



HAL
open science

The impact of ECB policies on Euro area investment

Christophe Blot, Jérôme Creel, Paul Hubert, Fabien Labondance

► **To cite this version:**

Christophe Blot, Jérôme Creel, Paul Hubert, Fabien Labondance. The impact of ECB policies on Euro area investment. [Research Report] Parlement européen. 2016. hal-03459319

HAL Id: hal-03459319

<https://sciencespo.hal.science/hal-03459319>

Submitted on 1 Dec 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



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

The impact of ECB policies on Euro area investment

IN-DEPTH ANALYSIS

Abstract

We analyze the reasons for which the very accommodative policy led by the ECB has not triggered a rebound of investment. After examining the evolutions of investment in the euro area, we observe a large heterogeneity both across sectors and countries. Consequently, it is questionable that the ECB's monetary policy can increase investment in the whole area. Therefore, we study the extent to which monetary policy impacts investment. We use a counterfactual analysis and compute the level of investment had the ECB's decisions been different. We observe the importance of the ECB in support to investment. Indeed, the investment in the euro area would have sunk without accommodative – first conventional, then unconventional – monetary policy. Finally, we lay the emphasis on the role of credit demand as one of the main determinants of investment since the 2008 crisis, which has depended among others on the impact of deleveraging and fiscal consolidation.

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

AUTHORS

Christophe BLOT (OFCE)

Jérôme CREEL (OFCE & ESCP Europe)

Paul HUBERT (OFCE)

Fabien LABONDANCE (CRESE, Université de Besançon & OFCE)

RESPONSIBLE ADMINISTRATOR

Dario PATERNOSTER

EDITORIAL ASSISTANT

Irene VERNACOTOLA

LINGUISTIC VERSIONS

Original: EN

ABOUT THE EDITOR

To contact the Policy Department or to subscribe to its monthly newsletter please write to: Poldep-Economy-Science@ep.europa.eu

Manuscript completed in June 2016

© European Union, 2016

This document is available on the Internet at:

<http://www.europarl.europa.eu/committees/en/econ/monetary-dialogue.html>

DISCLAIMER

The opinions expressed in this document are the sole responsibility of the author and do not necessarily represent the official position of the European Parliament.

Reproduction and translation for non-commercial purposes are authorised, provided the source is acknowledged and the publisher is given prior notice and sent a copy.

CONTENTS

EXECUTIVE SUMMARY	2
1. INTRODUCTION	3
2. MONETARY POLICY AND INVESTMENT	4
3. INVESTMENT DYNAMICS IN THE EURO AREA	6
4. HAS ECB MONETARY POLICY IMPACTED INVESTMENT SO FAR?	9
5. DEMAND AS THE MAIN DETERMINANT OF INVESTMENT SINCE THE CRISIS?	12
6. CONCLUSIONS AND POLICY IMPLICATIONS	14
REFERENCES	15
APPENDIX	16

DRAFT

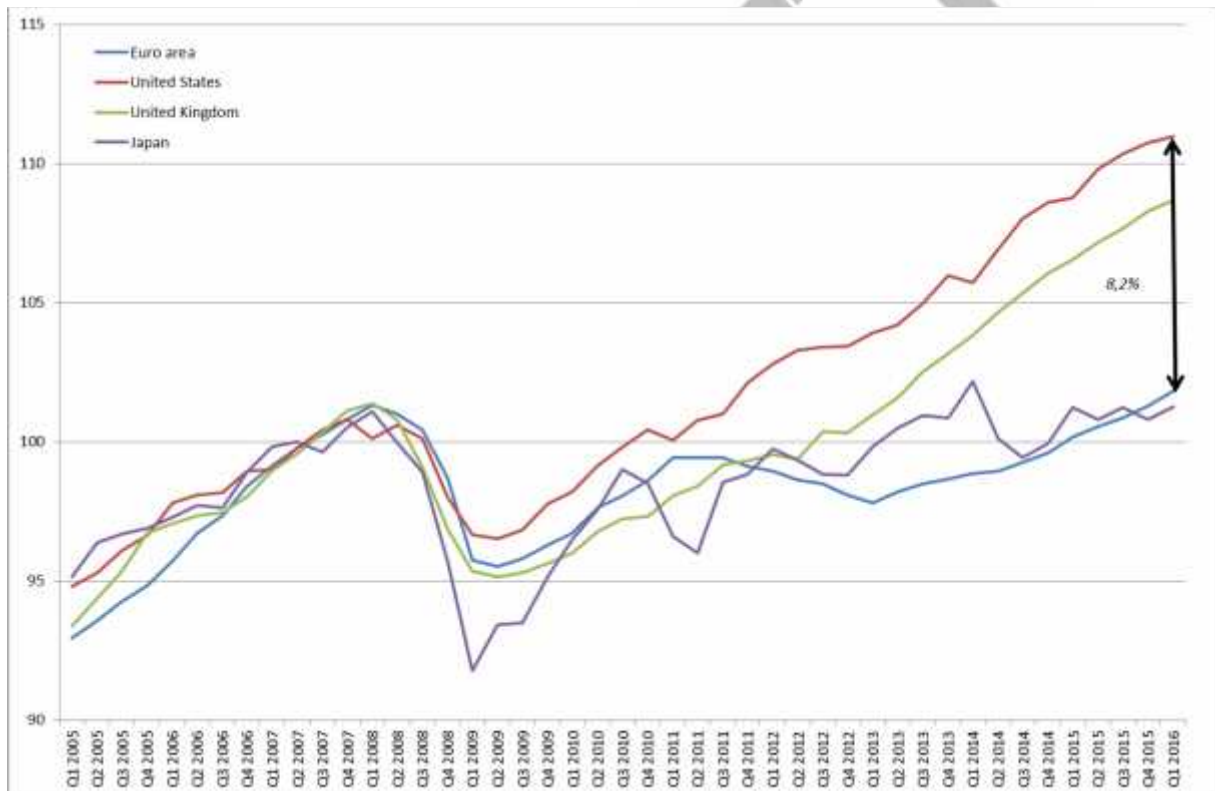
EXECUTIVE SUMMARY

- Since 2009, central banks have implemented highly expansionary policies to support activity and prevent industrialized economies from falling into deflation. The euro area recovery has been sluggish though. Investment in the construction sector and, to a lesser extent, in machinery and equipment was sharply hit by the crisis and the gap has remained large ever since. The investment gap has also been sizable and long-lasting in the South of the euro area whereas it has been temporary in the North.
- Macro trends in the euro area seem in sharp contrast with the ECB monetary stance, although they cannot be fully and directly attributed to monetary policy for they also depend on financial conditions for firms, including bank credit supply, and on aggregate demand.
- To assess the direct impact of monetary policy on investment in the euro area, we estimate an equation of total investment. It shows that in the long run, the cost of funding (measured by the indicator of monetary policy and the bank spread) affects negatively and significantly investment. Then we run a counterfactual exercise: we simulate the investment equation under two different scenarios of monetary policy. In the first, we assume that monetary policy has not been expansionary at all since 2008. In the second, we assume that ECB has not implemented non-standard measures. Consequently, we identify the path of investment which would have occurred if monetary policy had been different from the one that prevailed.
- Simulations suggest that monetary policy has effectively sustained the investment rate in the euro area. According to our assessment, at the end of the sample in 2015Q4, the investment rate would have been 5.5 points lower than its actual level without monetary policy. The crisis would have been much more severe without the monetary policy stimulus.
- Other factors have contributed to curb and delay the rebound of investment. The tightening of credit supply in 2009 and 2012 and the contraction of credit demand in 2010, 2012 and 2013, due to deleveraging and fiscal contraction, may have offset the impact of monetary policy on investment and they have weakened the recovery.

1. INTRODUCTION

Since 2009, central banks have implemented highly expansionary policies to support activity and prevent industrialized economies from falling into deflation. In a recessionary environment, policy rates reached a zero lower bound (ZLB) which has led central banks to resort to unconventional measures. These policies have resulted in an expansion of their balance sheets, reflecting liquidities provided by central banks to the financial system. These actions have raised many questions in the euro area about their impact on real activity because recovery has only been sluggish and weak, notably compared to the United States and the United Kingdom (Figure 1). Recovery is now reinforcing and GDP growth for 2016 is expected to reach 1.8% according to the OFCE. It is yet insufficient to reduce the euro area-US gap in terms of GDP per capita which widened after the European fiscal austerity episode of 2011.

Figure 1. GDP after the Great Recession
2007=100



Sources: National accounts

After a brief review of the literature on the relationship between monetary policy and investment, this briefing paper aims at providing some key elements on the recent developments of investment in the euro area. Then it provides an assessment of the impact of monetary policy on investment during the crisis by building a counterfactual scenario for investment in the euro area. One should always bear in mind that the low growth of investment (or of GDP) does not indicate per se that policies are not effective: things could have turned differently, and maybe worse, without these expansionary measures. Finally, the effectiveness of monetary policy may also have been thwarted by other decisions (notably fiscal consolidation) or shocks (financial shocks).

2. MONETARY POLICY AND INVESTMENT

Considering the expansionary measures taken by the ECB, sluggish growth in the euro area questions the effectiveness of ECB's monetary policies. While legitimate, arguments against ECB's efficacy remain disputable. First, the ECB has not been the only actor responsible for growth in the euro area and other factors, like high corporate leverage, policy uncertainty and fiscal austerity (then neutrality) can be invoked as contributors to the weak growth. Second, monetary policy has had a long list of objectives and channels of transmission among which those related to the real economy may not be of the utmost importance. Blot et al. (2015) argue, among others, that QE impacts the economy through several channels: signalling, portfolio-balance, liquidity, default, credit and exchange rate channels. The first four channels impact financing conditions while the last two directly impact the real economy. Friedman (2015) reports that empirical studies performed on the US have concluded that large-scale asset purchases had been successful in reducing two different spreads: short vs. long term and more-risky vs. less risky bonds, hence two channels related to financing conditions rather than directly related to consumption or investment. As a matter of fact, most of the recent empirical literature on QE experiences has focused on the impact of unconventional monetary policies on financial markets. Less has been done on macroeconomic variables and on the component of economic activity. The reasons for this "partial" assessment of the effectiveness of monetary policy during the crisis are twofold. On the one hand, taking into account the delayed transmission of monetary policy, which is generally estimated around 18 months,¹ researchers had no sufficient information to run robust analyses on the macroeconomic impact of unconventional monetary policies. On the other hand, the effectiveness of monetary policy may have been blurred by other policy decisions and shocks during this period, which makes it more difficult to identify precisely the effect of monetary policy per se. Third, as far as the real impact of monetary policy, on investment for example, is concerned, asymmetries may appear across countries and/or across sectors. The aggregate impact of monetary policy on investment -be it low or high- may well hide a large discrepancy among countries and/or sectors.

Considering the latter point, Barigozzi et al. (2014) have shown that the impact of monetary policy shocks on investment has changed over time in some euro area countries – Korobilis (2013) found a similar result for the US- but the change has been uneven across these countries. In Germany, the reaction of investment to shocks was lower (in absolute terms) before adopting the Euro whereas the opposite is true for Spain and the Netherlands. In France, Belgium and Italy, reaction has been the same before and after adopting the Euro. Moreover, the reaction of investment to monetary shocks has been quite different between Germany and other euro area countries since Euro adoption: a restrictive shock on monetary policy produces a sharp contraction in Germany and a more moderate one in the other countries. According to Ducoudré et al. (2015), the predictive power of investment equations for Germany, France, Italy, Spain, the UK and the US, drawing on usual determinants –cost of capital, mark-up, capacity utilization rate, and expected demand- has been very good until the-before-the-crisis investment peak. If they do not find changes in the determinants of investment over time, they show different elasticities of investment across countries. For instance, in the long run the cost of capital elasticity is twice higher in France than in the UK and almost three times higher than in Germany, Italy or Spain. Finally, Barkbu et al. (2015) study the implications of output dynamics, the cost of capital, high corporate leverage, corporate bond spreads, firms' cash flows and the Baker, Bloom and Davis index for policy uncertainty on investment. They show that investment does not respond to the same factors in the euro area countries. While output dynamics explains almost entirely investment in

¹ According to Peersman (2011), it would even be slightly longer for unconventional measures.

Spain and highly contributes to investment in France and Germany, financial constraints are particularly important in Italy and, to a lesser extent, in Portugal.

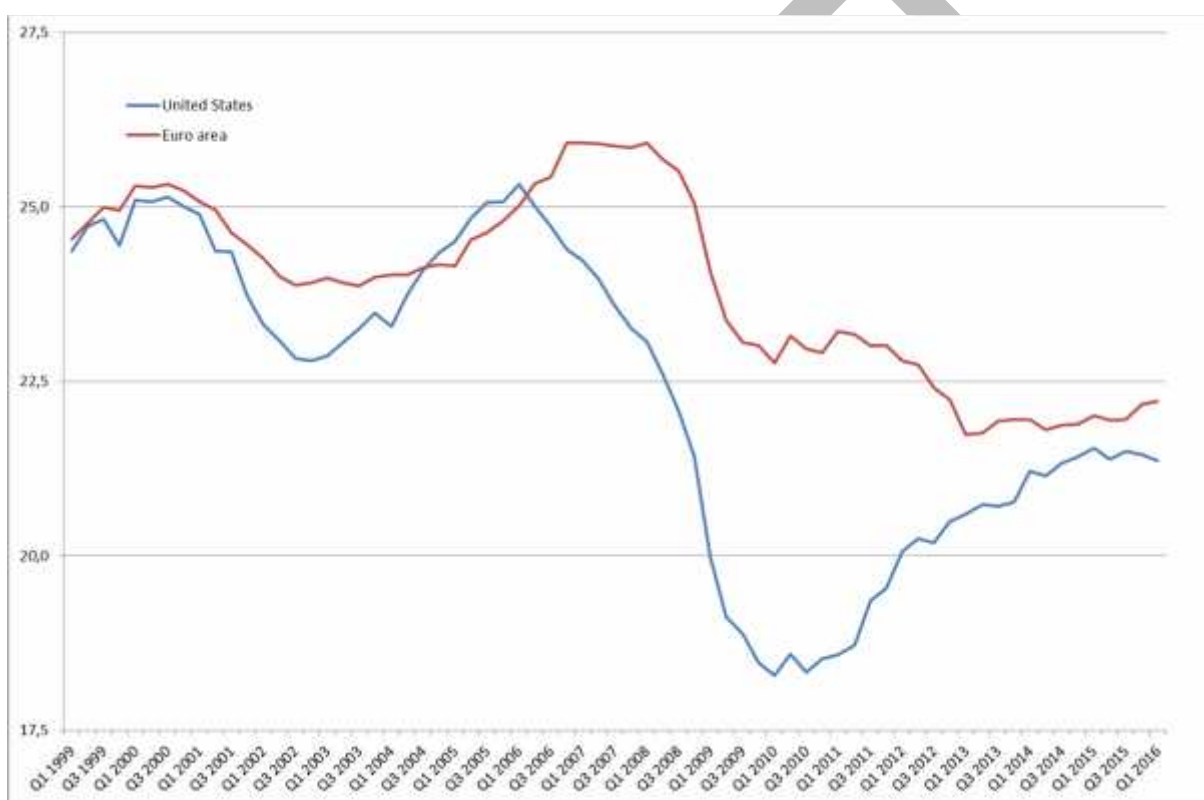
These different papers do not converge on the key determinants of country-by-country investment but they all point to the heterogeneity among euro area member states. The investment dynamics since 2007 in the euro area also illustrates significant discrepancies across countries but also across the main components of investment.

DRAFT

3. INVESTMENT DYNAMICS IN THE EURO AREA

Before investigating the impact of ECB's policies on investment, it is useful to have in mind several key points about investment in the euro area. Investment accounts for around 20% of the Euro area GDP. Total investment in volume has decreased by 13% from a peak observed in 2008Q1 until 2015Q4. The investment rate, measuring the ratio of total investment over value added, was at 26% in 2008Q1 and then fell at 21.7% in 2013Q1 (Figure 2). It has then stabilized around that value despite the ongoing recovery of economic activity. The difference with the situation in the United States is still striking. The fall started earlier and was more abrupt in the US but it recovered faster and significantly – from 18.3% at the end of 2010 to 21.5 at the end of 2015 – while it has stalled for several quarters in the euro area.

Figure 2. Investment rate in the euro area and in the United States
2007=100



Sources: Eurostat, Bureau of Economic Analysis.

Beyond this global picture, it is also informative to analyse the composition of investment to assess whether the observed decline in investment stems mainly from some countries or has mainly concentrated on some components (housing investment versus investment in machinery for instance). Two striking features are worth mentioning:

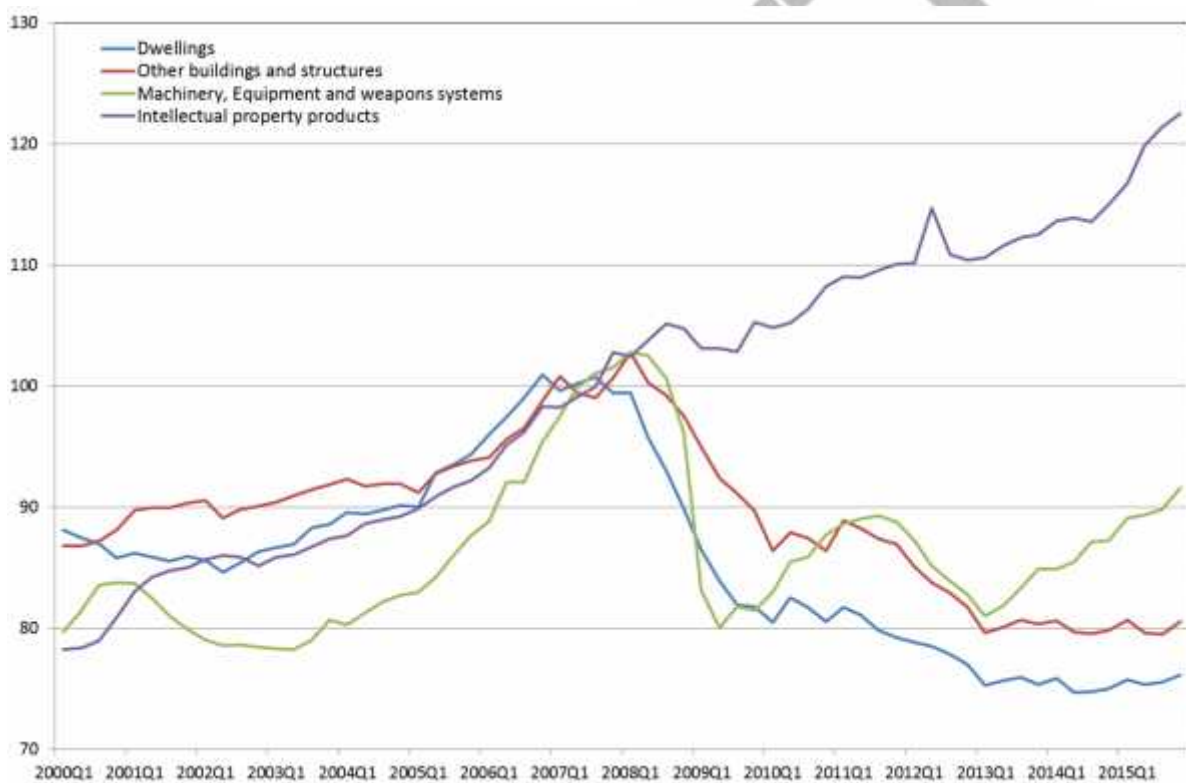
- i. Since 2008Q1, the decrease concerned almost all components of investment but intellectual property products (Figure 3). The bulk of the decrease stems from the construction sector (residential² and other construction) whose contribution contracted by 12.4 points – with nearly half from residential investment – out of an overall 13% decline. The contribution of machinery and equipment investment

² Residential investment is realized by households.

contracted by (-3.3 points) while it was positive for intellectual property products (+2.8).

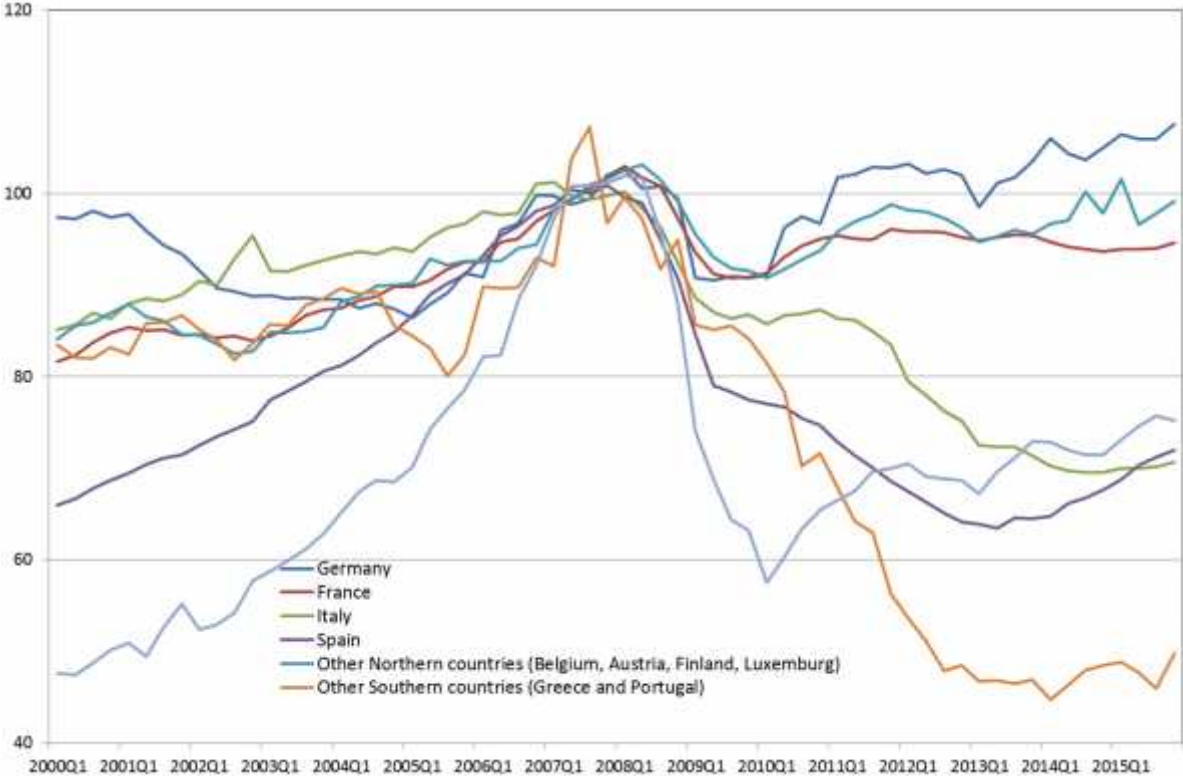
- ii. If we look at the evolution for euro area countries, we observe that investment was badly hurt by the crisis almost everywhere. But the divergence in the investment path between countries in the core and in the periphery is striking. The negative cumulative contribution of the decrease of investment in Italy, Spain, Portugal and Greece is close to 11 points (-4.8 for Italy, -4.0 for Spain and -2.2 for Portugal and Greece). Investment in Germany contributed positively at the global dynamics (+1.1) while the contribution was negative for France (-1.7). For most euro area countries, investment in volume is still below its pre-crisis level. The only exception is Germany whereas it is close to its pre-crisis level in other Northern euro-area countries (Belgium, Finland, Austria and Luxemburg).

Figure 3. Investment in the euro area – Asset breakdown
2007=100



Source: Eurostat.

Figure 4. Investment in the euro area – Geographical breakdown
2007=100



Source: Eurostat.

DRAFT

4. HAS ECB MONETARY POLICY IMPACTED INVESTMENT SO FAR?

Assessing the effectiveness of monetary policy to spur growth cannot be seriously inferred through the correlation between investment (or any other GDP component) and monetary policy stance. Clearly, the stance of monetary policy has been very expansionary in the euro area since the end of 2008 when the ECB first cut its policy rate, which rapidly reached the zero lower bound, and then resorted to a large set of exceptional measures to address the liquidity problems in the banking system, the sovereign debt crisis, the slump in economic activity and the risk of deflation. At the same time, the previous section has documented the investment gap. From this negative correlation, it might be tempting to conclude that monetary policy failed to provide support to investment despite the sharp stimulus.

Yet such a conclusion would bring confusion between correlation and causality. Things might have turned worse without the ECB's action. To assess more robustly the effectiveness of monetary policy, we need to resort to a counterfactual analysis.³ What would have been the investment outlook had the ECB not decreased the policy rate and not implemented unconventional monetary policy? To illustrate this, we first estimate an equation linking investment to its standard determinants identified in the literature. It is generally supposed that in the long run, the investment rate (gross investment divided by the gross value added) depends on the margin rate and the cost of capital.⁴ Firms tend to increase investment when their profitability increases and when the cost of raising funds – either through the banking system or from financial markets – decreases. Considering the investment rate as the endogenous variable implies that total investment is also related to demand. The short run dynamics of the investment may also be influenced by total demand, the change in the cost of funding and the rate of capacity utilization. The role of demand is fundamental as firms not only invest because of the return on investment but also because they expect that increasing their capacity of production will meet future demand.

Monetary policy influences the investment rate through the cost of funding. The estimated equation (see Appendix for details) makes a distinction between the impact of monetary policy in the long-run and in the short run. Monetary policy is measured by the shadow rate, which is the implicit interest rate set by the ECB and taking into account the unconventional monetary measures. For sake of simplicity, the total cost of capital only takes into account the interest rate set by banks on loans to non-financial corporations. Hereafter, we do not account for a potential effect of monetary policy on banks' spread, which may also be another channel through which monetary policy has influenced credit conditions and final demand. Consequently, the measured impact of monetary policy on investment that we compute may be considered as a lower bound.

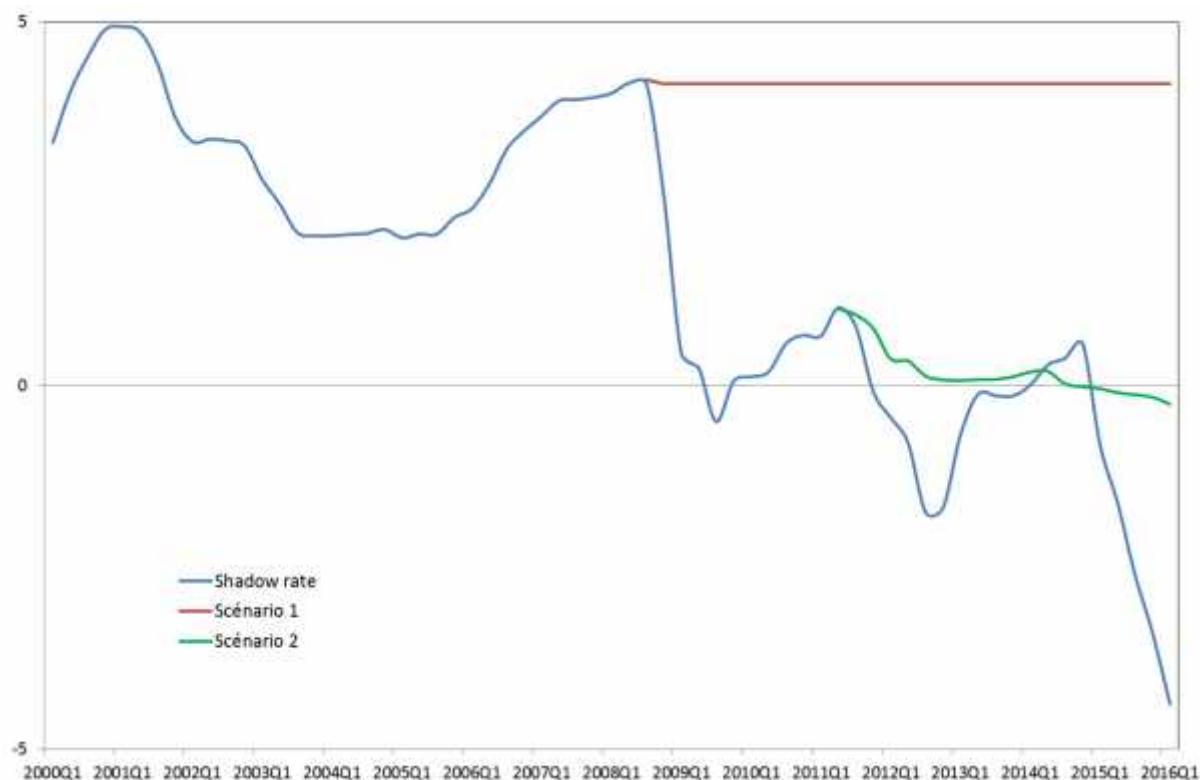
Based on the estimated determinants of the investment rate and their coefficient, we can simulate the path of the investment rate in two alternative scenarios from 2008 onwards. In the first scenario, the interest rate is fixed at its 2008Q3 value that is at 4.2% before the reduction that started in September 2008. This scenario builds on the gap between the status-quo and standard –the reduction in the interest rate– and non-standard monetary policy measures which have led the shadow rate to negative values (Figure 5). This scenario does not distinguish between conventional and unconventional policies and makes the (strong) assumption that the very expansionary monetary policy has not existed. The second scenario deals explicitly with the impact of unconventional measures. From 2011Q3, we

³ For a recent use of counterfactual analysis to assess the impact of monetary policy on GDP growth, see Pesaran and Smith (2016).

⁴ As our aim is specifically to gauge the effectiveness of monetary policy, we introduce explicitly an indicator for monetary policy stance. The cost of capital is proxied by this variable and an indicator measuring the spread between the interest rate fixed by banks and the monetary policy rate.

simulate the investment rate under the assumption that the shadow rate has remained equal to the EONIA rate, which is the standard measure of monetary policy stance when there are no unconventional monetary measures.

Figure 5. Monetary policy stance under alternative scenarios
(percentage changes, %)



Sources: ECB, Wu and Xia (2016).

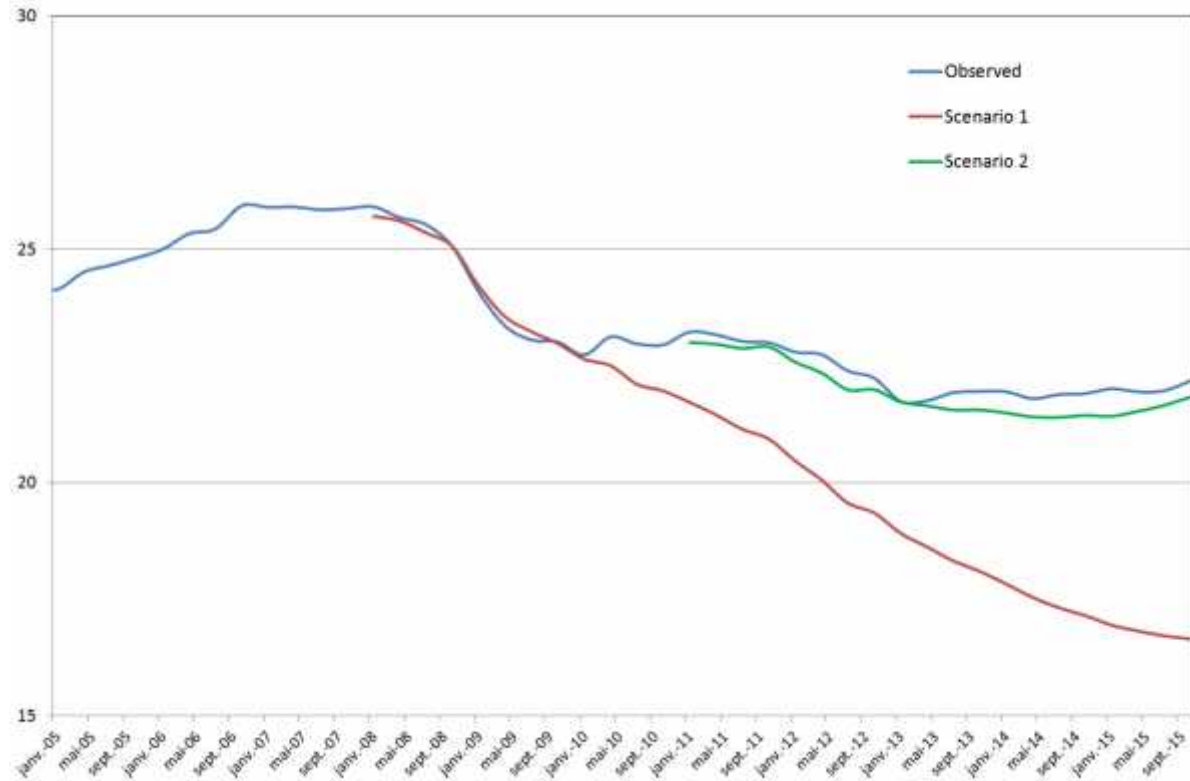
Starting from the equation estimated for the investment rate in the euro area, we can simulate the path of the investment rate which would have prevailed in each scenario and compare it with the actual investment rate. Simulation results are presented in Figure 6.

Simulations suggest that monetary policy has effectively sustained the investment rate. The main support comes from the decrease in the interest rate implemented during the crisis, hence from standard measures of monetary policy. Without them, investment rate would have been significantly lower than its current level (scenario 1), indicating that the crisis would have been much more severe. On average between 2008Q1 and 2015Q4, the investment rate would have been 2.3 points below its actual level. In 2015Q4, it would have been 5.5 point lower than its actual level. The role of other unconventional monetary policy decisions may be gauged through the simulation of scenario 2. It suggests that the investment rate has been supported by non-standard measures but that the effect has been much less significant. In 2015Q4, the investment rate would have been 0.3 point lower than its actual level.

This result is not surprising for at least two reasons. First, the aim of the unconventional measures was not only to support investment. Second, there is a delay between monetary policy impulse and aggregate effect which are estimated around 18 months and 2 years. As non-standard measures have been implemented later, their cumulative effect may not have been reached yet. Besides, it can be considered that the role of unconventional monetary policy is not fully captured in scenario 2. The non-standard measures have also contributed to the very low level of the EONIA so that taking into account the difference between the

EONIA and the shadow rate is not a perfectly strict measure of unconventional measures. These measures may notably explain why the EONIA rate has settled around the level of the deposit facility rate since 2009.

Figure 6. Investment rate under alternative scenarios
(percentage changes, %)



Sources: Eurostat, authors' simulations.

Consequently, scenario 1 gives some insights on the role of monetary policy during the crisis. It seems that they have been quite effective in supporting the investment rate since with an interest rate fixed at 4.2% from 2008Q3 onwards investment would have been significantly lower. Yet, it remains difficult to disentangle between the role of standard and non-standard measures. Apparently, the bulk of the monetary policy stimulus would result from the decrease in the interest rate but the precise role of each type of measure is not well represented and identified.

5. DEMAND AS THE MAIN DETERMINANT OF INVESTMENT SINCE THE CRISIS?

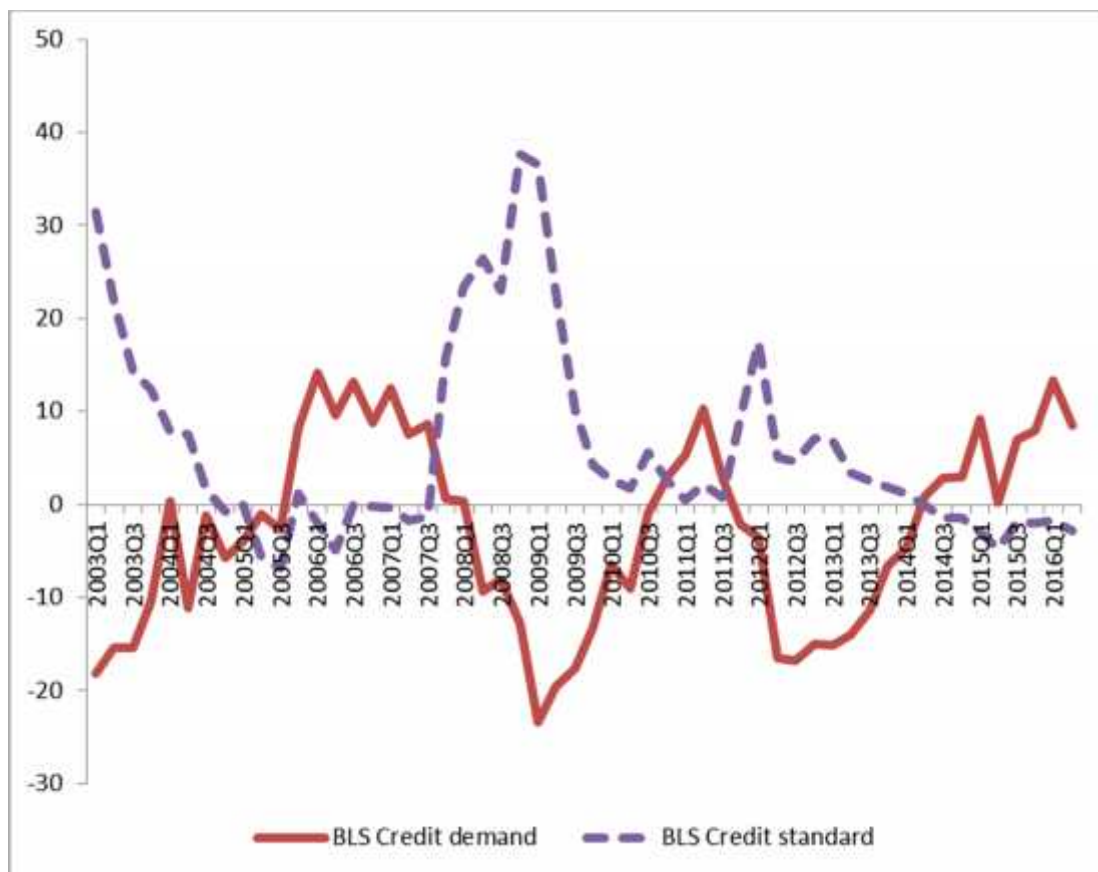
The simulations suggest that monetary policy has been quite effective at supporting investment since 2008. Investment rate would have been lower if the monetary policy stance had not been very expansionary. Though effective, the role of monetary policy may also have been mitigated by other negative shocks. ECB's decisions only impact on some variables in the financial and banking markets but the ECB's has not a perfect control on the global financing conditions of firms. Furthermore, investment is not only influenced by interest rate but also and certainly more importantly by demand factors. Recent evidence also point to the role of uncertainty⁵ stressing that higher uncertainty may deter firms from investing. Investment decisions impact the firms' economic and financial health over the long term so that firms are reluctant to invest if uncertainty increases.

Commercial banks played a central role in the financial crisis and largely contributed to the transmission of the financial shock to the real economy. They largely contributed to the credit boom and have been exposed to the subprime crisis. Literature has recently stressed that banks may have a procyclical appetite for risk-taking suggesting that they take on more risks in good times and less in bad times. This risk-taking behaviour may amplify movements in asset prices (Adrian and Shin, 2008). Besides, banks may have to adjust their capital ratio to comply with prudential rules. Consequently, banks would reduce credits in crisis periods. Furthermore, the financial situation of non-financial agents may also deteriorate when a negative shock occurs leading to financial accelerator effects (Bernanke et al., 1999) and credit rationing (Stiglitz and Weiss, 1981).

In that case, firms and households would like to invest but cannot get any financing from the monetary and financial institutions. These effects may be captured with survey data collected by central banks. Indeed, the Bank Lending Surveys (BLS) provided by the ECB show that since the crisis, credit conditions have been tightened. Access to credit depends now more on the level of risk than before the crisis. By extension, new firms, smaller firms and firms with a bad rating are now more penalized. Figure 7 illustrates this tightening in credit supply (labelled "credit standard" in the survey), especially during the subprime crisis in 2008 and 2009 and during the sovereign debt crisis in 2012.

⁵ See Bloom (2009).

Figure 7. Demand and supply factors in the credit market in the euro area



Source: ECB (Bank Lending Survey).

Nevertheless, this tightening in credit conditions might not be the only explanation behind the low credit volumes supplied to the private sector. Another explanation is that the financial crisis was a negative demand shock and that firms, especially SMEs, have lowered their credit demand (Kremp and Sevestre, 2013). Moreover, this negative demand shock has been amplified by pro-cyclical fiscal policy. This low credit demand is also illustrated in the previous Figure between 2008 and 2010 and again between 2012 and 2014. Since then, credit demand has improved though it remains volatile.

A simple correlation analysis between the growth rate of the investment rate and the credit conditions suggests that both the supply and demand sides of the credit market matter. The correlation between investment and credit demand is 0.55, while it is -0.58 between investment and credit supply.

6. CONCLUSIONS AND POLICY IMPLICATIONS

The disappointing euro area recovery has cast doubts on the effectiveness of ECB's monetary policy, standard and non-standard. More specifically, the growth of investment by non-financial corporations has been limited in the euro area despite accommodative monetary policies.

Our estimates of the determinants of investment show that both demand and supply factors matter. So although the monetary stance has been extremely accommodative, one reason for the weak rebound of investment may stem from the weak aggregate demand in the euro area that has been reflected in weak investment demand of firms and households and that has ultimately offset the positive effect of ECB policies.

As a matter of fact, our results show that monetary policy has strongly impacted the real economy. If the policy rate had remained at its level of 2008, investment would have been 5.5 points lower than its actual level.

This result has at least three policy implications.

First, although some monetary policy measures were not implemented to directly impact the real economy, it seems reasonable to argue that the ECB has triggered, all else equal, a rebound of investment. It means that the use of a wide array of policy instruments has permitted the ECB to target different objectives: an improvement in borrowing conditions, a sharp decrease in sovereign bond yields and support to consumption and investment. As a side implication, non-standard policies like Quantitative easing should be analysed and assessed in this context: they may not prove very useful in directly modifying capital formation because they draw, e.g. on the signalling effect (see Sahuc, 2016), whereas standard measures directly modify interest rates to households and non-financial corporations and then impact consumption and investment.

Second, the erratic movements in credit demand require a stimulus on aggregate demand. A closer cooperation between euro area governments and the ECB to support investment, via e.g. an extended public investment programme, would contribute to the sustained rise of credit demand and to the rise of inflation towards its target. It would therefore contribute to higher expected interest rates and would shorten the risk that low interest rates pose on financial markets.

Third, the recent period shows a fragile improvement in credit supply which requires to be strengthened in order for the ECB policy measures to be fully transmitted to households and non-financial corporations. The ball is in the field of banks, or it will be in the field of capital markets and their possible Union.

REFERENCES

- Adrian, T., & Shin, H. S. 2008. Liquidity and financial contagion. Banque de France Financial Stability Review: Special Issue on Liquidity, 11, 1-7. https://www.banque-france.fr/fileadmin/user_upload/banque_de_france/publications/Revue_de_la_stabilite_financiere/etud1_0208.pdf
- Barigozzi, M., Conti, A.M., Luciani, M., 2014. Do Euro area countries respond asymmetrically to the common monetary policy? Oxford Bulletin of Economics and Statistics 76(5), 693-714. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2487586
- Barkbu, B., Pelin Berkmen, S., Lukyantsau, P., Saksonovs, S., Schoelermann, H., 2015. Investment in the Euro area: Why has it been weak? IMF Working Paper 15/32, February. <https://www.imf.org/external/pubs/ft/wp/2015/wp1532.pdf>
- Bernanke, B. S., Gertler, M., & Gilchrist, S., 1999. The financial accelerator in a quantitative business cycle framework. Handbook of macroeconomics, 1, 1341-1393.
- Bloom, N., 2009. The impact of uncertainty shocks. Econometrica, 77(3), 623-685. http://pages.stern.nyu.edu/~dbackus/GE_asset_pricing/Bloom%20uncer%20shocks%20Ec%2009.pdf
- Blot, C., Creel, J., Hubert, P., Labondance, F., 2015. The QE experience: worth a try? Briefing Paper prepared for the Monetary Dialogue, European Parliament, March. <http://www.ofce.sciences-po.fr/pdf/briefings/2015/briefing10.pdf>
- Ducoudré, B., Plane, M., Villemot, S., 2015. Equations d'investissement, une comparaison internationale dans la crise. Revue de l'OFCE 138, 205-221.
- Friedman, B., 2015. Has the financial crisis permanently changed the practice of monetary policy? Has it changed the theory of monetary policy? The Manchester School Supplement, 5-19. <http://www.nber.org/papers/w20128>
- Korobilis, D., 2013. Assessing the transmission of monetary policy using time-varying parameter dynamic factor models. Oxford Bulletin of Economics and Statistics 75(2), 157-179. <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0084.2011.00687.x/abstract>
- Kremp E. and P. Sevestre, 2013. Did the crisis induce credit rationing for French SMEs?. Journal of Banking and Finance, Vol. 37, pp. 3757-3772. https://www.banque-france.fr/fileadmin/user_upload/banque_de_france/Economie_et_Statistiques/Kremp.pdf
- Peersman G., 2011. Macroeconomic Effects of unconventional monetary policy in the euro area. ECB Working Paper n°1397. <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1397.pdf?99ef78cb1aa613f60d8716d0db59b585>
- Sahuc, J.-G., 2016. The ECB's asset purchase programme: A model-based evaluation. Economics Letters, forthcoming
- Pesaran H. and R.P. Smith, 2016. Counterfactual Analysis in Macroeconometrics: An Empirical Investigation into the Effects of Quantitative Easing. Research in Economics, forthcoming.
- Stiglitz, J. E., & Weiss, A., 1981. Credit rationing in markets with imperfect information. The American Economic Review, 71(3), 393-410. <http://socsci2.ucsd.edu/~aronatas/project/academic/Stiglitz%20credit.pdf>
- Wu J. C. and F. D. Xia, 2016. Measuring the macroeconomic impact of monetary policy at the Zero lower bound. Journal of Money Credit and Banking, 48(2-3), 253-291. <https://www.imf.org/external/np/res/seminars/2015/arc/pdf/Xia.pdf>

APPENDIX

The estimated equation (an error-correction model) for total investment in the euro area is represented by the following equation:

$$\Delta\left(\frac{I_t}{VA_t}\right) = \frac{-0.086}{0.0} + \left(\left(\frac{I_{t-1}}{VA_{t-1}} \right) - \frac{0.023}{0.0} \cdot M_{t-1} - \frac{0.035}{0.0} \cdot Sha_{t-1} - \frac{0.151}{0.0} \cdot B_{t-1} + \frac{2.09}{0.0} \right) - \frac{0.214}{0.14} I_{t-1} + \frac{0.138}{0.0} I_{t-2} + \frac{1.108}{0.3} VA_{t-1} - \frac{0.006}{0.0} CUR_{t-1} + \frac{0.03}{0.0} \cdot Sha_{t-1} + \frac{0.006}{0.0} \cdot Sha_{t-2}$$

With I the investment, VA the value-added, Marge the margin rate, Shadow the indicator of monetary policy calculated by Wu and Xia (2016) and that takes into account the unconventional monetary policy measures. The bank spread is the gap between the interest rate on loans for non-financial corporations and the EONIA rate. CUR stands for the rate of capacity utilization. In the long term, an increase in margins has a significant positive impact on the investment rate. The cost of funding (measured by the indicator of monetary policy and the bank spread) affects negatively and significantly the investment rate. The model is estimated by OLS for the euro area. The sample period for estimation is 1999Q1 / 2015Q4. Data are taken from Eurostat, ECB and Datastream.

