Unconventional monetary policy and households' financial portfolio choices*

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This version: January 31, 2018

Abstract

I use data on Italian households' financial portfolios to examine how the unconventional monetary policy tools implemented by the ECB affect families' asset allocation choices. Using survey data on the portfolio composition of Italian families, I first disentangle any household change in financial wealth into its active saving component and its passive saving component (capital gains) using financial indexes. Then, I employ a two-step model to estimate the impact of unconventional measures on portfolio rebalancing, focusing on two asset groups, risky and non risky, and on three different households' groups. In order to identify the effects of unconventional monetary policy, I exploit households' cross sectional heterogeneity in the exposure to unconventional monetary policy due to their heterogeneous portfolio composition, while unconventional monetary policy is measured through assets valuation effects induced by ECB's announcements. The empirical analysis shows that unconventional monetary policy affects households portfolio composition in a direction that is consistent with the portfolio rebalancing channel, i.e. reducing the exposure to safe assets and increasing the investment in risky assets.

JEL-Classification: D12, E21, E58.

Keywords: Unconventional Monetary Policy, Portfolio Rebalancing Channel, Households' Portfolio Choices.

*I thank Stefania Albanesi, Michael Berlemann, Kerstin Bernoth, Andrea Delitala, Marcel Fratzscher, Mathias Klein, Angela Maddaloni, Maria Luisa Magli, Dieter Nautz, Hedwig Plamper, Valentina Raponi, Barbara Rossi, Ulrich Schneider, all participants of the DIW Phd internal seminar and of the FU Seminar Empirical Macroeconomics for helpful comments and suggestions. I also thank Michael Hachula, Michele Piffer and Malte Rieth for sharing the monetary policy proxy data. All remaining mistakes are mine.

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1 Introduction

The unconventional monetary policy (UMP) tools introduced by the European Central Bank (ECB) with the aim of restoring confidence in the functioning of the European financial system have been accompanied by strong movements in a number of important financial prices. These new tools spurred an intense public and academic debate about their financial and real implications on different economic agents. Few papers have analysed the impact of UMP on households wealth, in order to draw conclusions on the unconventional tools' impact on wealth distribution and wealth inequality. In particular, Bivens (2015), Adam and Tzamourani (2016), Domanski et al. (2016) and Casiraghi et al. (2016) perform simulation excercises where they focus on the UMP effects on financial wealth through capital gains while keeping portfolio composition constant over time, i.e. assuming that the portfolio composition is independent from macro and financial conditions. Is this assumption plausible? In order to address this issue, this paper gives an answer to the following questions: How do unconventional monetary policy affect families financial portfolio? Do UMP shocks directly affect households asset allocation choices? Do heterogeneous households, with heterogeneous preferences and heterogeneous financial portfolios respond in the same way to monetary stimulus?

Understanding how unconventional tools shape households' financial choices and risk appetite is important from several points of view. First, it gives new insight into the transmission channel of unconventional measures, and in particular into the portfolio rebalancing channel (PRC). This channel has been widely emphasized in the policy debate as one of the main transmission mechanism of unconventional policies (Bernanke et al., 2010; Bernanke, 2012; Gagnon et al., 2010; Joyce et al., 2012; Draghi, 2014, 2015) despite the fact that little is known about its empirical relevance. The idea behind it is that central bank's tools affect financial conditions by changing the quantity and the mix of assets held by the public. In this way, UMP should not only exert a downward pressure to the returns of the targeted assets, but it should also impact all other financial segments, as long as investors view different markets as sobstitutes and have incentives to shift their investments towards assets with higher expected returns. A preliminary evidence of this channel in the Euro Area comes from the immediate price effect of ECB's unconventional measures (among the others, Eser and Schwaab 2013; Altavilla et al. 2014; Fratzscher et al. 2016), while only few papers explore the relevance of the PRC for the transmission of UMP to and through banks, finding mixed evidence (among the others, Albertazzi et al. 2016; Koijen et al. 2016; Bua and Dunne 2017; Peydró et al. 2017). Second, it allows a better understanding of the direct impact of UMP on households wealth and wealth distribution, contributing to the very actual debate on whether unprecedented monetary accomodation have contributed to wealth inequality (Draghi, 2015, 2016; Haldane et al., 2014; Panetta, 2015; Yellen, 2015, 2016).

Despite its relevance, little is known on the direct impact of UMP on households' portfolio composition and, more in general, on the role that macroeconomic shocks play for asset allocation.

In order to fill the gap in the literature, I analyse the effects of unconventional tools on the Italian households' financial portfolio rebalancing choices from 2008 to 2014. Results show evidence of a shift in the portfolio composition, induced by unconventional monetary policy and consistent with the portfolio rebalacing channel. This paper makes four substantial contributions. First, using survey data on the portfolio composition of Italian families and augmenting it with financial data, it constructs a novel dataset that, for each household and asset classes, allows disentangling any change in financial wealth into capital gains and active saving component. Second, unlike much of the literature on household finance that considers only the role of financial and demographic determinants of portfolio rebalancing, this is the first paper that focuses and emphasizes the role that unconventional monetary policy plays in the portfolio rebalancing. Third, this is the first empirical investigation into the validity of the unconventional monetary policy portfolio rebalancing channel from the households perspective. Fourth, borrowing and adapting from the literature on the monetary policy's bank lending channel, it uses a novel metodology for the identification of unconventional monetary policy that exploits the cross sectional heterogeneity of households' portfolios to construct an individual measure of exposure to UMP.

I use the micro data contained in the Bank of Italy's Survey of Households' Income and Wealth, a dataset that gathers data on wealth and other aspects of households' economic and financial behavior of a representative number of Italian families. This data allows constructing financial portfolios, but it does not include any extra information that can be used to distinguish whether a change in financial wealth from year $t-1$ to t is due to valuation effects (passive saving component/capital gains) or to an active reallocation (active saving component). This distinction is crucial for this paper, as the aim of the study is to capture how UMP shapes households' financial decisions, i.e. how much families actively and voluntarely 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 isolating the active saving component of the most important eleven asset classes, which represent more than 90% of the average Italian financial portfolio.

I model the rebalancing decision as a two-stage decision process (Guiso et al., 2000, 2002a,b; Guiso and Jappelli, 2005) where households first choose whether to adjust their portfolio or notn and then they decide what percentage of their financial wealth to rebalance. The analysis is conducted separately for three groups of families: the "poor households", defined as those in the bottom 40% of income distribution, the "middle class households", defined as the 40% of households above the poor and and "rich households", defined as 20% richest households according to the income distribution. In order construct an exogenous measure of unconventional monetary policy, in the baseline identification I follow Altavilla et al. (2016) and Hachula et al. (2017) and build on the literature that uses high frequency data in an event study manner to estimate the impact of a monetary policy shock. I use a financial indicator related to the monetary policy stance and I use its change in price around the time of any unconventional monetary

policy announcement to capture the unexpected component of monetary policy revealed by the announcement itself. Furthermore, in order sharpen the identification I exploit households' cross sectional heterogeneity in their exposure to unconventional monetary policy due to their heterogeneous portfolio composition) to assess the individual exposure to monetary policy. Also in this case the UMP is captured by announcements and measured through its valuation effects.

The preliminar empirical analysis performed using the baseline UMP identification shows that unconventional tools affect households portfolio composition in a direction that is consistent with the portfolio rebalancing channel.[1] A contractionary unconventional announcement that increases the financial indicator used to capture the monetary shocks by 100 bp induces a positive rebalancing effect towards the safe asset category that is statistically significant for all households groups and that ranges between 12% and 24%. But considering the expansionary nature of unconventional announcements, this implies that between 2008 and 2014 Italian households have reduced their exposure towards safe assets. The opposite is true when considering the impact on risky asset. Results are significant only for the richest households and a contractionary unconventional announcement induces a negative rebalancing away from risky asset of roughly 14%. Again, this implies that Italian households have increased their exposure towards risky assets.

The analysis provides support for the rebalancing channel, although only for the richest groups. In fact, it appears that unconventional tools have induced a shift in all Italian households portfolios, pushing them away from government bonds, but it also appears that only households in the top 20% of the income distribution have increase their investment in riskier assets. This suggests that portfolio rebalancing has been an active channel of UMP's transmission also for households, although significant only for wealthiest families.

The paper proceeds as follows. Section 2 reviews the literature. Section 3 describes the data and the construction of the dataset. Section 4 discusses the empirical framework and the identification of unconventional monetary policy. Section 5 presents the robustness checks. Section 6 concludes.

2 Literature

[TBA]

3 Data Description and portfolio composition

The empirical analysis in Section 4 requires disaggregated and detailed data on a representative sample of households' portfolio composition, wealth and demographics. Fort this reason I make

[1] Empirical results that use the more advanced UMP identification strategy are not available yet. A detailed description of the methodology can be found in 4.5

use of the Bank of Italy's Survey of Households Income and Wealth. In this chapter I give an overview of the dataset and of the the methodology I apply to distinguish between active and passive saving. The features of the data are illustrated in greater details in Appendix A.

3.1 Data sources

The main dataset is obtained by the Survey of Households Income and Wealth (SHIW) that is a large scale household survey conducted by Banca d'Italia every other year. It contains detailed information on a random and representative sample of the Italian population regarding demographic characteristics, consumption, labor supply, income, real and financial wealth and demographics. SHIW is conducted since 1960 and the sample used in most recent surveys comprises about 8,000 households; as I focus on the unconventional monetary policy period, I rely on the waves from 2006 to 2014; 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 have already been interviewed in more than one previous survey. This panel component proves very useful for the determination of the change in wealth active saving component needed for the analysis. Data are collected through personal interviews in the first months of the calendar year, thus flows of income and consumption refer to the previous year; wealth and debt variables are end-of-period values. Thus, the survey depicts all included families at the same moment in time (at the end of the year). Questions concerning the whole household are answered by the head of the family, defined as the person primarily responsible for or most knowledgeable about the household budget. The unit of observation is the family. [2]

As it the case with many other countries, also in the case of SHIW the data on income and wealth may differ from the macroeconomic aggregate, and the discrepancy between surveys data and aggregated are even larger for financial assets. A partial explanation for it is that, on the on side, households may not be willing to disclosure some economic fatcs in full, and on the other side from the underepresetation of certain groups of the population. In fact, also the SHIW survey suffers from the lack of information on the welthiest, who are a few number but that account for a very large share of (not only) financial wealth.

3.2 The portfolio composition

In the SHIW questionnaire households are presented with a fixed list of different forms of saving and investment and they are asked whether on the 31st December of previous year the family held any of those forms of saving and investment and, if yes, what was the approximate value. Table 1 contains an overview of all asset classes among which the households can choose for the years 2006 to 2014. The entries are clearly too many to analyse for my purposes, especially

[2]The family 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 families.

considering that over time some asset classes have been eliminated from the survey while others have been included. Thus, grouping assets in a smaller numer of categories is the only way to make meaningful comparisons across different years and to be able to construct consistent series of over time. Assets have been aggregated according to asset types and not by asset riskiness or maturity. The list of the asset classes included in the analysis, together with a brief description and the broad asset category they belong to is contained in Table 2 the asset classes, together with a brief description and the broad category they belong to.

Table 3 lists all excluded asset classes as well as their average weight in the household' portfolios. It is worth noting that on average less than 10% of the portfolio is excluded from the analysis; thus, the average portfolio is well represented.

There are three reasons why an asset class is excluded from the analysis:

1. It is not possible to calculate the active saving component due to lack of extra information. As described late in this paragraph, this calculation is done using data available on Bloomberg. In case 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 privatised listed companies indexed funds and non-harmonized funds.

Thus, after eliminating the above mentioned assets, the remaining classes are aggregated into eleven categories. This number does allow to keep the data at a granular level, so to be able to still use financial data to well approximate their bi-annual return while being small enough to be handled. The eleven classes are listed in Table 4.

3.3 Passive and active rebalancing of portfolio

To understand the impact of UMP on the portfolio investments of families 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 (Juster et al., 2006): either some of it is sold or purchased (the active saving) or the price of the asset changes (passive saving or capital gain). Thus, by definition the change in the financial wealth composition between two point in time is always given by the the sum of the active and the passive saving

$$\underbrace{X^j_{i,t} - X^j_{i,t-1}}_{\text{change in wealth}} = \underbrace{x^j_{i,t} p^j_{i,t}}_{\text{active saving component}} + \underbrace{X^j_{i,t-1} r^j_{i,t}}_{\text{capital gains}} \tag{1}$$

where $X^j_{i,t}$ describes again the stock of money hold by household i in asset j, describes the annual return between $t-1$ and t of asset j, $x^j_{i,t}$ describes the flow of asset j and $p^j_{i,t}$ denotes the price of asset j at time t paid by household i. Rearranging, I obtain the expression for the active saving:

$$x^j_{i,t}p^j_{i,t} = X^j_{i,t} - X^j_{i,t-1} - X^j_{i,t-1}r^j_{i,t}. \tag{2}$$

Unfortunately the survey questionnaire does not contain questions about purchases or sales of asset. Moreover, it does not include any information about asset prices and returns. This implies that (2) cannot be used directly to compute the active saving component. I solve this problem by approximating the missing variables. In fact, for each wave the survey provides me with the money invested in several asset classes ($X^j_{i,t}$ and $X^j_{i,t-1}$). Thus, the only thing that is missing in order to calculate the active saving is the return on assets, $r^j_{i,t}$. I approximate the return on each asset with indexes that can well summarize the behaviour of the asset classes. Then, I can finally apply (2) and obtain the active saving component. It is important to notice that to apply 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 eleven classes listed in Table 4 excluding the deposits. In fact, I assume that they receives zero interest, that implies that changes in deposit, caused by saving or dissaving, are always treated as active rebalancing. The list of the indexes use to approximate the returns, together with a short description, is contained in Table 5.

Finally, the active saving components are aggregated further more into two final categories that are then used for the empirical analysis, the safe assets active saving component (that includes Btp, Bot, Ctz and the Cct) and the risky asset active saving component (that includes corporate bonds, equities and mutual funds). The same two categories are calculated also for the passive saving component.

I impose some requirements to the households to be considered in the analysis. Fist, only households followed at least two consequent years are included in the analysis (for the reason exlained above). Second, the net wealth must be positive. Third, the household must hold a positive financial portfolio (including deposits). Fourth, 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 families with a score below seven are eliminated from the sample. Pooling all waves together, I am left with a sample of 9138 households.

4 Empirical Analysis

4.1 Summary statistics

[TBA]

4.2 Econometric framework

In the portfolio allocation literature it is well established that not all households invest in risky asset markets. Moreover, 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 apply when considering the choice of rebalancing. In fact, the investement and the rebalancing decision problems are very similar, with the latter analysing in terms of (financial investment) flows what the former analyses in terms of (financial investment) levels. Thus, the use of OLS would leads to inconsistent paramenter estimates and for this reason I make use of a sample selection model (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, 1977). I estimate a probit model for the binary choice of rebalancing conditioning on not being invested in the asset category the period before (extensive margine decision) and then a rebalancing equation for the participants accounting for selection. In order to use the Heckman model, it is necessary to specify suitable identification restrictions, i.e. variables that impact only on the binary decision of rebalancing. The variables are: the use of on-line banking, the ownership of a securities account and the fact that at least one member of the household works in the financial industry. The analysis is conducted separately for the safe and the risky categories and for the three households' groups.

Thus, I employ the following linear and univariate model:

$$\begin{aligned} as^j_{i,t} &= c + \alpha_1 ps^j_{i,t} + \alpha_2 Z_{i,t} + \beta_1 UMP_t + \beta_2 C_t + \theta\lambda^j_{i,t} + \eta^j_{i,t} \\ P^j_{i,t} &= c + \alpha Z_{i,t} + \beta_1 UMP_t + \beta_2 C_t + \gamma R^j_{i,t} + \mu^j_{i,t}, \mu \sim \mathcal{N}(0,\, 1) \end{aligned} \tag{3}$$

where i denotes the household, t the time, j = risky/safe asset categories active saving component; $as^j_{i,t}$ indicates the active saving between $t-1$ and t over financial wealth in $t-1$; $P^{j,q}_{i,t}$ 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; ps_{i,t^j} is the capital gain between $t-1$ and t over financial wealth in $t-1$. [3] The variable UMP_t captures the effect of UMP on the dependent variable. The vector C_t contains variables that account for the business cycle, meaning the Debt to GDP ratio and the unemployment rate. These two measures have been chosen for their relevance in period of crisis. The vector $\phi_{i,t}$ contains households financial and demographic characteristics that reflect factors likely to shape portfolio decisions and, in turn, rebalancing decisions. The first category includes disposable income (linear and quadratic),change in net wealth (linear and quadratic) and dummies for households that are retired or unemployed. The second category includes the age, a dummy for post high-school education, dummy for the sex and marital status

[3] Several papers (among the others, see Juster et al. (2006)) have shown that increases are negatively correlated with saving, in line with the wealth effect theory.

of the household head; I also control for the family size. Finally, I also include dummies capturing the household head's attitude towards risk.[4]

To understand the impact of unconventional monetary policy on different households, I split the sample in 3 groups in the disposable income: the "poor households", defined as those in the bottom 40% of income distribution, the "middle class households", defined as the 40% of households above the poor and and "rich households", defined as 20% richest households according to the income distribution. I keep as reference for the group construction the disposable income in $t-1$.

4.3 A Measure of Unconventional Monetary Policy

While changes in common monetary policy stance are not driven by households' portfolio choices, economic conditions can influence both monetary policy and portfolio rebalancing. Therefore, estimating the causal effect of unconventional monetary policy on portfolio choices requires the idetification of "exogenous" monetary policy shocks. In fact, monetary policy decisions are anticipated to some extent by investors, whose expectations have been guided by previous speeches and central bank' actions. Moreover, measuring the effects of monetary policy in a unconventional environment is complicated by the fact that the identification of monetary policy cannot fully rely on the strategies developed for conventional periods. In fact, during unconventional times there is not a clean single measure of the overall stance of monetary policy. In this context, the identification of causality between monetary policy and households portfolio choices poses several challenges. To characterize the effects of exogenous unconventional monetary policy change on portfolio choices I follow Altavilla et al. (2014) and Hachula et al. (2017). The authors build on the literature that uses high frequency data in an event study manner to estimate the impact of a monetary policy shock. This approach focuses on one or more financial indicators related to the monetary policy stance. The idea is that the price of the indicator closely before a monetary announcement incorporates the (expected) endogenous response of monetary policy to the state of the economy. Thus, any variation in this price that occurs in a (small enough) window around an announcement of monetary policy must reflects only the unexpected component of monetary policy revealed by the announcement itself, and it is interpreted as exogenous with respect to the economy. Thus, with this methodology it possible to isolate the impact of exogenous shocks of monetary policy on the chosen indicator and use it as a monetary policy proxy. Hachula et al. (2017) use daily data on euro area government bond

[4] In the SHIW housheolds are asked to answer to the following question: "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; 4) low returns with no risk of loosing the invested capital". The aswered have been used to contruct dummies capturing the household head's attitude towards risk.

yields to estimate the following equation

$$\Delta y_{k,m,t} = c_k + \sum_{a=1}^{A} \gamma_a D_{a,t} + \sum_{n=1}^{N} \delta_n z_{n,t} + \eta_{k,m,t} \tag{4}$$

where: $\Delta y_{i,j,t}$ is daily changes in the bond yield of country i on maturity j at time t and i = Ita,Spa, Port, Irl; j = 2, 5, 10 year; c_i ia a country-specific constants; $D_{a,t}$ is dummy variable equal to 1 if the unconventional monetary policy announcement $a = 1, .., A$ took place at day t, zero otherwise; The event dummies reflect the major unconventional monetary policy announcement-related events that occurred between 2007 and 2014. The completed list of included events is in Table 9. They also include the release of macro news, $z_{n,t}$ which could influence the government rates.

The key parameters in equation are the coefficients γ_a. Each of these captures the common variation in yields in response to the ECB annoucement a, and aims to detect the exogenous component of the announcement. After estimating equation 4, the estimated vector $(\gamma_1, .., \gamma_A)^T$ is transformed into a daily binary variable $m_{D,t}$, that takes value 0 on non-announcement days and value γ_a on the day of announcement a. The vector $m_{D,t}$ is then aggregated into a bi-yearly series $m_{Y,t}$ by summing within two years. Thus, $m_{Y,t}$ is my exogenous measure of monetary policy. For a plot of the resulting unconventional monetary policy measure, see Fig. 1.

4.4 Preliminary Results

The outcome of the empirical analysis is contained in Table 6 and Table 7. Only the results of the second stage regression of the Heckman model are here reported and commented. Results of the first stage regressions for both safe and risky categories can be found in the Appendix D. Table 7 reports results for the safe asser category for all three households's groups. A positive sign indicates an increase in investment in the category (purchases), while a negative sign indicates a disinvestment (sales). The estimates suggest that there is a negative relationship between passive saving and active saving that is consistent with previous literature (Juster et al., 2006; Berben et al., 2006). Moreover, they also suggest that the change in net wealth does have a significant impact on rebalancing, and that for two groups safe asset active saving is quadratic in the change in net wealth. The other financial and demographic covariates seem to have little effect. The significance of the inverse mills ratio points towards the presence of selection bias, indicating that the use of a selection model is the correct choice. Regarding the two business cycle controls, results show that an increase in the Debt to GDP ratio has a negative impact on the active saving, while the opposite is true when considering the unemployment rate.

My primary interest centers on the effect of unconventional monetary policy on active saving. As shown in Table 6, a contractionary unconventional announcement that increases the yields of peripheral government bonds on average by 100 basis points has a positive effect on the

safe asset active saving that ranges from 12.7% to 24.2%, thus inducing households to increase their exposure towards safe assets. Considering the accomodative nature of unconventional annoucements (see Fig. 1), it implies that in unconventional times households have move away from safe assets.

Results look different when considering the impact of UMP on risky assets. In fact, as shown in Table 7, a contractionary unconventional announcement has a negative effect on risky assets, although the coefficient is now only significant for households in the top 20% (with a magnitude of 13.7%). Again, this implies that in times of accomodative unconventional monetary policy, the richest households have increase their exposure towards risky assets. Moreover, Table 7 shows that the effect of the two business cycle controls on risky asset rebalancing is opposite to the safe asset case, with the Debt to Gdp being positive and the unemployment rate being negative (but significant only for group 2 and 3). Also in this case results show that there is a negative relationship between passive and active saving, although the coefficients are smaller than in previous case. Moreover, they also suggest that the change in income and in squared income plays a role only for richest households, while for the other two groups it is the change in net wealth that has a positive and significant effect. The inverse mills ratio is again significant.

4.5 A different Identification of Unconventional Monetary Policy

The identification of (unconventional) monetary policy is challenging. The high frequency methodology employed in Section 4.3 makes sure that what follows the intervention could be attributed only to unconventional monetary policy actions and not to other changes in the economy around the same time, but it does not allow to better control for the business cycle including time fixed effects. In fact, due to the low frequency of the data, the UMP indicator is composed only by four data points that are the same for all. This implies that all households are assumed to be affected by UMP shocks in the same way, disregarding whether households have financial investments or not and disregarding the composition of their portfolio.

In order to improve the identification of unconventional monetary policy I borrow from the bank landing channel literature. In this literature the heterogeneity across banks is exploited to assist with the identification (see, among the others, Albertazzi et al. 2016; Chakraborty et al. 2016; Peydró et al. 2017; Acharya et al. 2017). The idea is that some banks are expected to be more affected than others (due to a different composition of their balance sheets) and their different reaction to monetary shocks can, in turn, speak to the causal effect of monetary policy. The same reasoning can be applied to households: it is possible to exploit households' financial portfolios to assess their exposure to unconventional monetary policies and improve the identification. Specifically, some ECB's unconventional tools have targeted peripheral countries' sovereign bonds, thereby improving the conditions of households owning that asset class. Thus, one could expect that families holding more of the policy-targeted assets and related securities

will benefit more from such unconventional tools. Analyzing the behavior of more affected households in comparison to that of households that are expected to be less affected allows to shed light on the effects of unconventional measures on portfolio rebalancing choices.

In order to construct an household exposure measure to UMP, I first estimate the UMP effect on the asset classes included in the analysis by estimating the effect of announcements on the indexes I use to approximate the returns with (see Section 3.3). I apply the same empirical approach as in (4)

$$\Delta y_{b,t} = c_b + \sum_{a=1}^{A} \gamma_{a,b} D_{a,t} + \sum_{n=1}^{N} \delta_n z_{n,t} + \eta_{b,t} \tag{5}$$

where $\Delta y_{b,t}$ is the daily change in the financial index b at time t; b = 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; c_b is the index specific constant; also in this case, $D_{a,t}$ is a dummy variable equal to 1 if the unconventional monetary policy announcement $a = 1, .., A$ took place at day t, zero otherwise. Following closely the methodology explained in Section 4.3, (5) is estimated for each of the ten indexes; the estimated vector $(\gamma_{1,b}, .., \gamma_{A,b})^T$ is transformed into a daily binary variable $w_{D,t,b}$, that takes value 0 on non-announcement days and value $\gamma_{a,b}$ on the day of announcement a. The vector $w_{D,t,b}$ is then aggregated into a bi-yearly series $w_{Y,t,b}$ by summing within two years. Thus, $w_{Y,t,b}$ is the bi-yearly series of the effect of monetary policy on b. Moreover, consistent with the assumption that deposits receives zero interest, the effect of the announcements on this asset class is assumed to be zero.

After having estimated the impact of unconventional tools on the different asset classes, I can now construct the household UMP exposure measure by interacting it with the household-specific portfolio composition

$$\text{UMP impact}_t \times \text{Portf comp}_{i,t} = \mathbf{w_t^\intercal c_{i,t}} \tag{6}$$

where $\mathbf{w_t^\intercal}$ is the (1 x 11) vector including the impact of announcements on the 11 asset classes (deposit plus the other ten considered assets) at time t and $\mathbf{c_{i,t}}$ is the (11 x 1) vector including the share invested by household i in each of the 11 asset classes t.

The empirical model is now the following:

$$\begin{aligned} as^j_{i,t} &= c + \alpha_1 ps^j_{i,t} + \alpha_2 Z^j_{i,t} + \beta_1 \text{UMP impact}_t \times \text{Portf comp}_{i,t} + \beta_2 \text{Portf comp}_{i,t} \\ &\quad + \delta_t + \theta \lambda^j_{i,t} + \eta^j_{i,t} \\ P^j_{i,t} &= c + \alpha Z_{i,t} + \beta_1 UMP_t + \beta_2 C_t + \gamma R^j_{i,t} + \mu^j_{i,t}, \mu \sim \mathcal{N}(0,\, 1) \end{aligned} \tag{7}$$

The coefficients of interest is the interaction variables that capture the heterogeneous impact of UMP depending on the household' portfolio composition, β_1. The time fixed effect δ_t absorbs the coefficient for UMP exposure.

4.6 Results

[TBA]

5 Robustness checks

[TBA]

6 Conclusion

Despite its importance, little is known about the direct effects of unconventional monetary policy on households' financial portfolio choices. In this paper I have analysed the effects of unconventional tools introduced by the European Central Bank on the Italian households' financial portfolio rebalancing choices from 2008 to 2014. Results show that unconventional monetary tools have induced a shift in all Italian households portfolios, pushing them away from government bonds, but it also appears that only households in the top 20% of the income distribution have increase their exposure towards riskier assets. This suggests that the portfolio rebalancing has been an active transmission channel of monetary policy also for households, although significant only for the richest ones. One possible explanation for this result can be found in the literature that documents a positive correlation between household characteristics and investment mistakes/choices: richer households are found to diversify more (among the others, Blume et al. 1978; Calvet et al. 2007; Bilias et al. 2010; Vissing-Jorgensen 2003, to rebalance more actively (among the others, Bilias et al. 2010; Campbell 2006; Calvet et al. 2009; Vissing-Jørgensen and Attanasio 2003), and to have a weaker disposition to hold losing and sell winning stocks Calvet et al. (2009) than other households.

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Table 1: List of asset classes included in the SHIW

2006	*2008*	*2010*	*2012*	*2014*
Cu. acc. with bank or po	Cu. acc. with bank or po	Cu. acc. with bank or po	Cu. acc. with bank or po	Cu. acc. with bank or po
Sa. acc. with bank or post	Sa. acc. with bank or post	Sa. acc. with bank or post	Sa. acc. with bank or post	Sa. acc. with bank or post
Certificates of deposit	Certificates of deposit	Certificates of deposit	Certificates of deposit	Certificates of deposit
Repos	Repos	Repos	Repos	Repos
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)
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)
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)
Other (CTEs, CTOs etc.)	Other (CTEs, CTOs etc.)	Other (CTEs, CTOs etc.)	Other (CTEs, CTOs etc.)	Other (CTEs, CTOs etc.)
Bonds	Bonds	.	.	.
.	.	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
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
Money market funds	Money market funds	Money market funds	.	.
Flexible funds	Flexible funds	Flexible funds		
.	.	Flexible&balanced funds	Flexible&balanced funds	Flexible&balanced funds
.	.	Non-harmonized funds	.	.
Indexed funds (ETF,ILF)	Indexed funds (ETF,ILF)	Indexed funds (ETF,ILF)	.	.
.	.	.	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 privatised c.	- of which in privatised 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
Managed portfolios	Managed portfolios	Managed portfolios	Managed portfolios	Managed portfolios
Bonds, govt. bonds and inv funds	Bonds, govt. bonds and inv funds			
(iss. by non-residents)	(iss. by non-residents)	.	.	.
.	.	.	Gov bonds (iss. by non-res.)	Gov bonds (iss. by non-res.)
.	.	.	Bonds (iss. by non-residents)	Bonds (iss. by non-residents)
Shares (iss. by non-residents)	Shares (iss. by non-residents)	Shares (iss. by non-residents)	Shares (iss. by non-residents)	Shares (iss. by non-residents)
.	.	Funds issued by non-res.	.	.
Other (iss. by non-residents)	Other (iss. by non-residents)	Other (iss. by non-residents)	Other (iss. by non-residents)	Other (iss. by non-residents)
Loans to cooperatives	Loans to cooperatives	Loans to cooperatives	Loans to cooperatives	Loans to cooperatives
			Other fin. assets	Other fin. assets

Notes: The table shows all asset classes included in the SHIW in the years 2006-2014. In case the asset class is not included in the survey, the symbol . is used.

Table 2: Description of asset classes included in the analysis

Asset classes	Description	Classification
Bank Current or savings account		Deposits
Certificates of deposit	Savings certificate with a fixed maturity date, specified fixed interest rate issued by banks. A CD restricts access to the funds until the maturity date of the investment. Perceived from the public as substitute of Government bonds	Gov bonds
Repos	Classified as a money-market instrument, is a form of short-term borrowing for dealers in government securities. The dealer sells the government securities to investors in the future. Perceived from the public as substitute of Government bonds	Gov bonds
PO current account or savings account		Deposits
PO savings certificates	Bonds issued by Cassa Depositi e Prestiti (Italian Government). They guaranteed by the government ? like BOT and other government bondsand guarantee the return of the principal plus any accrued interest at any time.	Gov bonds
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 Italina company that is 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

Notes: The table lists all asset classes included in the analysis, together with a brief description and their final classification.

Table 3: Asset classes excluded from the analysis

Asset classes	Year				
	2006	2008	2010	2012	2014
Cert. of deposits	0.017	0.018	0.025	0.02	0.021
Repos	0.003	0.014	0.011	0.011	0.013
Other gov. bonds (CTSs, CTOs, etc..)	0.004	0.003	0.005	0.004	0.005
Shares in unlisted companies	0.008	0.006	0.006	0.004	0.004
Shares in private companies	0.002	0.002	0.002	0.002	0.002
Shares in partnerships	0.001	0.002	0.001	0.001	0.001
Managed portfolios	0.015	0.012	0.011	0.022	0.010
Non-harmonized funds	.	.	.001	.	.
Index funds	0.002	0.002	0.002	.	.
Funds in foreign curr.		.	.	0.003	0.004
Bonds, gov bonds, inv. funds by non-res.	0.005	0.004	.	.	.
Bonds issued by non-res.	.	.	0.004	0.003	0.002
Gov. bonds issued by non-res.	.	.	0.003	0.004	0.003
Shares issued by non-res.	0.004	0.004	0.003	0.003	0.003
Funds issued by non-res.	.	.	0.002	.	.
Other issued by non-res.	0.001	0.001	0.001	0.002	0.001
Loans to cooperatives	0.022	0.018	0.022	0.018	0.015
Other fin. assets	.	.	0.001	0.003	0.002
% not included in the analysis	0.084	0.086	0.088	0.1	0.086

Notes: The table shows the excuded asset classes. For each year the percentage of holding is indicated. In case the asset class is not included in the survey, the symbol . is used. The last row indicates what percentage of the portfolio has been excluded in the empirical analysis.

Table 4: Final Asset categories

Deposits	=	bank and post office current & saving accounts
Short term gov bonds	=	BOTs + post office saving certificates
CCTs		
Long term gov bonds	=	BTPs + indexed BTPs
CTZs		
Bonds	=	bonds issued by Italian companies & Italian banks
Equities		
Liquidity funds		
Mixed funds	=	mixed + balanced equity + balanced bond + balanced+ flexible
Bond funds		
Equity funds		

Notes: The table shows the eleven macro asset classes included in the analysis and their components.

Table 5: Indexes used for the approximation of the returns

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
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
Btp/Btpi/Post office saving certificates	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
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 capitalisation and it measures the performance of the 40 most liquid and capitalised 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.

Notes: The table shows the indexes used to calculate the returns of the asset class. The first column lists the approximated asset classes, the second column contains the index used as proxy while the third column provide a brief description of the index.

Table 6: Heckman model-second stage equation: safe asset active saving component

	Group 1 lowest 40%	Group 2 40%-80%	Group 3 top 20%
Capital gains (%)	-7.400***	-7.422***	-6.223***
	(0.784)	(0.524)	(0.492)
UMP	0.242***	0.127***	0.232***
	(0.0613)	(0.0399)	(0.0410)
Debt/GDP	-0.0255***	-0.0136**	-0.0283***
	(0.00989)	(0.00666)	(0.00779)
Unemployment rate	0.150**	0.0724	0.196***
	(0.0681)	(0.0459)	(0.0546)
Δ Income (0000)	0.0515	0.00129	3.14e-04
	(0.0641)	(0.0328)	(0.00763)
Δ Income sq (0000)	-7.08e-08	1.47e-08	1.42e-09
	(8.26e-07)	(2.64e-07)	(1.11e-08)
Δ Net wealth (0000)	0.00137	0.00566***	8.59e-04***
	(0.00284)	(0.00124)	(2.91e-04)
Δ Net wealth sq (0000)	-5.35e-09	-1.18e-08***	5.70e-11**
	(3.44e-09)	(3.17e-09)	(2.82e-11)
Famiy size	-0.00747	0.00907	0.000560
	(0.0218)	(0.0147)	(0.0168)
Age	-0.00605***	-0.00242	0.00217
	(0.00220)	(0.00157)	(0.00187)
Retired	0.133**	0.0310	-0.0636
	(0.0679)	(0.0416)	(0.0437)
Unemployed	0.111	-0.0126	-0.0672
	(0.0704)	(0.0572)	(0.0769)
College+	-0.00724	0.00170	-0.000221
	(0.0734)	(0.0384)	(0.0317)
Woman	-0.0117	0.0421	-0.00898
	(0.0424)	(0.0297)	(0.0334)
Married	0.0196	-0.00822	-0.106**
	(0.0605)	(0.0417)	(0.0537)
Divorced	0.141*	-0.0661	-0.0720
	(0.0816)	(0.0581)	(0.0818)
High ret/high risk	0.495	-0.132	-0.0611
	(0.446)	(0.140)	(0.158)
Good ret/fair risk	0.117	-0.0142	-0.0109
	(0.0798)	(0.0454)	(0.0397)
Fair ret/low risk	0.0254	-0.0328	0.0102
	(0.0442)	(0.0274)	(0.0304)
Constant	2.802***	1.582***	2.086***
	(0.707)	(0.468)	(0.554)
Inverse Mills ratio	-0.269***	-0.170***	-0.143*
	(0.0859)	(0.0583)	(0.0866)
Observations	1031	1006	686

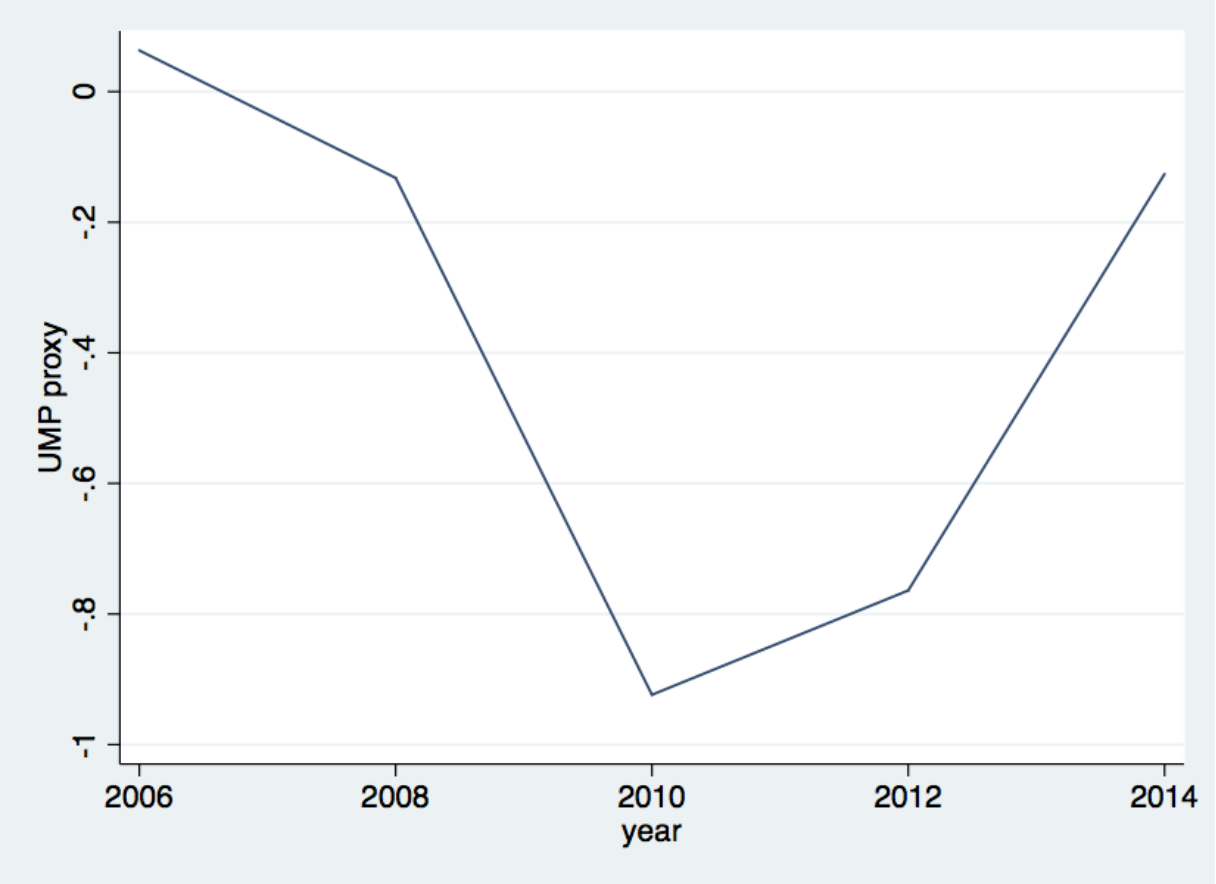
Notes: The table report the estimates of the Heckman model second stage equation, where the rebalancing decision is estimated accounting for selection. The dependent variable is defined as the safe asset active saving component (i.e. the active saving componenent of Bot, Btp, Cct and Ctz) over financial wealth in $t-1$. Standard errors in parentheses. * $p < 0.1$,** $p < 0.05$, *** $p < 0.01$.

Table 7: Heckman model-second stage equation: risky asset active saving component

	Group 1 lowest 40%	Group 2 40%-80%	Group 3 top 20%
Capital gains (%)	-0.523*	-0.414*	-0.682***
	(0.302)	(0.222)	(0.180)
UMP	-0.137	-0.0494	-0.137***
	(0.0879)	(0.0581)	(0.0501)
Debt/GDP	0.0122	0.0302***	0.0265***
	(0.0128)	(0.00861)	(0.00752)
Unemployment rate	-0.0715	-0.215***	-0.182***
	(0.0860)	(0.0580)	(0.0505)
Δ Income (0000)	0.0501	0.0735*	0.0147**
	(0.0636)	(0.0396)	(0.00739)
Δ Income sq (0000)	-8.17e-07	-4.25e-07	-2.38e-08**
	(6.67e-07)	(3.12e-07)	(1.17e-08)
Δ Net wealth (0000)	0.00532*	0.00265**	3.02e-05
	(0.00276)	(0.00131)	(9.12e-05)
Δ Net wealth sq (0000)	-4.48e-09	-2.74e-09*	-2.86e-12
	(2.79e-09)	(1.45e-09)	(3.84e-12)
Famiy size	0.00766	0.00999	-0.0117
	(0.0218)	(0.0165)	(0.0148)
Age	0.00239	0.00220	-0.00201
	(0.00273)	(0.00195)	(0.00171)
Retired	-0.0414	-0.0169	0.00267
	(0.0816)	(0.0493)	(0.0381)
Unemployed	-0.0759	0.00271	-0.141*
	(0.105)	(0.0680)	(0.0725)
College+	0.0184	-0.0631	-0.0537*
	(0.0772)	(0.0427)	(0.0277)
Woman	0.0577	-0.00495	0.0105
	(0.0503)	(0.0360)	(0.0331)
Married	-0.126	-0.0548	-0.0961*
	(0.0783)	(0.0583)	(0.0529)
Divorced	-0.0594	-0.0723	0.0123
	(0.0817)	(0.0619)	(0.0691)
High ret/high risk	-0.188	0.110	-0.140
	(0.255)	(0.124)	(0.105)
Good ret/fair risk	0.0482	-0.0141	-0.0432
	(0.0707)	(0.0484)	(0.0384)
Fair ret/low risk	0.0100	0.0718**	-0.0265
	(0.0516)	(0.0336)	(0.0300)
Constant	-1.077	-1.990**	-1.611***
	(0.916)	(0.617)	(0.544)
Inverse Mills ratio	-0.109***	-0.167***	-0.155***
	(0.0360)	(0.0339)	(0.0342)
Observations	499	593	986

Notes: The table report the estimates of the Heckman model second stage equation, where the rebalancing decision is estimated accounting for selection. The dependent variable is defined as the risky asset active saving component (i.e. the active saving componenent of corporate bonds, equity and mutual funds) over financial wealth in $t-1$. Standard errors in parentheses. * $p < 0.1$,** $p < 0.05$, *** $p < 0.01$.

Figure 1: The Unconventional Monetary Policy Measure



Notes: The graph depicts the bi-yearly cumulated UMP unexpected components captured by the change in price of a financial indicator related to the monetary policy stance (in this case, government bonds at 2,5 and 10 year maturity for Ireland, Italy, Portugal and Spain) around the time of any UMP announcement. For a complete list of the announcements included in the analysis, see Table 9.

Appendices

A Data sources

B Active saving determination in details

C Monetary policy proxy

Table 8: List of economic data releases included in Equation (4)

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)
France	CPI YoY; CPI MoM; Cons. Conf. Ind.; Bus. Conf. Ind. (Manu.); Prod. Outlook Ind.; Bus. Sent. Ind.; Cons. Spending MoM; CPI ex Tobacco; real GDP QoQ; real GDP YoY; ML & OS Unemployment Rate; Markit Manu. PMI SA; Markit Serv. PMI SA; PPI MoM; PPI YoY; Jobseekers Total SA; Trade Balance EUR; Manu. Prod. MoM SA; Own-Comp. Prod. Outlook
Germany	CPI YoY; CPI MoM; Manu. Ord. YoY NSA; Manu. Ord. MoM SA; Trade Bal.; Exp. MoM SA; Trade Bal. Imp. MoM SA; Trade Bal. EUR NSA; Retail Sales NSA YoY; Retail Sales SWDA; MoM Prod. Prices MoM; Ind. Prod. YoY NSA WDA; Ind. Prod.n MoM SA; Ind. Prod. YoY SA; Unem. Rate SA; Unem. Change SA; Ifo Pan Bus. Climate; Ifo Pan Bus. Expectations Current Account EUR; Import Price Index MoM; Markit Manu. PMI SA; GDP Priv.Cons. QoQ; GDP GFCF QoQ; GDP Inv. in Const. QoQ
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
UK	CPI Core YoY; GDP YoY; GDP MoM; Ret. Sales Ex Auto. YoY SA; Ret. Sales Ex Auto. MoM SA; PPI Manu.Prod. YoY NSA; PPI Manu. Prod. MoM NSA; PPI Input Prices MoM NSA; PPI Input Prices YoY NSA; Ind. Prod. YoY SA; Unem. Rate SA (Change); Markit/CIPS Const. PMI SA; Markit/CIPS Serv PMI SA; Govt. Budget Balance; Priv. Cons. QoQ; House Price Ind. MoM SA; Cons. Conf. Ind.; Gov. Spending QoQ
Spain	CPI YoY; CPI Core YoY; PPI MoM; Trade Balance EUR; Unem. MoM Net Change; Avg LC per Worker YoY; PMI Manu. SA
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

Table 9: ECB Unconventional Monetary Policy Announcements used to construct the UMP measure

22.08.2007	Supplementary liquidity-providing longer-term refinancing operation (LTRO) with a maturity of three months
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 (FRFA) for as long as necessary, 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	Governing 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

D More Results

Table 10: Heckman model-first stage equation: safe assets active saving component

	Group 1 lowest 40%	Group 2 40%-80%	Group 3 top 20%
Security Account	0.692***	0.557***	0.399***
	(0.103)	(0.0653)	(0.0684)
Work in Finance	0.0164	-0.0349	-0.0364
	(0.155)	(0.0986)	(0.0990)
Online banking	-0.0291	0.00694	-0.107
	(0.0816)	(0.0612)	(0.0719)
UMP	-0.140*	-0.108	-0.103
	(0.0813)	(0.0726)	(0.0957)
Debt/GDP	0.00819	0.000927	0.0549***
	(0.0137)	(0.0122)	(0.0166)
Unemployment rate	-0.0683	-0.0114	-0.405***
	(0.0948)	(0.0847)	(0.115)
Income (0000)	0.383***	0.271***	0.0852***
	(0.0709)	(0.0521)	(0.0289)
Income sq (0000)	-3.39e-06***	-1.67e-06***	-2.44e-07*
	(8.89e-07)	(4.76e-07)	(1.29e-07)
Net wealth (0000)	0.00748*	0.00723	-7.26e-04
	(0.00411)	(0.00456)	(6.93e-04)
Net wealth sq (0000)	1.15e-09	-8.09e-09	1.60e-11
	(5.30e-09)	(5.23e-09)	(3.46e-11)
Famiy size	-0.119***	-0.119***	-0.0852**
	(0.0305)	(0.0270)	(0.0364)
Age	0.00490*	0.00485*	-0.00527
	(0.00293)	(0.00285)	(0.00408)
Retired	0.0982	0.0423	0.180*
	(0.0954)	(0.0768)	(0.0947)
Unemployed	0.104	-0.00121	-0.0489
	(0.0996)	(0.0988)	(0.164)
College+	0.133	-0.0416	0.111
	(0.104)	(0.0752)	(0.0729)
Woman	0.0623	-0.119**	0.118
	(0.0602)	(0.0539)	(0.0765)
Married	-0.255***	0.00772	-0.0265
	(0.0826)	(0.0794)	(0.124)
Divorced	-0.183*	-0.0284	-0.355**
	(0.104)	(0.106)	(0.159)
High ret/high risk	-0.794	-0.132	-0.451
	(0.514)	(0.275)	(0.319)
Good ret/fair risk	-0.430***	-0.277***	0.0245
	(0.0963)	(0.0788)	(0.0927)
Fair ret/low risk	-0.112*	0.0688	0.0793
	(0.0614)	(0.0511)	(0.0691)
Constant	-2.301**	-1.547*	-3.805***
	(0.958)	(0.855)	(1.159)
Observations	3656	3652	1826

Standard errors in parentheses
* $p < 0.1$,** $p < 0.05$, *** $p < 0.01$

Table 11: Heckman model-first stage equation: risky assets active saving component

	Group 1 lowest 40%	Group 2 40%-80%	Group 3 top 20%
Security account	1.764***	1.254***	1.299***
	(0.108)	(0.0694)	(0.0798)
Work in Finance	0.130	0.253**	0.251**
	(0.167)	(0.103)	(0.118)
Online banking	0.264***	0.154**	0.239**
	(0.0853)	(0.0636)	(0.0784)
UMP	0.0905	-0.00727	-0.0521
	(0.100)	(0.0779)	(0.105)
Debt/GDP	-0.0481***	-0.0200	-0.0139
	(0.0167)	(0.0131)	(0.0179)
Unemployment rate	0.326***	0.137	0.0597
	(0.115)	(0.0909)	(0.124)
Income (0000)	0.563***	0.277***	0.188***
	(0.0773)	(0.0542)	(0.0346)
Income sq (0000)	-4.43e-06***	-1.29e-06***	-6.11e-07***
	(8.69e-07)	(4.86e-07)	(1.63e-07)
Net wealth (0000)	0.00188	0.00741**	-0.00108
	(0.00484)	(0.00312)	(0.00118)
Net wealth sq (0000)	9.55e-09	-2.87e-09	1.94e-10
	(6.20e-09)	(2.43e-09)	(2.28e-10)
Famiy size	-0.207***	-0.187***	-0.123***
	(0.0364)	(0.0288)	(0.0391)
Age	-0.00207	-0.00386	-0.000441
	(0.00361)	(0.00307)	(0.00436)
Retired	0.113	0.127	0.228**
	(0.115)	(0.0820)	(0.103)
Unemployed	-0.112	0.142	0.283
	(0.134)	(0.105)	(0.172)
College+	-0.204*	-0.207***	0.0332
	(0.121)	(0.0798)	(0.0808)
Woman	-0.0490	-0.133**	-0.0891
	(0.0715)	(0.0579)	(0.0823)
Married	-0.240**	-0.144	0.0985
	(0.106)	(0.0884)	(0.131)
Divorced	0.0164	0.120	-0.147
	(0.114)	(0.111)	(0.159)
High ret/high risk	0.110	0.719**	0.832**
	(0.405)	(0.292)	(0.418)
Good ret/fair risk	0.0714	0.0998	0.443***
	(0.104)	(0.0808)	(0.103)
Fair ret/low risk	0.157**	0.285***	0.275***
	(0.0716)	(0.0542)	(0.0737)
Constant	1.229	0.0357	0.163
	(1.156)	(0.920)	(1.256)
Observations	3656	3652	1826

Standard errors in parentheses
* $p < 0.1$,** $p < 0.05$, *** $p < 0.01$