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The redistributive effects of QE

IN-DEPTH ANALYSIS

Abstract

The on-going debate about income and wealth inequality has recently hit the sphere of monetary policymaking: some analysts argued that the quantitative easing would benefit the rich at the expense of the poor, whereas some argued the contrary. This briefing paper reviews the arguments on both sides, while going back to the relationship between conventional monetary policy and income inequality. An empirical test on the Euro area shows that monetary policy has an impact on the unemployment rate, hours worked and the inflation rate. We interpret it as a positive, though relatively minor, effect of conventional and unconventional monetary policies on equality in the Euro area.

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EXECUTIVE SUMMARY

- The rise in inequality is at the center of macroeconomic debates and has therefore spurred some empirical assessments of monetary policy in the US and Japan.
- Two conflicting conclusions have emerged so far. First, in the US economy, a restrictive (conventional) monetary policy would raise inequality. Second, in the Japanese economy, an expansionary (unconventional) monetary policy would raise inequality.
- We review the different arguments which have related conventional monetary policy with households' inequality. Then, we give analytical intuitions on the possible amplification effects of QE on inequality.
- Drawing on macro data for the Euro area, we show that conventional and unconventional monetary policies have had a minor impact on the unemployment rate, hours worked and the inflation rate.
- Assuming that these macro variables have an impact on wage and income inequality, we interpret this result as a minor side effect of ECB monetary policy: the expected QE exit may impinge only marginally on inequality.
- We conclude on the requirement to reinforce the accountability of the European central bank: it should not only be accountable for the price stability objective, but also for the consequences of monetary policy on the well-being of European citizens, including its possible incidence on households' inequality.

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1. INTRODUCTION

The growing importance of income and wealth inequality in the public debate, after the global financial crisis and after the publication of Piketty's book (2013), has recently spread to the monetary policymaking sphere. Though not entirely new, the debate has been finally spurred by the massive asset purchases of the Fed, the Bank of England, the Bank of Japan and, recently, the European Central Bank, and by the so-called risk that increases in asset prices made possible by QE policies would benefit the rich at the expense of the poor.

As we observed only few periods of quantitative easing, the effect of money creation at the zero lower bound on households' inequality and welfare has not been studied extensively. However, the expected effect of quantitative easing is first a lowering and a flattening of the yield curve and, second, an increase in inflation expectations (and hopefully in inflation realization). As there is a literature which studies the link between these changes in asset prices and in the price level on household inequality, one can assess the effect of quantitative easing on households' inequality.

We first focus of the effect of interest rate, second on the effect of inflation. In a third part, we discuss the link between unconventional monetary policy, asset prices and inequality.

The fourth part aims at assessing the impact of ECB's QE on euro area aggregate dynamics and more precisely its potential effect on some macro proxies for inequality. We develop a VAR model that allows us to identify exogenous monetary policy shocks and to estimate their effects on macroeconomic developments. Results show that monetary policy, be it conventional or unconventional, has had an impact on macro variables which impinge on households' inequality. More than QE per se, it is QE exit which may finally prove detrimental to households' inequality.

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2. CONVENTIONAL MONETARY POLICY AND INEQUALITY

The topic of monetary policy and inequality is not new. Romer and Romer (1999) reviewed the effects of monetary policy on the poor, in the short and the long run, paying much attention to the incidence of expected and unexpected inflation on the poverty rate or the average income of the poorest fifth of the US population. They concluded that expansionary policy can reduce poverty, but only temporarily, and that this effect might be reversed in the long run if the former short run policy has raised inflation and spurred more aggressive policy in the long run. In a Post-Keynesian tradition, Niggle (1989) and Argitis and Pitelis (2001) concluded that tight monetary policies lead to uneven distribution of income.

2.1 Decrease in interest rates and households' inequality

A decrease in interest rates affects households' consumption income and wealth through changes in prices in almost all markets: the goods market, the labour market and financial markets (Coibion et al. 2014 or Mersch 2014 for a summary). A first direct channel is the heterogeneous impact of a change in interest rate on households' income due to their portfolio heterogeneity or due to their access to financial markets. This is the so-called portfolio channel. Households who hold some assets, the return of which are linked to interest rate such as life insurance (Dobbs et al. 2013) will see a decrease in the return of their saving. Households who mainly issue debt with variable interest rates will benefit from a decrease in interest rate payment. As poorer households tend to have more debt than richer ones, one can expect a redistributive effect of a decrease in interest rate from high wealth households to low wealth households, and thus a decrease in households' income inequality.

Other channels come from the general equilibrium effect of a lower interest rate on economic activity. A low nominal interest rate first generates an increase in economic activity that increases wages, business income and inflation, and contributes to decrease unemployment (see Christiano, Eichenbaum, Evans 1996 for an early identification). The income composition channel refers to the heterogeneity in households' income: The income of households at the bottom of the wealth distribution is primarily labour income, whereas the income at the top of the wealth distribution is more correlated to firm profits, due to higher stock market participation for instance (Bricker et al. 2014 for the US). As a consequence, the relative increase in labour and business income can affect households' inequality. One must acknowledge a specific channel, the "employment channel" which is likely to decrease inequality. As unemployment falls after a decrease in interest rate, households finding a job experience an increase in their income. This obviously increases their welfare, although it can have an

ambiguous effect on inequality (as income dispersion can increase when unemployment decreases). The unemployment channel is often included in a broader channel, the earning heterogeneity channel, in the literature. This broader channel refers more generally to changes in non-financial income after a decrease in interest rate.

Finally, these previous effects focused on income effect of a change in interest rate. In addition, a decrease in interest rates can generate important changes in the price of long-lived assets, which directly affect the wealth of households. For instance, a decrease in interest rates contributes to increase house prices (Dobbs 2014). This generates a transfer from households who are net buyer of houses toward households who are net seller of houses. This transfer depends however on the ability of households to issue some debts. Besides, the net effect also depends on the change in the interest burden for buyers. For former buyers, who are still engaged in a mortgage at a variable interest rate, the decrease in interest rate will unambiguously trigger a positive income effect. Households who buy houses without increasing their indebtedness suffer more from increases in house prices due to the lowering of interest rates.

As a summary, a decrease in interest rates has many partial equilibrium and general equilibrium on households' income and welfare. The overall effect of a decrease in interest rate is thus an empirical question. Coibion et al. (2012) present an empirical investigation of the effect of monetary policy on households' inequality on US data for the period 1980-2008. They identify monetary policy shock by two procedures. The first one is the change in the target Federal Funds rate at each FOMC meeting, following the Romer and Romer (2004) strategy. The second one is the change in the inflation target identified in Coibion and Gorodnichenko (2011). They find that a decrease in interest rate decreases income and consumption inequalities. Labour income increases at the lower end of the income distribution (after a decrease in interest rates), and that labour income decreases at the upper end of the distribution. This effect at the upper end of the distribution is hard to explain at this stage but it can come from the earning of households in the finance sector for instance. Second, they find that consumption expenditures at the upper end of the expenditure distribution decreases a lot after a decrease in interest rate. This is an indication that a decrease in interest rate must generate a decrease in the wealth of the richest households, who react by decreasing their expenditures. This wealth transfer cannot be identified in Coibion et al. (2012) due to data availability. The literature on the effect of inflation on households' inequality and welfare is useful to identify those channels.

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2.2 Inflation and households' inequality and welfare

The effect of inflation on households' inequality and welfare has been studied considering the household portfolio. First studies such as Albanesi (2007) or Erosa and Ventura (2004) concluded that an increase in inflation was increasing inequality in wealth, because poor households hold a greater share of their portfolio in money and lose from the inflation tax. Very poor households actually only hold money (M1) and no other financial assets that would offer a better protection against inflation (like stocks or inflation-indexed bonds, for instance).

This initial result is not confirmed by other studies, which carefully look at households' portfolio. First, Doepke and Schneider (2006) look at the redistributive effect of an inflation shock, by carefully recomposing the share of nominal asset held by each type of households in the US. They find that an unexpected increase in inflation transfers some wealth (due to the inflation tax) from old and rich households, who hold nominal assets, to young and poor household who have nominal debt. An additional effect of an inflation shock is to decrease the real interest payment of the State, which can be thought as a tax on public bond holders. As only few households hold nominal bonds (20% of households, mainly at the upper end of the wealth distribution in the US, Bricker et al. 2014), this tends to decrease inequality.

Second Ragot (2014) shows that money holdings (M1) are very unequally distributed and are correlated with wealth in the US and in Italy for which good data were available. As a consequence, the direct effect of the inflation tax is ambiguous, as the level of the tax paid by richer households over their revenue is higher. Algan and Ragot (2010) investigate the indirect effect of an increase in inflation on capital accumulation. They find that for low level of inflation (which corresponds to the current situation), an increase in inflation raises the capital stock due to the so-called Tobin effect. Households buy more real claims on the capital stock when inflation increases, because the opportunity cost of the liquidity services of money (M1 or M2) decreases. As a consequence, real wage increases and real interest decreases, what tends to decrease inequality.

From these studies, one can conclude that both unexpected and expected inflation are more likely to decrease inequality income and consumption and that it increases relatively more the income of the poor.

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3. UNCONVENTIONAL MONETARY POLICY AND INEQUALITY

Though the literature on the impact of monetary policy on inequality is not new (see above), it has only dealt with the consequences of standard monetary policy and not with unconventional monetary policy and QE precisely. There is neither theoretical nor empirical study on that issue (with only one exception mentioned below). The question that arises is then whether QE alters (magnifies or mitigates) the general conclusion which has been emphasized with conventional monetary policy. Considering the transmission channels of QE (see Blot et al., 2015), and based on the effects emphasized in the previous section, we consider some likely effects of QE on inequality.

3.1 Does QE amplify the interest rates' effects on households' inequality?

In normal times, the instrument of monetary policy is the short-term interest rate, which influences indirectly asset prices and market rates at all maturities. As reminded by Brunnermeier and Sannikov (2012) conventional monetary policy mainly focuses on the short end of the yield curve whereas unconventional measures are implemented in order to act more directly on asset prices and market rates at longer maturities, that is, on the long end of the yield curve. Does it necessarily imply that QE effects, through the portfolio channel, are amplified? For this to be true, asset purchases should have more powerful effects than short-term interest rates decisions on long-term market interest rates.

Recent empirical evidence has pointed out that Fed's or BoE's asset purchases had significant effect on Treasuries and corporate bonds. Gagnon et al. (2011) suggest an impact on the 10-year interest rate between 30 and 100 basis points. Though these results are confirmed by other studies, it is worth mentioning that Hamilton and Wu (2012) conclude on rather smaller effects whereas Wright (2012) reports very short-lived effects.

Considering the portfolio channel effect of monetary policy on inequality, evidence does not clearly point to a magnified effect of QE. It may lower return and reduce financial incomes, hurting savers and benefiting debtors, but not necessarily more than standard monetary policy. As a matter of fact, if policy rate is already constrained by the zero lower bound, additional effect of QE may not be very strong.

Besides, the income composition channel emphasizes the impact of monetary policy on labour incomes versus profit incomes. Here, it seems that there is no strong argument to favour a different effect of QE compared to standard monetary policy. In the current Euro area situation, the

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composition of a potential increase in national incomes would certainly depend on the heterogeneous situation of firms and labour markets.

Finally, the bulk of the impact of monetary policy and of QE on inequality may be channelled through the unemployment channel and then through the macroeconomic incidence of QE. There is no formal evidence concluding that unconventional monetary policy would be more powerful than standard monetary policy. Peersman (2011) for the euro area and Gambacorta et al. (2014), based on a cross-country analysis, do not find significant differences on the output effects between conventional and unconventional monetary policy. Then, the reduction in unemployment, which would result from QE may reduce inequality by the same channel emphasized by Hoynes et al. (2012) and Bitler and Hoynes (2015) according to which low-educated workers have been more hurt by the rise in the US unemployment rate during the Great recession than high-educated workers.

3.2 QE and asset prices

The relation between QE, asset prices and households wealth inequality has attracted lots of attention due the recent upsurge in asset prices. As financial asset are mainly held by rich households, an increase in asset prices is sometimes perceived as an unfair increase in the wealth of rich households. A lot of confusion appears in this debate. The increase in asset prices when interest rates decrease is the general outcome. As potential buyers of financial assets can borrow at lower rate, their demand for financial assets will increase up to the point where the increase in prices offsets the decrease in interest payments. The increase in asset prices prevents buyers to benefit from low interest rate. Low interest rates are thus not a transfer to buyers. However, the increase in asset prices can generate a wealth effect for holders of financial assets, but if the increase in asset prices is temporary, their permanent income is little affected by the current increase in asset prices and consumption inequality (which is a key measure of inequality) is not affected. In other words, the transitory increase in asset prices does not translate into income and consumption inequalities. Second, although temporary, the increase in the price of financial assets transfers some wealth from net lenders to net buyers in the short run. This argument was already discussed for the price of houses. These redistributive effects among households participating to financial markets (which less than 50% of households in developed countries, even in the US), are difficult to assess due to data availability and are likely to generate some redistribution among the group of the richest households.

To conclude, the recent literature on monetary policy and households' inequality indicates that the effect of QE is likely to decrease income and consumption inequality, whereas it can generate a transitory increase in

wealth inequality due to the transitory increase in asset prices. In addition QE generates a temporary increase in asset prices, which yields a transfer from net sellers toward net buyers. More generally, households who dis-save or borrow will gain from QE, whereas households who save will suffer from low interest rate.

In terms of savings in an ageing population, the former argument also means that people close to retirement will benefit from a positive stock effect of QE: the higher price of their assets will improve their well-being. Conversely, people less close to retirement will suffer from a negative flow effect of QE: the return on their saving will decrease. In light of life-cycle differences among countries, unconventional policy measures may give rise to heterogeneous impacts in the euro area. When it turns to empirical evidence, Saiki and Frost (2014) showed that the portfolio channel has been working in Japan during a decade of unconventional monetary policy. Drawing on a vector autoregressive model including GDP growth, CPI inflation, monetary base, stock prices and Gini coefficient, and identifying monetary policy shocks through a Cholesky decomposition, they show that an expansion in the monetary base positively affects the Gini coefficient. The impact is smaller if the authors extend their sample to periods of conventional monetary policy. Hence they conclude that QE in Japan has had a specific positive impact on inequality.

3.3 Avoiding deflation with QE

As stressed previously, notably by Doepke and Schneider (2006) higher inflation would transfer wealth from old and rich households to young and poor households. Regarding the QE effect on inequality, the issue would then be related to the specific impact on inflation. Does it help to prevent from deflation? As reminded in Mario Draghi's statement the 22/01/2015, the aim of the expanded asset purchase programme is to bring euro area inflation rate closer to the 2 % target. Inflation dynamics has slowed down continuously since July 2013 increasing the risk of deflation in the euro area. Thus, if QE is powerful to avoid the deflation trap it would have a positive impact on equality. Besides, we may assume that the consequences of inflation on inequality are asymmetric. Under high inflation, it is likely that households, or at least some of them, would adjust their portfolio to hold more assets offering a better protection against inflation. The impact on inequality would not completely vanish but may be asymmetric: debtors benefit from unexpected inflation whereas creditors may be hurt less if they hold more stock than bonds. In a deflation scenario, creditors benefit from lower inflation whereas debtor would not have the opportunity to adjust their debt payment. Considering this argument, QE help to avoid negative consequences of deflation on inequality.

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4. A VAR MODEL OF QE'S EFFECTS IN THE EURO AREA

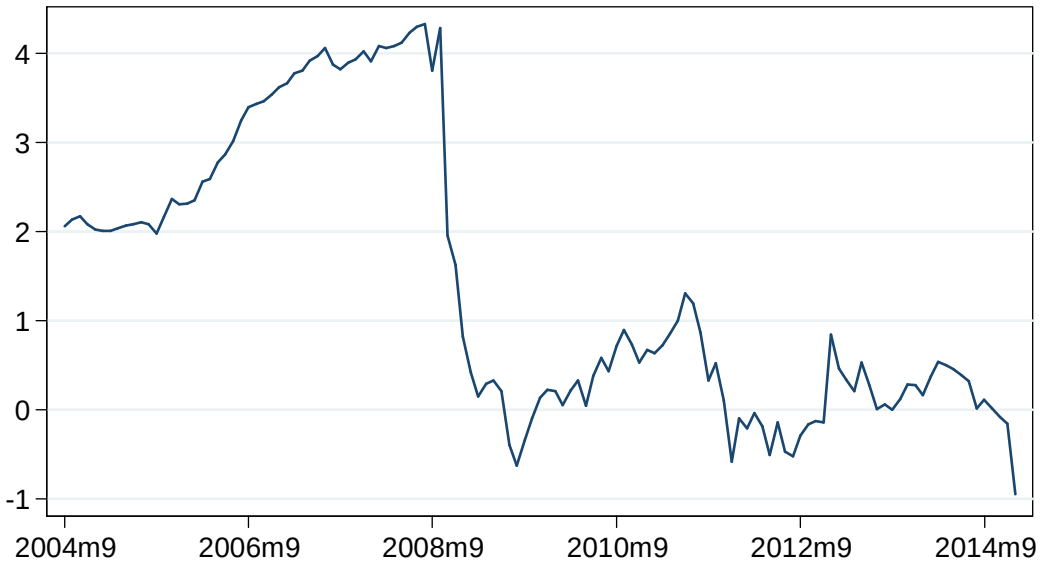
We aim at assessing the impact of the ECB's QE on euro area aggregate dynamics and more precisely its potential effect on some proxies for inequality. To do so, we propose an empirical evaluation of the unconventional measures in every sense implemented by the ECB since 2008. We develop a VAR model that allows us to identify exogenous monetary policy shocks and to estimate their effects on macroeconomic developments.

Adopting a general equilibrium perspective, we do not focus on the micro effects of policy shocks on inequality or on the disaggregated effects through each and every transmission channel but on the overall effect on aggregate dynamics. One major assumption in this section is therefore to approximate the effect of QE on inequality by the effect of QE on some aggregate data series. Monetary policy shocks influence the macroeconomy through several channels, which will ultimately influence investment, production, employment and inflation. By influencing economic activity, unemployment and inflation, monetary policy has an impact on income inequality. One could also argue that we can observe income inequality even in the absence of unemployment with the development of low-paid part-time jobs (this refers to whether the adjustment of the labour market following all sort of shocks is made on the extensive or intensive margin). We therefore extend the analysis to the effects of QE on the overall amount of hours worked in the economy.

We use data from the ECB's Statistical Data Warehouse, except for the ECB's shadow rate that is computed by Wu and Xia (2014) based on a term structure model. This measure takes into account all conventional and unconventional measures implemented by the ECB and generates their "implicit" effect on the main refinancing operation interest rate. This variable thus captures the overall stance of monetary policy and puts in the same space conventional and unconventional measures (see Figure 1). Moreover, this methodology allows us to capture ECB's interest rate dynamics even below the zero lower bound.

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Figure 1 – the ECB shadow rate, in % (source: Wu and Xia, 2014)



A VAR model with a Cholesky decomposition is used to decompose ECB shadow rate shocks into mutually orthogonal components with a structural economic interpretation. The Cholesky recursive identification assumption postulates that the structural errors are independent, and that reduced-form errors are related to structural errors through a lower triangular matrix, which means that the identification of structural shocks depends on the ordering of the variables in the vector of endogenous variables. A given variable will then respond contemporaneously to shocks to variables ordered after it and with a lag to shocks to variable ordered before it. The identification strategy then relies on the speed of adjustment of the different variables.

The VAR model includes the following variables in that specific order: unemployment rate, hours worked, industrial production, new credits, inflation, an index of euro area 10-year sovereign interest rates, a financial instability index (the Composite Index for Systemic Stress –CISS- computed by the ECB), the euro/dollar exchange rate, crude Brent oil prices, 2-year ahead inflation expectations (measured on financial markets by inflation swaps, source: Bloomberg), 5-year inflation expectations, and the ECB's shadow rate. The frequency of the dataset is monthly, starts in September 2004 and ends in January 2015. Our sample is thus constituted by a "normal times" period before 2008 and a "crisis" period when unconventional policies have been implemented since then.

We therefore assume that shifts in all macro variables included in our model result in a contemporaneous change in the ECB monetary policy variable which is ranked last. Low frequency variables like unemployment, hours worked, industrial production, credit and inflation are ordered first, so by

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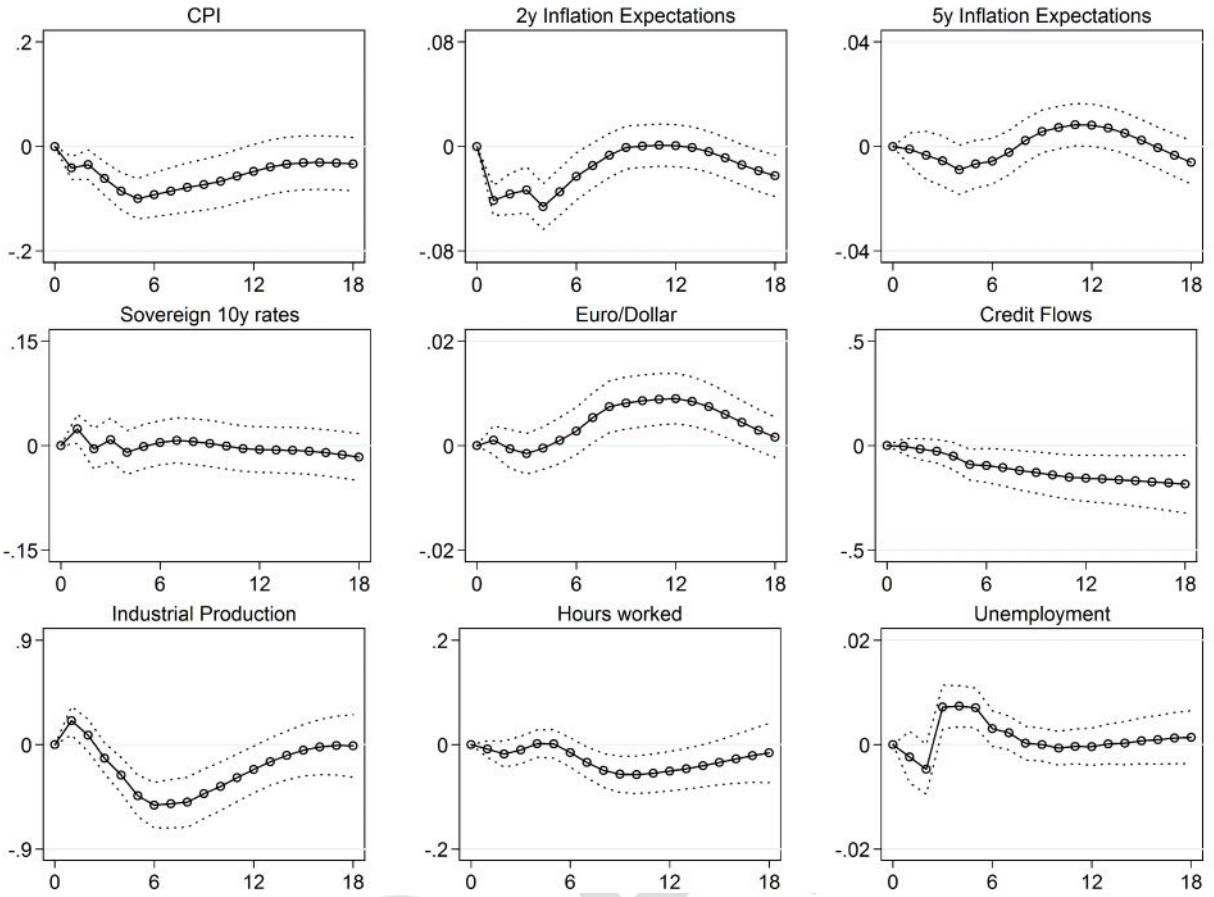
construction would not react contemporaneously to innovations in the other variables. Variables generated on financial markets – long term interest rates, the CISS, the exchange rate and oil prices – are ranked afterwards. Finally, inflation expectations appear just before the ECB shadow rate. These identification assumptions are extremely conservative in the extent that shocks to the ECB shadow rate are cleaned for all other contributions and can be seen as a lower bound of the potential magnitude of ECB monetary policy shocks.

The structural VAR analysis is performed with 3 lags, and a small sample estimator to correct for this potential bias. With this VAR model, we are able to estimate the effects over a long horizon (here, 18 months) of ECB monetary policy shocks on all the variables above-mentioned. Figure 2 shows the impulse response functions to an exogenous positive monetary shock, that is to say an increase in the main refinancing operation interest rate measured with the shadow rate. The size of the monetary shock corresponds to a one-standard-deviation innovation in the shadow rate which corresponds to a 0.23 percentage point increase, close to the usual 0.25 percentage point step in ECB interest rate variations. The dotted lines represent the 68% confidence interval.

We can observe that an increase of almost 0.25 percentage point of the shadow rate has the theoretically expected effects on all variables. More precisely, this restrictive monetary policy shock has a negative effect on inflation (around 0.1 percentage point) and a negative effect on inflation expectations. We also observe an appreciation of the euro exchange rate, a decrease of credit flows and a decrease of the industrial production. Regarding the effects on variables that could shed light on income inequality, we observe that a restrictive monetary policy has a negative effect on hours worked and raises unemployment after eight months.

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Figure 2 - Responses to a restrictive monetary policy shock



To estimate QE's effects with this model, we make the assumption that the monetary shock associated with the ECB's QE of 1.000 billion euros announced in January 2015 would be equivalent to a decrease of 2 percentage points in the shadow rate, which corresponds to the observed decline in the shadow rate between mid-2011 and mid-2012, period during which the ECB's balance sheet has increased by almost 1,000 billion euros. In addition, we have to assume that the estimated effects on the period 2004-2015 can be transposed to the months ahead.

Under these assumptions, we can expect that the most recent ECB's QE (which corresponds to an expansionary monetary policy shock, so all impulse responses have to be read symmetrically) will increase inflation expectations at 2 and 5 years with a maximum impact of 0.4 and 0.16 percentage points respectively at the horizon of 6 months. It will also lead to a depreciation of the euro vis-à-vis the US dollar, with a maximum impact of 0.08 percentage points after 10 months. The estimated effect on inflation would be positive with a maximum impact of 0.8 percentage point after 6 months and positive on industrial production with an effect of 4 percentage points after 8 months. The redistributive effect of monetary policy through inflation could then be at work with QE. We also observe that

hours worked will increase and the unemployment will decrease. These last two effects show that the QE's effect on economic activity will raise both dimensions of employment which is probably one of the most efficient channels, through which monetary policy influences inequality, to decrease income inequality. The effects of such a policy are not immediate and will appear several months after the implementation of the program, but these effects are relatively high especially when we observe the cumulated effects over the 18 months.

5. CONCLUSION

The issue of the impact of unconventional monetary policy on inequality arose recently in the academic literature and in the public debate. These potential side-effects of QE are of crucial importance and deserve a particular attention. It must yet be recognized that evidence is still sparse so that any conclusion should be considered with caution. Theoretical analysis has stressed that the impact of monetary policy on inequality is channelled through several channels, some of them leading to opposite conclusions. Consequently, it mainly remains an empirical issue. In light of empirical work so far, it seems that an expansionary policy would lead to a reduction in inequality. The sparse available evidence has mainly focused on standard monetary policy but there is no clear and convincing argument according to which the effect of QE might be strongly modified. Consequently, a more expansionary monetary policy is expected to reduce inequality, notably because it would prevent deflation while fostering economic growth (and then a reduction of unemployment).

Besides, if inequality is a policy objective, one should keep in mind that other economic policies have also an important impact on inequality. Fiscal policy and taxation policy are certainly more powerful than monetary policy in impinging on inequality. Furthermore, inequality may also result from financial frictions, with destabilizing amplification effects (Brunnermeier and Sannikov, 2012).

Finally, there is growing evidence that the effects of monetary policy go well beyond the inflation rate and the GDP growth rate, or macroeconomic stabilization. Monetary policy has an incidence on financial stability and on inequality. Hence the accountability of central banks becomes ever more crucial: certainly, they should not only be accountable for the price stability objective, but also for the consequences of their policies on the well-being of European citizens, be it in terms of banking and financial stability, or in terms of inequality. The conduct of monetary policy, when it comes to potentially modifying households' inequality, undoubtedly requires a strong democratic control.

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