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Effects of Monetary Policy Shocks on Income Mobility in the Euro Area Countries

Summary: This paper examines the impacts of monetary policy shocks on income mobility in the Euro area, relying on earnings heterogeneity and income composition channels through which monetary policy affects income distribution. From a relative mobility perspective, upward and downward mobility are estimated over the period 2004-2014 for the EMU countries that originated the Economic and Monetary Union (EMU 1999). By using a vector error correction model (VECM) approach, overall we find that an expansionary monetary policy seems to encourage upward mobility and discourage downward mobility. By income groups, a loose monetary policy appears to reduce downward mobility for the upper class, while no empirical evidence can be provided to support that monetary policy shocks alter upward mobility for the lower class. Monetary policy shocks are especially favourable for the middle class as an expansionary monetary policy seems to boost upward mobility. A detailed analysis of the middle class shows that an expansionary monetary policy may propel the upward mobility and hinder the downward mobility of the lower-middle class, particularly favouring this income group.

Key words: Monetary policy, Income mobility, Income distribution, Euro area.

JEL: D63, E52.

The global financial crisis of 2007-2008 and the subsequent period of financial and economic instability resulting from the massive contagion process entailed an unprecedented challenge for the European Central Bank (ECB). Orthodox monetary policies implemented up to that time (mainly through interest rates policies) were unable to guide the liquidity provision of money: key interest rates fell close to zero but the money market did not recover from the shock, and monetary policy was considered to be stuck in the liquidity trap. The ECB, altogether with other central banks, adapted its usual monetary policy framework to ensure the provision of liquidity to the banking sector and to try to revive credit in the euro area. For this purpose, they broadened their assortment of monetary instruments and implemented ultra-loose monetary policies to avoid a complete meltdown of the financial sector and to limit the adverse impact on the real economy.

These sizeable monetary stimuli have brought the question of how monetary policy might affect inequality to the foreground of economic and political debates, even provoking the attention of central bankers uncertain of the potential distributive

effects of their extraordinary monetary policy decisions (see, for example, Ben S. Bernanke 2013, 2015; Janet L. Yellen 2014; Mario Draghi 2016; Vítor Constâncio 2017).

In the academic sphere, an increasing literature has developed in recent years in order to understand and gauge the effects of monetary policy on income and wealth inequality (see, for instance, Andrea Colciago, Anna Samarlna, and Jakob de Haan 2018, for a survey). A number of channels have been proposed to explain the mechanisms through which these effects take place. Most of them affect households' wealth operating through either inflation (inflation tax channel, portfolio composition channel, or savings redistribution channel) or the transmission process of monetary policy impulses (interest rate exposure channel or financial segmentation channel). Changes in inflation may alter wealth distribution, taking into account the composition of the assets and debt portfolios of each household. When inflation increases, agents holding a large part of their wealth in cash balances (inflation tax channel) or in certain assets whose real values are sensitive to variations in inflation (portfolio composition channel) experience a larger drop in their wealth in comparison with agents holding a smaller share of their wealth in inflation-sensitive assets. According to the savings redistribution channel, unexpected inflation leads to redistribution from savers, who see the real value of their assets decrease, to borrowers, whose real liability values decrease. Focussing on the transmission process of monetary policy impulses, the interest rate exposure channel indicates that a decrease in interest rate benefits those agents who have negative net saving requirements (the difference between maturity assets and liabilities), while it hurts those with positive net saving requirements. In the same line, the financial segmentation channel suggests that market segmentation induces distortions such that monetary expansion implies the redistribution of wealth between different groups of agents, benefiting those who directly interact with the central bank or who participate in financial markets more frequently and actively.

Other channels, however, primarily affect income distribution by means of the transmission mechanisms of monetary shocks, such as the income composition channel (households obtain their income from different sources, each of which may respond differently to changes in monetary policy) and the earnings heterogeneity channel (the risk of being or becoming unemployed is distributed unequally across the population so that an expansionary monetary policy stimulating economic activity tends to favour those workers with higher odds of being or becoming unemployed) (see, for instance, Olivier Coibion et al. 2017). On the contrary, from a more heterodox perspective some authors point out that the argument of stimulating economic activity and increasing employment by means of an expansionary monetary policy can be questioned, as loose monetary measures may involve an adverse impact on investment and net exports (Engelbert Stockhammer 2016). This could occur inasmuch as it entails not only greater opportunities for the unemployed but also higher wages, which could discourage investment and exports due to higher production costs.

Based on these channels affecting income distribution, a number of studies have recently attempted to empirically test the effects of conventional and

unconventional[1] monetary policy on income inequality (see, for example; Coibion et al. 2017, for the US; Haroon Mumtaz and Angeliki Theophilopoulou 2017, for the UK; Ayako Saiki and John Frost 2014 and Masayuki Inui, Nao Sudo, and Tomoaki Yamada 2017, for Japan; Chiara Guerello 2018 and Michele Lenza and Jiri Slacalek 2018, for Eurozone countries; Davide Furceri, Prakash Loungani, and Aleksandra Zdzienicka 2016 and Rory O'Farrell, Lukasz Rawdanowicz, and Kei-Ichiro Inaba 2016, for a group of advanced and emerging economies). Nevertheless, to the best of our knowledge, the potential effects of monetary policy on income mobility, reflecting the dynamics of income distribution, have not been specifically addressed in the previous literature. In this line, on the basis of the income composition and earnings heterogeneity channels, this paper aims to provide empirical evidence of the effects of monetary policy on income mobility over the period 2004-2015 for the EMU countries that originated the Economic and Monetary Union (EMU 1999).

In contrast with static inequality studies, there is no unified view on how to measure the dynamics of income distribution. Nonetheless, it is widely accepted that there are two main approaches to tackle income mobility, which trigger two different concepts: relative mobility and absolute mobility. The former evaluates the positional changes of individuals within income distribution taking into account the starting and final point, while the latter assesses changes in individual income in relation to a value of income in the past; so income mobility measures should compare individual income over time regardless of whatever is happening to the rest of the population. As usual in the analysis of income distribution in developed countries, under a relative income approach we consider that there is income mobility only if an individual experiences a positional movement between deciles. This way, we compute the percentage of people in the total population that moves between income decile classes over two consecutive years, with upward and downward movements calculated separately.

This paper is organised as follows. Section 1 presents the data used in the study. Section 2 describes the methodology. Section 3 displays and discusses the results. The final section contains some concluding remarks.

1. Data

In order to compute relative income mobility for the EMU 1999 countries (Austria, Belgium, Finland, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain), we use data from longitudinal files for all the waves available at the time of writing (from 2005 to 2016) from European Statistics on Income and Living Conditions (EU-SILC)[2] (Eurostat 2018a)[3]. The EU-SILC has been carried out since 2004

[1] The term "unconventional" designates those monetary policies that are unusual within the framework of a mainstream and orthodox paradigm; it particularly refers to the series of measures enacted by the ECB since October 2008, ranging from forward guidance about intended future monetary policy actions to long-maturity and lending asset purchases.

[2] The longitudinal files of EU-SILC provide data for 10 out of the 11 countries that originated the EMU, as Germany does not report this information.

[3] **Eurostat.** 2018a. European Union Statistics on Income and Living Conditions (EU-SILC). https://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions (accessed June 10, 2018).

and is the reference source for comparative statistics on the distribution of income in Europe. The EU-SILC has the advantage of collecting detailed information on individual and household income, and data is comparable across the participating European countries. The longitudinal component only follows individuals for four consecutive waves, which implies that each year 25% of the sample is replaced by a new rotational group. As mobility measures are based on income changes over two consecutive years of data, the effects of attrition are greatly muted as compared to other measures based on longer sequences of panel data[4].

The concept of income used is that of household market income, that is, income before transfers, in order to exclude as much as possible the importance of the automatic stabilisation effects of the transfer system. It includes all income from work (salaries of employees and income of self-employed workers), income from capital and property, transfers between households, as well as income from private pension plans. However, it does not include social benefits in cash or in kind, imputed rent, income in kind – with the exception of a company vehicle – and self-consumption. The variable income in the EU-SILC is annual and corresponds to the year prior to the survey for all countries except Ireland[5] (income data refer to 12 months prior to the interview)[6]. All the nominal amounts have been converted to 2015 prices, using the annual data of the Harmonised Index of Consumer Prices (HICP) made available to researchers on the Eurostat (2018b)[7] website. As income is collected with reference to the previous calendar year, the HICP has been used accordingly.

Our unit of measurement is the household, since an individual's standard of living is influenced by his/her income and by the people with whom he/she lives; but our unit of analysis is the individual as we try to track people's economic position. To adjust household income according to its size, we use the modified OECD equivalence scale[8], and then we assign the equivalent household income to each member of the household.

Given that we define mobility in relative terms, we measure changes in individuals' relative position through transition matrixes. A transition matrix is constructed by first dividing the income range of each marginal distribution into a number of categories (we divide them into ten categories) and cross-tabulating the relative frequencies of observations within each matrix cell: typical element m_{rd} is the relative frequency of individuals with period $-t$ income in category r and period $-t + 1$ income in

[4] We are aware that our cross-country comparative analysis can be affected by different treatments of income variables (Kristina Krell, Joachim R. Frick, and Markus M. Grabka 2017) or different tracking rules in case of household split (Maria Iacovou and Peter Lynn 2013) between *register* countries, *survey* countries and *proxy* countries, but there is little that researchers can do *ex post* to overcome these issues. For a review of the advantages and disadvantages of EU-SILC for dynamic analysis across countries, see e.g. Stephen Jenkins and Philippe Van Kerm (2017).

[5] As argued by René Böheim and Jenkins (2006), the differences in income reference periods are unlikely to be a major source of non-comparability across countries.

[6] That is why the period analysed is 2004-2015.

[7] **Eurostat.** 2018b. Harmonised Index of Consumer Prices (HICP).
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=prc_hicp_aind&lang=en
(accessed June 10, 2018).

[8] A value of 1 to the first adult in the household, 0.5 to each remaining adult, and 0.3 to each member younger than 14.

category *d*. As indicated by Luis Ayala and Mercedes Sastre (2002), the main advantage of the transition matrix is that we can estimate separately the percentage of individuals that descend in the scale of income and those who ascend, enabling the illustration of asymmetric patterns across the distribution. In addition, as pointed out by Frank Cowell and Christian Schluter (1998), mobility measures based on transition matrices are more robust to measurement errors. However, transition matrices in general, as well as the way we define mobility, have the disadvantage of losing information on the changes that occur within the same decile and the magnitude of the income variation that the change in decile implies (Gary S. Fields and Efe A. Ok 1999). In this paper we use absolute transition matrices from year t to year $t + 1$, which consider constant limits set as the deciles of year t.

In order to avoid counting small income changes across the threshold of each category as movements, we restrict our definition of upward (downward) mobility, requiring change in more than one category to consider "genuine" relative mobility. This way, the upward (downward) mobility index is the percentage of individuals that ascend (descend) two or more categories between year t and $t + 1$.

Apart from the mobility indices mentioned, four macroeconomic variables are included in our models for the purpose of analysing the effects of monetary policy on income mobility: long-term real interest rates, private credit, gross domestic product *per capita* and unemployment rate. As we assume EMU 1999 is a group of countries with high mutual integration and similarity relative to other countries that joined EMU later in the twenty-first century, this allows us to avoid the need to address a wide range of socioeconomic variables for the sake of simplicity. This assumption allows condensing a complex phenomenon and makes it tractable from an empirical approach.

Policy rates and short-term interest rates are the most common proxies for conventional monetary policy (e.g. Furceri, Loungani, and Zdzienicka 2016; Coibion et al. 2017; Mumtaz and Theophilopoulou 2107). However, unconventional monetary policies account for the use of alternative variables more related to the monetary base, such as central bank assets (Saiki and Frost 2014; Guerello 2018) and government bond spreads (Mumtaz and Theophilopolou 2017). In our case, in order to capture as much as possible the overall effects of the wide variety of monetary policy decisions adopted by the ECB over the period analysed, we consider the real long-term interest rates as a proxy of monetary policy. In particular, we use the real long-term interest rates provided by the European Commission - Economic and Financial Affairs, Annual Macro-Economic (AMECO) database (2018)[9], which are measured by using GDP deflators at market prices. Likewise, as measures of private credit, economic activity and employment, we consider private credit as a percentage of the gross domestic product, from the World Bank (2018)[10], the gross domestic product *per capita* in purchasing

[9] **European Commission - Economic and Financial Affairs.** 2018. Annual Macro-Economic Database. http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm (accessed June 07, 2018).
[10] **World Bank.** 2018. Domestic Credit to Private Sector as a Percentage of the Gross Domestic Product. https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS (accessed June 07, 2018).

power standards from Eurostat (2018c)[11] and the unemployment rate from Eurostat (2018d)[12].

We work with an unbalanced panel of 10 countries containing 105 observations for the years 2004-2015 (5 missing observations)[13]. The descriptive statistics of the variables examined are shown in Table 1. It is worth noting that long-term real interest rates show great dispersion across countries compared to the other variables. The average percentages of population moving up and down in income distribution are not very dissimilar, even though there are countries with percentages of downward movers of nearly 24%, five times higher than the percentage of the country with the lowest downward mobility rate.

Table 1 Descriptive Statistics

Variable	Mean	Std. dev.	Min	Max
Real long-term interest rates	2.02	1.92	-0.89	8.60
Private credit	102.54	30.45	54.55	172.41
GDP *per capita*	31940.64	12088.12	17559.70	72541.60
Unemployment rate	8.69	4.47	3.70	26.10
Upward mobility	8.31	2.05	3.58	13.64
Downward mobility	9.28	2.61	4.92	23.74

Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018), Eurostat (2018a) and World Bank (2018).

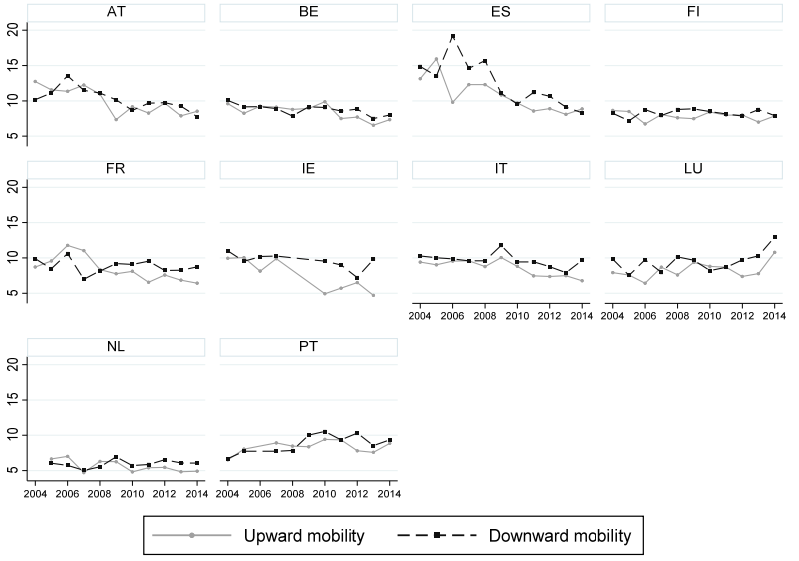
A detailed exploration of upward and downward mobility by country (Figure 1) supports the notion that they are not uniform across the 10 countries considered. In fact, there are multiple causes explaining mobility in each country, including the wide range of structural and institutional features. Nevertheless, it is worth highlighting that the percentage of the population that moves up at least two deciles in some countries is almost three times that of other countries for the same year.

Downward mobility shows even greater dispersion, as downward mobility rates in some countries are 3.5 times those of other countries in the same year. Although there is a general descending trend in upward and downward mobility, the time profile of upward and downward mobility also differs somewhat across countries, as shown in Figure 1. While we observe a general descending trend in almost all countries, Portugal and Luxembourg show a differential trend. Likewise, the slope of the trend is different by country and direction of mobility, showing that upward and downward mobility do not move in unison.

[11] **Eurostat.** 2018c. Gross Domestic Product per capita in Purchasing Power Standard. https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00114&plugin=1 (accessed June 07, 2018).

[12] **Eurostat.** 2018d. Unemployment Rate. https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tps00203&plugin=1 (accessed June 07, 2018).

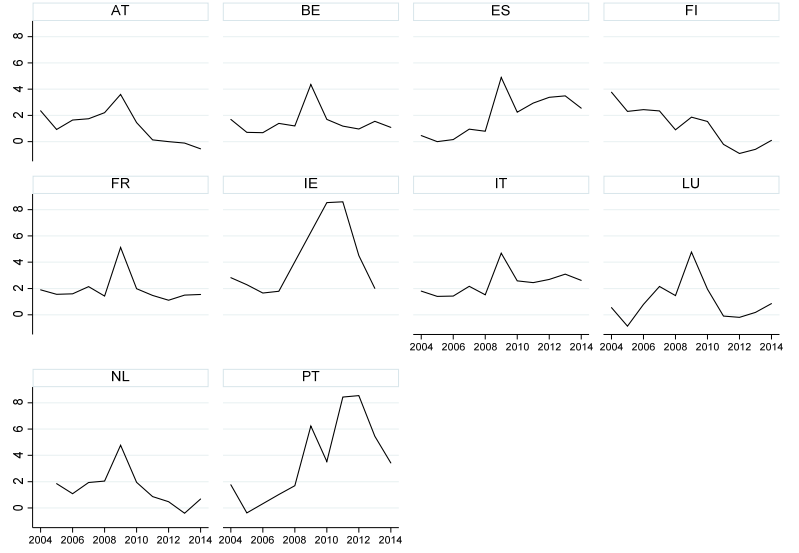
[13] Although it would be of great interest to analyse the individual response in every single country, the time length of our sample (annual data covering twelve years) makes it impossible to model it reliably. Therefore, unfortunately we are not able to draw conclusions regarding the different effects that monetary policy may or may not have had in the countries analysed.



Notes: AT: Austria, BE: Belgium, ES: Spain, FI: Finland, FR: France, IE: Ireland, IT: Italy, LU: Luxembourg, NL: the Netherlands, PT: Portugal. Year *t* means mobility from *t* to *t* + 1.

Source: Own elaboration based on EU-SILC longitudinal data (Eurostat 2018a).

Figure 1 Upward and Downward Mobility by Country, 2004-2015



Source: Own elaboration based on data from European Commission - Economic and Financial Affairs (2018).

Figure 2 Trends of Long-Term Real Interest Rates

We also find very different patterns in the long-term real interest rates profile (Figure 2). For instance, whilst Portugal shows a marked upward trend, Austria displays a clear downward one and the other countries present mixed patterns. However, almost all of them show a peak in 2009, reflecting the drastic change in ECB monetary policy started during the last quarter of 2008. Since 2009, the long-term real interest rates converge to a larger extent among countries as the monetary measures applied were more forceful and almost all decisions were clearly expansionary. As pointed out above, in the following sections we examine the potential effects of monetary policy on income mobility by proxying the changes in monetary policy through long-term real interest rates.

2. Methodology

Monetary policy impacts on the real economy take place through various transmission mechanisms, thus affecting diverse macroeconomic variables. For the sake of simplicity, we focus on a small number of variables taking into consideration the theoretical channels examined through which monetary policy tends to influence income distribution. The existing interaction and endogeneity among such variables leads us to propose a simultaneous equation system, following Christopher A. Sims (1980). First, we test the stationarity of our variables in order to avoid the potential existence of spurious regression. According to the different tests developed for panel datasets, Im-Pesaran-Shin (IPS), Augmented Dickey-Fuller (ADF) and Fisher-Phillips-Perron (FPP) allow us to conclude that our variables are non-stationary; in fact, they are first order integrated processes (Appendix, Table 2). As a result, a trustworthy analysis of the causal long-run relationship existing among the variables requires that they are cointegrated, that is, they display a joint movement (co-movement) beyond short-term adjustments.

The Robert F. Engle and Clive Granger (1987) statistic underpinning the Pedroni cointegration test confirms that there is a long-run equilibrium relationship between the variables composing our model[14]. Therefore, this panel dataset is analysed by using the Vector Error Correction Model (VECM) methodology, which allows us to examine both the direction and magnitude of a shock's effect and assess the persistence of the shock over time. Søren Johansen and Katarina Juselius (1990) propose a procedure based on different tests (either with trace or with eigenvalue) to determine the number of cointegration vectors. Based on this procedure we conclude[15] that two vectors are required in our analysis. Furthermore, the selection criteria by Gideon E. Schwarz (1978) and Edward J. Hannan and Barry G. Quinn (1979) establish one as the optimal lag order for our panel VECM.

[14] For all our models, the null hypothesis of no-cointegration is rejected at a confidence level equal or above 99%.

[15] Considering the Akaike information criteria, the best specification of our VEC models comprises two cointegrating vectors, which follow a linear data trend and include both intercept and trend. Therefore, the null hypothesis of "at most two cointegrating vectors" is accepted, whereas those hypotheses concerning "none" or "at most one integrating vectors" are simultaneously rejected at confidence levels between 90-95%.

Hence, the estimated model is as follows:

$$\Delta Y_{it} = \alpha\beta' Y_{i,t-1} + \Pi_{\mathrm{i}}\Delta Y_{i,t-1} + \gamma_{it}\delta_{it} + \mu_i + u_{it}, \quad (1)$$

where $i = 1, \ldots, N$ indicates countries, $t = 1, \ldots, T$ time and Y_{it} is a matrix of first-order integrated macroeconomic variables, Π_i is a matrix of coefficients representing the relationship between the first-differenced variables for two consecutive periods, α determines whether the correction vector enters a specific equation or not, β represents the correction vector, and d_{it} is a dummy variable controlling for the specific behaviour of peripheral countries (Ireland, Italy, Portugal and Spain) for the period between 2009 and 2013, due to their particular financial and economic difficulties.

Besides, $\alpha\beta' Y_{i,t-1}$ is a combination of stationary components and thus generates a stationary variable. To make sure the cointegration relationship is unique, we normalize by imposing the restriction that the first coefficient of the β matrix is equal to one.

A proper implementation of this panel data analysis requires assuming that the underlying structure is the same for each country. However, in practice, this constraint is likely to be undermined. Therefore, we allow for the individual heterogeneity of each country by introducing fixed effects. In this regard, μ_i is a vector of dependent variable-specific fixed-effects. Finally, u_{it} is the idiosyncratic shocks matrix, which is identically and independently distributed and has zero mean.

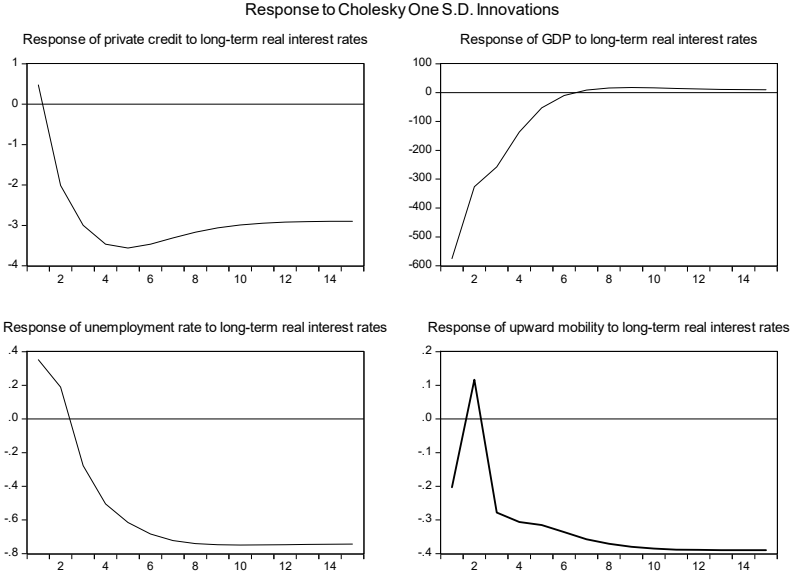
Once the VECM is estimated and its structural form is recovered, we use the impulse response functions to analyse the interactions between variables. In fact, impulse response functions study the impact of an exogenous shock on a chosen variable (in our case, the proxy variable for monetary policy: long-term real interest rates) on the other variables. The reliability of these impulse response functions depends on the real causal effect between each pair of variables, that is, the existence of Granger causality (the extent to which the information contained in a specific variable improves other variable's forecast). This implies coefficients of matrix Π_i being statistically different from zero. To be more precise and concise, we only report statistically significant results in the following section.

3. Results

In this section we present the results from the estimated panel Vector Error Correction Model in order to examine the average responses of endogenous variables (among others, upward and downward mobility) to an exogenous shock in monetary policy (proxied by long-term real interest rates) after controlling for time-invariant characteristics of countries. A statistically significant result implies that there is indeed a long-term co-movement among the chosen variables. Furthermore, we test for the stability of the panel VECM and conclude that it is stable, that is, shocks converge to zero over the long-run and thus every variable composing our model tends to a new equilibrium value over time. As our interest is on income mobility, we focus on the impulse-response functions associated with upward and downward mobility to test the impact of a monetary policy shock on income mobility.

We start analysing upward mobility (percentage of the population that experiences movements of two or more deciles up). Although the transmission mechanisms

are characterised by variable and uncertain time lags and it is difficult to predict the precise effect of monetary policy actions, our results suggest that, on average, a negative standard deviation shock in long-term real interest rates leads to a reduction in the upward mobility of 0.1 points after one year[16]. In other words, there is 0.10 percent less of population that experiences upward mobility. However, during the following years, the percentage of population that moves up increases. Thus, although the responses of contractionary (increase in interest rates) and expansionary (decrease in interest rates) shocks are not symmetric, we might interpret that lower interest rates triggered by expansionary monetary policies are found to lead upward mobility to a new equilibrium level – after approximately five periods – which is 0.4 points above the initial level (Figure 3).

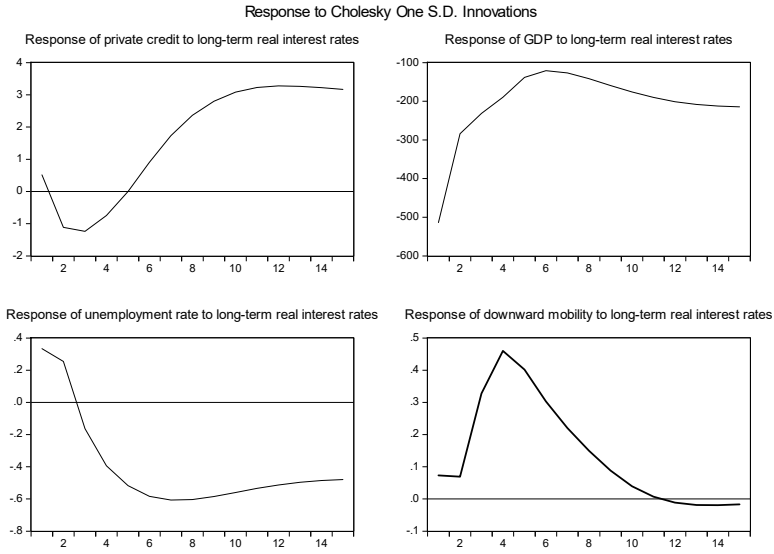


Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018) and Eurostat (2018a).

Figure 3 Upward Mobility Response to a Long-Term Real Interest Rate Shock

Regarding downward mobility (percentage of the population that experiences movements of two or more deciles down), the results display a quite different impulse-response function (Figure 4). A sudden decrease in long-term real interest rates may tend to reduce the percentage of the population that moves down, which falls by -0.45 points three years after the shock[17]. However, after about a decade the shock vanishes and downward mobility returns to its initial level. In this sense, the monetary policy shock simulated in our model is found to be neutral in the long-run for downward mobility.

[16] Note that the impulse response function shows the effect of a positive shock in long-term real interest rates, so that our interpretation is in the opposite direction.
[17] This result is significant only at 85% confidence level.



Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018) and Eurostat (2018a).

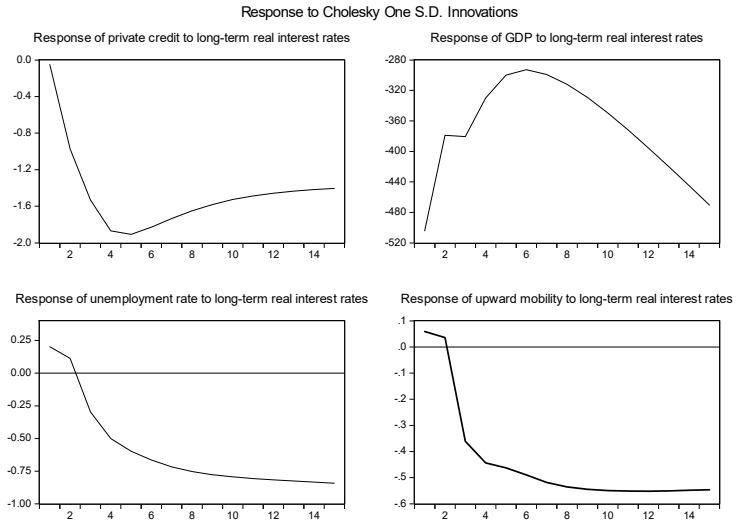
Figure 4 Downward Mobility Response to a Long-Term Real Interest Rate Shock

One of the setbacks of the aforementioned analysis is that it assumes homogeneous dynamics of individuals across income distribution. To address this shortcoming and to provide a deeper analysis, we now analyse income mobility (upward and downward) for different income groups, which correspond to some extent to lower, middle and upper income groups. The lower income group is composed of those individuals belonging to the first two deciles of the income distribution the first year. The middle-class group encompasses the population between the third and the eighth deciles, whereas those in the ninth and tenth deciles form the upper income group.

We find that, as expected, the dynamics differs indeed among different income groups. First, with regard to upward mobility, no analysis on upward mobility for the upper class can be offered as richer individuals (those in the last two deciles) cannot move up two or more deciles. For the lower part of the income distribution, results are not statistically significant, leading us to conclude that monetary policy seems to not have affected upward mobility for the poorer significantly. Nonetheless, for the middle-class we find that an expansionary monetary policy proxied by a negative shock in long-term real interest rates leads to greater upward mobility, which years later reaches its new equilibrium level around 0.7 points above its initial value (Figure 5).

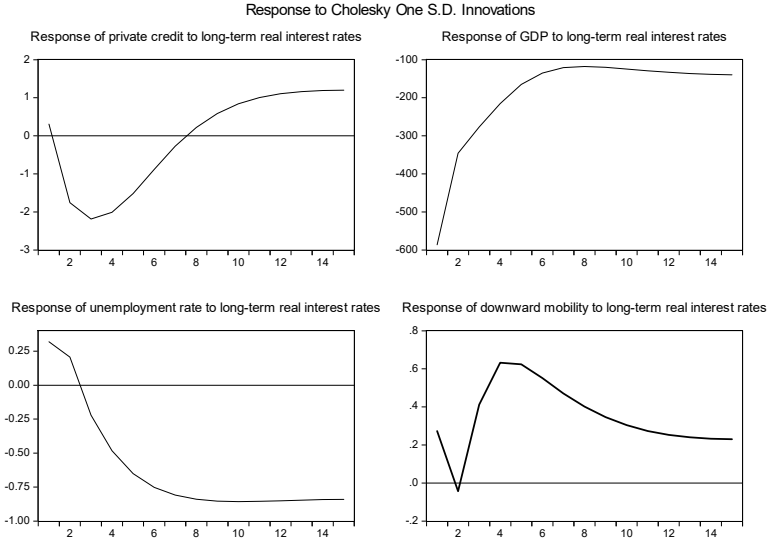
Concerning downward mobility, no downward mobility analysis for the lower class is conducted, bearing in mind that poorer individuals (those individuals in the first two deciles) cannot move down two or more deciles. For other income groups, we reveal that lower long-term real interest rates have a non-significant effect over the middle class downward mobility, while leading to a reduction of 0.6 points in upper

class downward mobility, which ends up acquiring a new equilibrium value of 0.3 points below its initial level (Figure 6)[18].



Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018) and Eurostat (2018a).

Figure 5 Middle Class Upward Mobility Response to a Long-Term Real Interest Rate Shock



Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018) and Eurostat (2018a).

Figure 6 Upper Class Downward Mobility Response to a Long-Term Real Interest Rate Shock

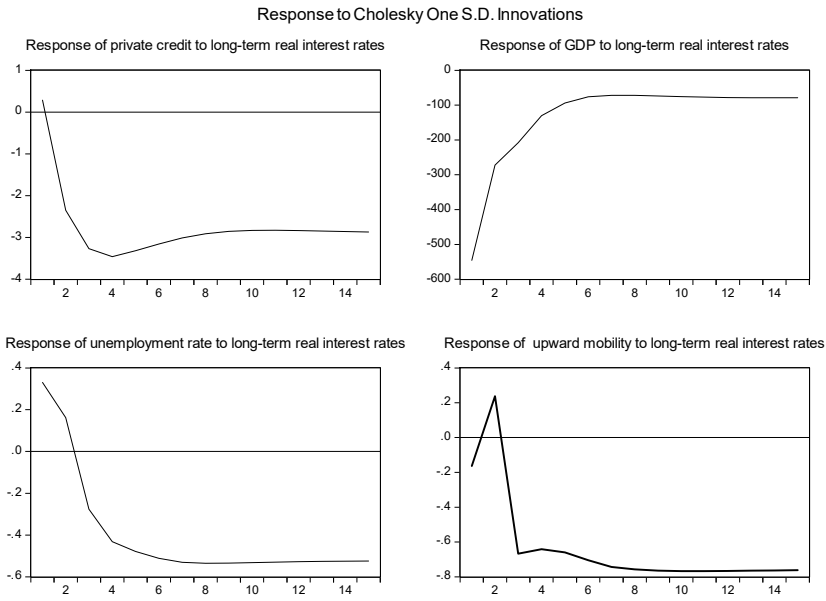
[18] This result for upper class individuals is significant at 85% confidence level.

Our results highlight the positive effect of expansionary monetary policy over middle class upward mobility, while the middle class downward mobility response to expansionary monetary policy is not significant. In this sense, we should bear in mind that the process through which monetary policy decisions affect the economy in general, and the changes in income distribution in particular, is related to a range of socioeconomic factors and the results of multiple interactions among sociodemographic characteristics, the regulatory framework and the performance of product and labour markets that influence income mobility.

Up to now, we have considered a broad definition of the middle class, comprising the central sixty percent of the population (deciles three to eight, both inclusive). To further assess the income group most likely to be affected by shocks in long-term real interest rates, we split the middle class into two groups of equal size: low middle-class (deciles three to five, both inclusive) and high middle-class (deciles six to eight, both inclusive).

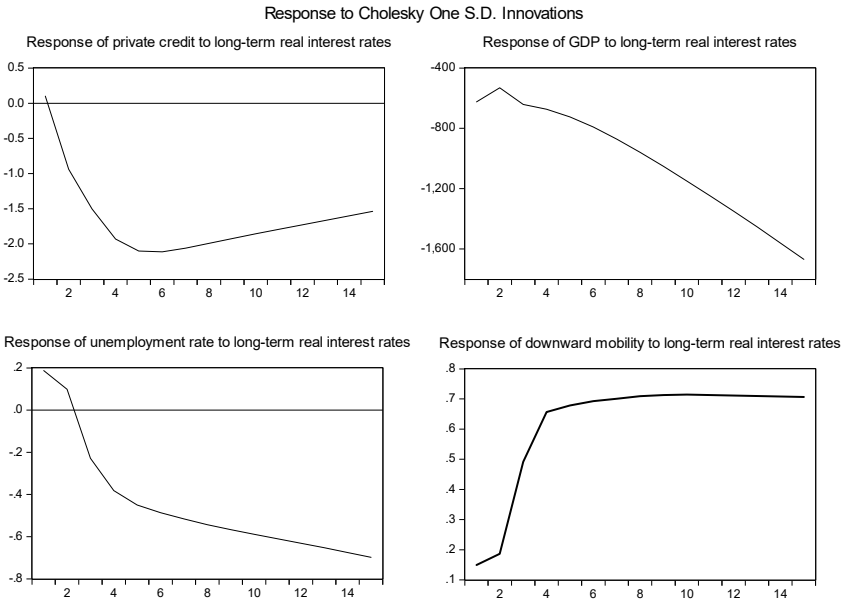
Figure 7 shows that a negative shock in long-term real interest rates results in a new equilibrium level of the lower middle-class upward mobility at 0.8 points above its initial value. This is abruptly reached approximately two years after the shock. Moreover, an unexpected expansionary monetary policy decreases the downward mobility for the low middle-class by 0.7 points over the long-run (Figure 8).

The non-significant impulse-response functions of the mobility related to the high middle-class leads us to conclude that the lower middle-class is precisely the income group whose mobility is more closely linked to monetary policy decisions.



Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018) and Eurostat (2018a).

Figure 7 Low Middle-Class Upward Mobility Response to a Long-Term Real Interest Rate Shock



Source: Own elaboration based on European Commission - Economic and Financial Affairs (2018) and Eurostat (2018a).

Figure 8 Low Middle-Class Downward Mobility Response to a Long-Term Real Interest Rate Shock

4. Concluding Remarks

Our results suggest that ECB monetary policy affects income mobility in Eurozone countries. According to the estimated panel Vector Error Correction Model, our findings highlight that over the period 2003 to 2015, before and after the financial crisis, expansionary monetary policy seems to encourage upward mobility and discourage downward mobility, as it stimulates economic activity and thus employment. This way, average responses of upward and downward mobility to exogenous shocks in monetary policy (proxied by long-term real interest rates) reveal that expansionary monetary policy is found to lead to upward mobility as of one year after the shock, while it lessens downward mobility, even though it vanishes in the medium-term.

These impacts of monetary policy shocks on income mobility are not homogeneous over income distribution. By income groups, our estimates reveal that lower interest rates entail a reduction in downward mobility for individuals belonging to the upper class (ninth and tenth deciles). These results are consistent with the expected effects of an essentially unconventional policy, which increases the capital income of the rich (income composition channel) by boosting asset prices, offsetting other income decreases, as reported for example for Japan (Saiki and Frost 2014), the U.S. (Juan A. Montecino and Gerald Epstein 2015) and the U.K. (Mumtaz and Theophilopoulou 2017).

Nevertheless, contrary to the expected results according to the earnings heterogeneity channel, no empirical evidence can be provided to support that expansionary monetary policy shocks increase upward mobility for the lower class (first two

deciles). Impacts of monetary policy shocks, however, are found in particular for the lower-middle class (third, fourth and fifth deciles), so that loose monetary policy seems to propel upward mobility and hinder downward mobility. Although it is not inferred directly from our results, it may be interpreted that individuals at the bottom of the income distribution appear not to take advantage of the stimulation of economic activity triggered by an expansionary monetary policy. In contrast, lower-middle income households, whose main source of income is clearly labour earnings and which have high chances of becoming unemployed and losing their labour income, end up benefiting from such countercyclical policy.

With the caveats imposed by the fact that reality is multicausal and that we only address the effects through certain specific transmission channels, these empirical findings tend to support the call for coordinating monetary and fiscal policies over the business cycle in order to achieve sustained growth and a more socially cohesive society with greater opportunities for all.

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Appendix

Table 2 The Results of Stationarity Tests for the Variables in Levels and First Difference (Null Hypothesis: Existence of at Least One Unit Root)[19]

		IPS		ADF		FPP	
		Level	D(1)	Level	D(1)	Level	D(1)
Long-term real interest rates	(1)	0.534	0.043	0.787	0.042	0.128	0.000
	(2)	0.766	0.532	0.939	0.608	0.439	0.000
	(3)	-	-	0.383	0.000	0.053	0.000
Private credit	(1)	0.366	0.682	0.386	0.588	0.006	0.036
	(2)	0.959	0.276	0.940	0.090	0.289	0.000
	(3)	-	-	0.094	0.000	0.999	0.000
GDP *per capita*	(1)	0.009	0.017	0.007	0.015	0.000	0.000
	(2)	0.135	0.527	0.041	0.505	0.009	0.012
	(3)	-	-	1.000	0.000	1.000	0.000
Unemployment rate	(1)	0.447	0.053	0.451	0.054	0.979	0.026
	(2)	0.579	0.269	0.726	0.061	0.979	0.000
	(3)	-	-	0.997	0.000	0.999	0.000
Upward mobility	(1)	0.019	0.000	0.013	0.000	0.031	0.000
	(2)	0.246	0.000	0.051	0.000	0.001	0.000
	(3)	-	-	0.414	0.000	0.542	0.000
Downward mobility	(1)	0.295	0.007	0.367	0.004	0.046	0.000
	(2)	0.287	0.153	0.083	0.015	0.088	0.000
	(3)	-	-	0.627	0.000	0.489	0.000
Group 1. Upward mobility	(1)	0.057	0.000	0.042	0.000	0.000	0.000
	(2)	0.179	0.119	0.021	0.008	0.000	0.000
	(3)	-	-	0.879	0.000	0.855	0.000
Group 2. Upward mobility	(1)	0.003	0.000	0.002	0.000	0.007	0.000
	(2)	0.048	0.008	0.003	0.000	0.002	0.000
	(3)	-	-	0.283	0.000	0.528	0.000
Group 2. Downward mobility	(1)	0.304	0.001	0.355	0.00	0.021	0.000
	(2)	0.253	0.084	0.066	0.003	0.033	0.000
	(3)	-	-	0.737	0.000	0.682	0.000
Group 3. Downward mobility	(1)	0.069	0.005	0.064	0.003	0.003	0.000
	(2)	0.149	0.045	0.021	0.026	0.078	0.000
	(3)	-	-	0.483	0.000	0.215	0.000
Low middle-class. Downward mob.	(1)	0.001	0.000	0.001	0.000	0.000	0.000
	(2)	0.100	0.013	0.020	0.004	0.000	0.000
	(3)	-	-	0.952	0.000	0.933	0.000
Low middle-class. Upward mob.	(1)	0.013	0.000	0.071	0.000	0.010	0.000
	(2)	0.153	0.059	0.020	0.001	0.000	0.000
	(3)	-	-	0.240	0.000	0.463	0.000
High middle-class. Downward mob.	(1)	0.378	0.004	0.422	0.001	0.041	0.000
	(2)	0.225	0.025	0.045	0.036	0.030	0.000
	(3)	-	-	0.589	0.000	0.462	0.000
High middle-class. Upward mob.	(1)	0.001	0.000	0.000	0.000	0.000	0.000
	(2)	0.039	0.006	0.005	0.000	0.000	0.000
	(3)	-	-	0.575	0.000	0.548	0.000

Notes: (1) - individual intercept; (2) - individual intercept and trend; (3) - none.

Source: Own elaboration.

[19] Im-Pesaran-Shin (IPS), Augmented Dickey-Fuller (ADF) and Fisher-Phillips-Perron (FPP) tests.