The Redistributive Impacts of ECB's Unconventional Monetary Policies: Evidence From Italian Household Surveys

(very preliminary version)

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Abstract

Unconventional Monetary Policies (UMP) recently implemented in most of the advanced economies have arised a controversial debate about their potential impacts on inequalities. Recurrently, non-standard monetary policy measures were held responsible for producing redistributive effects through asset price appreciation. At the same time, central bankers argued that these programs prevented the soaring of unemployment rates and eased households financial constraints. In this paper, we attempt to confront these two views by focusing on the case of the European Central Bank (ECB). Using extensive micro data from the Italian Survey of Household Income and Wealth (SHIW), we assess the redistributive impacts of the UMP conducted by ECB between 2008 and 2014, relying on the following redistributive channels : employment, indebtedness, asset price appreciation and the Zero Lower Bound (ZLB). Empirically, we mobilize Firpo & al. (2007)'s approach that combines Recentred Influence Function (RIF) regressions with the Oaxaca-Blinder decomposition method. We find that despite increase in low and middle income groups between 2010 and 2012, UMP have broadly had minor effects across households and their impacts on inequalities are relatively neutral.

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1 Introduction

Since the Global Financial Crisis (GFC) of 2008 and the recession that ensued, the economic debate among academics, policymakers and commentators in the developed world has separately focused on two burgeoning topics: monetary policy alongside the moves of central banks and the worrying level of income and wealth inequality. On the one hand, central banks have been on the front-line to prop up the economy by engaging massive cuts of their policy rates. In parallel, they mobilized an original toolkit of Unconventional Monetary Policies (UMP henceforth) that aimed to ease financial conditions and guide agents' expectations. These exceptional measures ranged from negative interest rates to forward guidance. However, almost a decade after the implementation of these measures, the economic recovery especially in the Eurozone, is still anemic and several doubts have been put forward about what else central banks can do. In fact, some argue that monetary authorities should continue to provide substantial liquidity to the economy while others call for the use of fiscal stimulus to exit from the current environment of low growth and high unemployment. On the other hand, the noteworthy contributions in public debate of Piketty (2014) and Atkinson (2015) made an unambiguous argument for the troubling state of inequality in the advanced economies and its potential impact on growth and social cohesion. Consequently, it fostered large discussions on how to resorb the huge disparities within societies and create an inclusive growth.

Macroeconomists have usually devoted a great deal of contributions to the relationship between monetary policy shocks and inequality. Still, in the aftermath of GFC, the extent to which UMP impacted or shaped income and wealth inequalities was ignored or at least, neglected by policymakers. This is logical as long as the first rank priority at that time was to stimulate the economy and enhance employment levels. As a matter of fact, central banks were subject to an intertemporal bias where long-run consequences of their decisions are sacrificed in favour of short-run objectives.

Nevertheless, until recently, a narrow linkage has been established between these two topics. In the United States (U.S.) and Europe, a large wave of criticisms has been steered towards central banks and their UMP as responsible for producing significant redistributive impacts. Actually, these critics draw up an image of a central bank captured by the vested interests of largest banks and affirm that monetary authorities usually favor the wealthy. To illustrate this idea, Acemoglu and Johnson (2012) state that:

> *"In recent decades, the Fed has given way completely, at the highest level and with disastrous consequences, when the bankers bring their influence to bear? As the American economy begins to improve, influential people in the financial sector will continue to talk about the need for a prolonged period of low interest rates. The Fed will listen. This time will not be different".*

The general public has also made an opinion about recent monetary policy measures and called for alternatives that do not make only the rich better off. Indeed, initiatives such as *"Quantitative Easing for the people"* - which claim the asset purchasing programs in the Eurozone to be designed in a way that help everyday people - clearly affirm central banks decisions disapproval. Hence, these opinions typically follow the stand arguing that central banks drove up wealth of the rich and widened therefore inequalities.

In the meantime, central bankers have as well taken sides in this debate by defending unambiguously the expansionary monetary policy they implemented since the financial crisis. Mario Draghi (2016), President of European Central Bank (ECB), supported in his turn that UMP have prevented the Eurozone to fall into a deep recession. Moreover, Draghi asserted that the criticism levelled at the ECB's decisions ignore what would have been the state of monetary union without such exceptional measures, arguing that :

> *"Those who claim that monetary policy worsens inequality typically do not consider the counterfactual. They take the distributional situation as given, but forget that monetary policy is acting precisely because the macroeconomic situation was at risk of changing. In fact, according to ECB simulations, Euro area GDP would be cumulatively at least 1.5 percent lower between 2015 and 2018 without the expansionary policy measures we have adopted".*

Notwithstanding that many suspect UMP to be behind the surge of inequality, little was said about the potential channels through which monetary policy influences income and wealth distribution. For example, the Centre for Economic Policy Research (CEPR) had published several articles about Quantitative Easing (QE henceforth) where unfortunately no serious contribution was made on its redistributive effects. Up to now, we are just aware that through their Large Scale of Assets Purchasing Programs (LSAPP or QE equivalently), central banks may have pushed up asset prices and, since the rich are those who mainly hold assets and portfolios, their wealth could significantly increase. Simultaneously, this would depress returns of middle class savers depositing money in banks and impact negatively inequalities. Needless to say that this assertion is not enough to support certainly that monetary policy widens economic inequalities, since we need to account for other possible channels. This is true to the extent that there is probably countervailing factors which drive down the disparities of income and wealth, as monetary policy (through interest rate cuts) could enhance employment levels and make debt repayments less painful. Besides, we don't know what is exactly the fraction of the increase in inequality that is attributed to monetary policy, as noticed by Bernanke (2015):

> *"Widening inequality is a very long-term trend, one that has been decades in the making. The degree of inequality we see today is primarily the result of deep structural changes in our economy that have taken place over many years. The effects of monetary policy on inequality are almost certainly modest and transient".*

Yet all these critics raise a paradox that could be briefly summarized: from one perspective, QE is blamed to have produced distributional effects through the mechanism of assets price appreciation described above. But, from another point of view, the Zero Lower Bound (ZLB) or near-zero interest rates - which could be considered as the starting point of UMP - may contribute to reduce inequality through the reduction of returns on fixed-interest assets. Hence, how come that the same policy produce two contradictory outcomes ? Amid these ambiguities, it is necessary to define beforehand how monetary policy - in its conventional and unconventional form - shapes, or at least, affects the distribution of income and wealth through different channels.

What is attempted in this paper is to investigate the redistributive impacts of UMP, with focus on the Eurozone case. Using individual data from the Italian Survey on Household Income and Wealth (SHIW), we are interested in assessing the distributional effects of the several unconventional monetary policy measures implemented by the ECB since the onset of the financial crisis in 2008.

We start first by identifying from the economic literature the different theoretical channels through which UMP are expected to impact the distribution of income. Our methodology borrows from decomposition methods in labor economics and mobilizes Unconditional Quantile Regression (UQR) techniques, introduced by Firpo & al. (2006), combined with the Oaxaca-Blinder decomposition method. The purpose of this empirical strategy is to help us defining the quantitative contribution of each theoretical channel of UMP on income quantiles, but also to identify the fraction of changes in income that is in fact attributable to UMP redistributive channels. To the best of our knowledge, this is the first time such an attempt is undertaken to evaluate the distributional implications of UMP at the Euro area level.

Precisely, this paper is interested in empirically assessing the redistributive impacts of UMP on Italian households, relying on the following distributional channels: changes in employment and indebtedness levels, financial and real assets appreciation plus the fall in returns of savings accounts. The redistributive outcome of these channels is evaluated through the prism of income groups per quantiles and the Gini coefficient (as a standard measure of income inequality) for three separate periods: 2008-2010, 2010-2012 and 2012-2014. In fact, in each of the chosen assessement periods, ECB conducted non-standard monetary policy measures that we classify according to three specific types of central bank interventions in times of UMP: asset purchase programs, lending facilities operations and the ZLB.

Our main findings depart from existing empirical studies that have tackled this topic on the ground of Vector Autoregressive models (VAR) (see among others Mumtaz & Theophilopoulou (2017)). Decomposition results suggest that UMP packages implemented by ECB for the 2008-2014 period have not produced significant redistributive impacts on Italian households. Besides, they do not seem adding much to income inequalities (as measured by the Gini coefficient). Apart from the 2010-2012 period, where changes in employment and households indebtedness levels have modestly increased income of bottom and middle class households, UMP redistributive channels looked impotent. Financial assets appreciation and savings accounts ownership, commonly considered as driving factors of the UMP-inequality nexus - due to the large asset purchase programs and the ZLB - also fails to show any important effects on income quantiles.

The rest of this paper is delineated as follows. In the next section, the purpose is to describe in detail how conventional monetary policy would affect positively or negatively income and wealth inequality. Then, we focus on the redistributive impacts of UMP, specifying the channels at stake and how they operate differently from classical interest rates cuts. In section 3 and 4, we derive the main distributive channels of UMP and specify our model, justifying theoretically our choice of variables. In section 5, we discuss some data issues along with the empirical techniques we are going to use. Finally, section 6 presents and interprets the main results, drawing some important lessons for future non-standard monetary policy measures of the ECB.

2 Redistributive impacts of monetary policy

2.1 Conventional monetary policy and inequality

Broadly speaking, standard monetary policy generally operates by shifting the policy interest rate, relying on an extensive analysis of economic activity. Considering that the economy is experiencing inflationary pressures, central banks can decide to control the money supply by increasing their respective policy rate. Conversely, they can reduce the latter, considering that the economy could plunge into a recession. The economic literature on the distributional impacts of conventional monetary policy approached the issue under that general framework. In this sense, most of research contributions either focused on identifying the theoretical channels from which monetary policy could impact inequalities or on empirically documenting the redistributive impacts of monetary policy shocks. The latter were frequently modelled as unexpected changes in central banks' policy rates, following the seminal paper of Romer & Romer (2004) (R&R henceforth) on the measurement of monetary policy shocks. Before discussing the most important contributions on this area, we begin by introducing the redistributive channels of monetary policy.

Coibion & al. (2017) was perhaps the first attempt that aimed at clearly defining the redistributive channels of conventional monetary policy. The first channel they identify refers to the "financial market segmentation". It suggests a straightforward idea: individuals dealing primarily with central banks decisions, mainly in financial markets, will respond instantaneously to market attitudes, adjust rapidly their positions and as a consequence benefit the most from monetary policy. Then, the operators who are the best connected to a given market will experience an important positive effect on their wealth. This is expected to increase inequalities as people who operate in financial markets are known to be highly skilled and positioned on the top of income distribution.

The second redistributive channel emphasized by Coibion and his co-authors concerns the "heterogeneity in income sources". It stresses the fact that if labor earnings are the primary source of income for most households, others may rely to a greater extent on financial, business or transfer incomes. As a result, monetary policy is likely to produce distributional effects across households following which type of income it favors. For instance, amid an economic downturn, if central bank seeks to increase labor earnings over financial returns, wealth will tend to be redistributed towards modest households. In this scenario, the level of income and wealth inequality is expected to decline. Similarly, if monetary policy happens to promote business profits, rich households will be better off and income disparities are likely to increase.

Besides, "portfolio effects" channel suggests that if households detain assets that are not protected by inflation, an inflationary shock would whip out their wealth and produce redistribution. This is particularly true for low-income households, who tend to hold assets in the form of cash. Of course, if inflation increases, the real value of currency portfolios will be the first impacted and inequality is likely to increase. Conversely, households who are able to own secured assets would be protected against unexpected shocks and their wealth less sensitive to contingencies. The last redistributive channel is termed as "Borrowers versus Savers" and underlines that high interest rates favour the wealthiest households who tend to be net savers while it hurts low and middle-income ones as they are in principle net borrowers.

Using these redistributive channels and mobilizing the Consumer Expenditures Survey (CEX), Coibion & al. (2017) looked to which extent monetary policy shaped inequality since 1980 in the U.S. economy. Their results have put forward that contractionary monetary policy increases systematically inequality across households. Also, given the breadth of survey data used by the authors, they had the opportunity to estimate the relative importance of each channel. For example, they found that following a monetary policy shock, top income quantiles (typically those who manage to diversify their income sources) respond positively while bottom ones experience significant drop in their income. As a consequence, the heterogeneity of income sources is of a high relevance to understand the redistributive effects of monetary policy. However, despite its originality, this work suffers from a fundamental limitation. Actually, all the inequality measures used by the authors focus solely on income and not wealth. Yet, redistributive effects of monetary policy and particularly in its unconventional form concern in the first place wealth (a stock variable) rather than income (a flow variable).

Comparably, in a recent paper, Auclert (2017) evaluates the role of redistribution in the transmission mechanism of monetary policy to consumption. This contribution is somehow close to the one of Coibion & al. (2017) inasmuch as it identifies similar redistributive channels, but this time, the impact on inequalities is approached through consumption and aggregate spending. To do so, the author builds a theoretical model with a single agent, incomplete markets and adds another redistributive channel called "interest rate exposure channel". This one occurs when interest rates falls redistribute wealth from households whose wealth is invested in short-term assets towards the ones whose portfolios are endowed with long-term bonds or adjustable-rate assets. According to Auclert, this redistribution lies in what he calls the Unhedged interest Rate Exposures (UREs) (the difference between all maturing assets and liabilities at a point in time). In actual fact, the URE measures household's real balance sheet exposure to interest rate changes. From that point on, a fall in interest rates lessens debt burden for those who hold assets for a longer duration and decrease the returns for households with short-term assets.

In his theoretical model, the author incorporates an additional redistributive channel that goes back to Fisher (1933). The "Fisher channel" describes the redistribution of wealth that arises as a consequence of unexpected inflation and its impact on nominal balance sheets. In this case, creditors are the losers while debtors are the winners. Doepke & Schneider (2006) empirically estimated this channel for the U.S. and found that on the one hand, losers from the "Fisher channel" are rich, retired households and the major bondholders in the economy. On the other hand, winners are young and middle-class households with fixed-rate mortgage debt in their liabilities.

Thus, from the two contributions we discussed above, it appears that redistributive channels of monetary policy involve three dimensions that produce simultaneously "winners" and "losers" : income, inflation and real interest rate. The heterogeneity of income sources and their differential response to business cycle fluctuations makes low-income households very sensitive to monetary policy shocks. Conversely, unexpected changes in price levels are equalizing as they redistribute wealth from savers (rich households) to borrowers (modest households). As for the outcome of real interest rates exposure on inequality, a deep investigation on the size and distribution of balance sheets across households is necessary.

We shall now discuss the empirical contributions on the redistributive impacts of conventional monetary policy.

Building on Doepke & Schneider (2006)'s article, Doepke & al.(2015) develop an overlapping-generations framework, which allows for heterogeneities in terms of preference, income and also in the housing market (i.e. different segments for rental units plus small and large owner-occupied houses). This is done so as to examine the distributional effects of expansionary monetary policy - one that aims at targeting a higher inflation rate - in the U.S. economy. For that purpose, they mobilize sector-level data from the Flow of Funds Accounts (FFA) along with individual data from the Survey of Consumer Finances (SCF). If the redistributive effects of monetary policy when the Federal Reserve (Fed henceforth) targets higher inflation do not radically differ from the findings of Doepke & Schneider (2006), the repercussions observed on the housing market deserve an explanation. Indeed, evidence suggest that changes in inflation affect real estate prices in a heterogeneous way. Prices of houses typically designed for first-time buyers slightly increase when inflation rises while the price for houses demanded by middle-class households - who want to mobilize their savings to upgrade their standards of living - significantly increases. Accordingly, this effect redistributes wealth from middle-class households towards elderly-rich ones. This finding rises as well two relevant remarks for our research question. First, it confirms that assets respond differently to monetary policy. Second, it shows that redistributive impacts could occur at the very heart of asset segments.

By extending this issue to a set of countries, Furceri & al. (2016) have tried to study the effects of monetary policy shocks on inequality. Using an Impulse Response Function (IRF), they attempted to capture the causal effect of monetary policy shocks - measured as unexpected changes in policy rates - *a la R&R* - on income inequality for a group of 32 advanced and emerging economies. The authors document that expansionary monetary policy contributes to lessen income inequality while the opposite is true for restrictive monetary policy. The magnitude of these effects depends certainly on the stance of business cycle, but also on the labor share of income and redistribution policies. Thus, expansionary monetary policies tend to have a larger positive effect in countries with a higher share of labor income and limited redistribution policies.

2.2 Redistributive impacts of UMP

In contrast to conventional monetary policy, contributions on the redistributive impacts of UMP are scarce. This scarcity is much more ressented on the theoretical side where until today no major contribution has been made. In addition to that, research on the redistributive effects of the ZLB is almost non existent. Is it because UMP's redistributive impacts in comparison to conventional monetary policy are not radically differrent ? Yet, the answer to this question is still pending. Even when looking at research that addressed this specific issue, a consensus is hard to find. For instance, Bivens (2015) stipulates that the difference between a conventional monetary expansion and QE with regard to their distributional implications is hard to disentangle. He argues that while the mechanism at stake is different, both monetary policies intend to lower long-term interest rates and then their redistributive effects could not differ that much.

Although several economists suspected assets price appreciation to amplify income disparities, Kiley (2014) challenged this reading. He states that the assets price appreciation channel is tenuous in a context of ZLB, particularly when UMP become a substitute of conventional monetary policy. Hence, the redistributive impacts of UMP would be less potent than standard monetary policy.

The debate over redistributive impacts of UMP has aroused a flood of empirical studies that took aim at presenting concrete evidence on any existing link between UMP and income distribution. Domanski & al. (2016) is amongst the rare contributions that sought to document for a large panel of advanced economies the redistributive impacts of all UMP direct channels (ZLB, appreciation of bonds, equity and real estate) while focusing exclusively on wealth inequality. The authors mobilize microdata from household surveys of six advanced economies (France, Germany, Italy, Spain, the U.K. and the U.S.) in order to construct household balance sheets per quantiles and obtain wealth distribution for each country of the panel. Afterwards, they computed the growth rate of assets and liabilities and determined rates of return on assets and cost of debt liabilities per quantile. Results suggest that the ZLB and high bond prices did not add much to wealth inequality whilst the rising equity prices seemed to be a potent driving factor. However, the paper omitted to estimate the indirect redistributive channels of UMP (namely employment and debt repayments). On top of that, not all the countries of the panel were implementing simultaneously UMP measures. For example, Eurozone countries, like Germany or France were indeed experiencing a sort of "back to normal" in their monetary policy stance (the ECB's policy rate started to rise precisely as of April 2011 before slowing down again).

Another research paper by Casiraghi & al. (2016) has studied the impact of UMP on inequalities for the Italian economy from 2011 to 2013, using an extensive micro dataset of Italian's households' income and wealth. The authors came to the conclusion that effects of UMP on inequalities were insignificant since both poor and rich households benefited respectively from the channels of employment and assets price appreciation. Therefore, these two channels of UMP balance each other out and the net effect on inequalities is neutral, challenging this way the assertion that UMP acts as a *"reverse Robin-Hood"*. Still, the critic we can formulate regarding this paper is that Italy and the Eurozone were not fully experiencing a proper UMP during the period of 2011-2013. Indeed, the Securities Market Program (SMP) - which has urgently provided liquidities in some segments of the debt securities market in 2010 - ended in the beginning of 2012. Other programs like the Outright Monetary Transactions (OMT) - a large scale of sovereign bonds purchasing by the ECB - has never been implemented. More than that, proper QE at the Eurozone level started as of November 2015. Consequently, it is hard to decide on the relevance of these results as the temporal horizon defined by the authors is somehow biased.

So far, one of the published articles which has mobilized micro data at the Eurozone level to examine the redistributive impacts of UMP is the one done by Adam & Tzamourani (2016). In fact, the authors used data from the Household Finance and Consumption Survey (HFCS) and computed all households balance sheets (62.000 households from all Eurozone countries) in order to investigate the distributional consequences of asset price inflation in the Euro area.

The methodology consisted in calculating households net wealth and multiplying it by a 10 percent price increase, which delivers the household's capital gains for a given class of assets (equities, bonds or real estate). Results shed light upon the fact that capital gains from bond and equity price increases tend to be concentrated amongst the top 5 percent households, while median household strongly benefits from the recovery of real estate market. Out of hand, these results do not sound very surprising since capital gains from assets price appreciation go mostly to rich households. Still, this contribution does not provide any support for inequality measures or in other words, results do not suggest actually that the UMP implemented by the ECB widened inequalities.

In recent past, research on the redistributive impacts of UMP has broadly focused on the impact of QE itself on inequality. This is understandable since QE involved massive asset purchases by central banks that amounted sometimes to 80 billions dollars, on a monthly basis.

As an illustration, building on a VAR model, Mumtaz & Theophilopoulou (2017) came to the conclusion according to which UMP and especially QE has increased inequality in the United Kingdom (U.K.). This finding is obtained from a counterfactual analysis, where the authors carried out a forecast of Gini coefficient's path under a "policy" and "no-policy" scenarios. The results show that the Gini coefficient for income, wage, and consumption is higher under the "policy" scenario. Equally, using data from the Fed's Tri-Annual Survey of Consumer Finances (SCF), Epstein and Montecino (2015) have studied the redistributive impact of QE1 in the U.S. (which has targeted the purchase of Mortgage Backed Securities) and have emphasized that, despite its equalizing effects on employment and mortgage refinancing, QE has truly widened income and wealth inequality, mainly due to equity price appreciations.

As from the review of literature we have made, some fundamental conclusions could be drawn concerning the distributional effects of UMP. First, given the fact that standard monetary policy and UMP target the same ultimate aim, which is to push down long-term interest rates, their redistributive impacts would not radically differ. Second, it is worth to emphasize that UMP are working through crucially different transmission channels. No longer credit and lending channels seem to be the dominant way in which it impacts the economy, but it appears much more to be working itself through asset prices, whether it is housing stocks, financial stocks, etc. Also, UMP are likely to produce distributional effects through indirect channels, since it is expected to impact positively employment and lessen debt repayments. In this case, UMP would drive down interest rates and encourage households to refinance their mortgage loans or contract a new one. Third, if according to the existing economic literature, restrictive monetary policy was perceived as the principal culprit of inequality; today, it's completely the opposite since expansionary monetary policy is the one accused of increasing inequalities. Finally, we notice that generally, central banks' empirical works tend to favor the tale that insists on the aggregate impacts of UMP on growth and the role played by countervailing channels to limit income disparities. Academics and commentators focus rather, on the distributional implications of UMP by type of income and/or category of agents. In this paper, we attempt to conciliate these two interpretations by empirically assessing the contribution of each distributional channel on income quantiles and determine which one dominates.

3 What are the redistributive channels at stake ?

As we have highlighted in the previous section, most of research that addressed distributional effects of UMP often omitted to take into account all of the factors at play. However, a thorough evaluation of this issue requires a proper identification of the channels involved. In our paper, we would like tackle this point in particular by taking on board at once the role played by direct and indirect redistributive channels of UMP in shaping income distribution.

To begin with, we need first to take stock of the different monetary policy measures carried out by ECB since 2008. We choose to succinctly distinguish these measures in accordance with three types of central banks' interventions : asset purchase programs, lending facilities operations and the ZLB.

For asset purchase programs, ECB's interventions consisted on purchases of public and private sector securities and bonds. The general objective of these programs is to lower long-term yields and stimulate economic activity. Actually, when monetary authorities purchase assets, this bolsters prices and pushes down returns, which encourage their owners to switch into other financial assets, to which apply the same mechanism (the latter refers to the portfolio rebalancing effect). For the period considered in this paper (i.e. 2008-2014), the ECB conducted the Securities Market Program (SMP from May 2010 until September 2012) and the Covered Bond Purchase Programme (CBPP1 from July 2009 until June 2010 & CBPP2 from November 2011 until October 2012) but also annouced on September 2012 the Outright Monbetay Transactions program (OMTs).

Regarding lending facilities operations, the ECB - during the sovereign debt crisis - sought above all to support bank lending and enhance private sector financing conditions. To do so, Eurozone banks have been provided with long-term loans, which can amount up to 30 percent of their outstanding loans to households and firms. Likewise, to improve banks liquidity, reserve requirements were significantly reduced in order to stimualte credit supply. In pratice, these operations were introduced via the Longer-term Refinancing Operations (LTROs), announced on December 2011. Since 2014, long-term loans granted to credit institutions have seen their maturity extended up to four years instead of three, as part of the Targeted Longer-term Refinancing Operations (TLTROs).

As for policy interest rate levels, the ECB has decided, following the GFC, to reduce its Main refinancing operations fixed rate (gradually from 3.25 to 1 percent) but chosen to raise it again as of April 2011. Patently, the side effects of this premature increase have pushed the Governing Council of ECB to repeatedly reduce its policy rate until it reached on March 2016 the ZLB.

Hence, asset purchase programs are expected to produce redistributive effects directly through assets price appreciation, especially if the latter are held by top-income households. Besides, given that lending facilities operations are intended to ease financial conditions on businesses and households, two indirect redistributive channels would be considered: poor and middle-class households would be encouraged to borrow more while businesses are likely to increase their labor demand. Finally, the ZLB redistributive channel could be summarized in what Keynes called the "euthanasia of rentiers" in that it directly reduces returns on fixed-rate assets and particularly those of savings accounts.

Following the aforementioned redistributive channels of UMP and in compliance with our survey, we derive the income equation :

$$Net\ Disposable\ Income = Labor\ income + Property\ income + Pensions\ and\ Net\ Transfers \quad (1)$$

In the equation specified above, *Labor income* refers to payroll and net self-employment incomes earned by workers employed or self-employed, *Property income* assembles earnings received from real-estate plus capital gains realized from financial assets (government securities, bonds and equities) minus interest payments. *Pensions and Net Transfers* simply denotes retirees income and public assistance to households (financial help, scholarships, alimony etc.). Note that this equation is presented in a way that matches the definition of net disposable income by the surveys we use. What is interesting here is the possibility to estimate at least one of the distributional channels of UMP. Therefore, *Labor income* should capture the effect of UMP on employment level as much as *Property income* is expected to reflect the asset-price appreciation. In addition, the presence of *Pensions and Net Transfers* could also help capturing the potential complementarity between fiscal and monetary policies.

Table 1 summarizes household total net disposable income for 2008, 2010, 2012 and 2014 extracted from the Italian SHIW. We notice first and foremost that Italians are less richer today than six years ago. In this respect, mean income has slightly increased between 2008 and 2010 and so is the case for all the income percentiles. That being so, it must be noted that mean income in Italy in comparison to 2010 has undergone a fall of 7.30 percent in 2012 and 6.85 percent in 2014. This is probably due to the negative macroeconomic shocks the Italian economy has faced since the Eurozone debt crisis. Besides, inequality measures, depicted by percentile ratios and Gini coefficient show to some extent that income inequalities in Italy have leveled-off or slightly increased between 2008 and 2014.

The present paper seeks to investigate the distributional implications of the UMP conducted by the ECB on Italian households. To this end, we mobilize four surveys of household income and wealth while considering an assessement over three periods. Specifically, we have in sight to evaluate the redistributive impacts of the CBPP1 and interest rate cuts between 2008 and 2010. Then, we focus on the SMP, CBPP2 and the LTRO for the period of 2010-2012. Finally, the 2012-2014 period documents the redistributive impacts of OMTs annoucement and the TLTROs.

The redistributive channels of UMP that are going to be estimated feature both direct and indirect channels. On the one hand, employment and indebtedness levels are considered as indirect channels. On the other hand, the appreciation of financial assets (government securities, bonds and equities), real assets (real estate) and the drop in savings account returns (we choose to term it as ZLB channel) will be comprehended as direct channels. Note that this channel will be evaluated only for the 2008-2010 period as data on savings accounts ownership have been deleted from the SHIW as of 2012.

Hence, the contribution of this paper is twofold. First, we depart from existing literature by proposing an overall evaluation of all theoretical channels of UMP. Second, all non-standard measures implemented by the ECB from 2008 until 2014 are included, which allows us to lend weight to the criticism levelled at ECB's monetary policy decisions.

Table 1: Total household income between 2008 and 2014

	Net Disposable Income			
	2008	2010	2012	2014
Mean	32146.08	32772.34	30380.22	30525.17
Percentiles				
10	11290	11710	10600	10400
25	17168.25	17509.5	16250	16687.26
50	26082.74	27024.94	24590.1	25107.88
75	40421.82	41227.24	38509.31	39377.36
90	58321.74	58733.36	55210.68	55264.82
99	119385.1	124701.2	110313.9	108444.7
Percentiles Ratios				
90/10	5.16	5.01	5.2	5.31
90/50	2.9	2.17	2.24	2.2
50/10	2.31	2.3	2.31	2.41
Gini Coefficient	0.34567	0.34999	0.35539	0.34567

Note: The statistics reported above are obtained using unit sampling weight (defined at household level)

4 Empirical model

The proposed model follows the income equation previously specified and defines itself with the terms of Epstein & Montecino (2015). We focus on the redistributive channels discussed in the previous section, namely asset-price appreciation, employment, debt and ZLB channel. In this way, property income and labor income should convey the effect of each channel on net diposable income.

Hence, the functional form of *Labor income* of a household i for a given period is :

$$Labor\ Income_{it} = \beta_t EMPLOY_{it} + \alpha_t Sex_{it} + \gamma_t Age_{it} + \theta_t EducAchi_{it} + \eta_t GeogArea_{it} + \epsilon_{it} \qquad (2)$$

where *EMPLOY*, a dummy variable, indicates whether the head of household is employed or self-employed and takes the value of one in both cases and zero otherwise. We include also a set of control variables: *Sex* is equal to one if the head of household is a male and zero if a female, *Age* refers to the age of household while *EducAchi* is a categorical variable, which denotes the level of educational achievement. In addition to this, because Italy is still experiencing important regional disparities, particularly between its north and south, we incorporate a categorical variable called *GeogArea*, which equals to one if the household lives in the north, two for the center and to three if the household is from the south of Italy.

As for *Property income*, it is assumed to depend directly on the ownership of a set of assets:

$$Property\ Income_{it} = \lambda_t Gov_{it} + \tau_t Bond_{it} + \phi_t Equity_{it} + \Omega_t RealEst_{it} + \Psi_t Savings_{it} + \nu_{it} \tag{3}$$

where *Gov* is a dummy variable that is equals to one if the household owns a domestic or foreign issued government security. We choose to put all the different types of government securities together in order to avoid potential correlations between independent variables. Likewise, *Bond*, also a dummy variable, stands not only for bonds issued by Italian firms but also for funds and Exchange-Traded Funds (ETFs). Similarly, *Equity* equals one if the household owns equity shares and zero otherwise. *RealEst* indicates if the household owns or not his principal residence. *Savings* estimates the ZLB channel as it refers to savings accounts ownership and takes the value of 1 if the household possesses one. Coefficients of *Property income* equation could be interpreted as the rate of return on each asset. Though, we would like to emphasize that since debt is theoretically not considered as a property, we prefer to include it after in the income equation. Thereby, *Debt* is a dummy variable that takes the value of one if the household has contracted during the period of interest a mortgage loan or consumer credit. Hence, the net disposable income equation becomes :

$$Net\ Disposable\ Income_{it} = \beta_t EMPLOY_{it} + \mu_t \mathbf{X}_{it} + \alpha_t \mathbf{Y}_{it} + \varepsilon_t Debt_{it} + e_{it} \tag{4}$$

where $\mathbf{X}_{it}$ is a vector gathering the control variables included in the *Labor income* equation and $\mathbf{Y}_{it}$ also a vector of all the dummy variables defined in the *Property income* equation, indicating whether or not the household own any of the assets specified.

As mentioned in the introduction, the purpose of our empirical strategy is twofold. First, estimate the impact of UMP redistributive channels on each income quantile and second, decompose the changes in income with respect to the quantitative contribution of each channel. To do so, we have to assume that :

$$\mathbb{E}\left\{e_{it} | EMPLOY_{it}, X_{it}, Y_{it}, Debt_{it}, t\right\} = \lambda \quad \text{for} \quad t = 0, 1 \tag{5}$$

where $t = 0$ denotes the pre-UMP decision period and $t = 1$ the post one. This expression refers to the ignorability assumption, which is crucial to our decomposition exercise. Usually, sampling-based surveys face the recurrent problem of "selection bias", resulting from the fact that subjects effectively observed in the sample are not representative of the concerned population. Therefore, some unobservable factors contributing to the dependent variable - income in our case - might be not captured by the model, leading to inconsistent estimates of coefficients. However, as emphasized by Firpo & al (2011) in the Handbook of Labor Economics, ignorability supposes that : *"unobservables do not need to be independent (or mean independent) of X (a given exogenous variable) as long as their conditional distribution given X is the same in groups A and B"*. This assumption implicitly recognizes the existence of selection biases in the samples as long as they are constant across both groups (for our case before the implementation of UMP package and after). In other terms, if some unobservable factors and the variable *EMPLOY* are correlated, the decomposition exercise remains robust since this correlation is the same for $t = 0$ and $t = 1$.

5 Data & methods

5.1 The Survey on Household Income and Wealth (SHIW)

The ideal way to investigate the redistributive impacts of monetary policy consists on mobilizing extensive micro datasets, generally transcribed in surveys of household finances conducted by central banks. This is necessary insofar as only individual data can display a large overview of household incomes and assets - relevant to monetary policy analysis - while taking into account of demographic and geographic dimensions. Even so, individual data on households finances are relatively difficult to obtain, due to the possible identification of respondents and the violation of anonymity. Thus, almost all the survey of households income and wealth at the Eurozone level are inaccessible or subject to constraining procedures. By way of example, the Household Finance and Consumption Survey (HFCS) collects homogeneously information on the assets, liabilities, income and wealth of Eurozone households whose access remains relatively limited. Though, the Bank of Italy's Survey on Household Income and Wealth (SHIW) is an exception as it is more easily reachable and offers partially the necessary elements to address our research question.

In practice, the SHIW contains several features that are relevant to document the redistributive impacts of UMP. First of all, it concerns about 8,000 households, distributed over 300 Italian municipalities and provides extensive data on incomes, savings, assets and liabilities of Italian households. Moreover, the SHIW is released every two years, offering users more choices regarding the temporal dimension in which a research would like to be aligned with. Also, since the sampling design involves heterogeneous households, "sampling weights" are included in the surveys. Usage of the latter is required so as to recognize for each respondent its relative importance and avoid estimation bias. And above all, the surveys track the same households across time using a single questionnaire number (NQUEST) that identifies the respondent along the different survey dates. That's not necessarily the case for other countries' individual data, where survey respondents are selected randomly. From this point, the SHIW's sampling method is very interesting on the grounds that it enables to observe how income of different households have changed over time, given an exogenous shock.

Nevertheless, just as other household surveys, the SHIW presents some shortcomings. As a case in point, data about the excluded households against bank loans - highly relevant as a control variable for the *Debt* channel - are nonexistent. It is also unusual to notice that information on households work experience - commonly agreed to be a fundamental control variable of income equation - lack in all the surveys. Although we bring *EducAchi* as a proxy, the *Labor income* equation might be inaccurately estimated. Another issue deals with the regular changes made to the SHIW at different stages. By the way, every time a new survey is released, we notice that some variables have been replaced, merged or simply removed from the questionnaire. For instance, in the SHIW of 2008 and 2010, household information about bank current and savings accounts were presented in separate variables, while in the 2012 and 2014 version, they were merged in one single variable. This issue would prevent us to estimate the associated impact of ZLB channel for 2010-2012 and 2012-2014 periods. We now turn to the discussion of our empirical strategy.

5.2 Empirical strategy

Interest for distributional decomposition methods in labor economics has significantly increased in the last decades. This concern was in part motivated by the growing economic inequalities in the advanced world, whether it deals with social backgrounds, gender or race. The purpose of our work is to use decomposition methods in such a way to examine the redistributive impacts of non-standard monetary policy measures. Consequently, the well-known Oaxaca-Blinder (OB henceforth) decomposition method - developed initially to study wage differentials - fits best the aim of assessing distributional effects of UMP. Concisely, OB first decomposes changes in mean wages into an explained and unexplained components [1] and separate them in a second phase with respect to the contribution of each independent variable. This second feature is what distinguishes OB from standard decomposition methods as in Juhn & al. (1993) or Gosling & al. (2000), as they do not allow for dividing the explained component into the quantitative contribution of independent variables.

Nonetheless, Firpo & al. (2007) introduced further improvements to OB's applications, through the decomposition of wage distributions beyond the mean using a novel Recentered Influence Function (RIF) regression. RIF regression method was first suggested by Firpo, Fortin and Lemieux (2006, FFL henceforth) and simply consists on estimating the impacts of changes in the distribution of independent variables on the dependent variable, replacing the latter by a chosen distributional statistic $v(F_y)$ (for example the 10th quantile or Gini coefficient). More formally, since the FFL approach is based on the concept of influence functions - a common instrument of robust statistics - the RIF of a single observation y for a given distributional statistic v is defined as $RIF(y;v) = v(F_y) + IF(y;v)$, where F_y denotes the density function of the dependent variable Y and $IF(y;v)$ stands for the influence function of an individual observation on the distributional statistic v. Following FFL notation, the general RIF-regression model linearly links the conditional expectation of the $RIF(v;y)$ with the covariates, so that $E[RIF(Y;v)|X] = m'(X)$. Note that the coefficients of the regression model can be estimated using OLS.

Forasmuch as we are interested in the effects of UMP on income distribution, the influence function of a quantile τ, $IF(y;Q_\tau)$, corresponds to $(\tau - \mathbb{1}\{y \leq Q_\tau\})/f_y(Q_\tau)$, where $\mathbb{1}\{.\}$ is an indicator function, Q_τ is the population quantile and f_Y the density function. Thus, the *Recentered*-IF for quantiles could be rewritten as :

$$RIF(y;Q_\tau) = Q_\tau + \frac{\tau - \mathbb{1}\{y \leq Q_\tau\}}{f_y(Q_\tau)} \tag{6}$$

Also, in the case of quantiles, the RIF regression or Unconditional Quantile Regression (UQR) as it is commonly phrased reflects the marginal (or the partial) effect of a shift in covariates X on the unconditional quantile and so the regression model becomes $E[RIF(Y;Q_\tau)|X] = m'(X)$. For example, in our case, the UQR seeks to estimate the impact of holding government securities on income among the 90th quantile in 2008, 2010, 2012 and 2014.

[1] In the literature on decomposition methods, the explained and unexplained components are usually called respectively composition effect and wage structure effect.

Therefore, for the first step of our empirical strategy, we need first to calculate from equation (6) the RIF for all quantiles and then run an OLS regression of each one on explanatory variables for both periods (before and after the UMP package).

As previously said, FFL's application of OB enables to extend the decomposition to RIF regressions' distributional statistics and more specifically to income quantiles and the Gini coefficient. As a result, for the latter, an implementation of OB decomposition method would allow us to check empirically, to what extent UMP redistributive channels have contributed to income inequality in Italy. Recall that in the light of FFL's approach, OB distributional decomposition aims to divide changes in the dependent variable for a distributional statistic into an explained component that measures shifts in the composition of covariates and an unexplained component, which rather, captures the effect of changes in coefficients. Formally, the change in a distributional statistic v over $t = 0, 1$ is $\Delta_v = v_1 - v_0$. For quantiles, the previous equation becomes $\Delta_\tau = \widehat{Q}_{1,\tau} - \widehat{Q}_{0,\tau}$, knowing that $\widehat{Q}_{t,\tau} = \bar{X}_t \widehat{\beta}_t$. As an illustration, changes overtime in net income for the 10th quantile ($\tau = 10$) is $\Delta_{10} = \widehat{Q}_{1,10} - \widehat{Q}_{0,10}$, which can be decomposed following FFL notation into :

$$\begin{aligned} \Delta_{10} &= (\widehat{Q}_{1,10} - \widehat{Q}_{c,1}) + (\widehat{Q}_{c,1} - \widehat{Q}_{0,10}) \\ &= \bar{X}_1\widehat{\beta}_1 - \bar{X}_1\widehat{\beta}_0 + \bar{X}_1\widehat{\beta}_0 - \bar{X}_0\widehat{\beta}_0 \\ &= (\bar{X}_1 - \bar{X}_0)\,\widehat{\beta}_0 \; + (\widehat{\beta}_1 - \widehat{\beta}_0)\,\bar{X}_1 \\ &= \Delta_X^\mu + \Delta_S^\mu \end{aligned} \tag{7}$$

where $\widehat{Q}_{c,1}$ is a counterfactual distribution, defined by FFL as the distribution of income that would have prevailed for the 10th quantile of households if they had received in $t = 0$ the same income as in $t = 1$. Adding and subtracting the term $\widehat{Q}_{c,1}$, we obtain the aggregate explained component Δ_X^μ and the unexplained one Δ_S^μ. These components can be further decomposed into the contribution of each explanatory variable. Accordingly, for the 10h quantile, the contribution of composition effect of government securities on income changes could be written as :

$$\Delta_{10,GovSec} = (\bar{X}_{1,GovSec} - \bar{X}_{0,GovSec})\,\widehat{\beta}_{0,GovSec} \tag{8}$$

Since we are using the OB decomposition method to tackle an issue that is a bit different from the purpose for which it was designed (i.e. the explanation of wage differentials and discriminations), we should then be cautious when interpreting the explained and unexplained components. Quoting Epstein & Montecino (2015), the explained component refers to "*the contribution of a change in the endowment of a factor X_k between two periods holding its return constant*". Thence, for the employment channel, explained component can be interpreted as the labor income premium a household would earn from increasing its employment level between $t = 1$ and $t = 0$, for a given real wage. In contrast, as aforementioned, the unexplained component measures contributions of changes in covariates' coefficients or returns to factors as in our case.

Then, in the case of financial assets, the unexplained component can be interpreted as the increase in household financial income, received from a rise in the rate of return (from β_0 to β_1) on a held government security or bond, holding fixed its endowment. The same applies to real estate, which we consider here as a real asset.

To summarize, in order to analyze the redistributive impacts of UMP, we implement an empirical strategy that follows FFL seminal paper. The general methodology that guides this paper consists on decomposing changes in net income with respect to UMP distributional channels between 2008-2010, 2010-2012 and 2012-2014, using RIF regressions. In the first place, for each time period, RIFs of income quantiles are calculated and standardly regressed on the independent variables specified in the net income equation. Afterwards, changes in income between the considered periods are decomposed into an explained and unexplained components using OB decomposition method. Last, this exercise is further expanded so that we could observe the quantitative contribution of UMP redistributive channels to income changes.

6 Results

6.1 RIF regression results

As previously stated, the first step of our empirical strategy consists on estimating the RIF of the dependent variable (net disposable income) for distributional statistics we are interested in, namely the 9-quantiles τ=$\{10, 20...80, 90\}$. The same is done for the Gini coefficient as the RIF regression supports it as a distributional statistic. After keeping only the positive values (and deleting some outliers), we carry out in the first stage log-transformations of the RIFs. Then, we run OLS regressions over 2008, 2010, 2012 and 2014 surveys, through the command $rifreg$, replacing the dependent variable by the RIF for each quantile τ of net disposable income [2].

Results of RIF regressions for each survey date are presented below in Figure 1. The red lines squares show for each quantile the RIF coefficients for 2010 while the rest of lines indicates the same for other survey years. More precisely, the graphs of RIF coefficients show the quantitative effect of each redistributive channel of UMP on different income quantiles. For instance, on the employment channel graph, the left side indicates the impact of employment on the income of poorer households and vice-versa, as and when we go along the right side of the graph. Interpretation that could be sketched from this figure is straightforward : a downward sloping curve means that the redistributive channel at stake tends to produce relatively a greater impact on poor and modest households than the rich ones. As a consequence, in this case, the redistributive channel could potentially contribute to reduce income inequality. On the contrary, an upward sloping line implies that the theoretical redistributive channel of UMP tends to benefit the richest and do not contribute much to the income of poor households. If so, the distributional channel at issue is then expected to increase income inequality.

[2] For the all RIF regressions, we use standard kernel function "Epanechnikov" with a bandwith of 0.06.

Figure 1: RIF regression results the observed periods

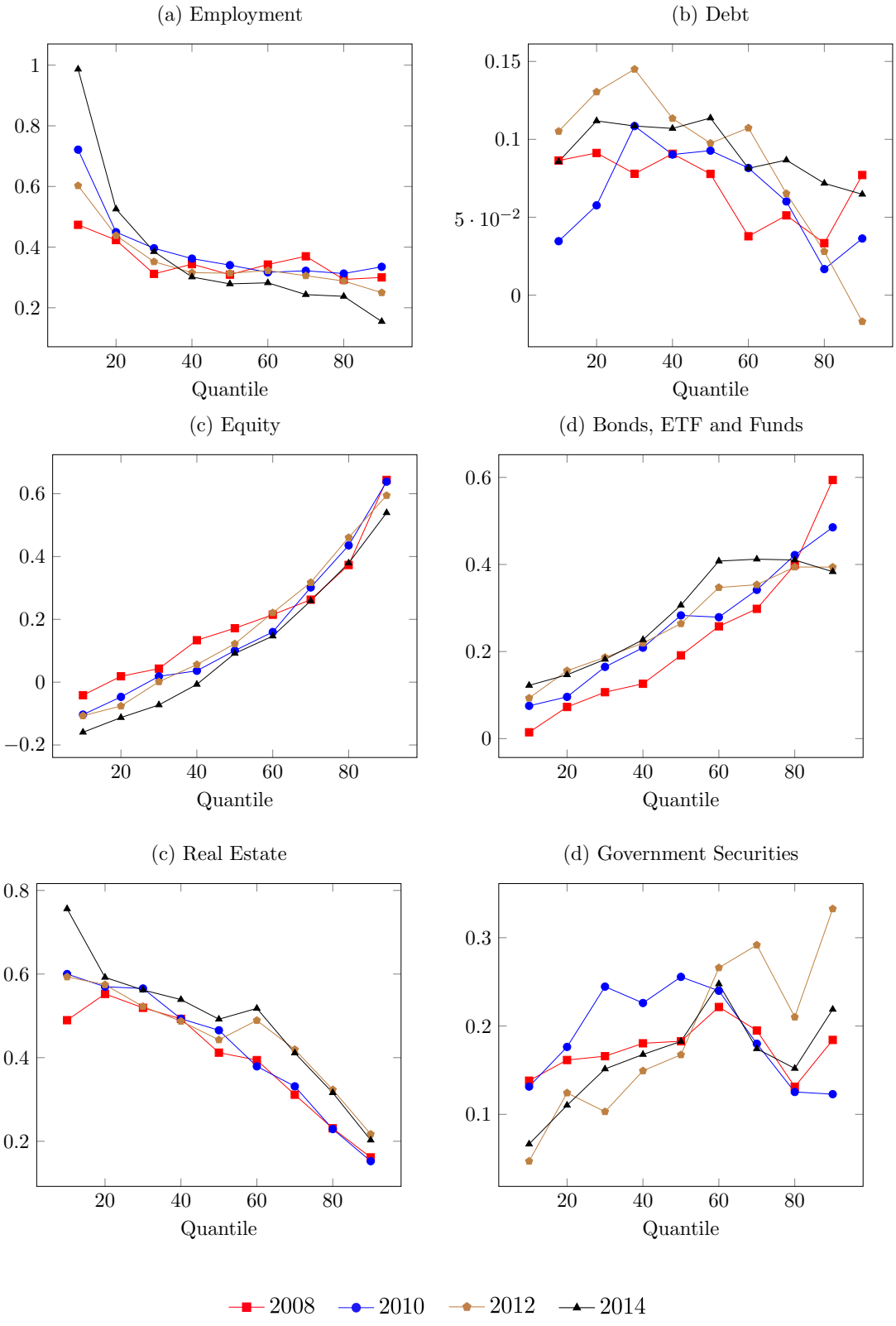
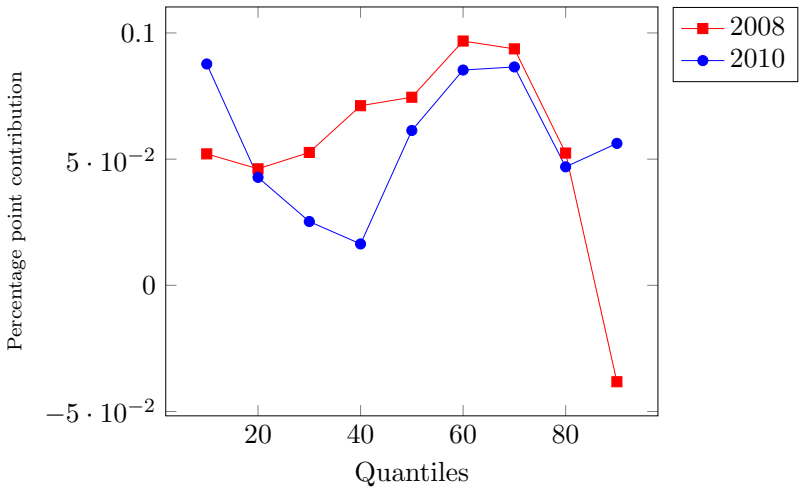


Figure 2: RIF regression results for ZLB channel

(a) Saving accounts



As we have expected in section 3, employment channel of UMP is a driving force that reduces income inequality, as the coefficients curve is downward sloping. To be more precise, the net diposable income of an employed head of household belonging to the 10th quantile in 2008 and 2010 was respectively 47 and 72 percent higher than the one of a household without employment. Comparably, the disposable income of an employed household from the same quantile group was higher than an unemployed one by 60 percent in 2012 and 98 percent in 2014. In regards to other income groups, we notice that the relative importance of employment decreases as we move toward top quantiles. For example, changes in employment levels between 2008 and 2014 have more or less contributed to increase the median income by 30 percent. At the same time, impact of employment channel on the 90th quantile was marginal as coefficients ranged for the estimated periods between 15 and 30 percent. This result is therefore in line with the assertion early formulated and stresses that poor households rely substantially on labor incomes.

Turning now to financial and real assets we notice that all the first had strong disequalizing effects since their coefficients curves are upward sloping. This observation is consistent with the conjecture suggesting that ownership of financial assets is highly concentrated among top-income households. In respect of *Equity* - which is generally recognized as the perfect unequal asset - they have contributed for example to the income of 90th quantile in 2010 and 2012 by respectively 64 and 59 percent. The same could be said about *Bonds*, *ETF* and *funds* whose slopes unambiguously indicate that their ownership benefit the most top-income households. Howbeit, interpretation should be nuanced with respect to government securities since they do not appear to be a strong disequalizing asset. Indeed, the shape of coefficients curves is upward sloping except for the 60th, 70th and 80th quantiles. That way, these income groups earn from government securities' ownership the same return as low income do.

Unlike financial assets, *Real Estate* are strongly equalizing to the extent that they have a greater impact on low-income groups (income of the 10th and 20th quantile groups who owned their principal residence in 2012 was 60 and 57 percent higher in comparison to those who didn't).

This result makes sense inasmuch as an important share of Italian households (more than seventy percent) own their principal residence. Furthermore, compared to the employment channel, Real Estate ownership contributes as well to a higher extent for median income households as long as its coefficients for the studied periods settle between 40 and 50 percent.

Altough indebtedness is arguably assumed to be concentrated among low-income households, the graph of the debt channel suggests that is not a strong equalizing factor. And for good reason, debt channel curves are not as downard sloping as employment channel or Real Easte. Also, coefficients values - though statistically significant - are not very high. Surprisingly, we can draw a similar analysis for the ZLB channel on the grounds that its curves for the two periods considered do not predict that savings accounts is a potent factor in reducing income inequality. Coefficients values point out as well that returns on savings accounts do not bring much to their holders.

Still, leaning only on RIF regressions do not give us any indication about the role played by UMP in these changes nor to what extent have they effectively impacted income inequalities. To accomplish this, we must turn to the second step of our emprical strategy, which deals with the decomposition exercice.

6.2 Decomposition results

Before starting to discuss the decomposition results, the OB method we are using divides aggregate changes in income into an explained and unexplained components. We assumed as well that when it comes to financial and real assets, the unexplained component signifies how much changes in the rate of returns on the specified assets have contributed to income. Therefore, the impact of asset-price appreciation channel on disposable income - through capital gains - must be absorbed by this component. For employment and debt channels, eyes should be focused on their explained components forasmuch as they capture if more households are employed and indebted consequently of monetary policy measures.

Once again, the main purpose of this exercise is to grasp quantitatively the actual contribution of UMP redistributive channels to income distribution. Falling within this approach makes sense since households' income is generally affected by countless factors, especially as the Italian economy has experienced serious economic issues during the Eurozone crisis between 2008 and 2014. On top of that, the frontier between distributional effects of UMP and those of standard monetary policy remains theoretically uncertain. For that reason, it is necessary to distinguish separately the contribution of UMP channels in the decomposition exercise. To this end, we choose to focus on the most discussed UMP channels, namely employment, debt, appreciation of financial and real assets and the ZLB. Starting from this point, the UMP channels are attributed to a) changes in the level of employment (i.e. the explained component), b) changes in the level of indebtedness. Shifts in the rate of return on financial assets, real estate and savings accounts are captured by c) plus d), e), f) and g) (i.e. the unexplained components). One may notice that we excluded from *UMP channels* the unexplained component of employment since it is not clear how theoretically UMP would affect real wages. Last, to assess the impact of UMP channels on inequalities, we mobilize the Gini coefficient, a standard measure of income dispersion whose value ranges from zero to one.

Table 2: Oaxaca-Blinder decomposition of Net Diposable Income for 2008-2010

	Q=10	Q=20	Q=30	Q=40	Q=50	Q=60	Q=70	Q=80	Q=90
Total change	0.0255	0.0094	0.0163	0.0277	0.0371	0.0386	0.0170	0.0212	0.0070
UMP channels	0.0814	0.0071	0.0353	-0.0069	0.0437	0.0316	0.0065	0.0002	-0.0097
Employment	0.1453	0.0131	0.0491	0.009	0.017	-0.0172	-0.0307	0.01	0.0192
a) Explained component	-0.0027	-0.0024	-0.0017	-0.0019	-0.0017	-0.0019	-0.0021	-0.0016	-0.0017
Unexplained component	0.148**	0.0155	0.0505*	0.0109	0.0187	-0.0153	-0.0286	0.0116	0.0209
b) **Debt**	-0.0015*	-0.0016*	-0.0014*	-0.0015**	-0.0013*	-0.0006	-0.00082	-0.0005	-0.0013
Financial & Real assets	0.0784	0.0117	0.0439	0.0076	0.0493	0.0364	0.0108	0.0034	-0.0259
c) Government Securities	-0.0006	0.0014	0.0072**	0.0042	0.0067	0.0016	-0.0013	-0.0005	-0.0056
d) Bonds	0.0067	0.0025	0.0064	0.0092**	0.0101**	0.0023	0.0048	0.0024	-0.0120
e) Equity	-0.0037	-0.004*	-0.0015	-0.0059**	-0.0043	-0.0033	0.0023	0.0037	-0.0003
f) Real Estate	0.076*	0.0118	0.0318	0.0001	0.0368	-0.0102	0.0050	-0.0011	-0.0061
g) **ZLB channel**	0.0072	-0.0006	-0.0055	-0.0111	-0.0026	-0.0023	-0.0014	-0.0011	0.0192*

Note: Each column in this table reports for distributional statistics the total changes in income during the implementation of the UMP package. It is the sum of the employment components (explained plus unexplained) and the financial assets components. The row "UMP channels" corresponds to (a) the explained component of employment plus (b) the explained component of government securities, plus the unexplained components of c) government securities, d) Bonds e) equity, f) Real Estate and g) ZLB channel. The same applies to the rest of decomposition exercices except the ZLB channel is not considered. $*$, $**$, $***$ respectively denote significance at the 10 percent, 5 percent and 1 percent levels.

Decomposition results of UMP channels for 2008-2010, 2010-2012 and 2012-2014 periods are exposed respectively in Table 2 above and Tables 3 and 4 below. Each column indicates the decomposition exercice for a given distributional statistic. The ones reported in these tables are the quantiles $\tau = \{10, 20, 30, 40, 50, 60, 70, 80, 90\}$, which gives a broad image of the bottom and top of income distribution. Table 5 focuses separately on Gini coefficients for the three periods. First row of all the tables summarizes the aggregate percentage change in net disposable income for each distributional statistic between $t = 0$ and $t = 1$. Intuitively, the statistics depicted underneath the row of "total change" add up to obtain the total percentage changes. The second row refers to the UMP channels that we previously defined and equals the percentage point contributions of the explained and unexplained components of the channels specified. The row "Employment" adds up the explained and unexplained components of the employment channel while the seventh row "Financial and Real assets" gathers the percentage point contributions of the unexplained components of Government Securities, Bonds, Equity, Real Estate and the ZLB (only for 2008-2010). It is worthwhile to emphasize that for most of the distributional statistics, the sum of UMP subcomponents is smaller than the total percentage change for the periods of UMP. This implies that actual changes in income for the studied periods were driven not only by monetary policy measures but also by other factors, not observed in our model.

In addition to this, synthetic contributions of UMP channels to income changes are depicted in Figures 3 and 4 (see Appendix). Each graph on the figure presents a seperate channel of UMP for the evaluated periods. As we interpreted for the RIFs regression results, if the slope of decomposition graph is downward sloping, the UMP channel would contribute to decrease inequality. On the contrary, an upward sloping curve means that the distributional channel had a disequalizing effect or in other words, tends to drive up income inequalities.

A first glance on the decomposition results of disposable income between 2008 and 2010 indicates that UMP channels do not seem to have produced considerable redistributive impacts. As a matter of fact, changes in the level of employment did not add much to income quantiles as none of the coefficients is statistically significant. Still, changes in real wages (i.e. unexplained component of employment) had strong impacts on some low-income quantiles. So to speak, income of the one percent poorest declined by almost 83 percent while the of the 10th and 20th quantiles increased respectively by only 15 and 5 percent. This can be explained by the shock of GFC on real wages especially for the 1 percent poorest who can rely solely on government transfer income in times of economic downturns. The same explanation could be put forward to explain contributions on disposable income from changes in households indebtedness. These latter have contributed to reduce the income of the bottom half of distribution between 0.13 and 0.16 percent. Albeit these numbers are very low, we can assert they result from banks behavior to contract their credit supply in order to recover their solvency. Also, if former research on UMP redistributive impact overemphasized the weight of assets-price appreciation, the fact remains that this channel didn't contributed importantly on income quantiles. This certainly amounts to the feeble sum of purchased assets by the ECB during the CBPP1 between 2008 and 2010 (around sixty billion of Bonds). In parallel, contrary to what commentators have noted, the fall in savings accounts returns generated by the ZLB does not show strong distributional effects since almost all the coefficients are not statistically significant.

Table 3: Oaxaca-Blinder decomposition of Net Diposable Income for 2010-2012

	Q=10	Q=20	Q=30	Q=40	Q=50	Q=60	Q=70	Q=80	Q=90
Total change	0.0902	0.0756	0.0770	0.0912	0.0942	0.0902	0.0720	0.0665	0.0619
UMP channels	0.1356	0.011	0.0473	0.0183	0.0347	-0.0015	-0.0564	-0.0576	-0.0385
Employment	0.0826	0.0174	0.0342	0.0343	0.0229	0.0048	0.0167	0.0212	0.0544
a) Explained component	0.0157***	0.0114***	0.0092***	0.0082***	0.0082***	0.0084***	0.0079***	0.0075***	0.0065***
Unexplained component	0.0669	0.006	0.025	0.0261	0.0147	-0.0036	0.0088	0.0137	0.0479
b) **Debt**	0.0019**	0.0028**	0.0031**	0.0021**	0.0018**	0.0020**	0.0012	0.0005	-0.0012
Financial & Real assets	0.0118	-0.0032	0.038	0.008	0.0247	-0.0119	-0.0655	-0.0656	-0.0438
c) Government Securities	0.0054*	0.0034	0.0096***	0.0052*	0.0058*	-0.0021	-0.008*	-0.006	-0.014**
d) Bonds	-0.0019	-0.0063*	-0.0023	-0.0010	0.0019	-0.0071	-0.0013	0.0028	0.0094
e) Equity	0.0001	0.0012	0.0007	-0.0008	-0.0009	-0.0027	-0.0006	-0.0011	0.0019
f) Real Estate	0.0082	-0.0015	0.03	0.0046	0.0179	-0.0703***	-0.0556**	-0.0613***	-0.0411*

Note: Each column in this table reports for distributional statistics the total changes in income during the implementation of the UMP package. It is the sum of the employment components (explained plus unexplained) and the financial and real assets components. The row "UMP channels" corresponds to (a) the explained component of employment plus (b) the explained component of government securities, plus the unexplained components of c) government securities, d) Bonds, e) equity and f) Real Estate. $*$, $**$, $***$ respectively denote significance at the 10 percent, 5 percent and 1 percent levels.

Contrary to 2008-2010, decomposition results of disposable income between 2010 and 2012 display positive redistributive impacts. In particular, the explained components of employment and indebtedness have positively contributed to all income groups and mainly to low and middle income households. In detail, the employment channel increased income of the one percent poorest (first quantile) by 6.73 percent, income of the 5th quantile by 2.35 percent and the one of 10th quantile by 1.57 percent. As for the debt channel, variations of the explained component for the 2010-2012 period positively contributed to the income of all quantile groups. These positive variations have strongly outweighed losses generated by the same channel on the former assessement period. Probably, these effects stem from the LTROs package that helped as much as possible to improve businesses soundness and household finances. From another angle, despite the implementation of the SMP and CBPP2, appreciation of financial assets have not produced the expected redistributive impacts. The coefficients of their unexplained components - when statistically significant - do not reach the one percentage point contribution of income. It is worth to observe that with regard to real estate channel, changes in the unexplained component appear to have negatively impacted income of the top half of distribution. Hence, real estate channel accounts for 7.03 percentage point decrease of the 60th quantile, 5.56 percentage point decrease of 70th quantile and 6.13 percentage point decrease of 80th quantile.

The decomposition results between 2012 and 2014 exhibit the weakest redistributive impacts. To start with, none of the employment channel coefficients is statistically significant, which casts doubt on the efficacy of UMP implemented by the ECB. Next, the debt channel had marginal negative effects on households income. This cancels the positive effect of changes in the level of household indebtedness observed for the previously assessed periods. Once more, distributional effects of financial assets appreciation is impotent inspite of OMTs program anoucement. Same could be said about real estates appreciation channel except for the 10th quantile whose income increased (to a statistically significant extent) by almost 11 percentage point. These minor effects could be justified either by the fact that no assets were purchased during the OMTs program or by ineffectiveness of the signaling effect ECB was sending to the markets (according to which Eurozone government securities are solvent assets).

Decomposition results for Gini coefficient are presented in Table 5 below. This exercise is highly relevant to our research question as it allows us to assess the contribution of UMP redistributive channels to income inequality. So far, results obtained for the Gini coefficients share the same conclusion we drew with respect to decompositon results for income quantiles. In fact, empirical evidence from Table 5 evoke that the impacts of UMP redistributive channels on inequality are weak and not even statistically significant. For example, during the 2008-2010 assessement period, none of the UMP channels contributed to income inequality apart from the strengthening of real estates prices - $RealEstate$ channel - that reduced Gini coeffficient by -0.0018. Apart from that, the fall in returns on savings accounts (i.e. the ZLB channel) does not seem to have had a significant contribution on income inequality. Similarly, since the GFC produced generally negative impacts on income quantiles, unexplained component of employment contributed to decrease the Gini coefficient by -0.0036. Oaxaca-Blinder decomposition results for 2010-2012 period suggest similar conclusions. Although, the employment channel (i.e. explained component of employment) increased income inequality, the latter barely raised the Gini coefficient by 0.0003.

Table 4: Oaxaca-Blinder decomposition of Net Diposable Income for 2012-2014

	Q=10	Q=20	Q=30	Q=40	Q=50	Q=60	Q=70	Q=80	Q=90
Total change	0.0087	0.0353	0.0239	0.0247	0.0238	0.0321	0.0268	0.0301	0.0018
UMP channels	0.11	-0.002	0.024	0.0325	0.0358	0.0194	-0.011	-0.0111	-0.02
Employment	0.2173	0.0492	0.0187	-0.0081	-0.012	-0.012	-0.0352	-0.0286	-0.054
a) Explained component	-0.00007	-0.00005	-0.00004	-0.00004	-0.00003	-0.000041	-0.00003	-0.000037	-0.000032
Unexplained component	0.2174***	0.0493	0.0188	-0.0081	-0.012	-0.0229	-0.0352	-0.0286	-0.0539*
b) **Debt**	-0.0014*	-0.0021**	-0.0023**	-0.0015**	-0.0013*	-0.0015*	-0.0009	-0.0003	0.0009
Financial & Real assets	0.1115	0.00013	0.0263	0.0341	0.0372	0.021	-0.0101	-0.0108	-0.0209
c) Government Securities	0.0013	-0.0009	0.0033	0.0013	0.0011	-0.0013	-0.0081*	-0.004	-0.0078
d) Bonds	0.0030	-0.00097	-0.0004	0.0008	0.0044	0.0063	0.0061	0.0016	-0.0011
e) Equity	-0.0023	-0.0016	-0.0032*	-0.0028	-0.0014	-0.0033	-0.0026	-0.0036	-0.0024
f) Real Estate	0.1095**	0.0117	0.0266	0.0348	0.0331	0.0193	-0.0055	-0.0048	-0.0096

Note: Each column in this table reports for distributional statistics the total changes in income during the implementation of the UMP package. It is the sum of the employment components (explained plus unexplained) and the financial and real assets components. The row "UMP channels" corresponds to (a) the explained component of employment plus (b) the explained component of government securities, plus the unexplained components of c) government securities, d) Bonds, e) equity and f) Real Estate. $*$, $**$, $***$ respectively denote significance at the 10 percent, 5 percent and 1 percent levels.

Table 5: Oaxaca-Blinder decomposition of Net Diposable Income for Gini coefficients

	2008-2010	2010-2012	2012-2014
Total change	0.0011	0.0007	0.0004
UMP channels	-0.0017	0.0009	-0.002
Employment	-0.0035	0.0018	-0.0083
a) Explained component	0.00004	0.0003***	1.55e-06
Unexplained component	-0.0036***	0.0015	-0.0083***
b) **Debt**	0.00002	0.00002	0.00006**
Financial & Real assets	-0.0018	0.0006	-0.0021
c) Government Securities	0.00004	0.0004**	-0.00007
d) Bonds	-0.0003	-0.00002	-0.0002
e) Equity	0.0002*	-0.0001	0.00003
f) Real Estate	-0.0018**	0.0007	-0.0019**
g) **ZLB channel**	-0.00003	n/a	n/a

Note: $*$, $**$, $***$ respectively denote significance at the 10, 5 and 1 percent levels.

One paradox that might arise when interpreting the contribution of government securities to the Gini coefficient is the following: how is it possible that this channel - which has positively contributed to the income of poor households between 2010 and 2012 - increases henceforth inequality? The answer to this paradox perhaps lies in the specific construction of Gini coefficient. Effectively, it tends to attach a greater importance for households belonging to the middle of the distribution relatively to those located at the extremes (i.e. the poorest and richest households). Decomposition results of income inequality for the 2012-2014 period look more or less analogous to the ones obtained for the first assessed period (2008-2010). Thus, UMP channels had not significantly contributed to the variations of Gini coefficient aside from the unexplained components of employment and real estates. Accordingly, the first reduced the Gini by -0.0083 while the second did it by -0.0019. However, we can not confirm if these results are motivated by the same factors as in the 2008-2010 period.

To sum up, our findings suggest that UMP exhibit very low redistributive impacts. Also, UMP' effects on income inequality - approached through the Gini coefficient - are weak along the evaluated periods. Specifically, the redistributive channels that have been most discussed in the last years - namely assets price appreciation and the "euthanasia of rentiers" - did not produce dramatic effects on Italian households.

Be that as it may, changes in employment and indebtedness levels have marginally benefited poor and middle class households in Italy. Put differently, in the absence of UMP, low income households would be in a worse situation. However, the size and magnitude of changes in real wages seem to be playing a more important role in shaping income distribution. Hence, our results rather supports the analysis of central bankers, who place an important weight on the macroeconomic impacts of UMP and the role played by indirect channels. Yet this outcome needs to be confirmed by other inequality measures that favor the top and bottom of the income distribution like 99/10 or 90/10 quantile ratios. Also, these results are not definitive as the ECB started by 2015 a large QE program that is targeting corporate and public sector assets, alongside covered bonds and backed securities. As a consequence, we should be probably expecting from the financial assets channel significant distributional effects in the near future. Last, one should note that our model fails to capture the structural policies implemented in Italy and particularly those that regard labor market reforms. Still, we do not believe this would bias our estimates since structural policies are generally intended to impact growth and the macroeconomy in the long-run.

7 Conclusion

Using the Italian Survey on Households Income and Wealth (SHIW), we show that UMP implemented by the ECB since 2008 had modestly impacted income inequalities - approached through the Gini coefficient - in the Italian economy. However, by considering the impact of UMP on each income quantile, we find that poor and middle class households have marginally gained from changes in the level of employment and indebtedness, especially between 2010 and 2012. To achieve this result, we distinguished at first three different types non-standard monetary policy measures: asset purchase programs, lending facilities operations and the ZLB. From this point forward, we focused our concern on the most discussed redistributive channels, namely: the appreciation of financial assets, real estate and savings accounts (direct channels) plus employment and indebtedness, which are viewed by the literature as an indirect effects of UMP. Empirically, we mobilized FFL seminal approach, that combines RIF regressions with the Oaxaca-Blinder decomposition method. This empirical strategy was motivated by the aim to dissect the contribution of each relevant component of UMP redistributive channels to changes in income for three assessment periods : 2008-2010, 2010-2012 and 2012-2014. For future research, perhaps a comparative perspective with a northern european economy (as Germany or France), where ownership of financial assets is more important, could yield a better comprehension of how the redistributive impacts of UMP actually work.

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A Appendix

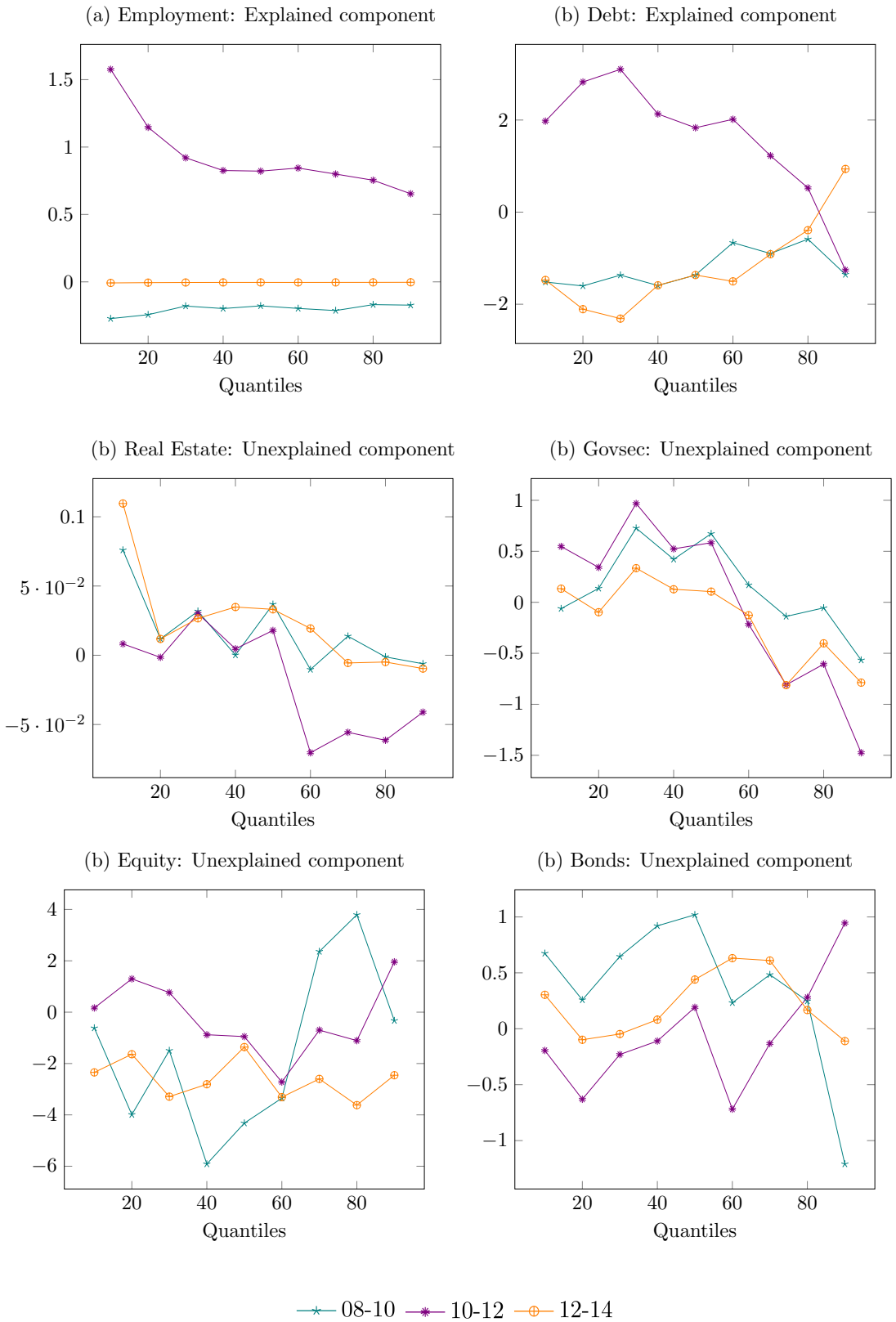
Table A.1: Means of independent variables (2008-2014)

	2008	2010	2012	2014
Employment	0.5311	0.5311	0.4996	0.4735
Debt	0.2072	0.1820	0.17	0.1472
Government Secuities	0.1063	0.1006	0.0790	0.0883
Bonds	0.1128	0.1348	0.1197	0.1202
Equity	0.0589	0.0587	0.04869	0.0472
Real Estate	0.7086	0.7072	0.7121	0.7182
Savings Accounts	0.2132	0.2035	n/a	n/a

Table A.2: Description of independent variables

	Definition
Employment ($EMPLOY$)	Dummy variable for the employment status of the head of the household.
Indebtedness ($Debt$)	Dummy variable for the employment status of the head of the household.
Government securities ($GovSec$)	Dummy variable indicating whether or not the household directly owns any government securities.
Bonds ($Bond$)	Dummy variable denoting if the household directly owns any bonds or not.
Equity ($Stock$)	Dummy variable indicating whether or not the household owns a non-zero amount of equity shares.
Real Estate ($RealEst$)	Dummy variable indicating whether or not the household owns his principal residence.
Savings Accounts ($Savings$)	Dummy variable that equals to one if the household possesses a savings account.
Sex (Sex)	Dummy variable that equals to one if the household head is a men and zero otherwise.
Geographical Area ($GeogArea$)	Categorical variable for the area where household head lives (north, center or south).
Education ($Educachi$)	Categorical variable that measures household head's level of educational achievement.

Figure 3: Decomposition results for the three studied periods



Note: These figures present graphically the explained and unexplained components of the UMP channels. Vertical axes reports for each quantile the contribution of UMP channel to income changes as displayed in the tables above. Note also that numbers on the vertical axes correspond to the same ones reported in the tables, but multiplied by 1000.

Figure 4: Decomposition results for the ZLB channel

(a) Saving accounts