



DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT  
ECONOMIC AND SCIENTIFIC POLICY **A**



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## Side Effects of Non-standard Monetary Policy: How Long is the Short-run?

Monetary Dialogue  
February 2017

In-Depth Analysis





**DIRECTORATE GENERAL FOR INTERNAL POLICIES**  
**POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY**

# **Side effects of non-standard monetary policy: how long is the short run?**

**Monetary Dialogue 6 February 2017**

## **COMPILATION OF NOTES**

### **Abstract**

In the short- to medium-run, non-standard monetary policy helps to stimulate the economy and stabilize financial markets. However, it is also widely acknowledged that side effects tend to materialize in the medium- to long-run. Thus, the time dimension is a crucial factor in assessing the riskiness of this policy approach. For the February 2017 session of the Monetary Dialogue, the Committee on Economic and Monetary Affairs (ECON) of the EP has requested a set of briefings to key monetary experts to address the side effects of non-standard monetary policy. Particular attention is given to the possibility that the ECB expansionary monetary policy may have contributed to the slowdown in labour productivity growth experienced by several member countries after the global financial crisis.

This document was requested by the European Parliament's Committee on Economic and Monetary Affairs.

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## INTRODUCTION

In the short- to medium-run, non-standard monetary policy helps to stimulate the economy and stabilize financial markets. However, it is also widely acknowledged that side effects tend to materialize in the medium- to long-run. Thus, the time dimension is a crucial factor in assessing the riskiness of this policy approach. The European Central Bank's (ECB) non-standard monetary policy measures have been in place for nearly a decade. These measures were implemented with the implicit idea that monetary policy can be tightened before negative side effects will take place. Today, with monetary policy operating about 10 years at the zero lower bound and with non-standard monetary policy measures set to continue until the end of 2017 or beyond, if necessary, the question when and to what extent negative side effects will take place has become a relevant policy issue. How long is the short run?

For the February 2017 session of the Monetary Dialogue, the Committee on Economic and Monetary Affairs (ECON) of the EP has requested a set of briefings to key monetary experts to address the side effects of non-standard monetary policy. Particular attention is given to the possibility that the ECB expansionary monetary policy may have contributed to the slowdown in labour productivity growth experienced by several member countries after the global financial crisis. The main conclusions and policy options are summarised below.

**Michael Hachula** *et al.*, (DIW Berlin) first document that labour productivity, defined as the ratio of GDP over employment, has indeed increased at a lower rate compared to the period before the crisis in several European countries. They then study how the expansionary monetary policy by the ECB has affected aggregate labour productivity in the euro area and in Europe. To do so, they first estimate the common variation in spreads of several euro area countries around monetary policy interventions of the ECB. They take these variations as the part of monetary policy exogenous to the economy, given that it was unexpected by markets upon announcement, and utilize it to estimate the causal effect of the monetary interventions on several variables of interest. They find that a monetary expansion, i.e. an exogenous decrease in interest rates, increases (rather than decreases) labour productivity. Behind this is an increase in both the numerator (GDP) and the denominator (employment). Since the numerator increases more strongly, productivity ultimately increases. They also document that the estimated positive effect of the ECB's unexpected monetary expansions on labor productivity is accompanied by an increase in private investment. This positive response of investment might at least in part contribute to the positive effect of the monetary intervention on labor productivity.

According to **Roman Horvath** (Center for Social and Economic Research) ECB's negative interest rate policy affected bank profitability negatively. A negative interest rate policy creates also risks for the insurance sector and pension funds, as these companies are subject to strict regulations preventing them from investing in more risky assets, while safe assets generate little to no return. In addition, households may have to reduce their consumption to maintain savings at the level necessary for retirement. True, unconventional monetary policy has improved financing conditions and increased lending, but too often to low-quality borrowers, sowing the seeds for the accumulation of bad loans in the future. The European Central Bank's unconventional monetary policy may have also increased wealth inequality as real and financial assets are mainly owned by wealthy households. While unconventional monetary policy measures have also reduced unemployment and thus decreased income inequality; the "wealth" effect is likely to dominate.

The paper by **Daniel Gros** (Centre for European Policy Studies) focuses on the specific effect that unconventional policy measures (and in general 'low for long') could have on

investment choices and hence on productivity. His conclusion is that there is no reason to believe that either low rates or unconventional monetary policy measures should lead to a systematic bias in investment choices. With lower rates less profitable investment projects will be chosen, but this is one of the purposes of the policy. The key point is that even with lower rates, investors will prefer the most productive projects, unless the financial system is completely distorted (and most evidence suggests that the banking system has become healthier over time).

In the euro area, the unconventional monetary policy measures of the ECB might create problems in terms of long term financial and fiscal stability. These problems are likely to become more severe as the bond buying continues, for the simple reason that central banks will end up owning a larger share of long term government debt. But it would be wrong to attribute any slowdown in productivity to the policy of the ECB.

## NOTES



**DIRECTORATE GENERAL FOR INTERNAL POLICIES**  
**POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY**

# **Side effects of ECB unconventional monetary policy on productivity**

**Michael HACHULA, Michele PIFFER, Malte RIETH**

## **IN-DEPTH ANALYSIS**

### **Abstract**

The European Central Bank has engaged in various forms of expansionary monetary policy in order to sustain output and to provide support to the dynamics of inflation. In this report we study empirically whether these policies contributed to the decline in labour productivity growth experienced by the euro area, and by Europe as a whole. We find that an exogenous monetary expansion that decreases interest rates leads to an increase in productivity, rather than to a decrease. This finding is consistent with our results that after the monetary expansion both output and employment increase, with output increasing at a faster rate, and that private investment expands.

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## EXECUTIVE SUMMARY

- The ECB has adopted a broad set of conventional and unconventional monetary policy measures after 2007 in order to bring inflation back to its target and stabilise the economy.
- The debate on possible costs associated with the expansionary stance of monetary policy has raised the possibility that the ECB's policy contributed to a slowdown of labour productivity growth in the euro area and in Europe, as it potentially led to a misallocation of capital.
- In this report we first document that labour productivity, defined as the ratio of GDP over employment, has indeed increased at a lower rate compared to the period before the crisis in several European countries. We then study how the expansionary monetary policy by the ECB has affected aggregate labour productivity in the euro area and in Europe.
- To do so, we first estimate the common variation in spreads of several euro area countries around monetary policy interventions of the ECB. We take these variations as the part of monetary policy exogenous to the economy, given that it was unexpected by markets upon announcement, and utilize it to estimate the causal effect of the monetary interventions on several variables of interest.
- We find that a monetary expansion, i.e. an exogenous decrease in interest rates, increases (rather than decreases) labour productivity. Behind this is an increase in both the numerator (GDP) and the denominator (employment). Since the numerator increases more strongly, productivity ultimately increases.
- We also document that the estimated positive effect of the ECB's unexpected monetary expansions on labor productivity is accompanied by an increase in private investment. This positive response of investment might at least in part contribute to the positive effect of the monetary intervention on labor productivity.

## 1. INTRODUCTION

Since the onset of the global financial crisis in 2007/08, the European Central Bank (ECB) has adopted a broad range of unconventional monetary policy measures in the form of quantitative or credit easing. Examples of these measures are the provision of lending to banks at longer maturities than before, the widening of the pool of assets accepted as collateral for refinancing operations, and large-scale purchase programs of government bonds and private assets. In addition to such measures, the ECB repeatedly indicated its commitment to keep interest rates low for an extended period of time, hence following policies of forward guidance.

There is growing consensus that these expansionary policy measures have generated a positive impact on output and prices in the euro area (see, among others, Fiedler et al. 2016, or Praet, 2016).<sup>1</sup> Boeckx et al. (2016), for instance, estimate that an expansion of the ECB's balance sheet stabilizes financial markets and leads to an increase of both output and inflation. Similar results are found by Hachula et al. (2016) regarding the effects of unconventional monetary policy interventions that lower sovereign bond yields in the euro area.

More recently, however, the debate on the ECB's monetary policy has concentrated on the risks and side effects potentially associated with unconventional measures in place for a prolonged period of time. In particular, the debate has focused on the possibility that monetary policy has contributed to low productivity growth in the euro area, and in Europe in general. Specifically, the low interest rates associated with the expansionary policies might contribute to a misallocation of resources that weighs on productivity, given that in a low interest rate environment less productive firms might attract a disproportional share of funding. For example, Acharya et al. (2015) provide micro level evidence on the effects of unconventional monetary policy on capital allocation across firms. They find that the banks that were indirectly recapitalized by the Outright Monetary Transactions (OMT) program by the ECB significantly increased their credit supply. However, low-quality borrowers benefited disproportionately from the post-OMT increase in loan volume. Hence, the authors conclude that OMT spurred an inefficient allocation of bank loans.

Evidence from a macroeconomic perspective is scarce. A study by Cette et al. (2016) finds a positive correlation between real interest rates and overall labour productivity in the euro area and its largest member states: a shock that lowers real interest rates decreases labour productivity. However, their analysis is predominantly based on pre-crisis data and does not specifically capture the effects of (unconventional) monetary policy, but everything that moves real interest rates in general. Importantly, from a macroeconomic perspective the micro level findings by Acharya et al. (2015) are not the only possible line of argumentation. Without the ECB's policies, the overall lending activity by banks might have been significantly lower. If productive firms use newly acquired funds associated with unconventional monetary policy measures to finance productive investment, overall productivity might even rise.

This report provides new empirical evidence on the effects of the ECB's unconventional monetary policies on macroeconomic productivity in the euro area and Europe. We follow the productivity definition applied in Cette et al. (2016) and consider the effects on labour productivity, which is defined as the ratio of output (gross domestic product) over employment. Put differently, labour productivity is measured by output per employed

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<sup>1</sup> Fiedler et al. (2016) also document that the effects of ECB's unconventional monetary policy measures on output and prices documented in empirical studies vary in magnitude. Studies show that the effects might also vary between the different types of policy measures employed by the Central Bank. However, unconventional monetary policy appears to have overall helped stabilizing the macro-economy after the financial crisis.

person. We then analyse how monetary policy easing shocks affect labour productivity. We start by outlining the evolution of labour productivity in Europe over the last decade, showing that after the crisis productivity has been increasing at a slower pace than before the crisis. We then use a panel data set with data on labour productivity and study how productivity reacts to the exogenous component of ECB announcements of unconventional monetary policy measures.

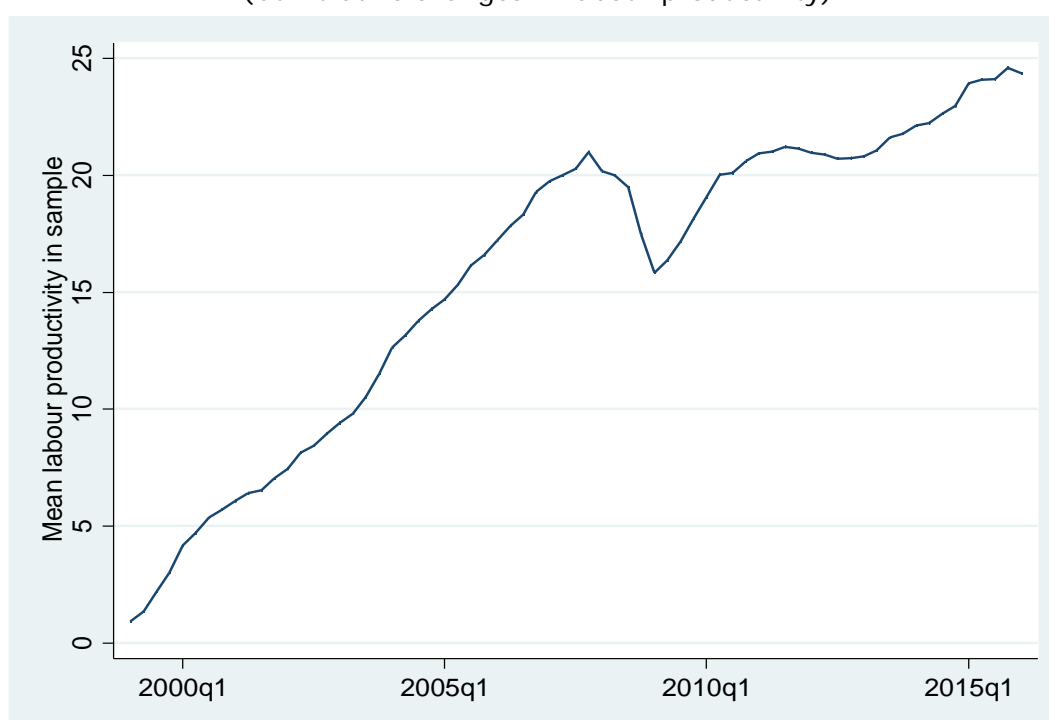
We find that expansionary policy interventions, which lower government bond yields, lead to an increase, rather than a decrease, in labour productivity in the euro area and in Europe. Looking at the two individual components of labour productivity, we document that both output and total employment increase in response to the monetary policy impulse. The rise in productivity can be explained by output reacting more strongly than total employment. In addition, we find that investment increases in response to the unconventional policy innovations, an effect that is consistent with the decrease in interest rates. The positive response of investment might, in the long-run, even additionally spur productivity growth. Overall, the results do not support the claims that the monetary policy of the ECB after the global financial crisis contributed to the decline in productivity. If anything, the estimates suggest that productivity would have been lower had the ECB not intervened with its monetary stimulus.

## 2. EVOLUTION OF LABOUR PRODUCTIVITY

Figure 1 shows the average evolution of labour productivity in 23 European countries for which data are available in the period after the introduction of the euro. As visible from the figure, labour productivity experienced a steady increase in the initial phase of the euro, following a positive trend. This increase in productivity comes to a stop during the global financial crisis, starting from which productivity in Europe declines. While the end of 2009 marks the beginning of a new increase in labour productivity, the level of productivity before the crisis is reached no sooner than in 2011. In addition, the trend growth in productivity after the crisis seems lower than the one experienced before the crisis. The figure thus suggests that Europe has experienced a marked slowdown in productivity growth, with potentially detrimental effects on long run growth rates of overall output.

**Figure 1: Evolution of mean labour productivity in Europe**

(Cumulative changes in labour productivity)



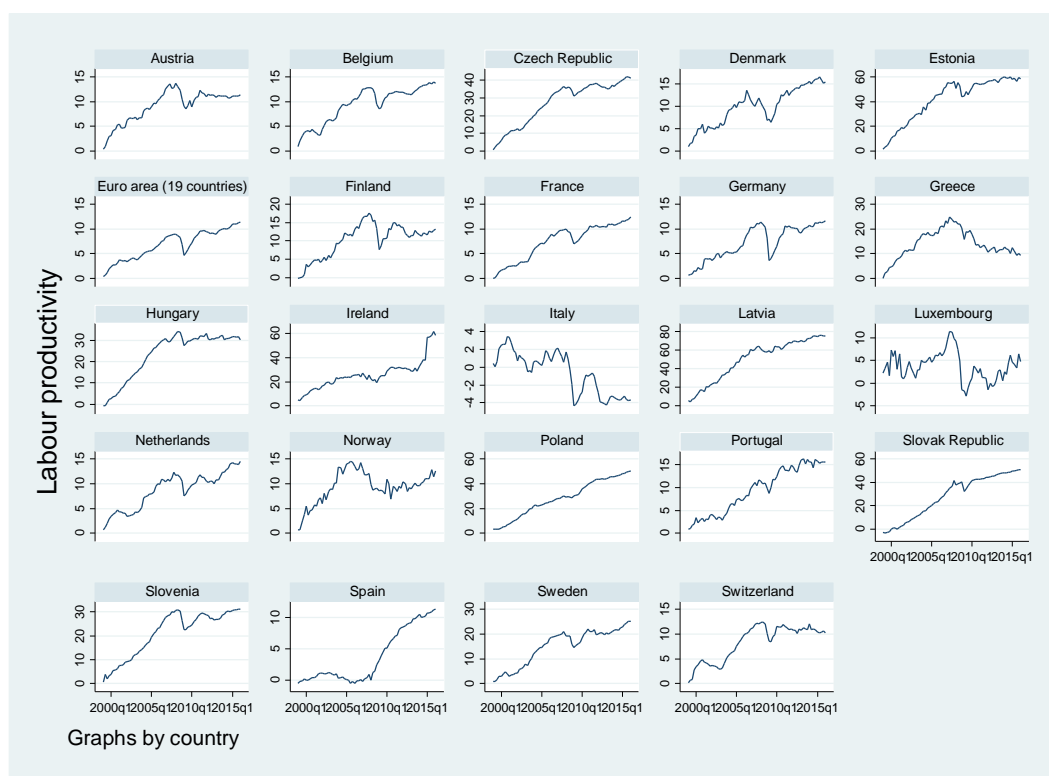
**Source:** Own calculations based on OECD.

Figure 2 inspects to what extent the overall slowdown in productivity in Europe is shared by the individual European countries. The figure shows the evolution of productivity for both euro area countries and non-euro area countries. It can be seen that the slowdown in the trend in productivity is present in several countries, and most notably in Austria, Belgium, Hungary and Switzerland. Contrary to most countries, Italy experienced a decrease in productivity well before 2007, and still appears to suffer from low levels of labour productivity. While not all countries experienced a sudden drop in productivity, several euro area countries did, including Germany and France.

Figures 1 and 2 jointly show that productivity dynamics in Europe have been severely hit by the global financial and European debt crisis. In the rest of this report we investigate to what extent this slowdown in productivity was also affected by the monetary policy interventions conducted by the ECB.

**Figure 2: Evolution of labour productivity in individual countries**

(Cumulative changes in labour productivity)

**Source:** Own calculations based on OECD.

### 3. THE EFFECTS OF MONETARY POLICY ON PRODUCTIVITY

In this section we first outline the empirical model used to estimate the effects of unexpected monetary easing by the ECB on macroeconomic variables. We then present the results for labour productivity and other associated key macroeconomic variables in the euro area and in Europe, respectively.

#### 3.1. Empirical strategy

The empirical strategy used in this report is divided in two steps. In the first step we isolate variations of the monetary policy rate that are exogenous with respect to the state of the economy. In the second step we exploit the estimated exogenous variations in the monetary policy rate to compute the causal effect that monetary policy interventions had on selected variables of interest.

More specifically, in the first step we build on Altavilla, Giannone and Lenza (2014) and extract the variations of the spreads on government bonds on the days in which the ECB announced the interventions. We consider all announcements of unconventional monetary policy in the period between 1 January 2013 and 31 March 2016, which refer to quantitative easing or forward guidance policies. In so doing, we focus on the period after the announcement of Outright Monetary Actions, which calmed financial markets and set the euro area debt crisis to an end. We make use of a panel model to extract the common variation across spreads computed against Germany for the government bonds of different euro area countries. The model is

$$x_{ijt} = \alpha + \beta x_{(ijt-1)} + \sum \gamma_a D_{at} + \sum \delta_n Z_{nt} + \eta_{ijt},$$

where  $x_{ijt}$ , indicates the spread versus Germany of country  $i$  at maturity  $j$  measured at period  $t$ ,  $D_{at}$  indicates the occurrence of ECB monetary policy announcement  $a$ ,  $Z_{nt}$  controls for news releases, and  $\eta_{ijt}$  is an error term. The coefficients  $\gamma_a$  capture the unexpected common change in sovereign spreads across the respective countries and maturities on each policy announcement day. We use spreads on Italy, Spain, Portugal and Ireland on maturities equal to 2, 5 and 10 years. The model is estimated on a daily frequency.

In the second step of the analysis, we aggregate the daily coefficients  $\gamma_a$  to a quarterly frequency and use it as an exogenous measure of unconventional monetary policy. We then estimate the following panel model describing the evolution of the quarterly macroeconomic variables of interest in response to the quarterly monetary policy shocks:

$$\Delta y_{it} = c + v_i + v_Y + \Delta y_{it-1} + \Delta y_{it-2} + \sum_{j=0,\dots,7} \beta_j S_{t-j} + u_{it}.$$

In this model,  $\Delta y_{it}$  denotes the quarterly rate of change in the variable of interest for country  $i$  in quarter  $t$ . The monetary policy shock is captured by  $S_{t-j}$  and refers to lag  $j$ . We add 7 lags of the monetary policy shock. In order to account for time-invariant country characteristics we include country fixed effects  $v_i$ . In addition, we allow for year fixed effects  $v_Y$  to correct for common unobservable time-varying factors. To remove possible autocorrelation in the error term, we include one lag of the dependent variable.

The main parameters of interest in the panel regression model are the  $\beta_j$  coefficients. These coefficients capture the dynamic effects of a monetary policy easing shock on the growth rates of the endogenous variable. To obtain the effects on levels, we cumulate the estimated  $\beta_j$ s for a given dependent variable  $\Delta y_{it}$ . We estimate the model using OLS based on a within-transformation, assuming that the error term  $u_{it}$  is independent and identically



distributed. We then base statistical inference on 500 Monte Carlo draws.<sup>2</sup> Last, we estimate impulse responses of the endogenous variables to a monetary policy easing shock over a horizon of two years.

### 3.2. Effects of monetary policy easing shocks in the euro area

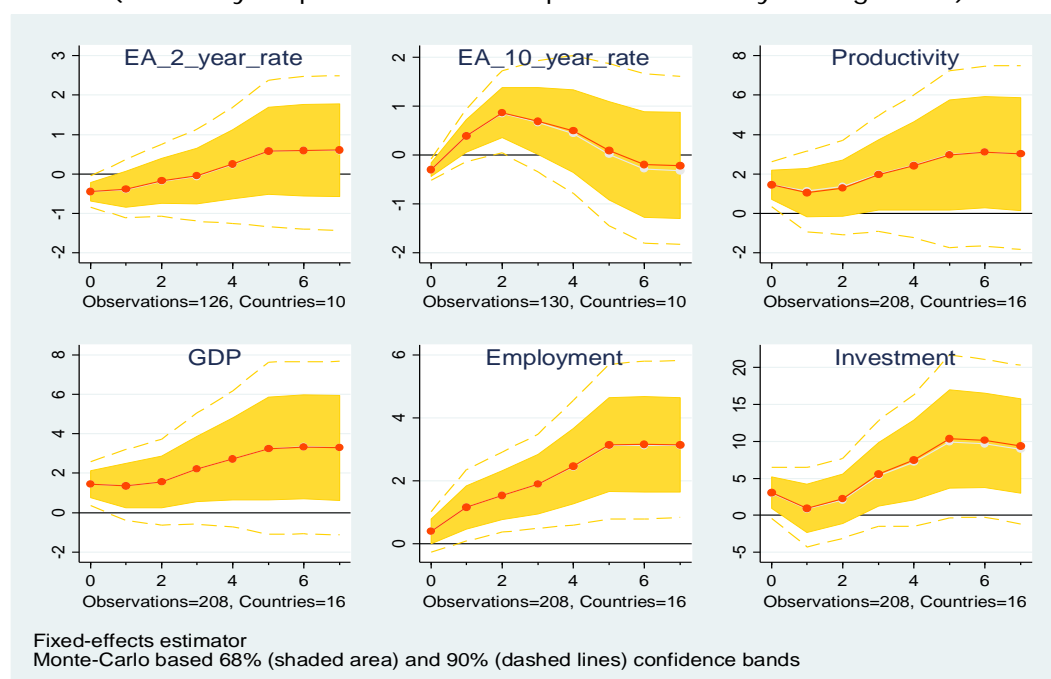
The results for the euro area are shown in Figure 3. The figure shows the response to an expansionary monetary shock of several variables, together with confidence bands that assess the statistical significance of the estimates. The shaded area shows one standard deviation confidence bands, while the dashed line depicts the 90% confidence bands.

The first two variables shown in Figure 3 refer to the response of the average two-year and ten-year rates on euro area government bonds of the ten largest member countries. As can be seen, the policy shock lowers the two-year rate upon impact by roughly 25 basis points. From then onwards, the two-year rate quickly returns to trend. Similarly, the ten-year rate drops on impact. It then overshoots, possibly reflecting higher growth expectations. Together, the two panels confirm that the isolated exogenous monetary policy surprises lower euro area sovereign yields at the two- and ten-year maturity upon impact.

The average response of labour productivity is shown in the top right panel. As outlined above, productivity is defined as GDP per employed person. According to the one standard deviation confidence bands, productivity increases immediately after the shock by more than one percent. It then gradually rises further, reaching a peak of more than two percent after one and a half years. Although the point estimates are only barely significant, the overall positive response suggests that unexpected monetary policy interventions by the ECB that lower euro area government bond yields tend to increase labour productivity.

**Figure 3: Effects of ECB monetary policy in the euro area**

(Quarterly responses to an unexpected monetary easing shock)



**Source:** Own calculations.

<sup>2</sup> Following Romer and Romer (2004), we use the estimated covariance matrix of the coefficients to draw new coefficients from a multivariate normal distribution, from which we compute a distribution of impulse responses.

To understand what drives this significant increase in productivity, in the bottom panels of Figure 3 we investigate the effect of the unexpected monetary policy interventions on GDP, employment and investment. Output increases significantly in the quarter of impact. It rises further and reaches a maximum at about four percent above trend after two years. The dynamics of employment are similar, albeit more sluggish. Moreover, the peak effect is lower. Together, these two responses provide a first explanation of what leads to the increase in productivity: GDP increases by more than employment in response to the unexpected monetary policy easing such that the ratio of the two, which defines labour productivity, ultimately increases. Note, however, that quantitatively the response of productivity, GDP, and employment are not directly comparable as they are the outcome of different models.

An alternative channel through which monetary policy interventions might affect productivity is investment. Higher investment by firms in response to the unexpectedly lower interest rates could lead to a replacement of old capital, with new capital spurring productivity. Indeed, the bottom panel provides indicative evidence for the existence of this second channel. Investment tends to increase following the monetary policy shock, although the response is only significant according to the one standard deviation bands after one year.

All in all, the evidence in this section suggests that expansionary unconventional monetary policy shocks by the ECB lead to an increase in productivity. This increase reflects a stronger increase in GDP than in employment, and stepped up investment activity by firms.

### **3.3. Effects on labour productivity GDP, employment and investment in Europe**

The results in the previous section referred to the euro area. We now extend the analysis to Europe and include data on overall 23 European countries for the estimation of the model, instead of only data for 16 euro area member countries. We include non-euro countries because they are likely to be affected by euro area economic conditions, given the strong real and financial ties of these countries to the euro area. Figure 4 shows the results. By and large, they are similar to the previous estimates. Nevertheless, there are several noteworthy differences.

Quantitatively, the response of GDP, employment and investment are weaker, suggesting that European non-euro area countries profit less from the unexpected monetary easing. Nevertheless, given that also in this sample the response of GDP is stronger than that of employment, productivity increases as well. Moreover, investment rises significantly several quarters after the shock. Together, these results point to the same two channels that lead to an increase in productivity as before: a stronger boost to GDP than to employment and an increase in private investment.

The results also caution against a simplistic focus on productivity as a criterion to evaluate economic policy measures. Productivity is a rather technical concept. Specifically, the widely used measure of labour productivity, which is also used in this report, is defined as the ratio of GDP over employment. Hence, any policy measure that has a similarly stimulating effect on employment as on GDP implies, according to this definition, a flat or insignificant response of labour productivity. In an extreme case, labour productivity could even decline if the increase in employment was larger than that in GDP. Such a hypothetical decline based on strong job creation could, however, hardly be seen as a detrimental effect of monetary policy.

**Figure 4: Effects of ECB monetary policy in Europe**  
 (Quarterly responses to an unexpected monetary easing shock)



**Source:** Own calculations.

## CONCLUSIONS

In the period after the 2007 the European Central Bank has engaged in extensive stimulus packages to keep inflation close to its target and to support economic activity in the euro area. While there is evidence that these measures have been effective in stimulating output, the debate has shifted towards potential side effects. Particular attention has been given to the possibility that the ECB expansionary monetary policy contributed to the slowdown in labour productivity growth experienced by several member countries after the global financial crisis.

In this report we document empirically that the ECB expansionary monetary shocks do not lead to a decrease in labour productivity. On the contrary, we find that an exogenous decrease in interest rates generates an increase in labour productivity. This result seems to be driven by the fact that both output and employment increase after the monetary policy expansion, with output increasing at a more rapid pace than employment. Since productivity is measured as the ratio between output and employment, the overall effect leads productivity to increase in response to the monetary shock.

We also find that investment increases in response to the monetary policy stimulus. Given the important role played by investment on long run productivity, the effect of monetary policy on investment is consistent with the result that a monetary expansion is not found to be detrimental to labour productivity growth.

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## NOTES



**DIRECTORATE GENERAL FOR INTERNAL POLICIES**  
**POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY**

# **The side effects of unconventional monetary policy**

**Roman HORVATH**

## **IN-DEPTH ANALYSIS**

### **Abstract**

The European Central Bank's unconventional monetary policy measures have been in place for nearly a decade. While they seem to have improved financing conditions and economic activity, their side effects have become more important over time. We discuss these side effects in this report. We argue that the European Central Bank's unconventional monetary policy contains non-negligible risks in the medium- to long-term. An ultra-low or negative interest rate environment for an extended period of time fuels the risk of housing price bubbles, deteriorates the stability of insurance companies and pension funds, and worsens the profitability of the banking sector. This unconventional monetary policy has improved the quantity of credit, but too often to low-quality borrowers, which may crowd out new and potentially efficient borrowers, therefore reducing creative destruction. It has also likely contributed to greater wealth inequality in the euro area.

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## EXECUTIVE SUMMARY

- The European Central Bank's unconventional monetary policy measures have been in place for nearly 10 years, and an ultra-low or even negative interest rate environment has prevailed for an extended period of time. Unconventional monetary policy may have helped to limit the largest imbalances at the height of the financial crisis, but it has had medium- to long-term side effects.
- With low interest rates for an extended period, and improving economic activity in certain euro area countries, housing prices in these countries began rising, with some showing nearly double-digit growth. An ultra-low interest rate environment makes investment in real estate more attractive because of the lack of other investment opportunities.
- The negative interest rate policy affected bank profitability negatively with a lag. Banks responded to the European Central Bank's Bank Lending Survey that their net interest rate margins declined following the implementation of negative rates.
- A negative interest rate policy creates risks for the insurance sector and pension funds, as these companies are subject to strict regulations preventing them from investing in more risky assets, while safe assets generate little to no return. Households may have to reduce their consumption to maintain savings at the level necessary for retirement.
- Unconventional monetary policy has improved financing conditions and increased lending. The quantity of lending increased, but too often to low-quality borrowers, sowing the seeds for the accumulation of bad loans in the future. In addition, extending loans to low-quality borrowers may crowd out new and potentially profitable enterprises and, therefore, reduce the process of creative destruction.
- The European Central Bank's unconventional monetary policy may have increased wealth inequality. Asset prices, real estate prices, and bond prices increased due to the unconventional monetary policy measures, which, in turn, led to an increase in the wealth of rich households. However, unconventional monetary policy measures have also reduced unemployment, which has decreased income inequality; though, the former effect of the increase of the value of financial assets is likely to dominate. Nevertheless, it should be emphasised that this evidence is surrounded by margins of uncertainty, because it is far from easy to separate (unconventional) monetary policy effects from other concurrent effects, and the precision of the available data on wealth may be an issue as well.

## 1. INTRODUCTION

Central banks typically use short-term interest rates (with the rates above zero) to influence aggregate demand and to achieve price stability. This is often labelled as conventional monetary policy. Following the outbreak of global financial crisis in 2007-2008, central banks reduced these short-term interest rates to zero; however, these conventional measures were not sufficient to restore macroeconomic (and financial) stability. With short-term interest rates close or equal to zero, central banks were forced to search for new measures to achieve their goals of price stability. These monetary policy measures at the zero lower bound have been termed as unconventional to indicate that they are meant to be temporary and are to be used in specific exceptional circumstances. However, in the euro area, unconventional monetary policy has been in place for nearly a decade.

There are different forms of unconventional monetary policy, and they are typically divided into three categories: balance sheet policies, forward guidance, and negative interest rate policy (Borio and Zabai, 2016). We refer the reader to Borio and Zabai (2016) for more information on the classification and implementation of unconventional policies. In this report, we take a look at the side effects that the unconventional monetary policy of the European Central Bank (ECB) is likely to have, focusing on those we think are the most important.

A number of empirical studies document that unconventional monetary policy has been relatively successful in influencing financing conditions in the euro area (see, for example, Gibson et al., 2016). Financial market fragmentation has also decreased following the implementation of these unconventional measures (Horvath, 2016).

It is a bit more difficult to say whether unconventional monetary policy has contributed positively to inflation and economic activity in the euro area. On the one hand, deflationary risks and weak economic activity were present despite several years of unconventional monetary policy. On the other hand, one would need to know the counterfactual—that is, what would happen without employing unconventional monetary policy measures. In this respect, Gambacorta et al. (2014) find that the ECB's unconventional monetary policy more strongly affected economic activity than prices in the euro area. It is also noteworthy that low oil prices contributed strongly to the low inflation environment in the euro area, and once these external factors fade, inflation may rise quickly again if the implementation of unconventional monetary policy is not discontinued (Forbes, 2015).

Although unconventional monetary policy may have positive short-term effects, its side effects may accumulate if the policy measures are implemented for an extended period. This report focuses specifically on these side effects and provides an analysis of the risks stemming from unconventional monetary policy. First, in Section 2, we discuss the effects of unconventional monetary policy on financial stability, focusing on several issues such as its effect on real estate prices, bank profitability, insurance companies and pension funds (along with the savings behaviour), and lending to risky enterprises. In addition to these effects, we also briefly discuss whether the equilibrium interest rate is really so low, as recent estimates suggest. In the following section, we discuss whether unconventional monetary policy has contributed to greater income and wealth inequality.

We primarily focus on the domestic side effects of the ECB's unconventional monetary policy—those that relate to the euro area. However, Taylor (2016) warns that the unconventional monetary policies of major central banks have had significant international spillovers, contributing to an accommodative monetary policy stance worldwide and

increasing the risk that central banks are stuck in a bad equilibrium, where one central bank pursues an accommodative policy because another central bank pursues it, and vice versa. Therefore, Taylor (2016) argues that sound policy rules and international monetary policy cooperation is necessary to restore the stability of the international monetary system.

## 2. THE ECB'S UNCONVENTIONAL MONETARY POLICY AND FINANCIAL STABILITY

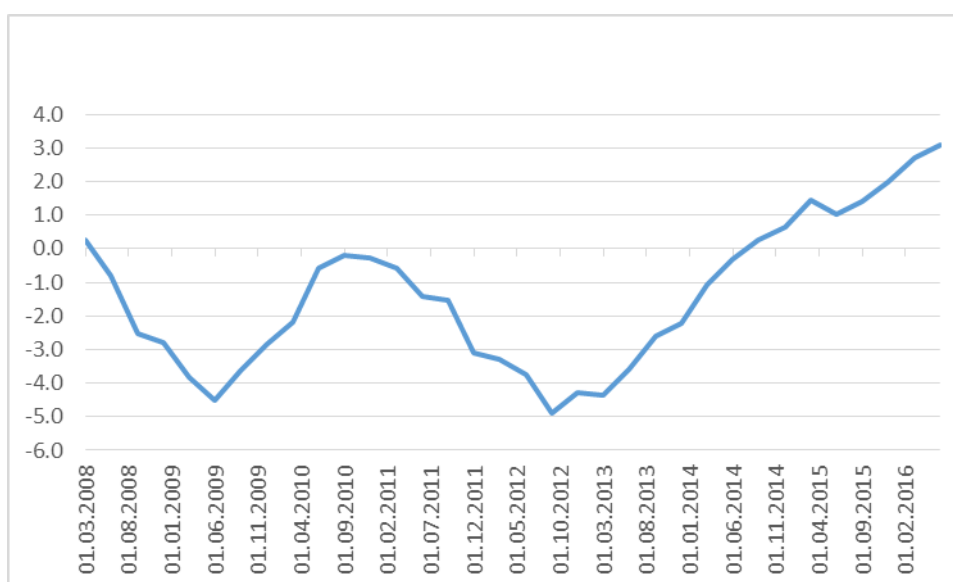
In this section, we focus on the side effects of the ECB's unconventional monetary policy regarding financial stability issues. First, we discuss whether the unconventional policy contributed to high real estate prices. Second, we focus specifically on negative interest rates and their effect on bank stability. Third, we examine the consequences of negative interest rates on insurance companies and pension funds. Fourth, we discuss the link between unconventional monetary policy and lending to low-quality firms. Fifth, we provide remarks on the measurement of the natural rate of interest.

### 2.1. Real estate bubbles?

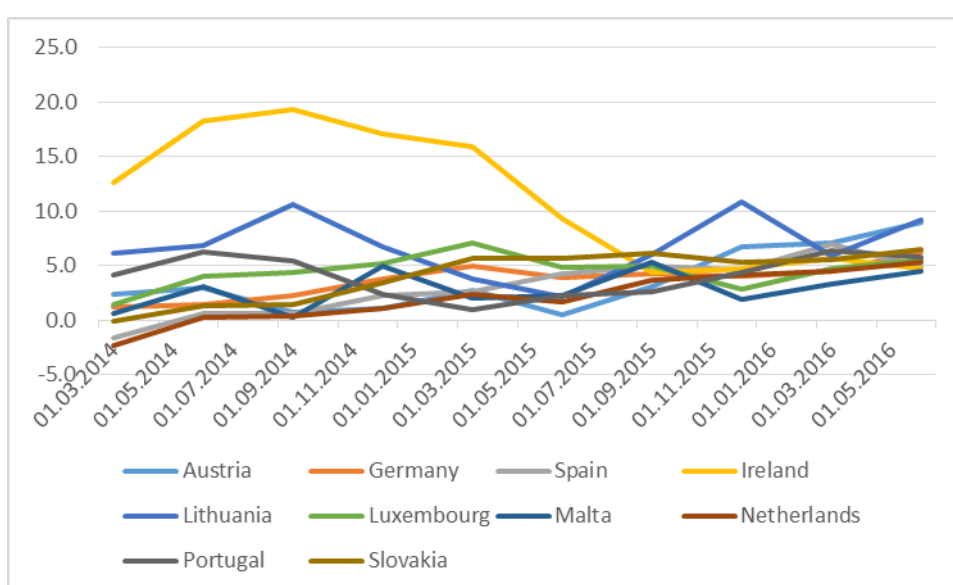
Real estate represents a large share of the wealth of households in the euro area. According to Dobbs et al. (2013), real estate represented slightly more than 40% of the overall wealth of households in the euro area in 2012, while life insurance and pensions represented approximately 20%, currencies and deposits an additional 20%, equity 8%, and other components represented less than 5%. The composition of wealth in the euro area may shift towards real estate even more so for two reasons. First, a persistent low interest rate environment reduces incentives to invest in products where the returns are strongly linked to the monetary policy rate, such as savings accounts or life insurance, and increases incentives for alternative investments, such as gold, real estate, or even art. Second, at the same time, low interest rates helped to recover the real estate market. With interest rates on deposits being close to zero, investing in real estate becomes an attractive option.

An important empirical question then arises: to what extent will this ultra-low interest rate environment increase real estate prices? Figure 1 presents the *real* growth of residential property prices from 2008 to mid-2016 in the euro area as a whole. We observe that, in the last year or two, prices began to rise well above consumer prices (note that the euro area Harmonised Index of Consumer Prices (HICP) inflation is positive but below 1%).

However, the euro area figures hide some heterogeneity among individual countries. While the real growth of housing prices in Austria, Germany, and Spain was approximately 5% in 2015-2016, the growth of housing prices in Greece and Italy was slightly negative. Figure 2 shows the real growth of residential property prices in 10 euro area countries with a focus on 2014-2016—the years that exhibited the highest growth of residential property prices. We can see that there is an upward trend for most of these countries, with 5% real growth in 2016 for each country except Austria and Lithuania, where the real growth was in nearly double-digit levels.

**Figure 1: Real Growth of Housing Prices in the Euro Area**

**Source:** BIS. Year-on-year changes.

**Figure 2: Real Growth of Housing Prices in Selected Euro Area Countries, Top Growth in 2014-2016**

**Source:** BIS. Year-on-year changes. Ten countries with the highest growth of housing prices in 2014-2016.

One could argue that the recent increases in housing prices were driven by improved economic activity rather than by unconventional monetary policy and, therefore, econometric evidence would be helpful to disentangle these two effects. However, empirical evidence on the effect of unconventional monetary policy on housing prices is rather scarce.

Rahal (2017) examines how unconventional monetary policy has affected housing prices in various developed countries, including the euro area, using panel vector autoregression models. Rahal (2017) finds that housing prices were systematically affected by unconventional monetary policy, peaking one or two years after the shock. According to

this result, recent increases in housing prices were at least partially driven by unconventional monetary policy.

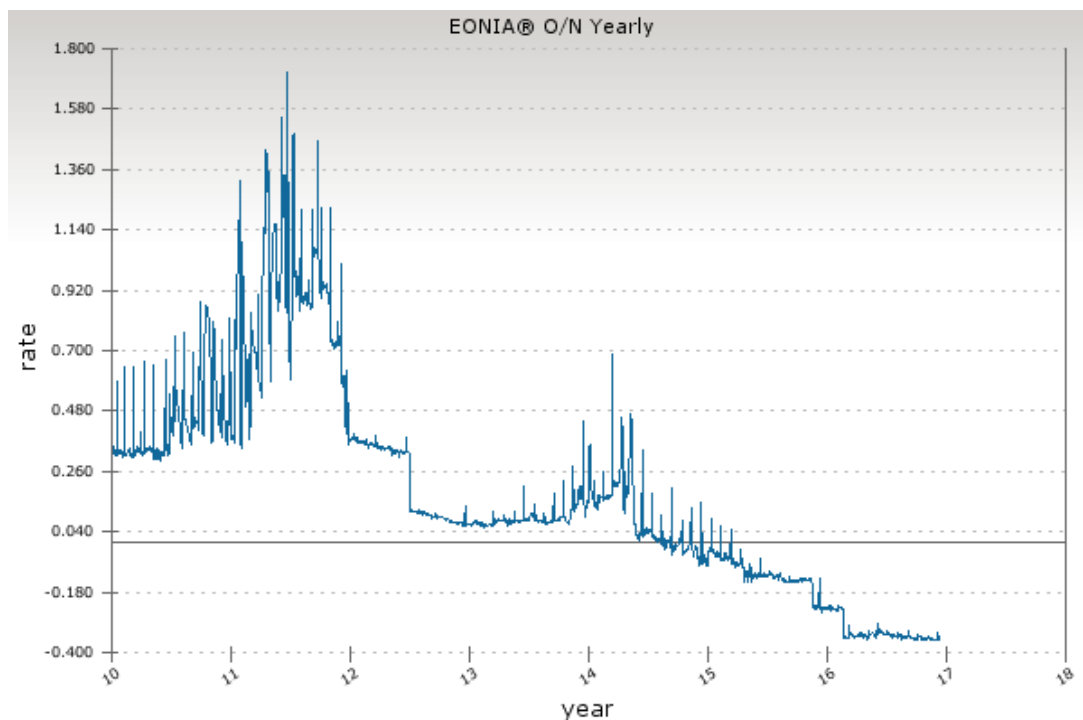
## 2.2. Bank performance under negative rates

Coping with deflationary risks and weak economic activity in the euro area, the ECB introduced a negative interest rate on the excess reserve deposit facilities of commercial banks to anchor medium- to long-term inflation expectations. This additional interest rate cut seems to have transmitted relatively well into lower interbank and retail rates (Blot and Hubert, 2016).

The question is whether the ultra-low interest rate environment, which has prevailed for several years, poses long-term risks to bank stability. We discuss the ultra-low interest rate environment in this sub-section, and negative interest rate policy can be thought of as a natural extension (Hughes-Hallett, 2016). The implementation of negative interest rates has also raised the question about the meaning of zero in the term “zero lower bound” and documented that the bound is effectively in the negative territory, rather than at zero, even though there is uncertainty regarding to what extent rates can go negative (therefore, what is the effective lower bound).

Figure 3 presents the Euro Overnight Index Average (Eonia) rate, which shows that negative interest rates prevailed in the euro area for approximately two years. Given the announcement after the Governing Council meeting on 8<sup>th</sup> December 2016 on the extension of the asset purchase programme until the end of 2017 (and possibly beyond), the negative interest rate environment is likely to prevail for at least an additional year.

**Figure 3: Eonia Rate, 2010-2016**



**Source:** <https://www.emmi-benchmarks.eu/euribor-eonia-org/eonia-rates.html>.

There are two main effects that a prolonged period of negative interest rates poses to bank stability.

The first effect is that a prolonged period of negative interest rates is likely to be detrimental to bank profitability due to the flattening of the yield curve and difficulties maintaining sufficient bank interest rate margins. Clearly, the effect of low interest rates on bank profitability is theoretically ambiguous because low rates also have positive valuation effects and reduce bank funding costs. Nevertheless, if the period of negative interest rates lasts too long, the former effect of reduced interest rate margins (commercial banks are unlikely to charge negative rates on deposits and, as a consequence, margins are smaller) and flattened yield curves will dominate. Reduced bank profitability (with lower capital ratios) then increases the risk of banks not being able to withstand negative shocks. However, we did not observe bank profitability fall significantly in 2015 and 2016, as banks retained higher-return assets from previous years in their portfolios. However, once the maturity of these assets expires and banks buy new lower-return assets while maintaining positive deposit rates, bank profitability may quickly become an issue.

Jobst and Lin (2016) examine the effect of negative interest rates on bank profitability in the euro area and argue that bank profitability can be an issue if negative rates prevail for an extended period. They recommend easing credit and expanding the ECB's balance sheet rather than implementing negative rates. They also emphasise financial stability concerns other than reduced profitability due to smaller margins. They note that because of stickiness in deposit rates, banks would be more prone to trade-off stable deposit funding for (less stable) market funding. In addition, it is noteworthy that banks may compensate for an ultra-low interest rate environment with higher fees.

Jobst and Lin (2016) show that negative rates are more likely to affect surplus countries where the need for negative rates is less, as negative rates are charged on excess reserves, and, typically, it is the banks in well-performing countries that have greater excess reserves.

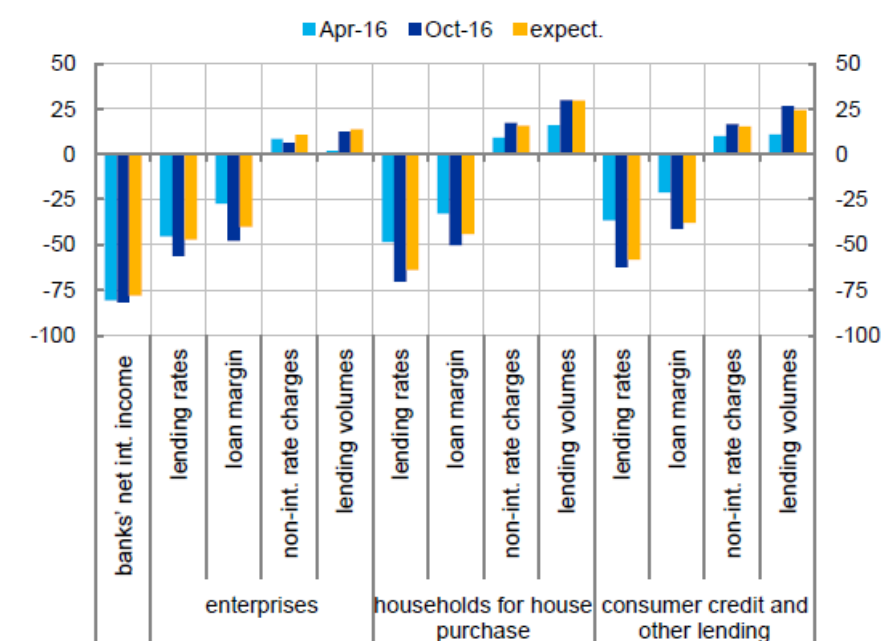
Figure 4 sheds some light on the effect of negative interest rates on banks' net interest rate income and non-interest rate charges. The source of the data is the ECB's Bank Lending Survey from October 2016, which surveyed banks in Europe. The banks reported that negative interest rates were detrimental to their net interest rate income in 2016 and that they expect these detrimental effects to continue in the future. The banks also reported that they somewhat increased non-interest rate charges.

Hughes-Hallett (2016) notes that negative rates may reduce the functioning of the monetary transmission mechanism because they may cause banks and businesses to begin storing cash outside the reach of central banks. This effect will be more severe if rates become even more negative than they are currently.

Negative interest rates have consequences for depositors, which we discuss in the following sub-section, and on the redistribution of wealth, which we discuss in Section 3. Negative interest rates may also increase excessive risk by banks and intensify their search for yield. Similarly, a negative interest rate environment may also increase the risks that banks delay repairing their balance sheets and promote lending to nonviable firms, which we discuss later in this report.

**Figure 4: Negative Interest Rates and Banks' Interest Income and Lending**  
 Impact of the negative DFR on banks' net interest income and bank lending

(net percentage of respondents; over the past and next six months)



Notes: The net percentages are defined as the difference between the sum of the percentages for "increased considerably" and "increased somewhat" and the sum of the percentages for "decreased somewhat" and "decreased considerably". The results shown are calculated as a percentage of the number of banks which did not reply "not applicable". The periods in the legend refer to the respective BLS survey rounds. "expect." stands for expectations that banks provided in the current round.

**Source:** ECB Bank Lending Survey, October 2016. DFR stands for deposit facility rate.

## 2.3. Savings, insurance companies and pension funds

The extended period of ultra-low interest rates has adversely affected savings behaviour and created risks for insurance companies and pension funds.

According to estimates from Dobbs et al. (2013), households in the UK, the US, and the euro area lost approximately \$160 billion in net interest income in 2007-2012 because of the ultra-low interest rate environment. The adverse effects varied widely by demographic group, with older households—typically the savers—being affected disproportionately more. Importantly, losses are likely to be much higher as of 2017, given that the ultra-low interest rate environment continues, and considering that the estimates from Dobbs et al. (2013) cover the period 2007-2012—a period that, at least for 2007-2009, was not characterised by an ultra-low interest rate environment. In addition, Dobbs et al. (2013) provide estimates of the effect of ultra-low interest rates for other sectors. We already mentioned that the effect on households in the euro area was negative (-\$160 billion, as discussed above). Governments and non-financial corporations were affected positively, while banks, insurance companies, and pension funds were affected negatively (see Table 5 on page 13 of their report).



Rajan (2013) and Heise (2016) note that an ultra-low interest rate environment is likely to have negative consequences for economic growth because households will have to reduce their consumption to maintain savings at the level necessary for retirement. Borio and Zabai (2016) note the potentially adverse effects of unconventional monetary policies on confidence, as consumers may interpret unconventional measures such as negative policy rates as a signal that the state of the economy is bad. A reduced level of confidence may further reduce consumption.

The ultra-low interest rate environment, which has persisted for an extended period, has negatively affected life insurance companies and pensions funds. Life insurance companies and pension funds are subject to strict regulations preventing them from investing in more risky assets and systematically searching for higher yields. In many countries, life insurance companies typically offer guaranteed return products for their customers (Dobbs et al., 2013 mention Austria and Germany, where contracts with guaranteed rates constitute more than an 80% share).

Because of the ultra-low interest rate environment, life insurance companies are forced to offer relatively low guaranteed rates, which decrease customer demand and cause customers to search for alternative investment opportunities, such as real estate. In addition, even though guaranteed rates are rather low, life insurance companies still find it difficult to be profitable because, for example, the government bond yields in which they could invest, are even lower. The profitability of life insurance companies becomes an even more relevant issue after the bonds that these companies bought before the crisis, which paid relatively high interest rates, expire and no longer remain in their portfolios. Therefore, the implementation of negative interest rates has been particularly devastating for this sector. Dorofiti and Jakubik (2015) show empirically that low interest rates exert a negative effect on profitability using cross-country data from the insurers sector in Europe. Similarly, pension funds are often required to guarantee non-negative returns (after deducting fees) and, accordingly, the ultra-low interest rate environment has created difficulties in generating positive returns.

## **2.4. The destruction of creative destruction?**

The ECB's unconventional monetary policy improved lending activity and modestly contributed to higher credit growth. However, it is the quality rather than quantity of lending that helps stimulate economic activity. Hasan et al. (2017) show that it is crucial to disentangle the quality and quantity of financial development, and that it is only the quality of financial development that matters for long-term economic growth.

Caballero et al. (2008) and Kwon et al. (2015) document that bank lending to nonviable firms in Japan has delayed the effective allocation of capital and labour and has contributed to the lost decade in Japan. Lending to nonviable firms increases the risk of accumulating non-performing loans in the future and may also crowd out lending to new and potentially efficient projects.

Acharya et al. (2016) examine the consequences of the ECB's outright monetary transactions (OMT). Using a rich dataset on bank-firm relationships in Europe, they examine several hypotheses. First, they examine whether the OMT programme improved bank health by stabilising the value of the sovereign debt portfolio. Second, they analyse whether improved bank health translates into the greater availability of bank funding to firms. Third, they examine whether bank funding has consequences for the real economy.

Acharya et al. (2016) show that the OMT programme, which was announced in mid-2012, has stabilised markets and improved the availability of bank funding to firms, but has had some unintended medium- to long-term side effects. They find that low-quality borrowers

particularly benefited from the increased availability of bank funding (often from weakly capitalised banks), but hoarded cash to improve their cash reserves rather than increasing their real activity. As this funding was extended at very favourable rates (below the rates for high-quality borrowers), Acharya et al. (2016) state that the increase in the loan supply to low-quality firms is partially explained by the zombie lending motives of some banks. In addition, they do not observe an increase in real activity even for high-quality borrowers. As a result, according to Acharya et al. (2016), unconventional monetary policy may reduce creative destruction.

In addition to the risk of lending to nonviable firms, an ultra-low interest rate environment for an extended period may also reduce the incentives for commercial banks to repair their balance sheets, for example, by removing toxic assets or writing-off non-performing loans (Lambert and Ueda, 2014). Regarding the asset side, banks are more easily able to roll over existing debt as well as grant new loans at very low interest rates. However, regarding the liability side, banks may enjoy the benefits of low term premia and the opportunity to extend the maturity of their debt at a low cost. Lambert and Ueda (2014) use US, euro area, and UK data to examine the consequences of unconventional monetary policy and find evidence both for slowing balance sheet repair and for the maturity transformation of debt.

## 2.5. Natural rate of interest: really so low?

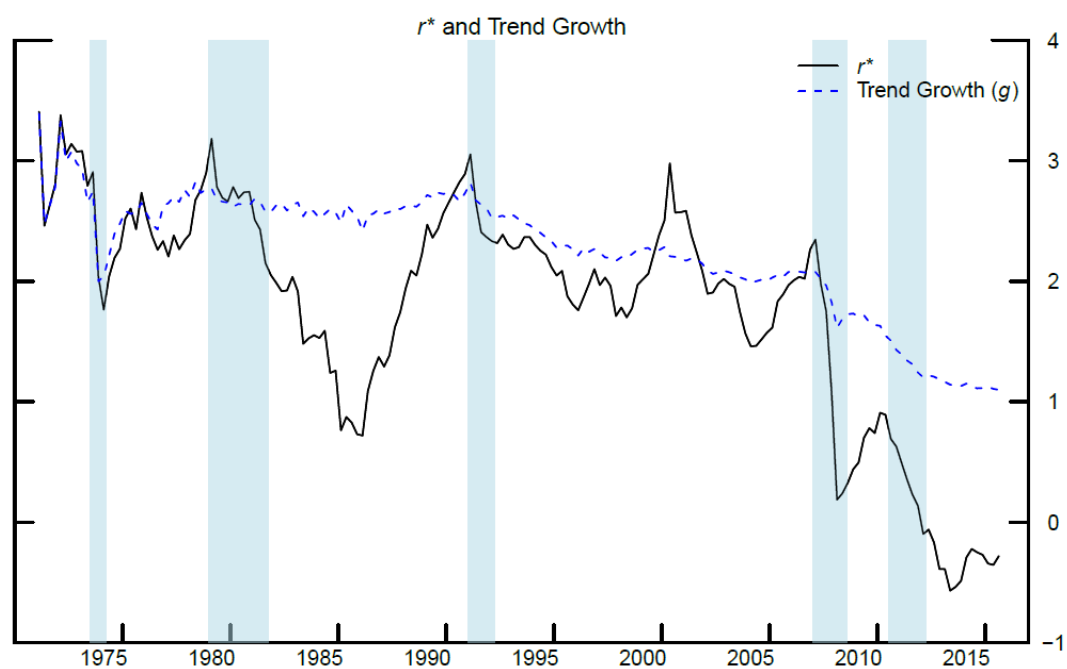
Although we analyse the side effects of unconventional monetary policy on financial stability in this section, we take a little digression to discuss whether (or not) the natural rate of interest has fallen in recent years. This digression is useful in order to understand to what extent a monetary policy is accommodative. A monetary policy would be considered less accommodative the more extensively the natural rate would fall.

The natural rate of interest is typically defined as the (nominal) interest rate delivering price stability and closing the output gap. Although central bankers usually note that estimates of the natural rate of interest are surrounded by a large degree of uncertainty, the available empirical evidence suggests that the natural rate of interest has fallen since the beginning of the global financial crisis. If this is so, the likelihood of implementing unconventional monetary policy increases, because it is more natural for the interest rate to be close to zero.

Figure 5 presents a recent estimate showing a decline in the natural rate of interest for the euro area. Holston et al. (2016) estimate the natural rate of interest using the Laubach-Williams approach, which is based on a small semi-structural model. The estimate for the euro area shows that the natural rate of interest is below zero.

The findings that the natural rate of interest fell significantly during the crisis have been criticised by Cukierman (2016). He argues that these estimates are biased downwards. Cukierman (2016) notes that the estimates are based on the models, which include short-term interest rates (which are typically not far from official monetary policy rates). Cukierman (2016) emphasises that short-term interest rates are less relevant for the economy because investment decisions are largely based on long-term interest rates. While the short rate is largely riskless, the long rate is risky and therefore captures the supply and demand in credit markets more adequately. In addition, the Laubach-Williams approach does not include financial frictions and, therefore, wrongly interpret the fall in aggregate demand due to financial frictions as the fall in the natural rate of interest. In addition, Cukierman (2016) emphasises that some approaches to estimate the natural rate of interest ignore that central banks decreased monetary policy rates due to financial stability considerations. Therefore, these approaches are subject to additional downward bias in estimating the natural rate of interest.

**Figure 5: Estimates of the Natural Rate of Interest in the Euro Area**



**Source:** Holston et al. (2016). Note that solid line depicts the natural rate of interest,  $r^*$ .

### 3. UNCONVENTIONAL MONETARY POLICY AND INCOME/WEALTH INEQUALITY

Income and wealth inequality has been rising in recent years in developed countries. It is noteworthy that this rise in inequality has been characteristic of developed markets, but not of emerging markets. Emerging market economies experienced an increase in the wealth and income of the middle-class to such an extent that inequality in these countries decreased. Therefore, we observe lower inequality globally (mainly because of China and India)—that is, lower inequality across countries, but higher inequality within (developed) countries (Milanovic, 2016).

Monetary policy has distributional effects by definition, but these distributional effects have never been at the forefront of academic or policy discussions. This is because the monetary policy rate typically fluctuated around some neutral rate of interest and the distributional effects netted out over the business cycle. However, even though there is a discussion about whether neutral policy has declined in recent years, it is very likely that the monetary policy rate (especially once we “adjust” the monetary policy rate for unconventional monetary policy measures to obtain the “shadow policy” rate) was well below the neutral (equilibrium) rate for an extended period of time. This expansionary policy for an extended time period, accompanied by the specific nature of unconventional monetary policy, has caused many commentators, policymakers, and researchers to note that unconventional monetary policy is likely to have contributed to income and wealth inequality in recent years (see, for example, Coibion et al. (2012) and Mersch (2014), among many others). However, at the same time, they also note that it is very difficult to assess how sizeable the effect of the monetary policy was. This difficulty stems from two issues: 1) the identification of monetary policy shocks from other concurrent shocks and 2) the accuracy of income and, especially, wealth data.

It is clear that inequality is an important phenomenon for society as well as for economic development, even though Heise (2016) rightly points out that it is very difficult to say whether there is a certain equilibrium level of income (or wealth) inequality that policymakers should promote.

Can income inequality also be relevant from a somewhat narrower central bank perspective? Clearly, the ECB mandate is to deliver price stability, and obviously, the ECB is not charged with considering income (or wealth) inequality. Mersch (2014) provides two general arguments why inequality matters—even for central banks.

First, income inequality may affect financial stability. The argument is that income inequality contributed to a credit boom, which subsequently translated into the global financial crisis (see Rajan, 2010, or Kumhof et al., 2015). On the other hand, Bordo and Meissner (2012) fail to find that income inequality contributed to the financial crisis. Although we can see there is some discussion about the importance of income inequality for financial crises, central banks typically err on the side of caution and monitor all possible risks.

Second, if monetary policy has distributional effects, these are likely to affect the monetary transmission mechanism. Mersch (2014) notes that the *“economy’s overall response to policy changes will depend on the distribution of assets, debt and income across households”*.

Coibion et al. (2012) provide a useful categorisation of the channels through which expansionary monetary policy may affect income (wealth) inequality:

- 1) Income composition channel: if monetary expansion increases profits more than wages, high-income households (individuals) become richer than the remaining households and, therefore, inequality is on the rise;
- 2) Financial segmentation channel: monetary expansion will translate more quickly to the households that actively trade in financial markets. As these households are typically richer, inequality will increase;
- 3) Portfolio channel: the share of cash to financial assets is lower for richer households (as compared to poorer households). As a result, monetary expansion producing higher inflation will increase the difference in wealth between rich and poor households;
- 4) Savings redistribution channel: monetary expansion reduces the cost of debt and lowers the interest rate paid on savings. As rich households are typically net savers and poor households net borrowers, inequality will decrease; and
- 5) Earnings heterogeneity channel: empirical evidence shows that low-income jobs are the most sensitive to business cycle fluctuations. Monetary expansion will disproportionately help poor households largely by reducing unemployment and, as a consequence, inequality will decrease.

As we can see, monetary expansion may either increase or decrease inequality depending on which transmission channels are dominant. Therefore, a careful empirical examination of actual data is needed. However, empirical evidence on the effect of unconventional monetary policy on income inequality is rather scarce.

Domanski et al. (2016) examine the effect of unconventional monetary policy on wealth inequality in France, Italy, Spain, Sweden, the UK, and the US. The authors provide a simulation approach to disentangle the various channels through which unconventional monetary policy may affect the distribution of wealth. They find that the main channels through which unconventional monetary policy affects wealth inequality are through stock markets and housing prices. They note that equities are typically in the hands of the richest households, while real estate is with average income households. Therefore, the stock market and real estate channels had opposing effects on wealth inequality, with the former increasing inequality and the latter decreasing it (or being neutral). Their results suggest that the net effect of unconventional monetary policy was that it increased wealth inequality because the stock market channel dominated. Domanski et al. (2016) warn their readers that they conducted a partial equilibrium exercise, while a general equilibrium framework would have been advisable. Nevertheless, it is, to the best of our knowledge, the first paper examining the distributional effects of unconventional monetary policy in select euro area countries using actual data. The ECB's unconventional monetary policy increased the value of financial assets (Gibson et al., 2016), which are typically held by wealthy households.

Saiki and Frost (2014) estimate a vector autoregression model for Japan and include income inequality in the model along with select standard macroeconomic and financial variables and a monetary base. They find that unconventional monetary policy in Japan increased income inequality, especially after 2008, when unconventional measures became more intense. Note that Coibion et al. (2012) provide an extensive analysis of US monetary policy shocks on income inequality; however, they cover the period essentially prior to the implementation of unconventional monetary policy.

The ECB's unconventional monetary policy may have also increased inequality through housing prices via two channels. Real estate is less likely to be owned by poorer

households. Claeys et al. (2016) report that the home ownership rate in the euro area stands at less than 50% for the bottom 20% of households (according to income) and less than 5% for the bottom 20% of households (according to wealth). On the other hand, the home ownership rate in the euro area for the top 10% of wealthy households stands at 80% and 90%, respectively, depending on whether we classify the top 10% of wealthy households according to income or wealth. The “housing” channel is especially relevant for the euro area countries that no longer suffer from economic depression and excessive financial imbalances. These countries exhibit solid growth in real estate prices, and ongoing unconventional monetary policy is likely to contribute to greater inequality. Given an ultra-low interest rate environment, real estate becomes a more attractive investment opportunity and may cause regional housing price bubbles.

However, there is some evidence that the ECB’s unconventional monetary policy likely reduced unemployment during the crisis period (Peersman, 2011), and a lower unemployment rate is typically associated with lower income inequality.

## CONCLUSIONS

The ECB's unconventional monetary policy has been in place for nearly a decade, and economic agents have been exposed to an ultra-low interest rate environment for an extended period of time. A negative interest rate policy has been in place for more than two years, and there are essentially no signs that this policy will be abandoned any time soon. The ECB's unconventional monetary policy may have had beneficial effects at the height of the crisis, but it has generated medium- to long-term side effects.

In this report, we focused on the potential side effects of the ECB's unconventional monetary policy. We discussed the risks of housing price bubbles, worsening bank performance, the instability of insurance companies and pension funds, as well as weaker consumption. We also discussed the risk that unconventional monetary policy may have increased the quantity of credit, although partially due to lending to low-quality borrowers. Finally, we discussed extensively how unconventional monetary policy characterised by an ultra-low interest rate environment for an extended period of time may have had distributional effects and potentially increased wealth inequality in the euro area. We emphasised that these side effects are non-negligible and that gradual monetary policy normalisation should take place.



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# Unconventional monetary policy and the productivity slowdown: cause or effect?

**Daniel GROS**

## IN-DEPTH ANALYSIS

### **Abstract**

The unconventional measures of the ECB are likely to have negative side effects the longer they are in operation. But these side effects concern financial stability and are an unavoidable pollution of future monetary policy with fiscal effects. It is highly unlikely, however, that the unconventional measures of the ECB will have had a measurable negative impact on productivity. In any event, the impact of the ECB's policy on investment seems to have been very limited. One of the reasons is that a major element in investment decisions is the risk premium on equity capital, which cannot be influenced by monetary policy and which has remained elevated. The available data on the composition of investment also do not suggest that ultra-low interest rates on most secure debt instruments have distorted investment flows towards low productivity areas.

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## EXECUTIVE SUMMARY

- This contribution looks at the questions of whether unconventional policies, or more generally ultra-low interest rates can have a negative impact on productivity.
- The conclusion is that persistent low productivity reduces trend growth and thus also equilibrium interest rates. But there is no evidence that monetary policy has had any impact on productivity.
- Ultra-low interest rates could result in lower productivity if they lead to a waste of investment. However, there is little reason why unproductive investment projects would be chosen as long as more productive ones are available. Moreover, there is no evidence that this has been the case in reality.

## 1. INTRODUCTION

Central banks in most developed economies have persisted with very expansionary and increasingly ‘unconventional’ monetary policy measures for almost a decade by now. Initially this was justified by the need to counteract the steep fall in demand following the financial crisis which erupted in 2007-08. In the euro area there was also a ‘double dip’ resulting from the widespread intra-euro area risk premia which arose in 2011-12. This is why the ECB’s policies became even more expansionary at a time when the recession in the US had already ended, allowing the Federal Reserve to end its bond-buying programme after a gradual ‘tampering’ of these purchases.

The ECB’s policies became increasingly ‘unconventional’ as persistent deflationary pressures kept inflation (and inflationary expectations) consistently below the “close to but below 2%” target which is now the norm for most developed economies.

Policy became ‘unconventional’ in several ways. The ‘zero lower bound’ on nominal interest rates was breached in terms of policy rates in the euro area some time ago. Already, even earlier, the ECB had offered very long (3-year) term lending to banks<sup>1</sup> and later it offered even very long-term loans at negative rates under the conditions that banks increase their lending by a certain benchmark <sup>2</sup> (TLTRO). And, finally, in early 2015, the ECB started a massive programme of public sector bond purchases. In this latter initiative, the ECB was several years behind the other major central banks (Fed, BoJ and BoE).

There is considerable uncertainty whether the ‘unconventional’ part of the expansionary measures has had a major impact on interest rates in the euro area. This has been the theme previous contributions (Gros 2015a, 2015b, 2016a, 2016b, 2016c). The basic point is simple: Central banks can directly determine only their own, short-term policy rates. The longer-term lending rates depend to a large extent on expectations in the market of how the rates will evolve in the future. When central banks keep their rates low – even in negative territory, as is the case of the ECB – and engage in unconventional measures, they signal to the market that rates are likely to remain ‘low for long’. In such an environment long-term rates will be low in any event.

It is widely believe that massive bond buying (like the ECB’s PSPP<sup>3</sup>) has an additional impact on long-term bond rates. But, in the opinion of this author, the impact of the PSPP and the various rounds of quantitative easing (QE) in the US, has been vastly overstated.

The key piece of evidence pointing to a limited impact of bond buying by central banks on long-term rates is the fact that long-term rates are highly correlated across currency areas (and particularly across the Atlantic, see Gros 2016a). There seems to be a common global trend in interest rates. The factors for this long-term decline in global (real long-term) interest rates are not fully understood. Recent empirical work suggests a number of factors (notably excess savings in Asia, see Gros, 2016a). In a globally integrated capital market, these ‘secular’ forces would tend to depress long-term rates (both real and nominal) everywhere.

The evidence of a dominant common global factor in long-term rates has been strengthened over the last month as interest rates have increased somewhat on both sides of the Atlantic,

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<sup>1</sup> LTRO (Longer-Term Refinancing Operations): [https://www.ecb.europa.eu/press/pr/date/2011/html/pr111208\\_1.en.html](https://www.ecb.europa.eu/press/pr/date/2011/html/pr111208_1.en.html)

<sup>2</sup> TLTRO (Targeted Longer-Term Refinancing Operations): <https://www.ecb.europa.eu/mopo/implement/omo/tltro/html/index.en.html>

<sup>3</sup> PSPP (Public Sector Purchase Programme): <https://www.ecb.europa.eu/mopo/implement/omt/html/pspp-ga.en.html>

although there has been no change in the policy of the ECB. The long-term common trend downwards might have been a coincidence, but the close correlation with the change that is ongoing right now provides strong evidence that long-term rates are highly integrated at the global level. This observation implies that the impact of unconventional measures can be only limited.

Another view of 'low for long' runs along the so-called 'natural' rate – or ' $r^*$ ' view. It holds that central bank policy rates should be close to the 'natural rate', which in turn should be equal to the long-run, or potential growth rate of output. This would imply that in the long run low rates should be associated with low productivity growth. But in this view the causality runs from low productivity to low rates (via low growth).

Could it be that the causality also runs the other way? That is, that very low interest rates reduce productivity growth because they distort the allocation of resources? If this were the case, low rates would have negative side effects, which would counteract the intended stimulating effects of monetary policy. This is the question addressed in this contribution.

The next section starts with some general considerations on the short and long term side effects of unconventional monetary policy in the financial and fiscal spheres. It then turns to the drivers of investment and shows that the actual cost of capital remained substantial even as many long-term rates have become negative. The following section 4 presents the dynamic of overall investment and some of its major components. Section 5 then presents some simple data on recent developments in productivity. Section 6 concludes.

As an aside, we note that the question put for the February monetary panel referred specifically to "ECB unconventional monetary policy". In the opinion of the author the impact of the unconventional part of the ECB's monetary policy has been rather limited. But there can be little doubt that the ECB has nudged long-term rates down by making its policy rate negative and announcing implicitly that it will be kept there for a long time. This contribution will thus address the question whether keeping rates low for a long period of time can have a negative impact on productivity.

## 2. QE EFFECTS: SHORT VERSUS LONG-TERM EFFECTS

The fundamental objective of quantitative easing is to reduce long-term interest rates, either broadly or in specific markets for the purpose of increasing inflation expectations and hence actual inflation.

There are three different channels through which this should happen: low long-term interest rates should stimulate investment and reduce savings (interest rate channel); the supply-induced portfolio rebalancing arising from reductions in the supply of the purchased asset available should induce reallocation toward other assets<sup>4</sup> (portfolio rebalancing channel) and the weakening the exchange rate (exchange rate channel) should stimulate external demand.

The literature has highlighted a number of possible downside effects associated with such policy, especially in the long term.

The first, and most general, is that exit strategies from QE are difficult to implement. Experience is limited and markets addiction to favourable liquidity conditions could unduly prolong unconventional measures. At some point the velocity of circulation of money should start to rise and extra bank balances can cause an inflationary surge. Moreover because government debt is being financed by quantitative easing, governments may have less market discipline to think about reducing fiscal deficits.

A second downside effect is specific of the euro area and relates to fiscal effects of monetary policy. The design of the purchases through the interventional of national central banks has resulted in fiscal effects thought the redistribution of interest income (seigniorage) both over time and across countries. See Gros (2016c)

Lastly and more importantly, dynamics in the portfolio rebalancing by leading to a reallocation of resources can result in various effects. The first is an increase in commodity, equity and other asset prices which in the end can result in too high inflation and/or financial instability. Second, it is sometimes argued that by raising asset prices, near-zero interest rates and QE have contributed to increases in inequality. Lastly the extra liquidity available could encourage greater risk taking or reduce attentive evaluation of real investment project profiles leading to over-investment or investment in non-productive opportunities.

QE started in the US in 2008 and lasted until 2014, in the UK it started in 2009 and ended in 2015. In the euro area it started only in March 2015 and it is still ongoing, while other unconventional monetary policy measure have been in place since 2011. The literature is quite scant when it comes to assessing the evidence of any of these effects, even on the US and in the UK.

Few studies focussing on the portfolio rebalancing and the effects on equity prices and inequality do not suggest much evidence in the direction of such downside risks. For instance Joyce et al. (2015) describes behaviour of insurance companies and pension funds in UK to assess the portfolio rebalancing effect. The results show that investors shifted their portfolios away from government bonds towards corporate bonds. But portfolio rebalancing has been limited to corporate bonds and did not extend to equities.

Fratzscher et al. (2016) assess the financial market impact of ECB unconventional monetary policy between 2007 and 2012 (hence not QE), looking at a broad range of asset prices and portfolio flows in the euro area and globally. They find that ECB policies boosted equity prices and lowered bond market fragmentation in the euro area and lowered credit risk among banks and sovereigns.

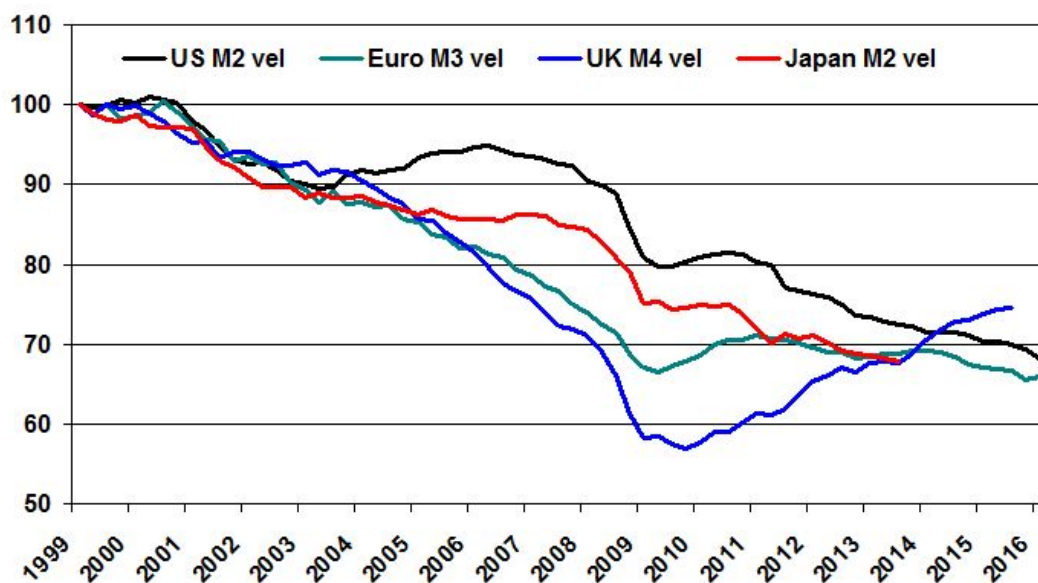
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<sup>4</sup> See for instance Gagnon et al. (2011) and Krishnamurthy and Vissing-Jorgensen (2011).



According to the picture below velocity of money has declined everywhere with the exception of the UK, so risks of inflation are still limited.

**Figure 1: Money multipliers and QE in the major economy**



Source: <http://economicsofimperialism.blogspot.be/2016/11/trouble-in-money-machine.html>

Montecino and Epstein (2015) analyse the impact of QE on inequality in the US. They look at different channels of impact of the QE policy on income distribution namely the employment channel, the asset appreciation and return channel, and the mortgage refinancing channel. They find that most likely, QE was modestly dis-equalizing. In addition, they admit that it is difficult to isolate how much of the dis-equalizing effect can truly be attributed to QE alone.

Wehlan (2015) looks at the effect of QE on inequality by focussing on two specific aspects, distribution of income and wealth as well as the idea that QE could benefit a small group of people associated with the financial sector. He makes the point that it is not clear in which way QE can boost wealth inequality. While evidence from the US suggests that QE boosted the net wealth position of middle-class households by increasing house prices, it had very little impact on the overall inequality of wealth. Moreover as lower interest rates benefit borrowers, QE should reduce unemployment and boost wages at the lower end of the income distribution. Overall it is not clear which effect dominates. He also suggests that the claim that QE helps banks or generates large commissions for traders are false.

Overall it seems that while some downside long term risks of QE exist in theory, in practice the evidence is not conclusive. In the rest of the paper the focus will be on the issue of productivity, more specifically whether unconventional monetary policy can negatively affect investment and productivity.

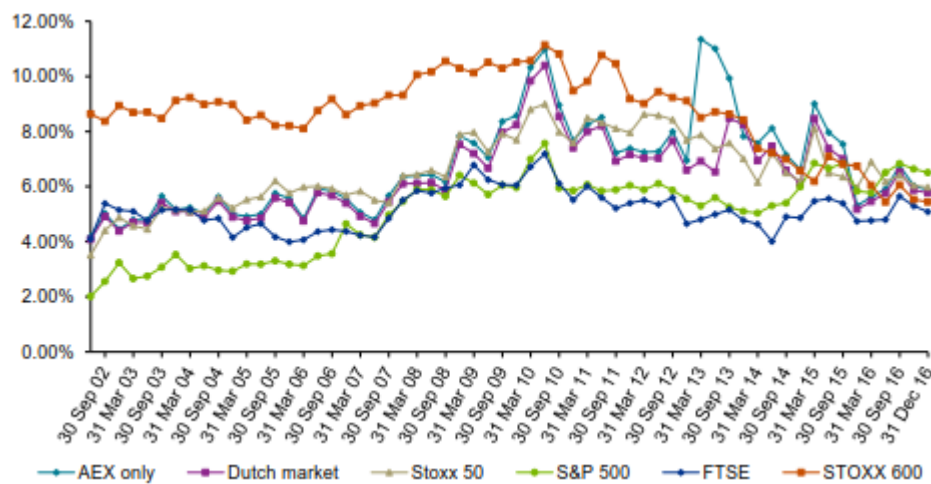
### 3. MONETARY POLICY, INVESTMENT AND THE COST OF CAPITAL

How would low rates have a negative impact on productivity? A first tempting answer is that at low rates capital might be wasted because even low productivity investment can then be financed profitably. However, this is the intended effect of expansionary monetary policy. When the central bank lowers rate it hopes to stimulate additional investment, i.e. projects which become profitable only at low rates. This will necessarily be projects whose productivity is lower than those which would have been undertaken under higher rates. With zero rates one might surmise that investment would increase until the marginal return goes to zero. However, this would not be correct. The 'hurdle rate' used for investment decisions in the private sector is usually the overall cost of capital, usually measured by what is called the 'weighted average cost of capital' (WACC), which is much higher than the central bank lending rate.

The WACC is of course different for each investment project depending on many factors, like risk, financial structure, etc. The WACC can thus not be precisely measured, but can only be estimated for averages for industries or sectors. There are few reliable time series for the economy-wide WACC. In practice the WACC is calculated as a (weighed) average of debt finance (usually some equivalent to the 'prime rate', the rate charged by banks to the lowest risk borrowers) and equity finance. The cost of equity finance is usually much higher, up to 10 %, than the policy rates of central banks. There is substantial, albeit not complete, pass through from central bank policy rates to the rates charged by banks. However, the equity risk premium, i.e. the difference between the expected return on equity and the central bank rate, can vary greatly over time and is generally little related to monetary policy (conventional or otherwise). A widespread finding for the US had been until recently that the equity risk premium had increased after the outbreak of the crisis, thus leading to an increase in the WACC for firms, even though short and long term interest rates on risk free borrowing had fallen substantially.

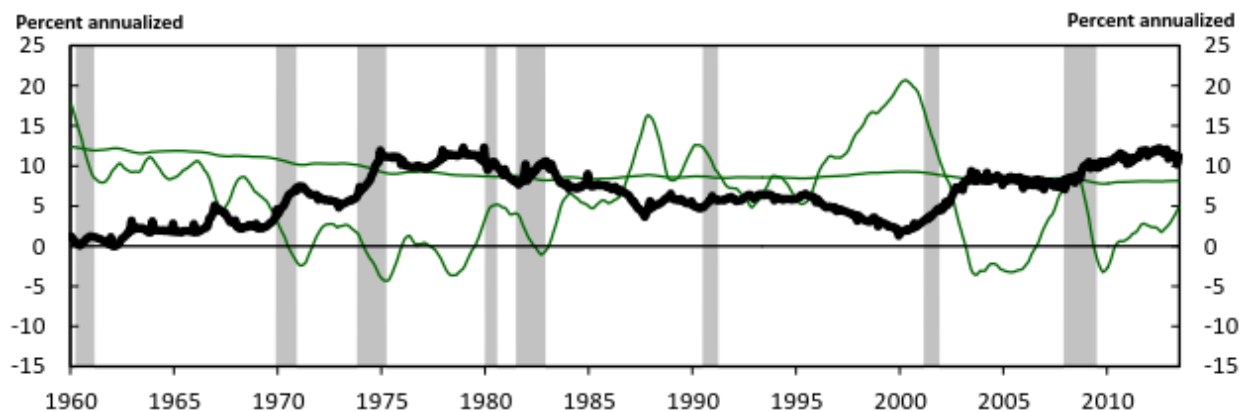
Whether or not 'unconventional' monetary policy leads to wasteful investment (which lowers productivity) would thus depend decisively on whether this policy leads a sharp fall in the WACC via a sharp fall in the equity risk premium. At the moment there is little evidence for this. For the US an authoritative survey (Duarte 2015) came to the conclusion that a number of different models indicated that the equity risk premium had increased up to mid-2012, thus after several years of unconventional policy by the Federal Reserve. For the euro area the most recent study (KPMG (2017), which uses stock market data comes to the conclusion that for some euro area markets the equity risk premium has slightly decreased over the last two years (but also that it remains significant, leading to a WACC clearly above zero).

**Figure 2: Implied equity risk premium**



**Source:** KPMG, 2017, p. 7.

**Figure 3: ERP models based on the historical mean of excess returns**



**Source:** Duarte, Fernando and Carlo Rosa, 2015, p. 31.

## 4. INVESTMENT IN THE EURO AREA

The weakness of investment demand since the beginning of the global financial crisis in 2008 has been a key factor in the weakness of the overall economy and thus the tendency of the central banks to use ever more unconventional measures.

But there is little evidence that ‘low for long’ has stimulated a lot of wasteful investment. Indeed investment has not been particularly dynamic over the last years.

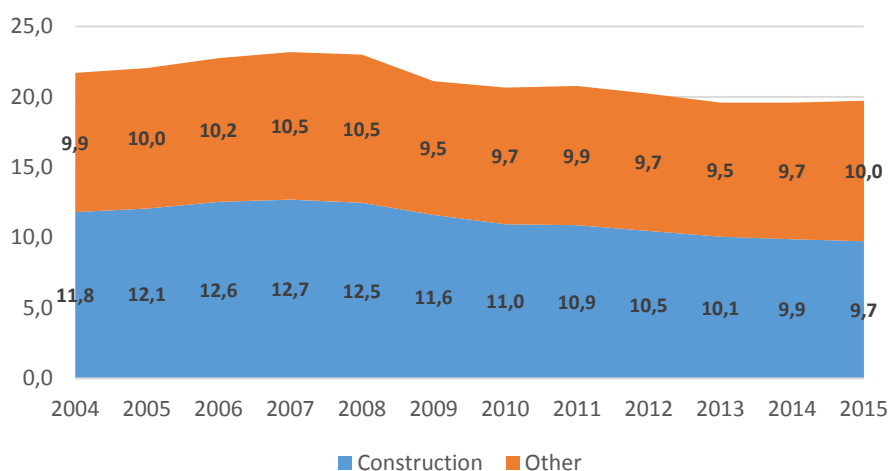
Central banks lowered their rates initially to zero when investment collapsed in the wake of the crisis. Unconventional measures were later adopted when demand remained weak and part of the weakness of demand was investment.

This applies in particular to the euro area, where demand has declined absolutely and as a share of GDP. Indeed this weakness of investment was one of the reasons of the so-called Juncker plan. More recently, investment has started to grow again. But the growth rate in 2016, the first full year for which one could expect an impact of the bond buying of the ECB, was rather moderate at around 5%.

Figure 4 below shows overall investment and construction investment (stacked) in euro area as a percentage of GDP. It is apparent that the share of investment in overall demand has actually declined until 2013. The rebound since then is minimal (data for 2016 are not yet available).

Figure 5 shows the growth rate of real investment, which gives a similar picture: a fall until about 2013, followed by a modest rebound.

**Figure 4: EA investment by sector, percent GDP**



**Source:** AMECO.

**Note:** “Other” means total investment excluding construction

**Figure 5: Growth rate of EA investment by sector**

**Source:** AMECO.

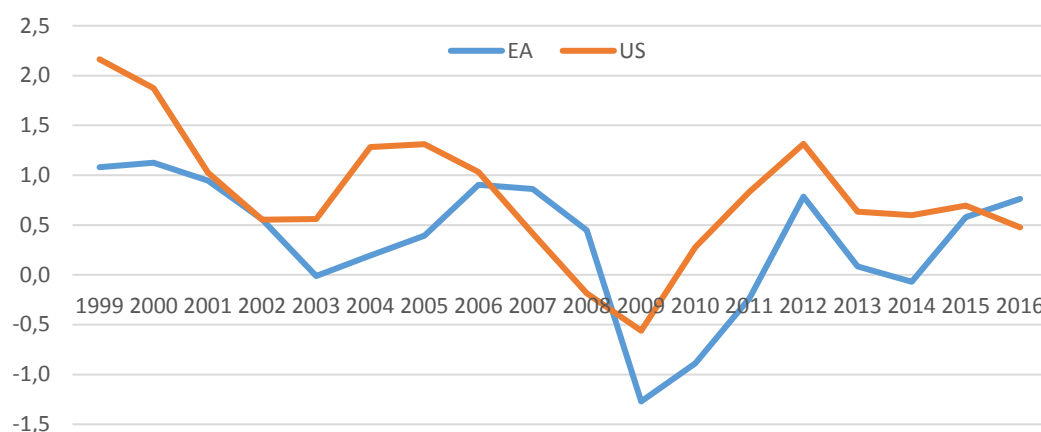
Moreover, there is also little evidence that unconventional monetary policy has had an impact on the composition of investment. Low rates might lower productivity if the additional investment they stimulate is in low productivity sectors, such as construction. However, the crisis was in large part due to over-investment in construction (which took place when rates were much higher). Since the outbreak of the crisis all investment has fallen, but construction investment has fallen more. The share of low productivity investment is thus today lower than when rates were much higher. The time which has passed since unconventional measures were adopted in the euro area is short to make any inference on the impact of these policies on the composition of investment.

## 5. RECENT DEVELOPMENTS IN PRODUCTIVITY

The premise of the view that unconventional policies have a negative impact on growth should in principle be based on evidence that productivity had reacted to unconventional monetary policy.

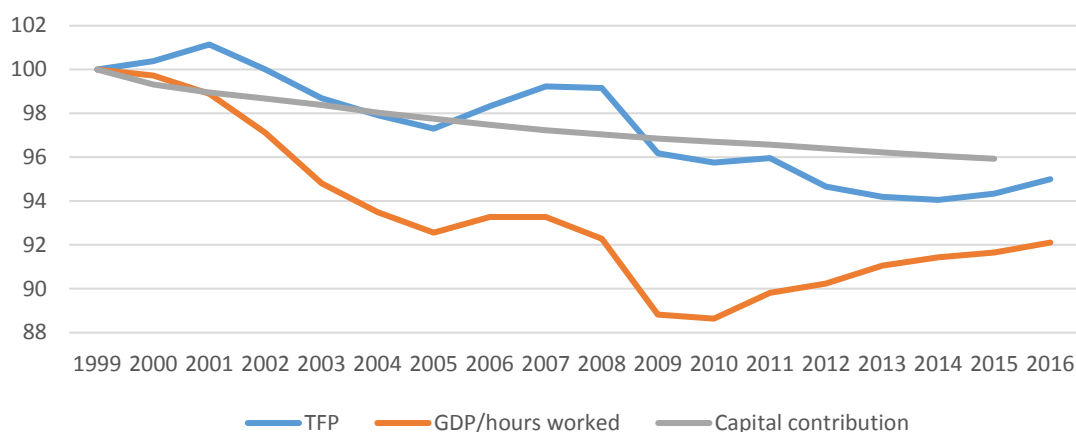
But there is little evidence that productivity has fallen after the ECB started buying government bonds (or even earlier after other unconventional measures, such as the LTRO or the TLTRO were adopted). Productivity is a slow moving variable and had been on a downwards trend for some time. Moreover, in the short term productivity is affected by the cycle: when demand goes down measured productivity first declines since firms cannot fire workers as quickly as they reduce production. All this implies that it is today particularly difficult to make any strong inference from observed short term changes in productivity. Moreover, productivity can be measured in many different ways. These different measures tend to move together over the medium run, but can diverge over the short term. Figures 6 and 7 below show the four most often used measures of productivity for the euro area and the US.

**Figure 6: TFP growth rate, moving average (trailing, 2 years)**



Source: AMECO.

**Figure 7: EA/US productivity ratio, 1999=100**



Source: AMECO and Conference Board. **Note:** EA capital contribution weighted by GDP.

The overall picture that emerges is that productivity has been slowing down for some time, but is now gently accelerating again.

## 6. CONCLUSIONS

The economic literature suggests that while unconventional monetary policy can bring short term positive effects, unduly persistent policy measures can lead to side effects. These are most likely to be associated to the portfolio rebalancing induced by the asset purchases. The empirical literature on the topic is limited and overall points to limited effects, at least for the time being.

This paper focuses on the specific effect that unconventional policy measures (and in general 'low for long') could have on investment choices and hence on productivity. Our conclusion is that there is no reason to believe that either low rates or unconventional monetary policy measures should lead to a systematic bias in investment choices. With lower rates less profitable investment projects will be chosen, but this is one of the purposes of the policy. The key point is that even with lower rates, investors will prefer the most productive projects, unless the financial system is completely distorted (and most evidence suggests that the banking system has become healthier over time).

In the euro area, the unconventional monetary policy measures of the ECB might create problems in terms of long term financial and fiscal stability. These problems are likely to become more severe as the bond buying continues, for the simple reason that central banks will end up owning a larger share of long term government debt. But it would be wrong to attribute any slowdown in productivity to the policy of the ECB.

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