

The Crisis Management of the ECB

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Abstract

A succession of crises - the global financial and economic crisis (GFC) in 2008, the Great Recession of 2009 and the following Euro crisis - forced the economic policy to action. After the fiscal policy has used up its ammunition in the fight against the effects of the 2009 recession, monetary policy remained the only expansive player in the political arena. The European Central Bank (ECB) responded - like the other major central banks in the world - first with a zero interest rate policy, then by "quantitative easing". However, the ECB acted in comparison with the Fed with some delay.

In the evaluation of the crisis management of the ECB must clearly state that it has missed its own inflation target of 2%. However, it has been successful in reducing the high government bond yields after the famous "Whatever it takes" speech by ECB President Draghi in July 2012 and the subsequent announcement of the OMT (outright monetary transactions) programme.

Whether the quantitative easing program by the ECB in the years 2015/17 with a view to achieving the primary objective, namely an inflation rate of 2% will be successful is an open question. Simulations with the Global Economic Model of Oxford Economics indicate that the quantitative easing policy will achieve the inflation target but with a great delay. The impact on the real economy will not be as large as QE experiments in the USA. Other unintended effects - such as the formation of bubbles on the stock markets - are greater than the intended effects.

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1. Different rapid responses to the crises

A succession of crises - the global financial and economic crisis (GFC) in 2008, the Great Recession of 2009 and the following Euro crisis - forced the economic policy to action. After the fiscal policy - due to the accumulation of unsustainable high debt - had shot its "Keynesian" powder in the fight against the negative impact of the recession in 2009 (see European Commission, 2009; OECD, 2009A, 2009B; Breuss et al, 2009), monetary policy remained the only expansive player in the political arena. The US Fed reacted probably fastest compared to the other dominant central banks of the world. Shortly after the collapse of Lehman Brothers in September 2008 it reduced the benchmark interest rate (federal funds rate) to near zero, and started with the use of unconventional measures, such as "quantitative easing "(QE). Since the expansionary monetary policy was accompanied by a stimulating fiscal policy, the US economy recovered faster and more sustainable from the Great Recession than Europe. Not least thanks to the then Fed Chairman Ben Bernanke (2015), who had studied thoroughly the Great Depression, this time the Fed responded quickly and more correctly than in the Great Depression in the thirties. Generally, in contrast, however, to the "Great Depression" in the 1930s the policy reaction of the industrial countries was much better and more appropriate in the present crisis (see Eichengreen, 2015; Baldwin and Giavazzi, 2015; BIS, 2015; Breuss, 2016).

The European Central Bank (ECB) also responded to the crises with conventional (zero interest rate policy) and unconventional measures (QE), but with a significant delay to the US Fed. In September 2014 the ECB set its base interest rate (main refinancing operation rate) to near zero and a QE program was launched in March 2015. In the euro zone, monetary policy was expansionary, but the fiscal policy after the euro crisis starting in 2010 (also due to the tightening of the fiscal rules: Sixpack; fiscal pact, etc.) switched to austerity. Therefore, the recovery from the Great recession was only short-lived and culminated already back into a "double dip" recession in 2011-2013. The lack of economic policy coordination was the main reason while the economy of the euro zone, unlike the US still barely reached pre-crisis levels of real GDP.

The present analysis of ECB's crisis management and its evaluation focusses primarily on its ability to reach its self-defined goal. In contrast to the Fed, which has two objectives (price stability and full employment), the EU Treaty (TFEU, Article 127) assigns the ECB only one primary goal: *"The primary objective of (monetary policy) the European System of Central Banks (hereinafter referred to as 'the ESCB') shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic*

policies in the Union (secondary objective) with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union.”

2. Is the ECB a “crisis winner”?

The primary objective of the ECB - as part of the European System of Central Banks - is to maintain price stability (Article 127, TFEU). For this purpose, it lays down and executes a monetary policy, uniform for the whole euro area. In the wake of various crises and the reform of the governance of Economic and Monetary Union (EMU - tightening of fiscal policy coordination; Banking Union) the ECB has accrued more and more tasks. Therefore, one could call the ECB a “crisis winner”. Her dominant role results from the fact that due to the crises she acts more and more as a "multitasker":

- 1) *Common monetary policy*: The diverse crises have amplified the already existing heterogeneity of the euro area (no "European business cycle") and lead to split of the euro zone economy in a more or less prosperous core (or north) and a debt-driven periphery (the South). This constellation makes the main task of the ECB, namely the implementation of a single monetary policy for the euro area increasingly difficult.
- 2) *Banking Supervision*: Since November 2014, the ECB within the framework of the first stage of the European Banking Union (Single supervisory mechanism – SSM; see ECB, 2014B; Breuss et al., 2015) monitors the largest banks in the euro area.
- 3) *Troika*: As part of the rescue operations in the euro zone, the ECB is part of the Troika (together with the European Commission and the IMF). The ESM Treaty mentions the ECB several times as an important partner (e.g. “... the Commission, in liaison with the ECB...”) when negotiating, with the ESM Member States concerned, a memorandum of understanding (an "MoU") (see Article 13) for the so-called programme countries (earlier, Cyprus, Greece, Ireland, Portugal and Spain; now Greece is the remaining country within a bail-out programme of the euro area).

This "multi-tasking" the ECB is widely criticized because it could jeopardize the actual main task, the implementation of the single monetary policy in complete independence (Article 282, TFEU). In particular, with the banking supervision and especially through participation in the Troika, there is the risk of interference in the fiscal policies of the Member States of the euro zone. Some observers (e.g. the German Council of Economic Experts, 2012) suspected that with this multitasking role the ECB could come into conflict with its competence for monetary policy according to the EU Treaty.

3. Successes and failures of the ECB

3.1 "Whatever it takes"

The ECB scored a great success in bringing down government bond yields which got out of control since the outbreak of the Euro crisis in 2010. In particular, the yields of government bonds of the peripheral countries - especially those of Greece, but also Ireland, Portugal and Spain - jumped up considerably. After the famous "Whatever-it-takes" speech by ECB President Mario Draghi in London in July 2012 and the subsequent announcement of the OMT program¹ the spreads of yields on euro government bonds got significantly smaller. After the start of EMU, the financial markets cultivated the so-called "no bail-out illusion", meaning that buyers of government bonds from euro zone countries believed that the default risk of all countries belonging to the euro zone would be practically equal - namely zero. Only after the outbreak of the euro crisis, triggered by implausible budget figures in Greece in late 2009, the financial markets (and ratings agencies) realized the differences of country risks and began to rate the default risk realistically. Initially this led to an overshooting and the spreads in yields rose sharply. Those of peripheral countries scored strongly upwards (most in Greece), while the core countries - particularly in Germany - even declined. The Draghi speech plus the OMT announcement ended this spook and resulted in a nearly realistic assessment of the risks of sovereign defaults by member states of the euro zone.

3.2 ECB lost control over inflation

In contrast to the success of a successful announcement policy of the ECB (OMT program) the ECB failed in the field of its main task, namely the maintenance of price stability according to its own definition.

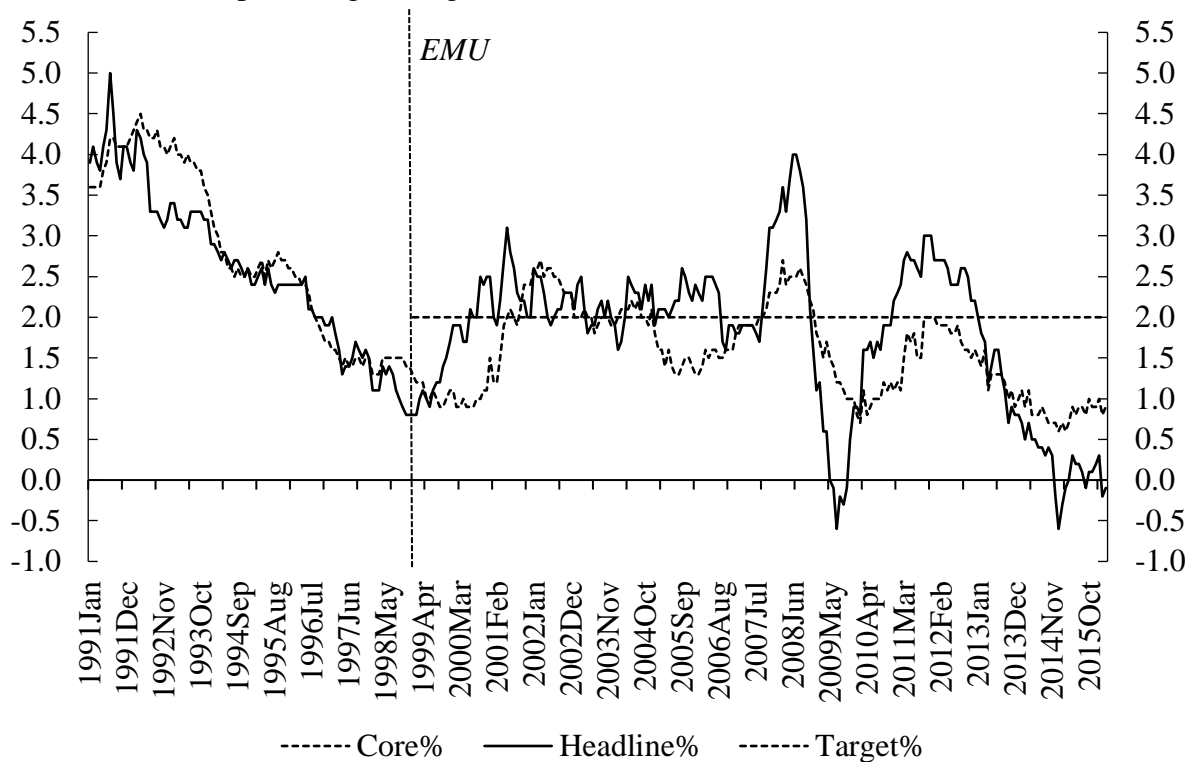
Since 2003, the ECB has achieved the self-defined objective of achieving an annual inflation rate of the Harmonized Index of Consumer Prices (HICP) of "below but close to 2%" in the medium term. Since 1999 - according to Eurostat - the inflation rate was 1.81%. In the period before the crisis (1999-2008) the average annual inflation rate was 2.18%. Before the start of EMU (1991-1998), the inflation rate was 2.62%.

¹ The OMT program (Outright Monetary Transactions) was strictly tied to reform conditions and was designed essentially only for the program euro-zone countries (Greece, Ireland, Portugal and Spain; see ECB, 2012). However, no program countries has made use of the OMT program. Nevertheless, OMT has been the subject of a major dispute (complaint: the ECB is pursuing "Public Finance"), first raised before the German Constitutional Court and (after request for a preliminary ruling) subsequently was decided by the European Court of Justice. On 16 June 2015, the ECJ ruled in Case C-62/14 Gauweiler and others that the OMT program is compatible with EU law. Now the Federal Constitutional Court (Bundesverfassungsgericht) had to make a final decision.

Since the Great Recession of 2009, however, the ECB has lost control of its self-imposed inflation target. On average, between 2009 and 2015 the rate of inflation was only 1.26% with negative (deflation) phases 2009, 2015 and early in 2016.

Hidden behind the average rate of inflation of the euro area (February 2016 -0.3%, March 2016 – 0.1%) there are large spreads between the Member States. Out of the 19 Euro area countries, in February 2016 still 11 member states exhibited a deflation and eight a slight inflation. The deepest deflation rates were in Cyprus (-2.2%), Spain (-1%) and Slovenia (-0.9%). Austria and Malta observed the highest inflation rates with each 1%.

Figure 1: Euro area inflation rates – core and headline inflation
(Annual percentage changes)



Source: ECB

3.3 The wrong inflation target?

The ECB seems to have not only lost control of the inflation target, it also aims at the wrong inflation index. The definition of price stability (2%) of the ECB aims to headline inflation of the HICP. However, it cannot control all components of total inflation, in particular the energy, commodity and food prices. These are set on the international commodities markets and thus are beyond the control of the ECB.

It would therefore make more sense if the ECB would only target core inflation (HICP excluding energy and food prices) as its price stability objective. Especially in times of strong

fluctuations in the energy and commodities markets as 2008 (boom) and 2014/15 (trough), core inflation would be closer to the self-imposed goal of price stability (see Figure 1). The core inflation rate rose since the start of ECB's QE gradually: from 0.6% in March 2015 to around 1.0% in 1Q2016. Although one can see in this inflation increase the traces of the unconventional intervention of the ECB, it is still too early to call this development a great success of the QE program of the ECB.

3.4 Target range rather than point target

The ECB could save the spasmodic attempt to achieve an inflation rate of just under 2%, if she returned to the original (valid until 2003) inflation target, namely below 2%. That would - as practiced by the Swiss National Bank - correspond a target range rather than a point target (see Fuster, 2016).

4. Lessons from the Great Depression

The collapse of Lehman Brothers on 15 September 2008 - in stark contrast to the misbehavior of monetary policy during the Great Depression of the thirties - gave the central banks of the major industrialized countries the signal, to intervene expansionary without limits. Initially this was done with conventional and after they were exhausted with unconventional means.

4.1 From conventional ...

When the subprime crisis of 2007 took its course, US Fed - even before the collapse of Lehman Brothers - responded with a reduction in its main interest rate (Federal Funds Rate - FFR). Starting from 5.25% in 3Q2007 the Fed decreased the FFR steadily to 0-0.25% in December 2008. The ECB responded only after a delay to the crisis². In July 2008, she even increased its main policy rate for main refinancing operations (MRO) from 4% to 4.25%.

Only after the Lehman Brothers crash she began to reduce her interest rates gradually until the most recent monetary decision on March 2016 when the ECB decreased the MRO rate of the Eurosystem by 5 basis points to 0.00% and, hence reached really the zero bound of conventional monetary policy. The interest rate on the marginal lending facility has been decreased by 5 basis points to 0.25%. The interest rate on the deposit facility was decreased by 10 basis points to an "penalty rate" of -0.40%.

Other major central banks (the Bank of England - BoE) reacted more quickly. The Bank of Japan (BoJ) - even before the GFC in 2008 and the Great Recession of 2009 - tried (unsuccessfully so far) to fight deflation,

² Since the inception of EMU in 1999, the ECB reacted always with a lag to the interest rate decisions of the Fed (see Breuss, 2002).

The near zero interest rate policy (or a policy at the zero lower bound – ZLB) of the national banks of the Western world in the last post-crises years one could also interpret as an inadvertent entry into Islamic banking. Its most important element is the prohibition of interest, also known as "riba".

4.2 ... to unconventional measures

Once the interest rates of the main central banks reached the zero level, they switched from conventional to unconventional measures (according to the ECB to nonstandard measures). The US Fed responded not only with conventional measures (interest rate cuts), but also with unconventional measures (especially QE) shortly after the collapse of Lehman Brothers. This was followed by the BoE, and much later, by the ECB (for an overview of monetary policy in the crisis, see Table 1).

Although Japan and the United States practiced the QE policy even before the crisis, only the Great Recession 2009 forced them to a strong expansion. The Fed and the BoE increased their QE programs up to 20% and 25% of GDP. The ECB only reached a level of 13% of GDP.

The BoJ - with the start of "Abenomics" - launched since 2013 a massive expansion of the QE program, which could be increased up to the end of 2017 to 90% of GDP.

Table 1: Monetary policy in the crisis – unconventional measures

ECB	Fed	BoJ
2008 – Fixe-rate full allotment – FRFA	2008 – Term-Auction Facility – TAF; Term Securities Lending Facility – TSLF 2008/12 - FFR down to 0-0.25%	2008 – Securities Lending Facility - expansion
2008/2009/2011 – Long-term Refinancing Operations (6m, 1Y, 3Y) – LTRO	2008 – Primary Dealer Credit Facility – PDCF Forward guidance	2008 – Outright purchases JGBs
2009/2011/2014 – Covered Bonds Purchase Programme (s) – CBPP 2010 – Securities Markets Programme - SMP	2008 – Asset-Backed CP MMMF Liquidity Facility – AMLF (and MMIFF)	2008 – CP repo operations - expansion; Outright purchases CP
2012 – Outright Monetary Transactions (announcement) – OMT	2008 – Commercial Paper Funding Facility – CPFF	2008 – Special Funds-Supplying Operations to Facilitate Corp. Financing
2013 – Forward guidance 2013/11 – MRO rate down to 0.25%	2009 – Term Asset-Backed Securities Loan Facility (ABS CMBS) – TALF	2009 – Outright purchases Corporate Bonds
2014 – Targeted Long-term	2009 – Liquidity to credit	2010 – Asset Purchase

Refinancing Operations - TLTROs	markets – consumer, small businesses CMBS – TALF	Programme - APP
2014 – ABS and Covered Bond Purchase Programme – ABSPP, CBPP	2008/2010/2012 – Large-scale Asset Purchases – QE1, QE2, QE3 – LSAP	2012 – Loan Support Programme
2015 – Expanded Asset Purchase Programme – APP – QE: 3/2015 to 3/2017: €60 bn per months (“QE” = PSPP)	2008/2011/2012/2013/2014 QE4 – “tapering” Forward guidance (qualitative and quantitative) 2015/12 – phase-out of ultra-expansionary policy (FFR increases to 0.25%-0.5%)	2013 – Quantitative and Qualitative Monetary Easing (70 trillion Yen a year) under “Abenomics” 2014 – Expansion of QE (80 trillion Yen a year)
2016/4 – ECB expands APP to €80 bn per month MRO rate set to 0% New TLTRO II, maturity 4 yrs.		

ABCP = High-quality Asset-Backed Securities; ABS = Asset-Backed Securities; ABSPP = Asset-Backed Securities Purchase Programme; AMLF = Asset-Backed Commercial Paper (CP) Money Market Mutual Fund Liquidity Facility; APP = Asset Purchase Programme; CBPP = Covered Bond Purchase Programme; CMBS = Commercial Mortgage-Backed Securities; FFR = Federal Funds Rate; JGB = Japanese Government Bonds; LSAP = Large-Scale Asset Purchases; MMIFF = Money Market Investor Funding Facility; MRO = Main Refinancing Operations; PSPP = Public Sector Purchasing Programme; SMP = Securities Markets Programme; TALF = Term Asset-Backed Securities Loan Facility;.

Source: Constancio (2015A).

4.2.1 Intended and unintended impact of QE

As the monetary policy at the zero lower bound (ZLB) has become ineffective, practically all major central banks of the industrial world are applying unconventional measures (QE). As part of the QE policy the Central Banks buy private and government bonds. This increases the total assets of the Central Bank and the monetary base³. The QE policy has intended and unintended side effects.

QE intends to avoid deflation and should help to rise inflation (in the euro zone near to 2%). Important is also to improve the transmission, i.e., the transmission of monetary easing into the banking sector: interest rates should decline, credit lending should increase. This should ultimately lead to a stimulation of the economy through greater investment, consumption and employment.

Unintended are the formation of bubbles on the stock markets, the distortion of prices in the financial markets (especially in the bond market), the deterioration of income distribution

³ A short-cut version of QE would be “Helicopter money”, firstly proposed by Milton Friedman (1969), where money is directly (not in the case of QE via bank lending) is transferred to consumers.

(debtor - private and state - win, savers lose⁴) and ultimately QE raises the European law questions whether the ECB does not engage in prohibited state financing.

4.2.2 Forward guidance

In 2008, when the GFC began to evolve the Fed was the first central bank to introduce “forward guidance”⁵. Forward guidance about the Federal Reserve’s target for the federal funds rate should be a clear communication about the timing of its policy stance. The Fed has two objectives: maximum employment and two percent inflation.

Since December 2008, the Federal Reserve’s target for the federal funds rate has been between 0 and 0.25%. Through “forward guidance,” the Federal Open Market Committee (FOMC) provides an indication to households, businesses, and investors about the stance of monetary policy expected to prevail in the future. By providing information about how long the Committee expects to keep the target for the federal funds rate exceptionally low, the forward guidance language can put downward pressure on longer-term interest rates and thereby lower the cost of credit for households and businesses and also help improve broader financial conditions.

Whereas the turnaround in conventional (interest rate) monetary policy announced in December 2015 was a successful example of good “forward guidance”, the previous ad hoc announcement of “tapering” the QE programme (e.g. the scaling down of monthly bond purchases from before USD 80 billion to 65 billion) by the former Fed Chairman Ben Bernanke in June 2013 was badly prepared. In January 2014 this winding down of monetary (QE) stimulus was implemented. The 2013-14 Fed announcement relating to tapering of asset purchases had considerable reactions on the financial markets, in particular on the exchange rates, government bond yields, and stock prices for 21 emerging markets (see Mishra et al, 2014)⁶.

Since July 2013 the Governing Council of the European Central Bank (ECB) has been providing forward guidance on the future path of the ECB’s policy interest rates conditional on the outlook for price stability (see ECB, 2014A). Overall, the ECB’s forward guidance is aimed at clarifying the Governing Council’s assessment of the inflation outlook in the Euro

⁴ Zero interest rates lead on the one hand - via “financial repression” (see Reinhard and Sbrancia, 2011; Reinhard et al, 2011) – to a creeping loss of savers (they earn returns below the rate of inflation) and on the other hand it can help to liquidate government debts, but it might also lead to large renewed expansions in debt.

⁵ See: http://www.federalreserve.gov/faqs/money_19277.htm

⁶ The impact of Fed’s “tapering” (wind down the QE programme) and increase of its interest target rates will not only be restricted to the USA. During low-interest rate policy in the U.S. and Europe financial capital looked for more profitable investments in developing or BRICS countries. After the announcement and implementation of U.S. “tapering” of QE capital is flowing back into the industrial world causing problems in some of the developing or BRICS countries (incl. Turkey and Argentina; see NZZ, 2014). Also in general, changes in Fed’s target interest rates influence the rates on other national banks around the globe (see NZZ, 2015).

area and its monetary policy strategy based on that assessment. The evidence suggests that forward guidance has so far served the ECB's intentions well by providing greater clarity on the Governing Council's conditional monetary policy orientation.

4.3 Transatlantic divergence in monetary policy

The crisis management of the ECB so far always lagged behind that of the Fed. This constellation can also be expected for the near future. While the ECB lowered its expansionary monetary policy in December 2015 and again in March 2016 by the reduction of her policy rates, the Fed already launched their phase-out of the ultra-expansionary monetary policy. On 16 December 2015 Janet Louise Yellen, since 1 February 2014 the new Chair of the Board of Governors of the Federal Reserve System (Fed) announced the turnaround of US monetary policy by increasing the Federal Funds Rate with a bandwidth of 0% to 0.25% up to 0.25% to 0.50%.

This first step towards normalization leads to a transatlantic divergence of monetary policy of the USA and the Euro Zone with unforeseeable consequences (weakening of the Euro; international capital flows towards USA).

5. Panel estimation of monetary policy in the crisis

The central banks of four countries are experiencing QE (in a broad sense) since the crisis of 2009, namely, Japan, the USA, UK and the Eurozone. In the following we estimated with a panel econometric approach the impact of QE in the four countries over the period 1Q2009 to 4Q2016. The database is the Global Economics Database of Oxford Economics.

According to the intended and unintended impact postulated in chapter 4.2.1 we test which effects had the standard measure (interest rate cuts) and non-standard measures (QE programmes) on the major macroeconomic variables (GDP, long-term interest rates, credit expansion, inflation and on the stock market prices). The estimation results of Table 2 are the following:

- Standard policy: Interest rate policy of the four central banks do not yield clear-cut results. This may be due to the fact, that relative early after the GFC central bank's target interest rates were reduced to a zero-level bound (ZLB). Therefore, over the whole period, the influence of interest rate policy can hardly be measured. In the case of influencing real GDP, the interest rate, credit demand and stock market prices, the estimated coefficients reflect the correct theoretically expected sign. In some cases, the sign is not correct (in one version of the credit equation and in both inflation equations) and in both credit equation the coefficient is not significantly different from zero.
- Non-standard policy: QE had in all cases the correct sign and (with the exception of one stock market equation) a significant influence. A 10% increase of QE has increased real

GDP only between 0.1% to 0.5% - depending on the type of the estimated GDP equation (i.e. the QE multiplier is between 0.01 and 0.05), long-term interest rates (bond yields) came down by 0.3%, credits expanded by 0.9% to 1.0%, inflation increased by 0.2%, and stock market prices were stimulated by around 2%.

Table 2: Monetary policy in the crisis - impact on GDP, interest rates, credits, inflation and stock market prices (1Q2009-4Q2016)

	Con-stant	R_{cb}	QE	LPR	D(U)	GDP	R²
GDP ₁	0.96**	-1.87**	0.03**				0.13
GDP ₂	-0.18	-0.77**	0.05**	1.02**			0.75
GDP ₃	1.22**	-0.20** (R)	0.01**	0.91**	-0.55** D(D)		0.76
Interest rate	1.98**	1.81**	-0.03**				0.78
Credit ₁	-1.57**	1.17	0.09**				0.14
Credit ₂	-1.93**	-0.14	0.10**			0.31**	0.28
Inflation ₁	0.41**	1.27**	0.02**				0.32
Inflation ₂	0.28	1.75**	0.02**		-0.69		0.06
SMP ₁	5.79	-10.60**	0.21**				0.23
SMP ₂	1.64	-2.51	0.06			4.33**	0.32

Bold = sign not in conformity with theory;

Dependent variables: GDP = real GDP (% changes); Interest rate (R) = long-term interest rates (10-years government bond yields), Credit = loans to non-financial corporations (% change); Inflation = HICP inflation rate (%); SMP = stock market price index (% changes);

Explaining variables: QE = quantitative easing in % of GDP; R_{cb} = central bank's target interest rate (%); LPR = Labour productivity (% change); U = unemployment rate (%); D(U) = absolute change of the unemployment rate; D(D) = absolute change of the debt to GDP ratio; GDP = lagged by 2 quarters in explaining Credit₂.

Panel estimation with fixed country effects: 4 countries (Eurozone, Japan, UK, USA); period: 1Q2009-4Q2016; in the equation Credit₂, real GDP enters with a lag of 2 quarters.

** Statistically significant at 95% and 99% levels.

GDP₂ = Verdoorn's law; GDP₃ = expanded GDP equation with monetary and fiscal policy explanations; Inflation₂ = Phillips curve.

Data source: Oxford Economics: Global Economics Database; own estimates with EViews 8.

6. DSGE model evaluations of QE

There is already a considerable literature evaluating the QE policy of central banks, primarily in the case of the USA⁷, but also in the UK and Japan. Most studies use Dynamic Stochastic General Equilibrium (DSGE) models, others apply econometric time series techniques.

⁷ A short history of US's unconventional monetary policy since the Great Recession in 2009 can be found in Williamson (2015A, 2015B).

6.1 USA

A prototype DSGE model to analyse QE policy by the US Fed is those of Gertler and Karadi (2013), based on earlier work by Gertler and Karadi (2011) and Gertler and Kiyotaki (2011). Shortly after the meltdown of the shadow banking system that followed the Lehman failure in September 2008, the Federal Reserve initiated what is now known as QE1, followed by QE2 and QE3. The new policy measures have been large-scale asset purchases (LSAPs), known more generally as quantitative easing (QE).

In their DSGE model, Gertler and Karadi (2013) interpret LSAPs as reflecting central bank intermediation. If private intermediaries are constrained in their ability to borrow, LSAPs can matter. The net benefits from LSAPs can be positive even if the central bank is less efficient than the private sector in intermediating the assets. These net benefits are likely to be increasing in a financial crisis, since in this instance limits to private arbitrage are likely to be unusually tight.

Under different scenarios the authors come to the conclusion expected from QE policy: GDP, inflation and asset prices goes up as expected, the yields on long-term bonds go down⁸.

Gertler and Karadi (2013) find a QE multiplier of around 0.4, i.e. government bond purchase of 2.5% of GDP leads (in the ZLB scenario) to a short-term real GDP increase of 1.0%. Under the scenario with flexible interest rates (Taylor rule), the QE multiplier is only 0.1 (which comes near to our panel estimation in Table 2).

As a rare exception, Song (2014) – with a DSGE model with financial frictions and labour market search – analyses the impact of the US LASP programme on the labour market.

Among the policy objectives, unemployment rate is a crucial target to the US Fed. The bond purchasing (QE) policy has stronger effects on labour market and the security purchase policy creates more volatility to the unemployment rate. Both policies have effective short-run effect yet ineffective even negative long-run effect. Also, timing effects of asset purchase policy reactions are different.

6.2 UK

There are many empirical studies on the macroeconomic impact of British QE done by LSAP. Joyce and Spaltro (2014) show that during the first round of British QE the increase in the growth of the credit action was relatively small, though QE was statistically significant for bank lending dynamics.

⁸ These results are in line with time-series estimates of Gambacorta et al. (2011). Christensen and Rudebusch (2012) find a negative effect of the Federal Reserve's first LSAP program and the Bank of England's QE program of between 50 and 100 basis points on 10-year government bond yields.

Weale and Wieladek (2015) examine the impact of large scale asset purchase announcements of government bonds on real GDP and the CPI in the United Kingdom and the United States with a Bayesian VAR, estimated on monthly data from 2009M3 to 2014M5. The results suggest that an asset purchase announcement of 1% of GDP leads to a statistically significant rise of 0.58% (0.25%) and 0.62% (0.32%) rise in real GDP and CPI for the US (UK). In the US, this policy is transmitted through the portfolio balance channel and a reduction in household uncertainty. In the UK, the policy seems to be mainly transmitted through the impact on investors' risk appetite and household uncertainty. Their results are more in favour of QE than previous ones based on the similar methodology (see Baumeister and Benati, 2013).

Butt et al. (2014) by studying the bank lending channel (BLC), found that the QE of the Bank of England did not boost bank lending. But it is consistent with other studies which show that QE boosted aggregate demand and inflation. UK policymakers did not rely on QE to boost bank lending and the evidence lends support to the use of other policies, rather than QE, to attempt to improve the supply of credit. Schuder (2014) stipulates that generally effects of expansionary monetary policy during economic crises are ambiguous.

Practically all DSGE models (for an overview, see Caglar et al., 2011) apply small open closed economy models. An exception is Pietrzak (2015). He evaluates QE programmes of the Bank of England with a small open economy DSGE (SOE) model (in an extension of the model by Gertler and Karadi, 2013). He demonstrates that QE policy in a closed economy model delivers much higher effects on real GDP, inflation and bond yields than in a SOE model with spillovers from and to other countries⁹. The QE multiplier in a closed model is 0.6, in a SOE model 0.3. A QE impulse of 14% of GDP leads to an increase in real GDP in the first case of 9%, in the second case of only 4%¹⁰.

6.3 *The Euro area*

The hitherto QE literature was primarily concentrated on countries with a longer tradition in this kind of unconventional monetary policy, in the USA and in the UK. As the ECB is lagging behind this tradition the respective economic literature is not very much developed. Dedola et al. (2013), based on work by Gertler and Kadri (2011, 2013) develop a two-country

⁹ For an econometric analysis of spillovers from monetary policies (interest rate and QE) in Europe and the USA to Mexico, see Morais et al. (2015).

¹⁰ Falagiarda (2013), estimates the macroeconomic effects of QE with a DSGE approach for the US and the UK. His findings indicate that large asset purchases of QE2 in the US had a peak effect on long-term rates in annualized terms of around -63 basis points, on the level of real GDP of 0.92%, and on inflation of 0.37 percentage points. In the UK, the preferred model specification suggests that the first phase of the APF programme had a peak effect on long-term rates of -69 basis points, on the level of real GDP of 1.25%, and on inflation of 0.49 percentage points.

DSGE model in order to study the spill overs to others countries of QE programmes executed in one country (Euro area) and the effects of international policy coordination. Due to the international transmission of the monetary policy in one country to others this implies that, under some circumstances, international coordination of unconventional policies may be especially important. On the other hand, gains from cooperation should not be expected to be much larger for unconventional policies than for more standard policies.

7. A New Evaluation of ECB's QE since 2015

Because of considerable limitation so DSGE model simulations, we evaluate the most recent QE policy of the ECB with the Global Economic Model of Oxford Economics. Most DSGE models evaluating QE policies are one-country models, mostly closed economy models. As Dedola et al. (2013) have shown, international spillovers have to be taken into account. Furthermore, there are differences in the impact of QE in closed and SOE models as Pietrzak (2015) has demonstrated. In the case of the Euro area with a heterogenous set of member states, it would be necessary to evaluate the impact of ECB's QE not only for the average of the Euro area but for each Member State separately. The DSGE model technique, however, reaches very fast its limits with the three-country case (see Breuss and Fornero, 2009). Whatever DSGE model type one take, it seems as if the macroeconomic impact of QE is overestimated.

7.1 ECB's QE program 2015-17

On 22 January 2015, the Governing Council decided that asset purchases - the program initiated on 4 September 2014 - should be expanded to include a secondary markets public sector asset purchase program (hereinafter the "PSPP"; see ECB, 2015). Under the PSPP the NCBs, in proportions reflecting their respective shares in the ECB's capital key, and the ECB may purchase outright eligible marketable debt securities from eligible counterparties on the secondary markets. This decision was taken as part of the single monetary policy in view of a number of factors that have materially increased the downside risk to the medium-term outlook on price developments, thus jeopardising the achievement of the ECB's primary objective of maintaining price stability. The ECB does not call its *Expanded Asset Purchase Programme (APP)* explicitly a quantitative easing (QE) program¹¹. It consists of three components:

- a) the third covered purchase program (CBPP3),
- b) the asset-backed securities purchase program (ABSPP), and

¹¹ Constancio (2015B) calls only the PSPP a so-called QE programme. For a detailed description of ECB's QE program, see Claeys et al. (2015).

c) the public sector purchase program (PSPP).

As of March 2015, in terms of the *size of the PSPP, the ABSPP and the CBPP3*, the liquidity provided to the market by the combined monthly purchases was initially planned to amount to EUR 60 billion¹². The ECB (2015) intended to carry out the purchases until the end of September 2016 (from March 2015 to September 2016 totalling EUR 1140 bn.)¹³.

On 3 December 2015 the ECB decided to extend the asset purchase programme (APP). The monthly purchases of €60 billion under the APP are now intended to run until the end of March 2017 (totalling EUR 1500 bn), or beyond, if necessary.

On 10 March 2016 the ECB decided to extend further the asset purchase programme (APP). The monthly purchases under the asset purchase programme have been expanded to €80 billion starting in April. This increases the total amount of ECB's QE program from March 2015 to March 2017 to EUR 1740 bn.

To ensure the continued smooth implementation of the asset purchases, on March 2016 the ECB also decided to increase the issuer and issue share limits for the purchases of securities issued by eligible international organisations and multilateral development banks from 33% to 50%. Further, the ECB decided to include investment-grade euro-denominated bonds issued by non-bank corporations established in the euro area in the list of assets that are eligible for regular purchases under a new corporate sector purchase programme

7.2 Macro model simulations of ECB's QE

As an alternative approach to the usually applied DSGE models we use the Global Economic Model of Oxford Economics to analyse the impact of ECB's QE programme over the years 2015 and 2017¹⁴. This is a fully integrated global economic model where the individual country models (of 47 countries and some aggregates, like the Euro Zone) are fully lined through global assumptions about trade, exchange rates, competitiveness, capital markets, interest rates, commodity prices and internationally traded goods and services. The rest of the world economy is covered in six trading blocs so that global GDP and trade are fully modelled.

¹² ECB's documentation of the ongoing purchases under the Expanded Asset Purchase Programme (APP), See: <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>

¹³ Cœuré (2015) discusses the concerns about the potential scarcity of bonds in the Euro area over the lifetime of the programme. Indeed, the European Commission forecasts that the aggregate euro area public budget deficit will fall to -2.2% in 2015 and -1.9% in 2016. As a result, the net issuance (defined as new debt minus redemptions) of medium- and long-term securities by the euro area debt management offices (DMOs) in 2015 was expected to be around €200 billion.

¹⁴ See: <http://www.oxfordeconomics.com/forecasts-and-models/countries/scenario-analysis-and-modeling/global-economic-model/overview>

In particular, we are interested in the impact of ECB's QE programme on the Euro area and its Member States as well as on spill overs to third countries. A specific feature of the Oxford model is that it not only models standard ECB monetary policy (the reaction on interest rate changes as of the Main Refinancing Operation rate) but also deals with non-standard instruments, like QE for the ECB and major industrial countries. QE feeds directly into the long-term interest rate and the credit conditions of private banks and hence, leading to impulses for investment and consumption and lastly to GDP.

7.2.1 Model assumptions

We simulate the concrete QE programme of the ECB, announced in January 2015 and implemented in March 2015 plus the extensions announced on 3 December 2015 and on 16 March 2016. The size of PSPP amounts to monthly purchases of government bonds of EUR 60 bn from March 2016 to March 2016. From April 2016 to March 2017 we consider the extension to EUR 80 bn monthly purchases. The programme runs until March 2017 and totals then EUR 1740 bn. As the Oxford model is a quarterly model we implement this programme as follows: Starting with 1Q2015 we input into the model EUR 60 bn, then from 2Q2015 to 1Q2016 in each quarter EUR 18 bn. From 2Q2016 to 1Q2017 we input EUR 240 bn in each quarter which over nine quarters cumulates to the respective amount of EUR 1740 bn. The relative size of the QE programme starts with 0.6% in 1Q2015 and increases to 2.2% in 1Q2017. The inputs for the QE simulations run until 1Q2017, the simulation results are presented until 4Q2020 in order to see what happens if the ECB stops its QE policy.

7.2.2 Model results

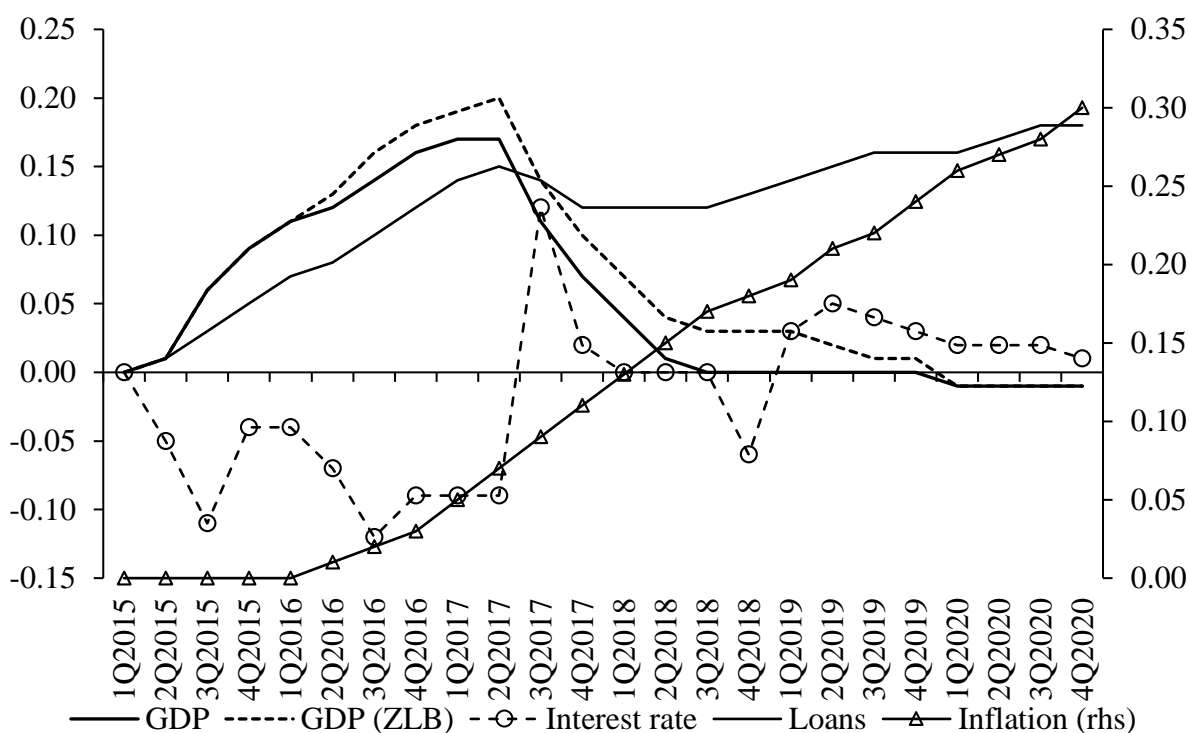
Generally, our impact results are modest compared to other exercises with DSGE models for the USA. The novelty of our approach is that we are able to quantify the effects not only for the aggregate of the Euro area but also for the individual Member States. Furthermore, we are able to study the spill overs to third countries.

1) The intended impact of ECB's QE on macroeconomic variables

As discussed earlier, QE policy can have intended effects, but may also lead to unintended impacts. In Figure 2 we have depicted the intended impact on real GDP, interest rates, loans and inflation. As in reality, the QE policy does not transmit into the intended effects immediately. In contrast to simulations with DSGE models (e.g. Gertler and Karadi, 2013) the QE stimulus does not have an immediate impact on the macro economy, rather it takes time. In our simulation ECB's QE program reaches the peak impact on real GDP only in 1Q2017 with a cumulative increase of 0.17%. In the scenario with ZLB (the MRO of the ECB is kept constant at zero level throughout the simulation period) the GDP effect would be – similar to

simulations by Gertler and Karadi (2013) - somewhat higher, by 0.03%. There is, however an immediate impact on long-term interest rates (yield of government bonds). They go down immediately by 0.10% but jump back after the run out of the QE program. The impact on loans to non-financial institutions continuously increase – even after the run out of the QE program – and will reach a cumulative increase of nearly 0.20% in 2020. The major target, however, the increase of inflation, firstly takes time to be realized and, secondly will exhibit its expected impact only in the long-run; due to the QE impulse, inflation will only increase cumulatively by 0.30% in 2020.

Figure 2: ECB's QE: Intended macroeconomic impact in the Eurozone (Cumulative deviations from baseline in %)



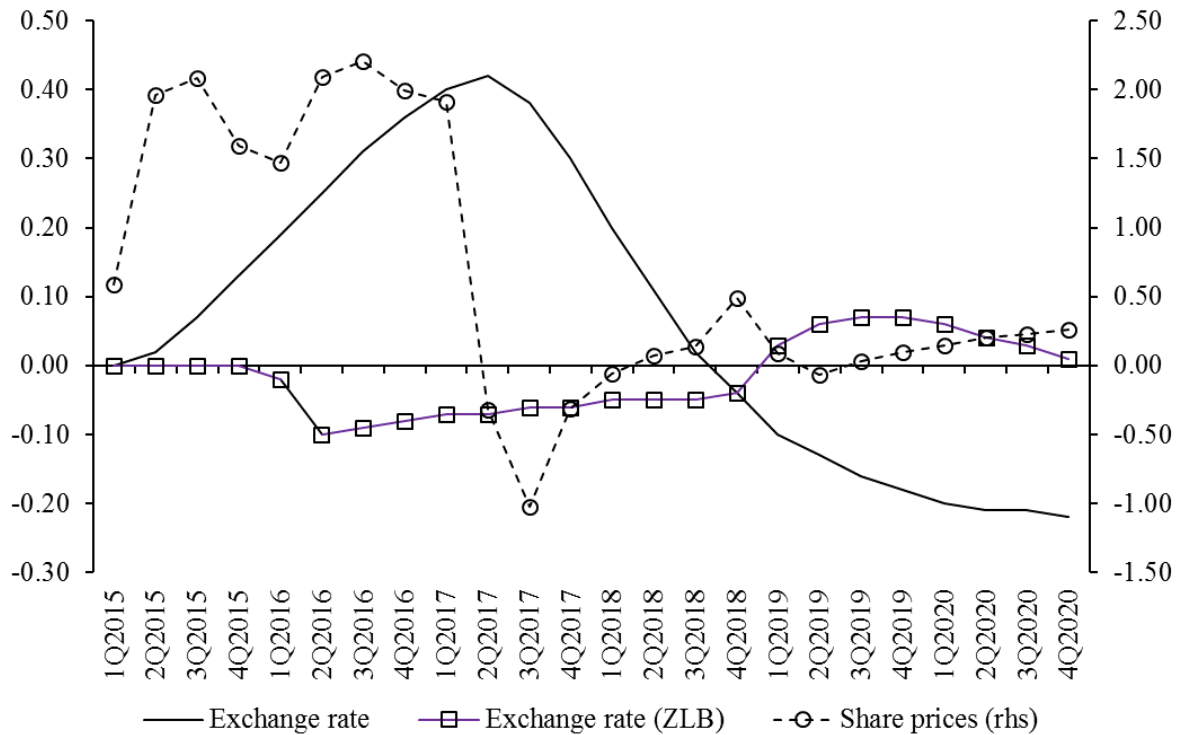
Inflation is depicted on the right scale.

Source: Simulations with the Oxford Economic World model.

2) The unintended impact of ECB's QE on macroeconomic variables

QE will probably also have an unintended impact on e.g. the exchange rate and share prices. Share prices are influenced immediately by around 0.4% and collapse after the end of the QE program (see Figure 3). One might expect that the monetary stimulation by QE would lead to ad depreciation of the Euro vis à vis the US dollar. In our simulations this effect is only true in the ZLB scenario. In the scenario with flexible interest rates (where the endogenous adjustment is executed via a Taylor rule) ECB's QE policy even leads to an appreciation of the Euro (see Figure 3).

Figure 3: ECB's QE: Unintended macroeconomic impact in the Eurozone
(Cumulative deviations from baseline in %)



Shares prices are depicted on the right scale.

Source: Simulations with the Oxford Economic World model.

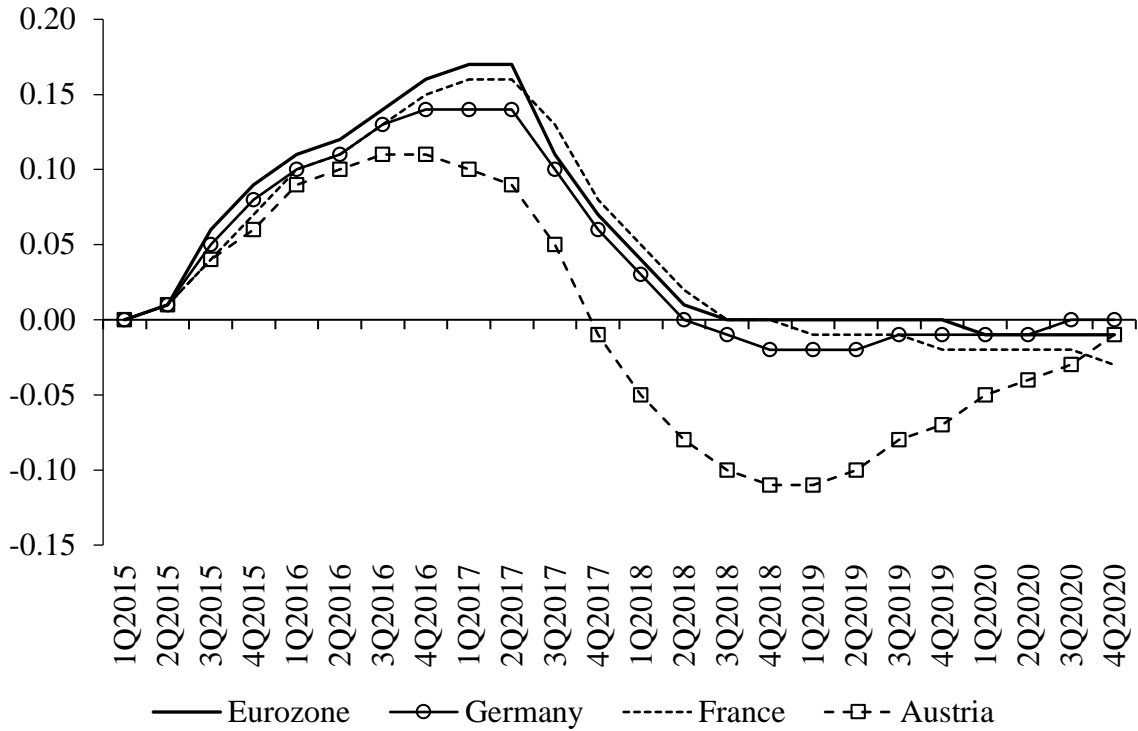
3) Spillovers to other Euro area and third countries

The advantage of the Oxford World Model is that it allows not only to study the effects of QE policy in the country where it is executed but also to study the spillovers to other countries. In the case of ECB's QE the impact is not only interesting for the average of the Eurozone but also for its member states. In the following simulations we depict only the results for the flexible interest rate scenario for some selected Eurozone member states.

In the large Eurozone countries, Germany and France the impact of ECB's QE on real GDP is more or less in line with the Eurozone average (see Figure 4). However, a small core country, Austria may expect QE much weaker GDP effects than the Eurozone average.

As it is probably intended by the ECB its QE policy is more effective in the periphery countries of the Eurozone (see Figure 5). In particular, the additional impulse to the GDP of Greece and Spain is above average of the Eurozone.

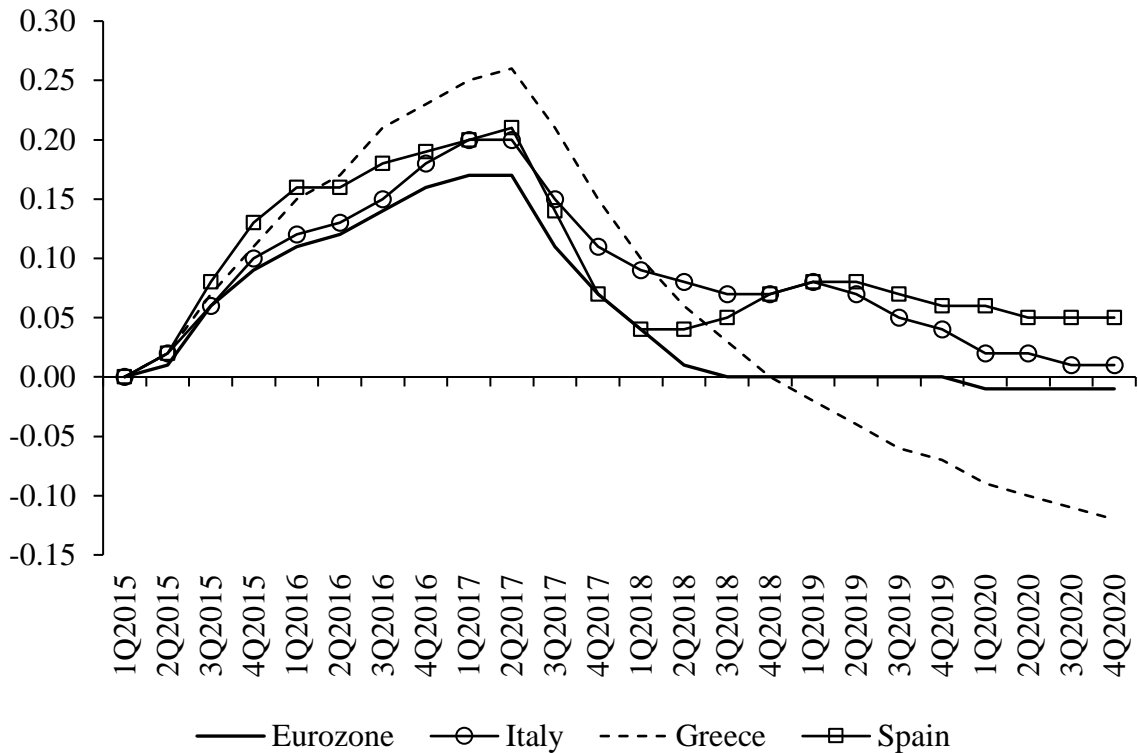
Figure 4: ECB's QE: Impact on real GDP in the core countries of the Eurozone
(Cumulative deviations from baseline in %)



Flexible interest rate scenario.

Source: Simulations with the Oxford Economic World model.

Figure 5: ECB's QE: Impact on real GDP in the periphery countries of the Eurozone
(Cumulative deviations from baseline in %)



Flexible interest rate scenario.

Source: Simulations with the Oxford Economic World model.

The spillovers to third countries are much weaker than those within the Eurozone. ECB's QE will have only a slight positive GDP effect in the UK (in the peak of 1Q2017 of 0.06%), whereas the USA GDP is only marginally influenced by ECB's QE (0.01%).

4) QE multipliers in comparison

The actual development since the start of ECB's QE in March 2015 indicates that the intended impact on the Eurozone economy did not yet occur. Inflation is still subdued, real GDP growth in the Eurozone is weak, only some signs of hope are the slight increase in bank lending to private households and non-financial corporations (see ECB, 2016). It seems therefore that the QE multiplier on real GDP (i.e. the impact of a 1% of GDP increase in QE on the growth rate of real GDP) is much weaker (and has a long lag) than simulated with DSGE models.

As reported earlier – in DSGE models - the QE multiplier on real GDP is in the range of 0.1 to 0.4 for the USA and 0.2 to 0.6 for the UK.

In our simulations with the Oxford World model the QE multiplier on real GDP is 0.08 (in the flexible interest rate scenario) and 0.09 (in the ZLB scenario). These moderate multipliers are closer but somewhat higher than the estimated multipliers for the period 2009-2016 in Table 2. They range from 0.01 to 0.05.

8. Conclusions

All major central banks of the industrial world have responded to the global financial and economic crisis (GFC) in 2008 and the Great Recession of 2009 with a very expansionary monetary policy. These are the lessons of the Great Depression of the thirties, when the Federal Reserve slammed on the brakes and caused a prolongation of the crisis. The ECB responded to the crisis with an expansionary monetary policy - though delayed compared to the US Fed. The ECB gained considerable power in the crises (GFC and Euro crisis since 2010). Therefore, one could describe the ECB even as a "crisis winner". It gathered - in addition to the core task of monetary policy – more and more tasks. By taking over the banking supervision as part of the European banking union and by participating in the rescue operations (in the Troika) in the peripheral (program) countries of the Euro area, the ECB became the "multitasker".

A preliminary assessment of the crisis management of the ECB leads to the conclusion that she was successful in lowering the yields on government bonds in the peripheral countries of the Euro area in particular due to its announcement policy ((Draghi's famous “whatever it

takes” speech and the OMT announcement). However, in recent years she failed to reach her real goal, to maintain price stability - at least in the self-chosen definition of an inflation rate of 2%. She would have an easier life if she would only target core inflation and secondly when she would say goodbye to the point target (inflation at 2%) and instead - would try to reach a target range (0-2%) - as she did before 2003.

After the exhaustion of the traditional monetary policy instruments (driving down interest rates to its zero lower bound) during the crises, major central banks in the world - first the BoJ, the Fed and the BoE - and more recently the ECB – started with unconventional or non-standard measures (especially QE). While the QE policy in Japan miserably failed it seemed to have worked in the US and UK. Recently, the ECB also embarked to a specific QE policy. Our econometric analysis and model simulations show that ECB’s QE policy could work properly, however only with a considerable delay and most likely not to the desired extent.

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