figure 2, red line) and in the ECB's inability in sustaining that specific asset class between 2006 and 2008. Figure 5 shows that the UMPs had a negative effect on risky assets in the first two years under analysis. This result has to be attributed entirely to the strong negative effects of unconventional tools announcements on the FTSE MIB index.[12] There is a positive correlation between percentage of the portfolio invested in equity and income (Table 12). This explains why rich households' portfolio have experienced stronger capital losses. On the contrary, including the portfolio rebalancing boosts

[12] These results are not reported here, but are available upon request.

portfolios' return, with the top quartile gaining between 30-35% of the initial value of their portfolio thanks to unconventional monetary policy valuation effects and their UMPs-induced investment decisions. In contrast, the bottom three quartile increase the value of their portfolio by 3-4%. Thus, it is possible to conclude that households' heterogeneous portfolio rebalancing driven by UMPs is the major cause for financial wealth polarization among households.

It is important to highlights some caveats of this analysis. This simulation aims at gauging the direct distributive implications of unconventional monetary policy on the basis of the *ex-ante* distribution of financial wealth, considering only some of the asset categories Italian households are invested in. Thus, it only measures what group of households gains/loses the most *ex-post* consitioning to the two asset categories under analysis, but it is mute with respect to the optimal portfolio rebalancing response to unconventional monetary policy. In principle, there could be a scenario where households in the bottom three quartiles show inertia in rebalancing their government bond or risky asset positions, but are active in other financial investments more heavily affected by UMPs. This could boost the value of their portfolio but it would not be captured by this analysis.

7 Conclusion

Unconventional monetary policy is expected to affect investors' portfolio choices, yet in the current academic debate on the impact of unconventional tools on households' wealth redistribution it is always assumed that households do not adjust their portfolios in response to monetary policy. This paper rejects this claim and shows that UMP does indeed matter for households' portfolio decisions, at least for households at the top of the income distribution.

To understand the impact of unconventional tools, I combine several waves of the Bank of Italy's Survey on Household Income and Wealth with financial indexes. This allows me to construct a novel dataset that contains granular information on the active portfolio rebalancing of a representative sample of Italian households from 2006 to 2016. Then, I identify monetary policy by isolating the unexpected change in households' financial wealth due to ECB's unconventional announcements. This allows me to estimate the UMP wealth effect on portfolio rebalancing.

The analysis shows that in a period of financial turbulence in which households have drastically reduced their financial investment, accommodative unconventional tools have induced a positive shift toward both Italian government bonds and Italian risky assets. These findings point toward the effectiveness of ECB's unconventional actions in restoring trust in the financial system and are consistent with the so-called confidence channel of monetary policy. The paper also finds that these results only hold for households in the top quartile of the income distribution. Moreover, I conduct a simulation exercise that evaluates the impact of unconventional tools on households' financial wealth considering both UMP-induced valuation and rebalancing effects. It appears that the difference in households' portfolio performance across the income distribution has to be attributed almost only to the rebalancing component, suggesting that rebalancing decision might play a prominent role in the redistributional effects of monetary policy.

These findings have important policy implications. Understanding how households are affected and heterogeneously respond to monetary policy changes can have important implications for the transmission mechanism of monetary stimulus to households and, through them, to the real economy. Moreover, although distributional politics are not one of the the objectives of central banks, uncovering the unintended and negative consequences of monetary intervention should be of primary interest, in order to understand where the risks are concentrated in the household sector.

Finally, I acknowledge that this paper leaves some open issues. Due to data limitation, I am unable to uncover the role that households' behavioral traits play on the monetary policy/rebalancing decisions relationship. Moreover, comparing the impact of conventional and unconventional monetary policy on rebalancing choices could also be important. Addressing these questions is beyond the scope of this paper and represents an interesting and exciting avenue for future research.

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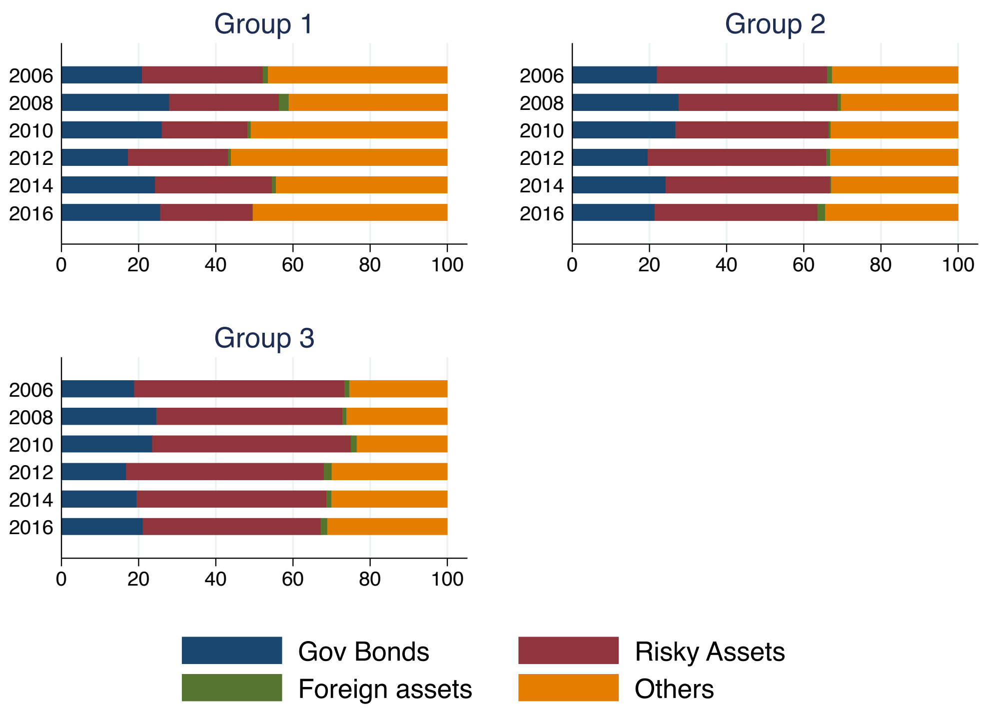
Table 1: Households' Financial assets 2006-2016

Assets classes	2006	2008	2010	2012	2014	2016
Included in the analysis						
Bot[a]	0.064	0.083	0.071	0.045	0.048	0.047
Btp[b]	0.019	0.019	0.016	0.026	0.022	0.018
Cct[c]	0.021	0.018	0.017	0.010	0.017	0.013
Ctz[d]	0.002	0.000	0.003	0.000	0.001	0.000
Equities	0.066	0.060	0.041	0.046	0.037	0.033
Corporate bonds[e]	0.064	0.080	0.071	0.086	0.078	0.052
Mutual funds	0.072	0.061	0.072	0.057	0.059	0.064
Excluded from the analysis						
Deposits[f]	0.894	0.898	0.916	0.942	0.930	0.938
Other goverment papers	0.005	0.002	0.005	0.003	0.005	0.003
Postal bonds	0.071	0.064	0.058	0.064	0.050	0.049
Certificates of deposits	0.015	0.021	0.018	0.015	0.018	0.026
Repos	0.005	0.015	0.010	0.010	0.012	0.014
Other mutual funds	0.035	0.029	0.005	0.004	0.002	0.003
Assets issued by non-nationals	0.010	0.010	0.010	0.009	0.006	0.007
Unlisted equity	0.008	0.010	0.010	0.008	0.008	0.008
Managed portfolios	0.013	0.011	0.012	0.021	0.012	0.010
Loans to cooperatives	0.019	0.019	0.018	0.015	0.012	0.011

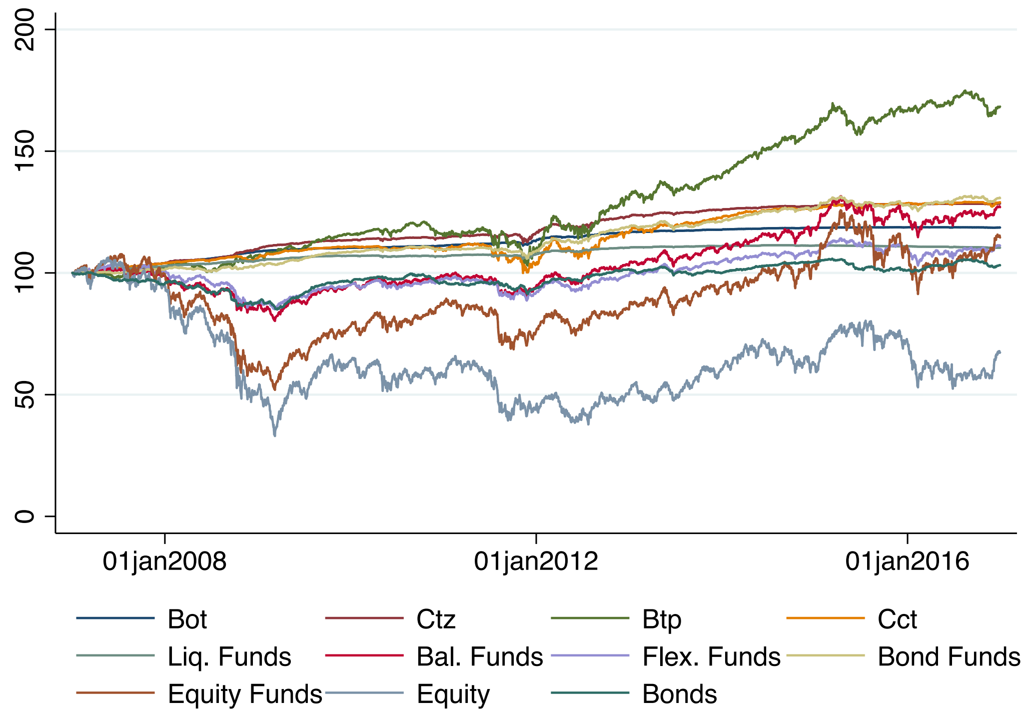
Note: The table includes the percentage holding of all financial asset classes contained in the Bank of Italy's SHIW from 2006 to 2016. The top panel reports the asset classes included in the analysis; the excluded ones are reported in the bottom panel. Averages are calculated using sample weights.
Source: Bank of Italy's Survey on Household Income and Wealth, 2006-2016.
[a] Treasury bills up to one year maturity.
[b] Long-term government bond.
[c] Floating-rate Treasury credit certificates, 2-4 years in maturity indexed to BOT.
[d] Treasury bills up to two year maturity.
[e] Bonds issued by Italian banks and firms.
[f] Current accounts, saving accounts, post office current accounts, post office saving accounts.

Figure 1: Households' portfolio composition, 2006-2016



Note: The figure shows the evolution of Italian households' portfolio composition in the period 2006-2016, for three groups of households: Group 1 (bottom two quartiles of the income distribution), Group 2 (third quartile) and Group 3 (top quartile). Government bonds include: bot, btp, cct and ctz. Risky assets include: equity, corporate bonds, and mutual funds. Foreign assets include all assets issued by non-residents. Others include: postal bonds, certificates of deposits, repos, unlisted equity, and managed portfolio. Deposits are excluded. Averages are calculated using sample weights.
Source: Bank of Italy's Survey on Household Income and Wealth, 2006-2016.

Figure 2: Evolution over time of the financial indexes included in the analysis, 2007-2016



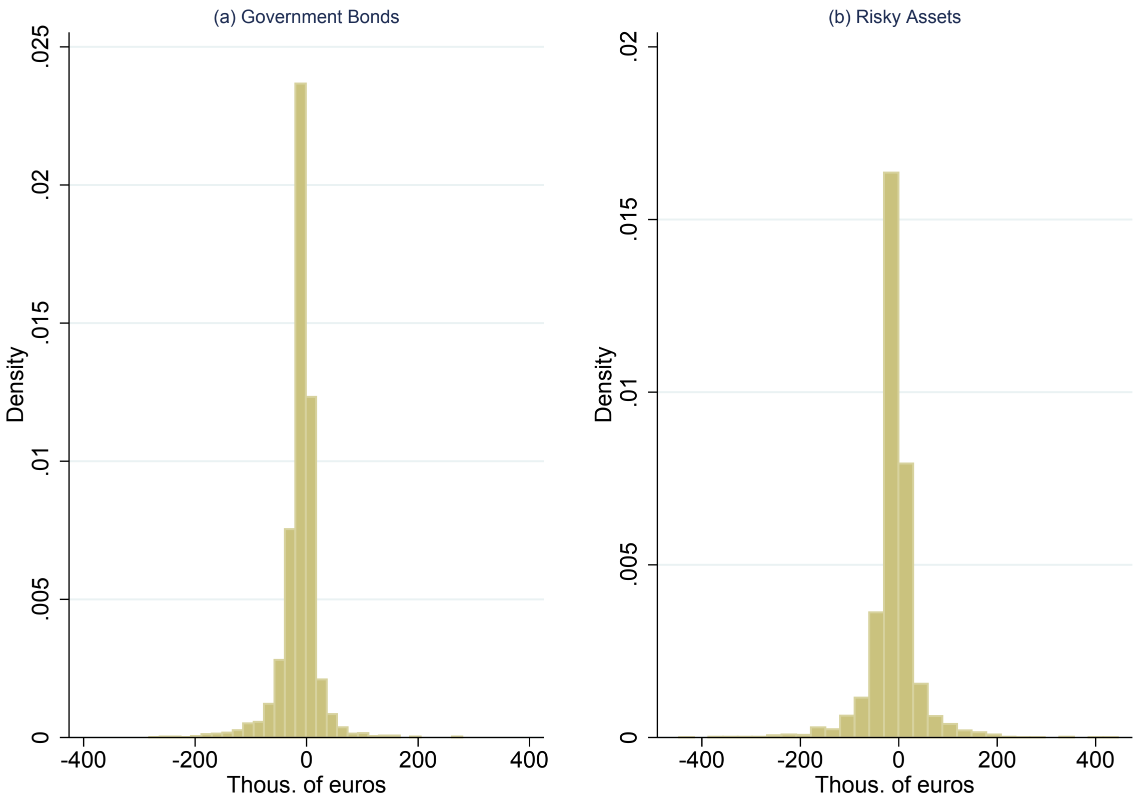
Note: The figure shows the eleven financial indexes used to approximate the return of the ten asset classes included in the analysis (Section 3.2) and to estimate the impact of ECB's UMP announcements on the financial categories included in the empirical analysis (Section 4.1). All data are indexed to 100 on January 1, 2007.
Source: Bloomberg and Datastream.

Table 2: Description of the financial indexes included in the analysis, 2007-2016

Asset classes	Index	Index description
Bot	FTSE MTS Italy BOT Ex-Bank of Italy	It measures the performance of short-term Italian government debt securities, or BOTs. The FTSE MTS Ex-Bank of Italy BOT Index includes all the BOTs listed on MTS
Btp/Btpi	FTSE MTS Italy BTP Ex-Bank of Italy	It measures the performance of short-term Italian government debt securities, or BOTs. The FTSE MTS Ex-Bank of Italy BTP Index includes all the BTPs listed on MTS
Ctz	FTSE MTS Italy CTZ Ex Bank of Italy Index	It measures the performance of short-term Italian government debt securities, or BOTs. The FTSE MTS Ex-Bank of Italy CTZ Index includes all the CTZs listed on MTS
Cct	FTSE MTS Italy CCT Ex-Bank of Italy	It measures the performance of short-term Italian government debt securities, or BOTs. The FTSE MTS Ex-Bank of Italy CCT Index includes all the CCTs listed on MTS
Bonds	Italian constituents of BofA Merril Lynch Euro Corporate Index	It tracks the performance of EUR denominated investment grade corporate debt publicly issued in the eurobond or Euro member domestic markets.
Equity	FTSE MIB Gross Total Return	It is the primary benchmark index for the Italian equity market. It captures approximately 80% of the domestic market capitalization and it measures the performance of the 40 most liquid and capitalized Italian shares
Liquidity Fund	Banca Fideuram Indice Fondi di Mercato Monetario	It measures the performance of all Italian liquidity funds. The index is calculated as the weighted average of the daily net asset value of each included fund.
Balanced Funds	Italy Fideuram Balanced Group	It measures the performance of all Italian balanced funds. The index is calculated as the weighted average of the daily net asset value of each included fund.
Flexible Fund	Italy Fideuram Flexible	It measures the performance of all Italian flexible funds. The index is calculated as the weighted average of the daily net asset value of each included fund.
Bond Fund	Italy Fideuram Bond Funds	It measures the performance of all Italian bond funds. The index is calculated as the weighted average of the daily net asset value of each included fund.
Equity Fund	Italy Fideuram Equity Funds	It measures the performance of all Italian equity funds. The index is calculated as the weighted average of the daily net asset value of each included fund.

Note: The table reports the name and the description of the financial indexes used to approximate the asset classes included in the empirical analysis. The first column lists the asset classes; the second column contains the name and the provider of the indexes used to approximate asset classes listed in Column 1; the third column provides a brief description of the indexes.
Source: Bloomberg and Datastream.

Figure 3: Active rebalancing



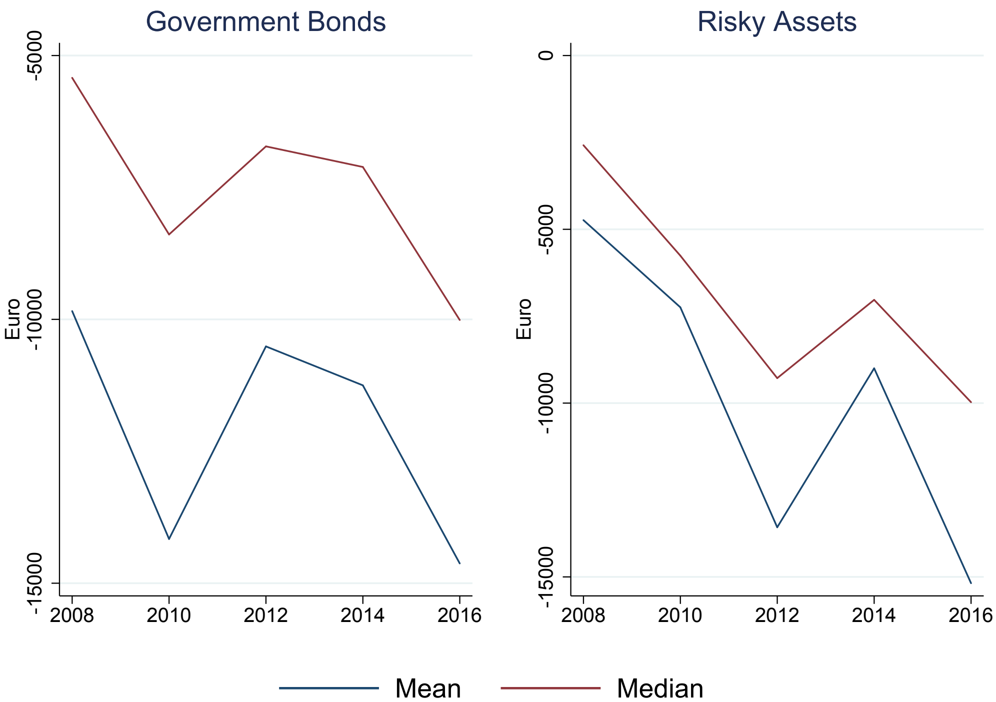
Note: The figure shows the distribution of Italian households' active rebalancing for the two asset categories included in the empirical analysis, government bonds (bot, ctz, btp,cct) and risky assets (liquidity funds, mixed funds, bond funds, equity funds, equity, and corporate bonds) over the 2006-2016 period. The unit is thousands of euro. For a detailed explanation of the methodology used to construct the two active rebalancing categories, please refer to Section 3.2. Only data included in the estimation sample is reported here. Thus, rebalancing equal to zero as well as positive rebalancing in t conditioning on not being invested in the asset category in $t-1$ have been excluded from the picture.
Source: Bank of Italy's Survey on Household Income and Wealth, Bloomberg, Datastream and own calculation.

Table 3: Active Rebalancing, Summary Statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Government Bonds						
Group 1	966	-9207.94	-6061.98	24268.94	-193365.90	200150.60
Group 2	1163	-14567.42	-7551.96	33100.98	-282372.70	118234.90
Group 3	894	-12375.98	-8410.40	40724.94	-258490.20	279394.10
Full sample	3023	-12047.96	-7282.91	33835.78	-282372.70	279394.10
Risky Assets						
Group 1	538	-6326.02	-6765.15	28208.82	-110462.90	188918.40
Group 2	1184	-8580.45	-6078.64	47167.97	-269932.60	445047.40
Group 3	1371	-11630.82	-6356.70	57088.08	-446124.80	354559.90
Full sample	3093	-9821.48	-6259.39	50329.77	-446124.80	445047.40

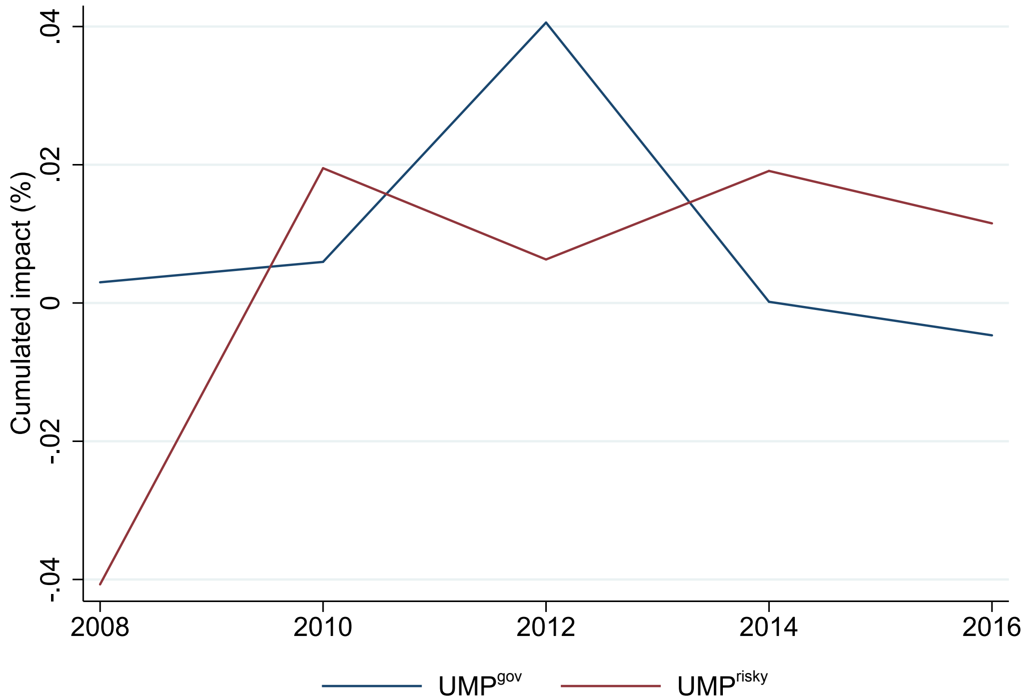
Note: The table reports the summary statistics for the active rebalancing of the two categories included in the analysis, government bonds (Bot, Ctz, Btp, Cct) and risky assets (Liquidity funds, mixed funds, bond funds, equity funds, equity and corporate bonds) for the year 2006-2016. Summary statistics are reported for the full sample as well as for different groups of households along the income distribution: Group 1 (bottom two quartiles of the income distribution), Group 2 (third quartile) and Group 3 (top quartile). For a detailed explanation of the construction of the two active rebalancing categories, please refer to Section 3.2. Only data included in the estimation sample is used for the calculations. Thus, rebalancing equal to zero as well as positive rebalancing in t conditioning on not being invested in the asset category in $t-1$ have been excluded from the table.
Source: Bank of Italy's Survey on Household Income and Wealth, Bloomberg, Datastream and own calculation.

Figure 4: Evolution of the active rebalancing, 2008-2016



Note: The figure shows the evolution over time of the mean and the median value of households' active rebalancing of the two categories included in the analysis, government bonds (Bot, Ctz, Btp, Cct) and risky assets (Liquidity funds, mixed funds, bond funds, equity funds, equity and corporate bonds) for the year 2006-2016. The unit is thousands of euro. For a detailed explanation of the construction of the two active rebalancing categories, please refer to Section 3.2. Only data included in the estimation sample is reported here. Thus, rebalancing equal to zero as well as positive rebalancing in t conditioning on not being invested in the asset category in $t-1$ have been excluded from the picture.
Source: Bank of Italy's Survey on Household Income and Wealth, Bloomberg, Datastream and own calculation.

Figure 5: The Unconventional Monetary Policy Measure



Note: The graph depicts the bi-yearly cumulated impact of UMP announcements' unexpected component on government bonds and risky asset categories. The blue and red lines are obtained by estimating at the daily frequency the effect of ECB's UMP announcements on the returns of several financial indexes (bot, btp, ctz, cct in the case of UMP^{gov} and equity, corporate bond, liquidity funds, mixed funds, bond funds and equity funds in the case of UMP^{risky}), estimating Equation (3). The daily impact is then aggregated into a bi-yearly series by summing within two year window, as explained in Section 4.1. For a complete list of the ECB's announcements included in the analysis, see Table C.2.

Table 4: UMPs and Active Rebalancing - Baseline Results

	(1) Risky assets	(2) Government bonds
Risky, lag × $\text{UMP}^{\text{risky}}_{\text{average}}$	6.283***	4.599***
	(2.088)	(1.712)
Safe, lag × $\text{UMP}^{\text{gov}}_{\text{average}}$	-2.443	-1.782
	(2.724)	(2.567)
Risky, lag	-0.504***	0.0713*
	(0.0415)	(0.040)
Safe, lag	0.223***	-0.693***
	(0.068)	(0.050)
Δ Income	0.303***	0.0870
	(0.077)	(0.060)
Δ Net wealth	0.0672***	0.0418***
	(0.007)	(0.007)
Net wealth, lag	0.0182***	0.0111**
	(0.004)	(0.004)
Income, lag	0.139**	0.145***
	(0.067)	(0.046)
Constant	yes	yes
Demographics, lag	yes	yes
Risk aversion, lag	yes	yes
Time FE	yes	yes
Observations	3093	3023
R^2	0.338	0.370

Note: The table reports the estimates from Equation 4 including data from 2008 to 2016. The dependent variables are the stock (in euro) of active rebalancing of risky assets (Column 1) and of government bonds (Column 2). The variables $\text{UMP}^{\text{risky}}_{\text{average}}$ and $\text{UMP}^{\text{gov}}_{\text{average}}$ are constructed estimating Equation (3) with daily data and then following the procedure explained in Section 4.1 to construct a bi-yearly series. Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.1. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: UMPs and Risky Assets Active Rebalancing - Groups

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Risky, lag × $\text{UMP}^{\text{risky}}_{\text{average}}$	6.283***	1.739	5.929	6.619**
	(2.088)	(4.959)	(3.650)	(2.789)
Safe, lag × $\text{UMP}^{\text{gov}}_{\text{average}}$	-2.443	-0.962	-4.462	0.599
	(2.724)	(11.09)	(2.798)	(4.016)
Risky, lag	-0.504***	-0.312***	-0.490***	-0.516***
	(0.0415)	(0.103)	(0.0776)	(0.0512)
Safe, lag	0.223***	0.182*	0.182***	0.227**
	(0.0680)	(0.107)	(0.0659)	(0.103)
Δ Income	0.303***	0.348**	0.254*	0.324***
	(0.0775)	(0.171)	(0.146)	(0.0996)
Δ Net wealth	0.0672***	0.0679***	0.0763***	0.0601***
	(0.00700)	(0.0135)	(0.0116)	(0.00928)
Net wealth, lag	0.0182***	0.0180*	0.0131**	0.0180***
	(0.00435)	(0.00988)	(0.00540)	(0.00641)
Income , lag	0.139**	0.295	0.256	0.169
	(0.0686)	(0.246)	(0.226)	(0.130)
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion,lag	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3093	538	1184	1371
R^2	0.338	0.211	0.367	0.355

Note: The table reports the estimates from Equation (4) including data from 2008 to 2016. In all four columns the dependent variable is the stock (in euro) of risky assets active rebalancing. The first column shows the results when considering the full sample. In the following three columns households are split according to the value of their disposable income: Group 1 includes households in the bottom two quartiles of the income distribution, Group 2 contains households in the third quartile, and Group 3 comprises households in the top quartile. The variables $\text{UMP}^{\text{risky}}_{\text{average}}$ and $\text{UMP}^{\text{gov}}_{\text{average}}$ are constructed estimating Equation (3) with daily data and then following the procedure explained in Section 4.1 to construct a bi-yearly series. Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.2. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: UMPs and Government Bonds Active Rebalancing - Groups

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Risky, lag × $\text{UMP}^{\text{risky}}_{\text{average}}$	4.599***	11.36	6.371	3.164*
	(1.712)	(7.210)	(4.593)	(1.911)
Safe, lag × $\text{UMP}^{\text{gov}}_{\text{average}}$	-1.782	8.667	-3.431	-2.411
	(2.567)	(6.069)	(4.452)	(2.784)
Risky, lag	0.0713*	0.00677	0.120	0.0439
	(0.0398)	(0.0883)	(0.0836)	(0.0459)
Safe, lag	-0.693***	-0.662***	-0.674***	-0.719***
	(0.0502)	(0.0844)	(0.0923)	(0.0786)
Δ Income	0.0870	0.327***	0.134	-0.00699
	(0.0602)	(0.116)	(0.0875)	(0.0934)
Δ Net wealth	0.0418***	0.0309***	0.0385**	0.0441***
	(0.00719)	(0.00852)	(0.0158)	(0.00918)
Net wealth, lag	0.0111**	0.00599	0.0124	0.0101**
	(0.00434)	(0.00520)	(0.0102)	(0.00508)
Income, lag	0.145***	0.484***	0.202	0.128
	(0.0456)	(0.124)	(0.188)	(0.0971)
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3023	966	1163	894
R^2	0.370	0.391	0.349	0.418

Note: The table reports the estimates from Equation (4) including data from 2008 to 2016. In all four columns the dependent variable is the stock (in euro) of government bonds active rebalancing. The first column shows the results when considering the full sample. In the following three columns households are split according to the value of their disposable income: Group 1 includes households in the bottom two quartiles of the income distribution, Group 2 contains households in the third quartile, and Group 3 comprises households in the top quartile. The variables $\text{UMP}^{\text{risky}}_{\text{average}}$ and $\text{UMP}^{\text{gov}}_{\text{average}}$ are constructed estimating Equation (3) with daily data and then following the procedure explained in Section 4.1 to construct a bi-yearly series. Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.3. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: UMPs and Risky Assets Active Rebalancing - Excluding 2016

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Risky, lag × $UMP^{risky}_{average}$	6.876***	0.473	5.424	7.843***
	(2.280)	(5.399)	(5.574)	(2.635)
Safe, lag × $UMP^{gov}_{average}$	-1.056	4.540	-3.966	2.690
	(2.601)	(10.07)	(3.602)	(3.461)
Risky, lag	-0.473***	-0.363***	-0.500***	-0.464***
	(0.0490)	(0.117)	(0.116)	(0.0568)
Safe, lag	0.168***	0.109	0.131	0.162**
	(0.0652)	(0.117)	(0.107)	(0.0820)
Δ Income	0.308***	0.315*	0.300	0.330***
	(0.0844)	(0.167)	(0.194)	(0.103)
Δ Net wealth	0.0668***	0.0546***	0.0870***	0.0593***
	(0.00751)	(0.0125)	(0.0156)	(0.00914)
Net wealth, lag	0.0197***	0.0216**	0.0136*	0.0194***
	(0.00424)	(0.0104)	(0.00729)	(0.00536)
Income, lag	0.120*	0.201	0.0697	0.0846
	(0.0727)	(0.256)	(0.383)	(0.116)
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	2566	446	755	1365
R^2	0.327	0.220	0.358	0.346

Note: The table reports the estimates from Equation (4) including data from 2008 to 2014. In all four columns the dependent variable is the stock (in euro) of risky assets active rebalancing. The first column shows the results when considering the full sample. In the following three columns households are split according to the value of their disposable income: Group 1 includes households in the bottom two quartiles of the income distribution, Group 2 contains households in the third quartile, and Group 3 comprises households in the top quartile. The variables $UMP^{risky}_{average}$ and $UMP^{gov}_{average}$ are constructed estimating Equation (3) with daily data and then following the procedure explained in Section 4.1 to construct a bi-yearly series. Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.4. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: UMPs and Government Bonds Active Rebalancing - Excluding 2016

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Risky, lag × $UMP^{risky}_{average}$	5.093***	11.91	-1.915	5.510**
	(1.928)	(7.785)	(4.692)	(2.234)
Safe, lag × $UMP^{gov}_{average}$	-3.040	7.206	-4.099	-4.728
	(2.813)	(7.144)	(5.262)	(3.078)
Risky, lag	0.0898*	-0.0228	0.0245	0.0950*
	(0.0470)	(0.100)	(0.0887)	(0.0551)
Safe, lag	-0.648***	-0.619***	-0.669***	-0.640***
	(0.0574)	(0.118)	(0.0897)	(0.0932)
Δ Income	0.122*	0.423***	0.224**	0.0358
	(0.0666)	(0.133)	(0.0966)	(0.0939)
Δ Net wealth	0.0380***	0.0244***	0.0265***	0.0437***
	(0.00556)	(0.00845)	(0.00803)	(0.00851)
Net wealth , lag	0.00750**	0.00173	-0.000383	0.0107**
	(0.00341)	(0.00544)	(0.00507)	(0.00497)
Income , lag	0.153***	0.566***	-0.133	0.0876
	(0.0492)	(0.146)	(0.192)	(0.0943)
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	2533	805	789	939
R^2	0.433	0.342	0.563	0.417

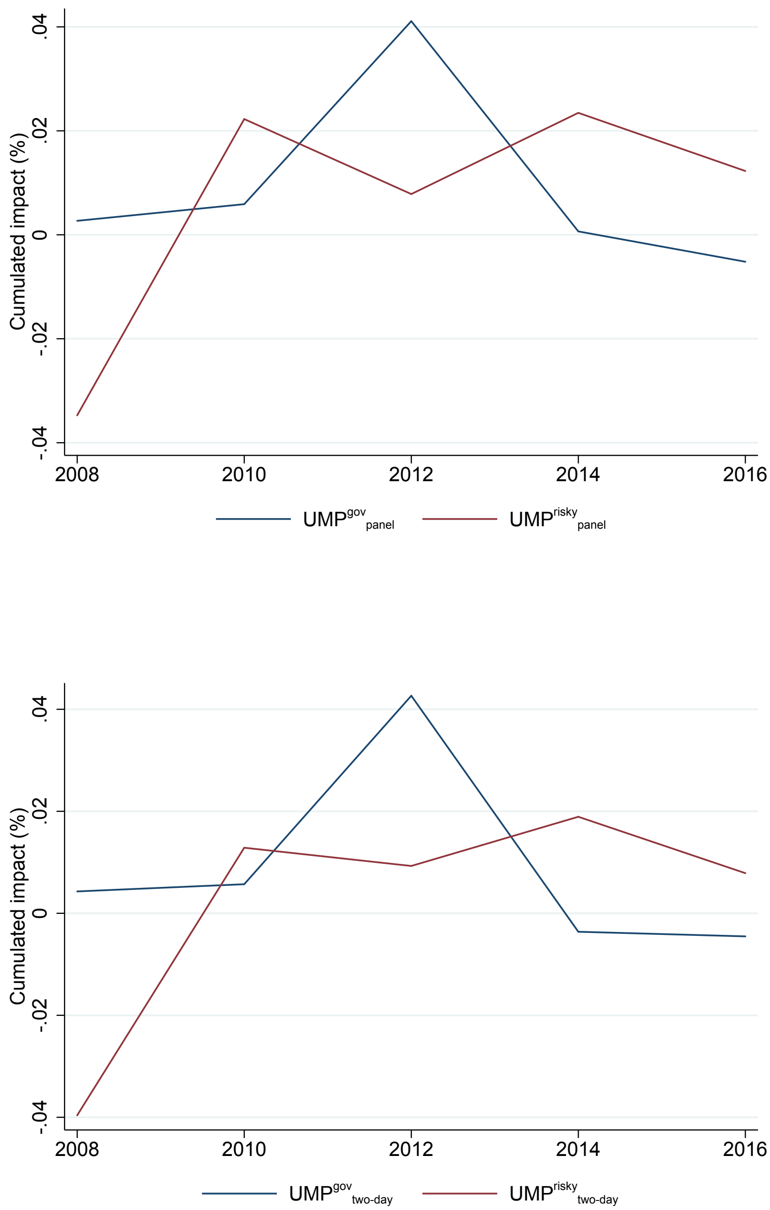
Note: The table reports the estimates from Equation (4) including data from 2008 to 2014. In all four columns the dependent variable is the stock (in euro) of government bonds active rebalancing. The first column shows the results when considering the full sample. In the following three columns households are split according to the value of their disposable income: Group 1 includes households in the bottom two quartiles of the income distribution, Group 2 contains households in the third quartile, and Group 3 comprises households in the top quartile. The variables $UMP^{risky}_{average}$ and $UMP^{gov}_{average}$ are constructed estimating Equation (3) with daily data and then following the procedure explained in Section 4.1 to construct a bi-yearly series. Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.5. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Robusness Checks: Heckman Selection Model

	(1) Risky assets 2^{nd} stage	(2) Risky assets 1^{st} stage	(3) Gov Bonds - 2^{nd} stage	(4) Gov Bonds - 1^{st} stage
Risky, lag $\times$ UMP$^{risky}_{average}$	6.239***		4.589***	
	(0.948)		(1.100)	
Safe, lag $\times$ UMP$^{gov}_{average}$	-2.501		-1.851	
	(1.910)		(1.141)	
Risky, lag	-0.507***		0.0665***	
	(0.0171)		(0.0211)	
Safe, lag	0.221***		-0.693***	
	(0.0435)		(0.0232)	
Δ Income	0.294***		0.0785	
	(0.0723)		(0.0607)	
Δ Net wealth	0.0673***		0.0417***	
	(0.00455)		(0.00397)	
Net wealth, lag	0.0168***	5.04e-07***	0.0108***	5.81e-08
	(0.00350)	(5.62e-08)	(0.00303)	(5.41e-08)
Income, lag	0.0745	1.51e-05***	0.0910*	1.02e-05***
	(0.0615)	(9.50e-07)	(0.0552)	(8.88e-07)
Inverse Mills ratio	-4415.6***		-4484.8*	
	(1588.3)		(2720.2)	
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations		19675		19730

Note: The table reports the estimates from an Heckman selection model (Equation 5) including data from 2008 to 2016. Columns 2 and 4 report the estimates of the first stage of the model, i.e. a probit model for the binary choice of rebalancing conditioning on not being invested in the asset category in $t-1$ (extensive margin decision); The dependent variables are dummy variables equal to 1 if a rebalancing of risky assets (Column 2) and government bonds (Column 4) has occurred between $t-1$ and t, zero otherwise. Column 1 and 3 include the estimates of the rebalancing equation conditioning to participation. The dependent variables are the (stock of) active rebalancing of risky assets and government bonds, respectively. The variables UMP$^{risky}_{average}$ and UMP$^{gov}_{average}$ are constructed estimating Equation (3) with daily data and then following the procedure explained in Section 4.1 to construct a bi-yearly series. Only the coefficient of interests and the households financial controls are reported here. For the extended version of the table, please refer to Appendix D.6. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 6: The Unconventional Monetary Policy Measure



Note: The graph depicts the bi-yearly cumulated impact of UMP announcements' unexpected component on government bonds and risky asset categories. The blue and red lines are obtained by estimating at the daily frequency the effect of ECB's UMP announcements on the returns of several financial indexes (bot, btp, ctz, cct in the case of UMP^{gov} and equity, corporate bond, liquidity funds, mixed funds, bond funds and equity funds in the case of UMP^{risky}), employing Equation (6) for the top panel and Equation (7) for the bottom panel. The daily impact is then aggregated into a bi-yearly series by summing within two year window, as explained in Section 4.1. For a complete list of the ECB's announcements included in the analysis, see Table C.2.

Table 10: Robusness Checks: UMP Identification

	(1) Risky Assets	(2) Gov Bonds	(3) Risky Assets	(4) Gov Bonds
Risky, lag × $\text{UMP}^{\text{risky}}_{\text{panel}}$	7.201***	4.648**		
	(2.261)	(1.842)		
Safe, lag × $\text{UMP}^{\text{gov}}_{\text{panel}}$	-2.329	-1.921		
	(2.694)	(2.527)		
Risky, lag × $\text{UMP}^{\text{risky}}_{\text{two-day}}$			5.825***	4.537**
			(2.253)	(1.788)
Safe, lag × $\text{UMP}^{\text{gov}}_{\text{two-day}}$			-2.412	-2.042
			(2.499)	(2.394)
Risky, lag	-0.526***	0.0610*	-0.502***	0.0792**
	(0.0399)	(0.0353)	(0.0421)	(0.0395)
Safe, lag	0.226***	-0.681***	0.214***	-0.682***
	(0.0678)	(0.0485)	(0.0675)	(0.0480)
Δ Income	0.304***	0.0934	0.296***	0.0908
	(0.0775)	(0.0598)	(0.0777)	(0.0596)
Δ Net wealth	0.0671***	0.0371***	0.0672***	0.0371***
	(0.00698)	(0.00545)	(0.00701)	(0.00546)
Net wealth	0.0182***	0.00819**	0.0184***	0.00818**
	(0.00434)	(0.00323)	(0.00435)	(0.00322)
Income	0.138**	0.144***	0.136**	0.143***
	(0.0685)	(0.0455)	(0.0687)	(0.0455)
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3093	3023	3093	3023
R^2	0.340	0.431	0.336	0.431

Note: The table reports the estimates from Equation (4) including data from 2008 to 2016. The dependent variables are the stock (in euro) of active rebalancing of risky assets (Column 1 and 3) and of government bonds (Column 2 and 4). The variables $\text{UMP}^{\text{risky}}_{\text{panel}}$ and $\text{UMP}^{\text{gov}}_{\text{panel}}$ are constructed using panel techniques to estimate the daily impact of ECB's unconventional announcements (Equation 6) and then following the procedure explained in Section 5.2. Variables $\text{UMP}^{\text{two-day}}_{\text{panel}}$ and $\text{UMP}^{\text{gov}}_{\text{two-day}}$ are constructed using a two-day window to capture the impact of ECB's unconventional announcements (Equation 7) and then following the procedure explained in Section 4.1 . Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.7. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11: Robusness Checks: Estimation Sample

	(1) Risky Assets weighted	(2) Gov Bonds weighted	(3) Risky Assets quality check	(4) Gov Bonds quality check
Risky, lag × $\text{UMP}^{\text{risky}}_{\text{average}}$	6.876***	2.666*	7.576***	4.363**
	(2.549)	(1.512)	(2.565)	(2.100)
Safe, lag × $\text{UMP}^{\text{gov}}_{\text{average}}$	-3.717	-0.563	-2.397	-0.735
	(3.565)	(2.532)	(2.802)	(3.590)
Risky, lag	-0.534***	0.0353	-0.491***	0.0750
	(0.0549)	(0.0339)	(0.0500)	(0.0487)
Safe, lag	0.257***	-0.772***	0.229***	-0.681***
	(0.0886)	(0.0490)	(0.0816)	(0.0591)
Δ Income	0.168	0.0689	0.327***	0.145*
	(0.109)	(0.0649)	(0.106)	(0.0846)
Δ Net wealth	0.0640***	0.0307***	0.0741***	0.0405***
	(0.00834)	(0.00652)	(0.00925)	(0.00805)
Net wealth, lag	0.0133**	0.00914**	0.0160***	0.0119**
	(0.00528)	(0.00382)	(0.00593)	(0.00472)
Income , lag	0.147*	0.174***	0.150*	0.106*
	(0.0778)	(0.0470)	(0.0908)	(0.0620)
Constant	yes	yes	yes	yes
Demographics, lag	yes	yes	yes	yes
Risk aversion	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3093	3023	1877	1619
R^2	0.388	0.470	0.348	0.423

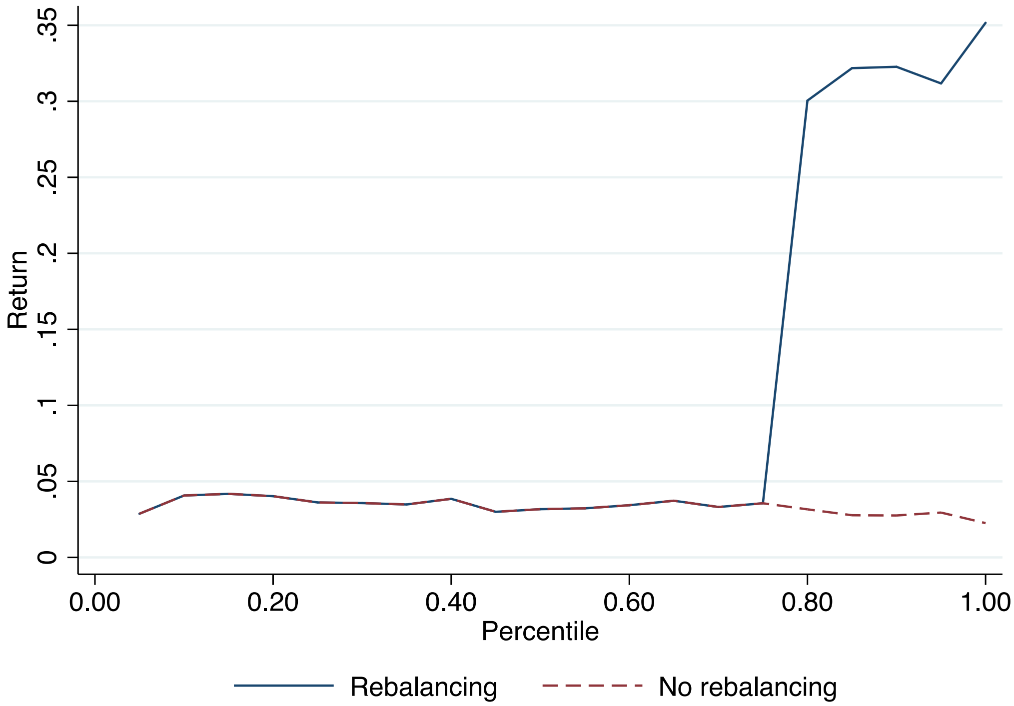
Note: The table reports the estimates from Equation 4 including data from 2008 to 2016. The dependent variables are the stock (in euro) of active rebalancing of risky assets (Column 1 and 3) and of government bonds (Column 2 and 4). Column (1) and (2) of Table 11 report the results when using the weighted sample, while Column (3) and (4) show results when cutting the sample to control for the quality of the survey data. The variables $\text{UMP}^{\text{risky}}_{\text{average}}$ and $\text{UMP}^{\text{gov}}_{\text{average}}$ are constructed estimating Equation (3) and then following the procedure explained in Section 4.1. Only the coefficient of interests and the households' financial controls are reported here. For the extended version of the table, please refer to Appendix D.8. Standard errors (in parenthesis) are robust to heteroskedasticity. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Composition of Households' Financial Portfolio

Perc	Risky Assets	Gov Bonds	Tot Port	Perc	Risky Assets	Gov Bonds	Tot Port
1-5%	282.05	243.32	525.37	*51-55%*	2708.66	3709.46	6418.12
6-10%	102.74	600.40	703.14	56-60%	5330.80	9706.12	15036.92
11-15%	193.73	1561.69	1755.42	*61-65%*	3227.68	9259.44	12487.12
16-20%	279.19	1460.13	1739.31	*66-70%*	4535.45	7019.62	11555.06
21-25%	848.93	2025.16	2874.09	*71-75%*	6031.49	13256.72	19288.21
26-30%	893.31	2001.81	2895.11	*76-80%*	11004.80	13590.84	24592.32
31-35%	1285.07	2512.35	3797.41	*81-85%*	10227.97	7731.53	17959.49
36-40%	1282,79	4631.78	5914.57	*86-90%*	11284.95	8359.34	19644.29
41-45%	3661.5	2707.35	5368.85	*91-95%*	14073.27	13393.51	27466.78
46-50%	3706.02	4726.50	8432.52	*96-100%*	40792.87	14446.77	55239.64

Note: The table shows the average holding of risky assets, government bonds and the value of total portfolio along the income distribution. Averages are computed using sample weights provided in the SHIW. *Source*: Bank of Italy's Survey on Household Income and Wealth, 2006.

Figure 7: The impact of UMPs on households' financial portfolio



Note: The graph shows the average cumulated total portfolio rate of return between 2006 and 2016 for twenty different groups of households, ordered from left to right according to the quintile of income distribution they belong to. Two different scenarios are represented. The solid blue line depicts the cumulated portfolio rate of return when including both the UMP-induced valuation effect and active portfolio rebalancing. The red dashed line is its counterfactual and considers the cumulated portfolio return when the portfolio rebalancing component is shut down. By construction, the two lines only differ for households in the top quartile, as the empirical analysis finds that they are the only one rebalancing their financial portfolio following an accommodative unconventional monetary policy shock. For the initial value of total portfolios on 2006, see Table 12. The value of financial portfolios in 2016 is calculated using Equation (8). For each household i, the portfolio return is calculated as $\text{Tot Port Ret}_{2016,i} = \frac{\text{Tot Port}_{2016,i} - \text{Tot Port}_{2006,i}}{\text{Tot Port}_{2006,i}}$.

Appendices

A Data

Table A.1: List of asset classes included in the SHIW

2006	*2008*	*2010*	*2012*	*2014*	*2016*
Current account	Current account	Current account	Current account	Current account	Current account
Saving account	Saving account	Saving account	Saving account	Saving account	Saving account
Certif. of dep	Certif. of dep	Certif. of dep	Certif. of dep	Certif. of dep	Certif. of dep
Repos	Repos	Repos	Repos	Repos	Repos
PO savings certificates	PO savings certificates	PO savings certificates	PO savings certificates	PO savings certificates	PO savings certificates
BOTs (T-bills)	BOTs (T-bills)	BOTs (T-bills)	BOTs (T-bills)	BOTs (T-bills)	(T-bills)
CCTs (T-certificates)	CCTs (T-certificates)	CCTs (T-certificates)	CCTs (T-certificates)	CCTs (T-certificates)	CCTs (T-certificates)
.	.	.	Infl-indexed BTPs (T-bonds)	Infl-indexed BTPs (T-bonds)	Infl-indexed BTPs (T-bonds)
BTPs (T-bonds)	BTPs (T-bonds)	BTPs (T-bonds)	BTPs (T-bonds)	BTPs (T-bonds)	BTPs (T-bonds)
CTZs (zero coupon)	CTZs (zero coupon)	CTZs (zero coupon)	CTZs (zero coupon)	CTZs (zero coupon)	CTZs (zero coupon)
Other Gov. Bonds	Other Gov. Bonds	Other Gov. Bonds	Other Other Gov. Bonds	Other Gov. Bonds	Other Gov. Bonds
Bonds	Bonds	.	.	.	.
.	.	Bonds iss. by Italian firms	Bonds iss. by Italian firms	Bonds iss. by Italian firms	Bonds iss. by Italian firms
.	.	Bonds iss. by Italian banks	Bonds iss. by Italian banks	Bonds iss. by Italian banks	Bonds iss. by Italian banks
Equity funds	Equity funds	Equity funds	Equity funds	Equity funds	Equity funds
Balanced equity funds	Balanced equity funds	.	.	.	.
Balanced bond funds	Balanced bond funds	.	.	.	
Balanced funds	Balanced funds	.	.	.	.
Bond funds	Bond funds	Bond funds	Bond funds	Bond funds	Bond funds
Money market funds	Money market funds	Money market funds	.	.	.
Flexible funds	Flexible funds	Flexible funds			
.	.	Flexible&balanced funds	Flexible&balanced funds	Flexible&balanced funds	Flexible&balanced funds
.	.	Non-harmonized funds	.	.	.
Indexed funds	Indexed funds	Indexed funds	.	.	.
.	.	.	Funds or ETFs in foreign cu.	Funds or ETFs in foreign cu.	Funds or ETFs in foreign cu.
Shares in listed c.	Shares in listed c.	Shares in listed c.	Shares in listed c.	Shares in listed c.	
- of which in privatized c.	- of which in privatized c.	.	.	.	.
Shares in unlisted c.	Shares in unlisted c.	Shares in unlisted c.	Shares in unlisted c.	Shares in unlisted c.	Shares in unlisted c.
Shares in private c.	Shares in private c.	Shares in private c.	Shares in private c.	Shares in private c.	
Shares in partnerships	Shares in partnerships	Shares in partnerships	Shares in partnerships	Shares in partnerships	Shares in partnerships
Managed portfolios	Managed portfolios	Managed portfolios	Managed portfolios	Managed portfolios	Managed portfolios
Bonds and inv funds	Bonds and inv funds	.	.	.	.
(foreign)	(foreign)	.	.	.	.
.	.	.	Gov bonds (foreign)	Gov bonds (foreign)	Gov bonds (foreign)
.	.	.	Bonds (foreign)	Bonds (foreign)	Bonds (foreign)
Shares (foreign)	Shares (foreign)	Shares (foreign)	Shares (foreign)	Shares (foreign)	Shares (foreign)
.	.	Funds (foreign)	.	.	.
Other (foreign)	Other (foreign)	Other (foreign)	Other (foreign)	Other (foreign)	Other (foreign)
Loans to coop.	Loans to coop.	Loans to coop.	Loans to coop.	Loans to coop.	Loans to coop.
			Other fin. assets	Other fin. assets	Other fin. assets

Note: The table shows all asset classes included in the SHIW in the years 2006-2016. In case the asset class is not included in the survey, the symbol . is used. *Source*: Survey on Households Income and Wealth, Banca d'Italia,

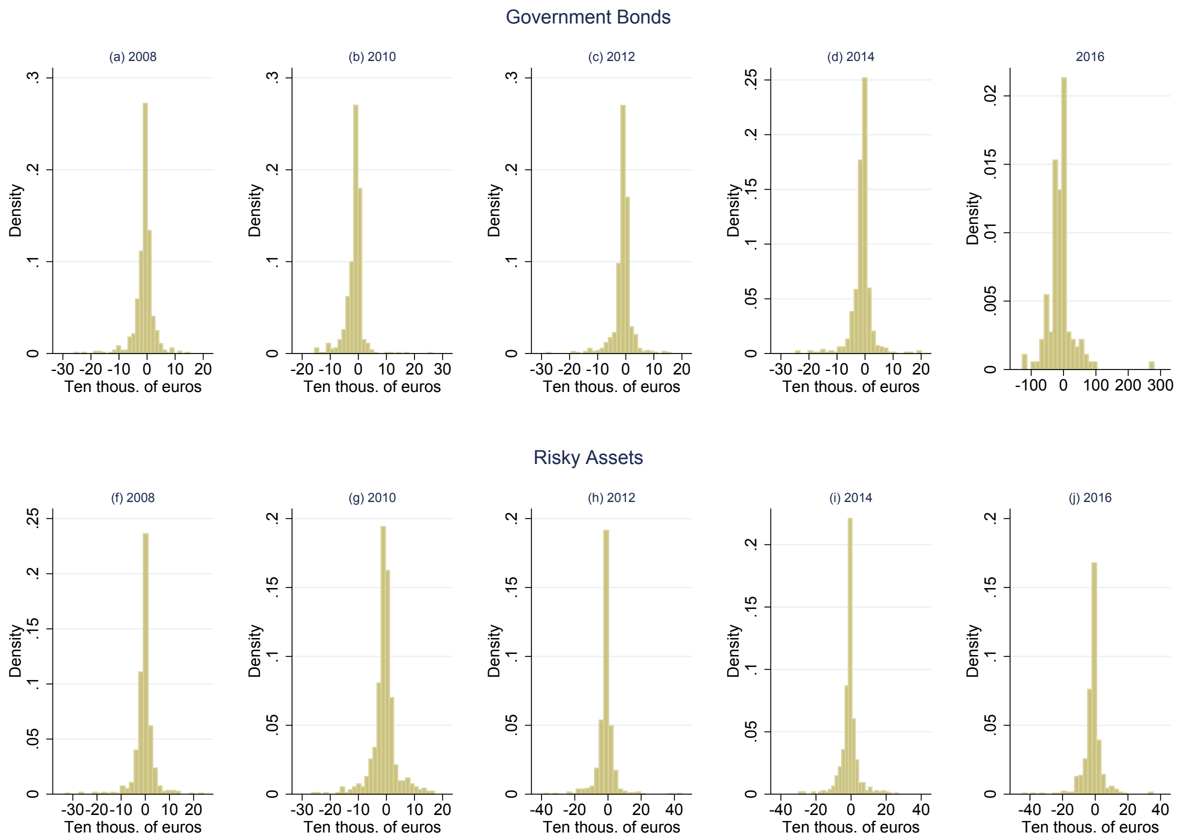
Table A.2: Description of asset classes included in the analysis

Asset classes	Description	Classification
Bot	Government bills up to 1 year	Gov bonds
Ctz	Government bills up to 2 year	Gov bonds
Btp	Government bonds	Gov bonds
Btpi	Inflation linked bonds	Gov bonds
Cct	Government floating rate notes	Gov bonds
Bonds issued by Italian banks	Bank bonds are bonds that are issued by banks. As with any type of bond, bank bonds are a debt instrument	Corp bonds
Bonds issued by Italian firms	Firms bonds that are issued by firms. As with any type of bond, firms bonds are a debt instrument	Corp bonds
Shares in listed Italian companies	Stocks of publicly-traded Italian companies traded on the Milan Stock Exchange	Equities
Italian Liquidity Fund	A liquidity fund portfolio is comprised of short-term, or less than one year, securities representing high-quality, liquid debt and monetary instruments	Funds
Italian Balanced Funds	A balanced fund is a mutual fund that generally keeps to a 50-50 mix of stock and bond investments	Funds
Italian Flexible Funds	Mutual fund that allows capital to be invested as the financial professional sees fit. Flexible mutual funds do not have any restrictions on where the money is to be invested or how much money is allowed to be used	Funds
Italian Balance Equity Funds	Balanced fund with a higher percentage of equity	Funds
Italian Balanced Bond Funds	Balanced fund with a higher percentage of bonds	Funds
Italian Bond Funds	A bond fund is a fund invested primarily in bonds and other debt instruments. The exact type of debt the fund invests in will depend on its focus, but investments may include government, corporate, municipal and convertible bonds, along with other debt securities like mortgage-backed securities	Funds
Italian Equity Funds	Fund that invest primarily in stocks represent the largest category of mutual funds. Generally, the investment objective of this class of funds is long-term capital growth	Funds
Italian Mixed Funds	Given by the sum of Italian Balanced Funds, Italian Balanced Bond Funds, Italian Balance Equity Funds, Italian Flexible Funds	Funds

Note: The table lists all asset classes included in the analysis (Column 1), together with a brief description (Column 2) and their final classification (Column 3).

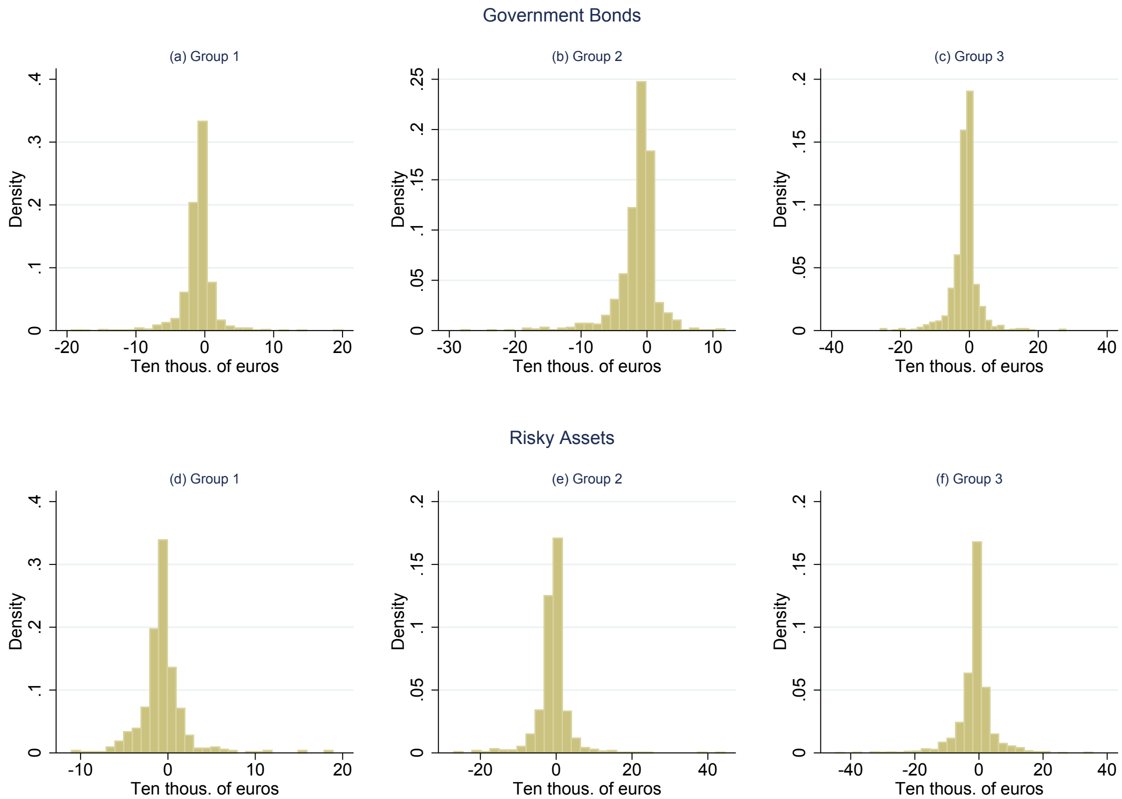
B Construction of the Active Rebalancing Variables

Figure 8: Active Rebalancing by Year, 2008-2016



Note: The figure shows the distribution of Italian households' active rebalancing over the 2008-2016 period for the two asset categories included in the empirical analysis: government bonds (bot, ctz, btp, cct) in the top panel; risky assets (liquidity funds, mixed funds, bond funds, equity funds, equity and corporate bonds) in the bottom panel. For a detailed explanation of the construction of the two active rebalancing categories, please refer to Section 3.2. Only data included in the estimation sample is used for the calculations. Thus, rebalancing equal to zero as well as positive rebalancing in t conditioning on not being invested in the asset category in $t-1$ have been excluded from the table. The unit is ten thousand euro.
Source: Bank of Italy's Survey on Household Income and Wealth, Bloomberg, Datastream and own calculation.

Figure 9: Active Rebalancing by Household Groups, 2008-2016



Note: The graph shows the distribution of Italian households' active rebalancing over the 2006-2016 period for the two asset categories included in the empirical analysis: government bonds (bot, ctz, btp, cct) in the top panel; risky assets (liquidity funds, mixed funds, bond funds, equity funds, equity and corporate bonds) in the bottom panel. Three groups of households are included in the graph: Group 1 (households in the bottom two quartiles of the income distribution), Group 2 (households in the third quartile) and Group 3 (households in the top quartile). For a detailed explanation of the construction of the two active rebalancing categories, please refer to Section 3.2. Only data included in the estimation sample is used for the calculations. Thus, rebalancing equal to zero as well as positive rebalancing in t conditioning on not being invested in the asset category in $t-1$ have been excluded from the table. The unit is ten thousand euro.
Source: Bank of Italy's Survey on Household Income and Wealth, Bloomberg, Datastream and own calculation.

C Unconventional Monetary Policy Identification

Table C.1: Economic Data Releases

Euro area	EC Bus. Climate Ind.; Current Account Net WDA SA; EC Cons. Conf. Ind; CPI YoY; CPI MoM; BOP CA Net NSA; New Orders (Manu.); YoY GFCF QoQ; EC Serv. Conf. Ind.; Markit Comp. PMI SA; Markit Serv. PMI SA; Retail Sales Vol. YoY WDA; Retail Sales Vol. MoM SA; ZEW Exp. of Econ. Growth; Trade Bal. with non EZ; M3 Money Supply 3 M. MA; PPI Industry Ex Constr.YoY; PPI Industry Ex Constr. MoM; Unem. Rate; GDP SA QoQ (real SA)
Italy	CPI NIC Incl Tbc. YoY; NSA CPI NIC Incl Tbc. MoM NSA; Cons. Conf. Ind. SA; Bus. Conf. Manu. Sector; Hourly Wages MoM SA; Ind. Orders YoY NSA; Ind. Orders MoM SA; Ind. Prod. YoY WDA; Ind. Prod. MoM SA; Ind. Prod. YoY; Ind. Sales YoY; Ind. Sales MoM SA; Manu. PMI SA; Serv. PMI SA; PPI Manu. MoM; PPI Manu. YoY; PPI Manu. YoY; Priv. Cons. QoQ SA WDA; Retail Sales MoM SA; Retail Sales YoY; Trade Balance Total; Unem. Rate SA; Real GDP YoY SA WDA; Trade Balance Non EU NSA
US	C PI YoY NSA; CPI MoM SA; CPI Ex. Fd. & En. YoY NSA; UM Cons. Conf. Ind; Pers. Cons. Exp. CPI YoY SA; Gov. Budget Balance; Cons. Spend. GR MoM SA; Core PPI; Housing Starts/Permits; PPI Fin. Goods SA; MoM% Avg. H Earnings YoY% SA; Dur. Goods Orders MoM SA; Markit Manu. PMI SA; PPI - Fin. Goods; Diff. between Exp. and Imp.; Cap. Util.n % of Tot. Cap.; Avg. H Earnings MoM% SA; CB Leading Ind. MoM; Ind. Prod. MoM SA; In. Jobless Claims SA; GDP QoQ SAAR; Bus. Inventories MoM SA; Constr. Spend. MoM SA: ; Production Nonfarm QoQ SA

Note: The table lists all economic data releases included in Equation (3).
Source: Bloomberg

Table C.2: ECB Unconventional Monetary Policy Announcements

22.08.2007	Supplementary liquidity-providing longer-term ref oper (LTRO) with a maturity of 3 m
28.03.2008	LTROs with a maturity of six months
29.09.2008	Special term refinancing operation
08.10.2008	Fixed rate tender procedure with full allotment on the main refinancing operation(MROs)
15.10.2008	List of assets eligible as collateral in Eurosystem credit operations extended
07.05.2009	LTROs with a maturity of one year
04.06.2009	Details on Purchase program for covered bonds (CBPP)
03.12.2009	Phasing out of 6-month LTROs, indexation of new one year LTROs
04.03.2010	Phasing out of 3-month LTROs, indexation of six month LTROs
10.05.2010	Securities Markets Program (SMP)
28.07.2010	Risk control measures in collateral framework reviewed
03.03.2011	Further LTROs
09.06.2011	MROs as fixed rate tender procedures with full allotment,at least until October 2011
04.08.2011	Further LTROs with a maturity of three and six months
08.08.2011	ECB will actively implement its Securities Market Program
06.10.2011	New covered bond purchase program (CBPP2)
08.12.2011	Two additional LTROs with a maturity of three years
21.12.2011	Results of first three year LTRO
09.02.2012	ECBs Governing Council approves eligibility criteria for additional credit claims
28.02.2012	Results of second three year LTRO
06.06.2012	FRFA on MROs as long as necessary, and at least until January 2013
26.07.2012	Whatever it takes... speech by ECB President Mario Draghi in London
02.08.2012	Outright Monetary Transactions program (OMT)
06.09.2012	Technical features of OMT
06.12.2012	FRFA on MROs as long as necessary, and at least until July 2013
22.03.2013	Collateral rule changes for some uncovered government guaranteed bank bonds
02.05.2013	FRFA on MROs as long as necessary, and at least until July 2014
04.07.2013	Gov Council expects the key ECB interest rates to remain at present or lower levels for an extended period of time (open-ended forward guidance)
08.11.2013	FRFA on MROs as long as necessary, and at least until July 2015
05.06.2014	Targeted longer-term refinancing operations (TLTROs)
03.07.2014	Details on TLTROs published
04.09.2014	Deposit rate -0.2
22.01.2015	Announcement of expanded asset purchase programme (APP)
16.07.2015	Reaffirmation that purchases are intended to run until end of September 2016
31.08.2015	New category of assets added as eligible collateral
03.09.2015	Increase in PSPP issue share limit
23.09.2015	Eurosystem adjust purchase process in ABS programme
22.10.2015	Questions on requirements for APP extension answered
09.11.2015	Increase in PSPP issue share limit enlarges purchasable universe
03.12.2015	APP extended until March 2017, deposit rate -0.3
21.01.2016	Review and possibly reconsider monetary policy stance at next meeting
10.03.2016	New targeted longer-term refinancing operations (TLTRO II), APP expanded, corporate bonds added to APP, deposit rate -0.4
21.04.2016	Details on implementation of APP expansion
03.05.2016	Legal acts relating to TLTRO II is published
02.06.2016	Details on corporate sector purchase programme (CSPP) published
21.07.2016	Confirmation that APP at 80 billion per month to run at least until March 2017
08.09.2016	Council meeting confirming continuation of APP
05.10.2016	Changes to collateral eligibility criteria and risk control measures for unsecured bank bonds
20.10.2016	Council meeting confirming continuation of APP

Note: The table lists all ECB unconventional announcements included in Equation (3)

D Results

Table D.1: Baseline Results - Extended Table

	(1) Risky assets	(2) Government bonds
Capital gains	-1.352***	-0.310
	(0.307)	(0.299)
Risky, lag × $\text{UMP}^{\text{average}}_{\text{risky}}$	6.283***	4.599***
	(2.088)	(1.712)
Safe, lag × $\text{UMP}^{\text{average}}_{\text{gov bond}}$	-2.443	-1.782
	(2.724)	(2.567)
Risky, lag	-0.504***	0.0713*
	(0.0415)	(0.0398)
Safe, lag	0.223***	-0.693***
	(0.0680)	(0.0502)
Δ Income	0.303***	0.0870
	(0.0775)	(0.0602)
Δ Net wealth	0.0672***	0.0418***
	(0.00700)	(0.00719)
Net wealth	0.0182***	0.0111**
	(0.00435)	(0.00434)
Income	0.139**	0.145***
	(0.0686)	(0.0456)
Age	91.86	32.91
	(72.09)	(40.49)
Married	-5023.1*	3100.3
	(2747.8)	(2290.3)
Divorced	180.9	-4756.7***
	(3340.6)	(1565.1)
Famiy size	-2964.9***	-2390.5***
	(794.3)	(544.9)
College+	6864.0***	214.1
	(2477.4)	(1876.3)
Mortgage	-3344.3*	-1586.2
	(1940.0)	(1677.9)
Woman	-317.0	-1108.3
	(1555.2)	(1120.4)
High ret/high risk	18967.5*	-13023.6***
	(10600.8)	(3521.0)
Good ret/fair risk	4689.7**	-2934.5
	(2380.7)	(1803.1)
Fair ret/low risk	3488.9**	-1125.9
	(1547.5)	(1200.7)
Constant	yes	yes
Time FE	yes	yes
Observations	3093	3023
R^2	0.338	0.370

Standard errors are robust to heteroskedasticity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.3: Government bonds, Baseline Results - Extended Table

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Capital gains	-0.310	-1.085	-0.908	0.138
	(0.299)	(0.980)	(0.598)	(0.334)
Risky, lag × $\text{UMP}^{\text{average}}_{\text{risky}}$	4.599***	11.36	6.371	3.164*
	(1.712)	(7.210)	(4.593)	(1.911)
Safe, lag × $\text{UMP}^{\text{average}}_{\text{gov bond}}$	-1.782	8.667	-3.431	-2.411
	(2.567)	(6.069)	(4.452)	(2.784)
Risky, lag	0.0713*	0.00677	0.120	0.0439
	(0.0398)	(0.0883)	(0.0836)	(0.0459)
Safe, lag	-0.693***	-0.662***	-0.674***	-0.719***
	(0.0502)	(0.0844)	(0.0923)	(0.0786)
Δ Income	0.0870	0.327***	0.134	-0.00699
	(0.0602)	(0.116)	(0.0875)	(0.0934)
Δ Net wealth	0.0418***	0.0309***	0.0385**	0.0441***
	(0.00719)	(0.00852)	(0.0158)	(0.00918)
Net wealth	0.0111**	0.00599	0.0124	0.0101**
	(0.00434)	(0.00520)	(0.0102)	(0.00508)
Income	0.145***	0.484***	0.202	0.128
	(0.0456)	(0.124)	(0.188)	(0.0971)
Age	32.91	-10.31	41.28	86.81
	(40.49)	(64.92)	(53.21)	(105.3)
Married	3100.3	1984.7	6093.7	6797.5
	(2290.3)	(1723.7)	(6713.3)	(9711.1)
Divorced	-4756.7***	-285.0	-2802.8	-15848.9***
	(1565.1)	(1978.1)	(2245.5)	(5612.3)
Famiy size	-2390.5***	-2467.1***	-1467.3	-3293.0***
	(544.9)	(875.0)	(938.9)	(1056.3)
College+	214.1	-632.9	-6216.0*	4727.0*
	(1876.3)	(3068.7)	(3516.6)	(2760.3)
Mortgage	-1586.2	-4533.4*	-3529.2**	2091.3
	(1677.9)	(2383.6)	(1504.2)	(3781.9)
Woman	-1108.3	-1865.9	1411.5	-3194.8
	(1120.4)	(1470.6)	(2059.4)	(2568.9)
High ret/high risk	-13023.6***	-12580.8***	-8718.5	-5233.1
	(3521.0)	(3120.8)	(7146.3)	(6778.8)
Good ret/fair risk	-2934.5	2806.3	-4843.6*	-3356.3
	(1803.1)	(3595.9)	(2936.8)	(3066.2)
Fair ret/low risk	-1125.9	-2769.5**	-1951.3	230.9
	(1200.7)	(1317.8)	(2048.3)	(2656.1)
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3023	966	1163	894
R^2	0.370	0.391	0.349	0.418

Standard errors are robust to heteroskedasticity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.2: Risky Assets, Baseline Results - Extended Table

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Capital gains	-1.352***	-0.907*	-2.014***	-1.176***
	(0.307)	(0.498)	(0.436)	(0.421)
Risky, lag × $\text{UMP}^{\text{average}}_{\text{risky}}$	6.283***	1.739	5.929	6.619**
	(2.088)	(4.959)	(3.650)	(2.789)
Safe, lag × $\text{UMP}^{\text{average}}_{\text{gov bond}}$	-2.443	-0.962	-4.462	0.599
	(2.724)	(11.09)	(2.798)	(4.016)
Risky, lag	-0.504***	-0.312***	-0.490***	-0.516***
	(0.0415)	(0.103)	(0.0776)	(0.0512)
Safe, lag	0.223***	0.182*	0.182***	0.227**
	(0.0680)	(0.107)	(0.0659)	(0.103)
Δ Income	0.303***	0.348**	0.254*	0.324***
	(0.0775)	(0.171)	(0.146)	(0.0996)
Δ Net wealth	0.0672***	0.0679***	0.0763***	0.0601***
	(0.00700)	(0.0135)	(0.0116)	(0.00928)
Net wealth	0.0182***	0.0180*	0.0131**	0.0180***
	(0.00435)	(0.00988)	(0.00540)	(0.00641)
Income	0.139**	0.295	0.256	0.169
	(0.0686)	(0.246)	(0.226)	(0.130)
Age	91.86	105.5	134.1	46.76
	(72.09)	(77.86)	(122.7)	(130.0)
Married	-5023.1*	-1573.4	-11104.4***	130.8
	(2747.8)	(3698.5)	(3944.9)	(7353.7)
Divorced	180.9	3741.6	-672.6	-1965.6
	(3340.6)	(4140.1)	(5272.5)	(6366.6)
Famiy size	-2964.9***	-568.4	-3124.5**	-3682.2***
	(794.3)	(1208.5)	(1224.0)	(1357.0)
College+	6864.0***	8358.1	10400.4**	6191.5*
	(2477.4)	(6604.3)	(4458.0)	(3177.0)
Mortgage	-3344.3*	-7564.9	-5157.3*	-1892.4
	(1940.0)	(4958.4)	(2731.8)	(3073.4)
Woman	-317.0	3632.7	-2668.5	156.1
	(1555.2)	(2620.0)	(2211.9)	(2825.0)
High ret/high risk	18967.5*	-9641.7*	36314.5	17304.3*
	(10600.8)	(5509.3)	(28772.8)	(10096.9)
Good ret/fair risk	4689.7**	3649.0	2453.8	6578.6*
	(2380.7)	(2901.6)	(4182.9)	(3613.8)
Fair ret/low risk	3488.9**	6658.6**	-191.4	5401.6*
	(1547.5)	(2720.5)	(2383.9)	(2756.3)
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3093	538	1184	1371
R^2	0.338	0.211	0.367	0.355

Standard errors are robust to heteroskedasticity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.4: Risky Assets, 2006-2014 - Extended Table

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Capital Gains	-1.367***	-0.878*	-1.726**	-1.357***
	(0.315)	(0.520)	(0.733)	(0.376)
Risky, lag × UMP^{risky}	6.876***	0.473	5.424	7.843***
	(2.280)	(5.399)	(5.574)	(2.635)
Safe, lag × UMP^{safe}	-1.056	4.540	-3.966	2.690
	(2.601)	(10.07)	(3.602)	(3.461)
Risky, lag	-0.473***	-0.363***	-0.500***	-0.464***
	(0.0490)	(0.117)	(0.116)	(0.0568)
Safe, lag	0.168***	0.109	0.131	0.162**
	(0.0652)	(0.117)	(0.107)	(0.0820)
Δ Income	0.308***	0.315*	0.300	0.330***
	(0.0844)	(0.167)	(0.194)	(0.103)
Δ Net wealth	0.0668***	0.0546***	0.0870***	0.0593***
	(0.00751)	(0.0125)	(0.0156)	(0.00914)
Net wealth	0.0197***	0.0216**	0.0136*	0.0194***
	(0.00424)	(0.0104)	(0.00729)	(0.00536)
Income	0.120*	0.201	0.0697	0.0846
	(0.0727)	(0.256)	(0.383)	(0.116)
Age	129.6*	113.9	231.8	69.52
	(77.50)	(82.69)	(157.5)	(118.0)
Married	-4824.4	-2965.2	-8278.2*	-554.9
	(2997.3)	(3753.3)	(4635.8)	(6792.8)
Divorced	1683.6	3649.6	6572.2	-5739.2
	(3796.4)	(4946.8)	(6371.0)	(7672.1)
Famiy size	-2780.9***	-438.1	-1928.8	-3822.5***
	(855.5)	(1241.6)	(1621.7)	(1307.4)
College+	4360.2*	10230.7	12194.6**	2197.2
	(2638.3)	(6931.0)	(6022.8)	(3069.5)
Mortgage	-1828.4	-1984.2	-5950.2*	298.9
	(2134.7)	(3436.9)	(3248.6)	(3138.7)
Woman	-1457.8	5685.0**	-5061.7**	-1744.6
	(1602.4)	(2619.6)	(2497.8)	(2513.8)
High ret/high risk	12740.9	-6924.2	38441.1	11130.4
	(10997.3)	(5572.5)	(45480.5)	(9860.2)
Good ret/fair risk	1582.8	1644.7	875.3	2253.7
	(2576.6)	(2943.6)	(5445.8)	(3477.1)
Fair ret/low risk	2515.7	4143.5	-2000.3	4334.5*
	(1724.4)	(2863.5)	(3300.2)	(2595.4)
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	2566	446	755	1365
R^2	0.327	0.220	0.358	0.346

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.5: Government Bonds, 2006-2014 - Extended Table

	(1) Full Sample	(2) Group 1 1-50%	(3) Group 2 51-75%	(4) Group3 76-100%
Capital Gains	-0.416	-1.240	-0.106	-0.307
	(0.307)	(1.067)	(0.584)	(0.338)
Risky, lag × UMP^{risky}	5.093***	11.91	-1.915	5.510**
	(1.928)	(7.785)	(4.692)	(2.234)
Safe, lag × UMP^{safe}	-3.040	7.206	-4.099	-4.728
	(2.813)	(7.144)	(5.262)	(3.078)
Risky, lag	0.0898*	-0.0228	0.0245	0.0950*
	(0.0470)	(0.100)	(0.0887)	(0.0551)
Safe, lag	-0.648***	-0.619***	-0.669***	-0.640***
	(0.0574)	(0.118)	(0.0897)	(0.0932)
Δ Income	0.122*	0.423***	0.224**	0.0358
	(0.0666)	(0.133)	(0.0966)	(0.0939)
Δ Net wealth	0.0380***	0.0244***	0.0265***	0.0437***
	(0.00556)	(0.00845)	(0.00803)	(0.00851)
Net wealth	0.00750**	0.00173	-0.000383	0.0107**
	(0.00341)	(0.00544)	(0.00507)	(0.00497)
Income	0.153***	0.566***	-0.133	0.0876
	(0.0492)	(0.146)	(0.192)	(0.0943)
Age	25.49	-14.76	-19.75	114.8
	(42.64)	(69.14)	(57.80)	(98.93)
Married	1644.2	2071.7	-1008.9	6429.3
	(1928.4)	(1977.2)	(3400.4)	(8044.2)
Divorced	-6434.4***	-369.8	-3292.8	-18418.1***
	(1847.2)	(2180.2)	(3270.6)	(5510.7)
Famiy size	-2435.9***	-2725.8***	-1826.4**	-2553.2**
	(559.6)	(933.0)	(881.2)	(1003.4)
College+	1184.3	-1348.6	-4190.4	4045.0
	(1999.6)	(2918.4)	(3798.0)	(2756.0)
Mortgage	-1576.1	-5155.6**	-3580.7**	2155.5
	(1838.5)	(2461.5)	(1613.0)	(3506.9)
Woman	-1206.0	-2183.8	-278.7	-2400.2
	(1150.1)	(1633.9)	(1682.8)	(2528.8)
High ret/high risk	-13258.0***	-13274.5***	-8016.5	-10260.4
	(3737.3)	(3565.3)	(7568.9)	(6515.8)
Good ret/fair risk	-2691.4	2843.4	-4800.6*	-2373.5
	(1871.3)	(3854.0)	(2587.9)	(3080.0)
Fair ret/low risk	-910.7	-3409.8**	-813.4	496.4
	(1140.2)	(1450.8)	(1525.3)	(2462.5)
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	2533	805	789	939
R^2	0.433	0.342	0.563	0.417

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.6: Robusness Checks: Heckman Selection Model - Extended Table

	Risky assets 2nd stage	Risky assets 1st stage	Gov Bonds - 2nd stage	Gov Bonds - 1st stage
Capital gains	-1.348***		-0.309*	
	(0.139)		(0.167)	
Risky, lag × $UMP^{average}_{risky}$	6.239***		4.589***	
	(0.948)		(1.100)	
Safe, lag × $UMP^{average}_{gov\ bond}$	-2.501		-1.851	
	(1.910)		(1.141)	
Risky, lag	-0.507***		0.0665***	
	(0.0171)		(0.0211)	
Safe, lag	0.221***		-0.693***	
	(0.0435)		(0.0232)	
Δ Income	0.294***		0.0785	
	(0.0723)		(0.0607)	
Δ Net wealth	0.0673***		0.0417***	
	(0.00455)		(0.00397)	
Net wealth	0.0168***	0.000000504***	0.0108***	5.81e-08
	(0.00350)	(5.62e-08)	(0.00303)	(5.41e-08)
Income	0.0745	0.0000151***	0.0910*	0.0000102***
	(0.0615)	(0.000000950)	(0.0552)	(0.000000888)
Unemployed	454.7	-0.0600	-790.2	-0.120***
	(3473.7)	(0.0517)	(2380.5)	(0.0442)
Age	109.8	-0.000966	16.91	0.00537***
	(70.10)	(0.00110)	(50.72)	(0.000977)
Married	-4203.2	-0.200***	3707.3**	-0.212***
	(2978.9)	(0.0452)	(1881.2)	(0.0377)
Divorced	462.2	-0.00264	-4134.0	-0.179***
	(3181.7)	(0.0526)	(2628.2)	(0.0504)
Famiy size	-2402.1***	-0.163***	-1938.6***	-0.0907***
	(887.7)	(0.0140)	(716.5)	(0.0125)
College+	6984.1***	-0.0868**	444.7	-0.0739*
	(1994.2)	(0.0393)	(1752.8)	(0.0380)
Mortgage	-3448.3	-0.0932**	-690.2	-0.266***
	(2560.5)	(0.0455)	(2359.1)	(0.0445)
Woman	20.13	-0.0952***	-1044.5	0.0487*
	(1729.2)	(0.0287)	(1234.2)	(0.0257)
High ret/high risk	16468.1***	0.482***	-11582.1	-0.470***
	(5832.3)	(0.129)	(7585.4)	(0.142)
Good ret/fair risk	3735.2	0.230***	-2079.3	-0.238***
	(2322.3)	(0.0388)	(1972.0)	(0.0375)
Fair ret/low risk	2271.5	0.335***	-1185.8	0.0176
	(1764.9)	(0.0283)	(1212.3)	(0.0256)
Securities account		1.351***		0.625***
		(0.0327)		(0.0323)
Works in finance		0.244***		0.0208
		(0.0533)		(0.0517)
Online banking		0.233***		0.0428
		(0.0340)		(0.0334)
lambda	-4415.6***		-4484.8*	
	(1588.3)		(2720.	
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations		19675		19730

Standard errors are robust to heteroskedasticity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.7: Robusness Checks: UMP Identification - Extended Table

	(1) Risky Assets	(2) Gov Bonds	(3) Risky Assets	(4) Gov Bonds
Capital Gains	-1.409***	-0.312	-1.259***	-0.299
	(0.309)	(0.301)	(0.323)	(0.311)
Risky, lag × UMP^{safe}	7.201***	4.648**		
	(2.261)	(1.842)		
Safe, lag × UMP^{risky}	-2.329	-1.921		
	(2.694)	(2.527)		
Risky, lag × UMP^{risky}			5.825***	4.537**
			(2.253)	(1.788)
Safe, lag × UMP^{safe}			-2.412	-2.042
			(2.499)	(2.394)
Risky	-0.526***	0.0610*	-0.502***	0.0792**
	(0.0399)	(0.0353)	(0.0421)	(0.0395)
Safe, lag	0.226***	-0.681***	0.214***	-0.682***
	(0.0678)	(0.0485)	(0.0675)	(0.0480)
Δ Income	0.304***	0.0934	0.296***	0.0908
	(0.0775)	(0.0598)	(0.0777)	(0.0596)
Δ Net wealth	0.0671***	0.0371***	0.0672***	0.0371***
	(0.00698)	(0.00545)	(0.00701)	(0.00546)
Net wealth	0.0182***	0.00819**	0.0184***	0.00818**
	(0.00434)	(0.00323)	(0.00435)	(0.00322)
Income	0.138**	0.144***	0.136**	0.143***
	(0.0685)	(0.0455)	(0.0687)	(0.0455)
Age	92.47	21.99	91.65	23.12
	(72.11)	(39.01)	(72.40)	(39.08)
Married	-5074.8*	1594.4	-4991.0*	1603.6
	(2741.6)	(1722.6)	(2744.4)	(1709.2)
Divorced	92.44	-4818.6***	264.9	-4833.0***
	(3329.0)	(1576.0)	(3337.5)	(1579.8)
Famiy size	-2956.8***	-2240.2***	-2948.0***	-2229.1***
	(792.9)	(521.1)	(794.9)	(521.7)
College+	6806.7***	649.8	6882.3***	679.4
	(2471.5)	(1818.1)	(2483.7)	(1828.1)
Mortgage	-3325.4*	-1675.6	-3407.2*	-1651.6
	(1939.6)	(1667.9)	(1940.8)	(1666.9)
Woman	-315.9	-1542.8	-343.4	-1591.4
	(1554.6)	(1032.5)	(1555.9)	(1029.6)
High ret/high risk	18890.0*	-12668.7***	19233.0*	-12861.3***
	(10622.6)	(3411.5)	(10646.5)	(3511.8)
Good ret/fair risk	4624.1*	-2335.2	4831.6**	-2318.1
	(2375.1)	(1704.8)	(2387.8)	(1693.3)
Fair ret/low risk	3486.8**	-599.7	3469.6**	-577.8
	(1543.6)	(1077.8)	(1548.7)	(1080.2)
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3093	3023	3093	3023
R^2	0.340	0.431	0.336	0.431

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.8: Robusness Checks: Estimation Sample - Extended Table

	(1) Risky Assets	(2) Gov Bonds	(3) Risky Assets	(4) Gov Bonds
Capital Gains	-1.573***	-0.0528	-1.479***	-0.116
	(0.333)	(0.252)	(0.389)	(0.364)
Risky, lag × UMP^{risky}	6.876***	2.666*	7.576***	4.363**
	(2.549)	(1.512)	(2.565)	(2.100)
Safe, lag × UMP^{safe}	-3.717	-0.563	-2.397	-0.735
	(3.565)	(2.532)	(2.802)	(3.590)
Risky, lag	-0.534***	0.0353	-0.491***	0.0750
	(0.0549)	(0.0339)	(0.0500)	(0.0487)
Safe, lag	0.257***	-0.772***	0.229***	-0.681***
	(0.0886)	(0.0490)	(0.0816)	(0.0591)
Δ Income	0.168	0.0689	0.327***	0.145*
	(0.109)	(0.0649)	(0.106)	(0.0846)
Δ Net wealth	0.0640***	0.0307***	0.0741***	0.0405***
	(0.00834)	(0.00652)	(0.00925)	(0.00805)
Net wealth	0.0133**	0.00914**	0.0160***	0.0119**
	(0.00528)	(0.00382)	(0.00593)	(0.00472)
Income	0.147*	0.174***	0.150*	0.106*
	(0.0778)	(0.0470)	(0.0908)	(0.0620)
Age	104.8	19.19	52.99	25.55
	(82.15)	(57.41)	(90.23)	(58.44)
Married	-4105.5	-274.1	-2913.4	1045.0
	(3302.6)	(1547.3)	(3969.6)	(2627.5)
Divorced	-752.0	-5383.1***	5032.0	-6453.2***
	(2676.1)	(1548.3)	(4919.2)	(2257.5)
Famiy size	-2524.1***	-2032.3***	-3384.9***	-2726.9***
	(884.2)	(698.4)	(1067.4)	(787.5)
College+	10580.1***	773.0	6994.2**	-492.6
	(3115.5)	(1841.2)	(3062.0)	(2566.2)
Mortgage	-5032.5*	-3184.0*	-6278.0**	-1631.6
	(2599.2)	(1712.5)	(2490.3)	(2452.7)
Woman	-938.7	-623.9	-1442.6	-2157.0
	(1841.6)	(1175.5)	(2158.0)	(1615.6)
High ret/high risk	7101.1	-8648.2**	19702.9*	-10963.1*
	(8309.8)	(3729.6)	(11451.3)	(6277.5)
Good ret/fair risk	6068.6**	-2993.0*	6504.1*	-4342.5*
	(2875.2)	(1629.3)	(3453.8)	(2455.9)
Fair ret/low risk	4563.4**	-206.2	2961.6	-1903.1
	(1927.3)	(1292.3)	(2107.9)	(1643.5)
Constant	yes	yes	yes	yes
Time FE	yes	yes	yes	yes
Observations	3093	3023	1877	1619
R^2	0.388	0.470	0.348	0.423

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$