

## How the Eurosystem's enhanced credit support policy contributed to averting a severe credit crunch in 2009

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*The authors show that the Eurosystem's Enhanced Credit Support policy package successfully contributed to averting a major credit crunch in 2009. This package included mainly the fixed rate full allotment (FRFA) and the longer-term refinancing operations (LTROs). According to the authors' calculations, without these non-standard monetary policy measures, the euro area's GDP growth would have been, on average, 2.2 percentage points lower than the actual level observed over 2009. Credit spreads would have jumped by an extra 400 basis points. The zero lower bound on nominal interest rates would have been hit in mid-2009. What is more, the euro area would have entered into a mild deflationary episode. The authors' assessment is based on a counterfactual simulation drawn from an estimated macroeconomic model with banking frictions.*

In response to the 2008-2009 crisis, the Eurosystem launched a series of unprecedented monetary policy measures, grouped together under the label Enhanced Credit Support (see Trichet, 2009). Two measures stand out in this policy package: (i) the adoption of the fixed rate full allotment (FRFA) tender procedure, where the ECB sets the interest rate (fixed rate) and stands ready to offer whatever amount of liquidity is demanded by the banking sector, against good quality collateral (full allotment); and (ii) the lengthening of the maturity of central bank funding via longer-term refinancing operations (LTROs).

Through these measures, the European Central Bank (ECB) aimed to: (i) provide unlimited access to central bank liquidity, against good quality collateral; and (ii) increase the average maturity of outstanding liquidity in the banking sector, from approximately 20 days before the crisis to more than 200 days in the second half of 2009.<sup>1</sup>

In this *Rue de la Banque*, we draw on Cahn et al. (2016) and propose an analysis of the 2008-2009 Enhanced Credit Support policy package based on an estimated

medium-scale macroeconomic model. According to the latter, the package was highly successful and helped to avert a major credit crunch.

### **Turmoil in the euro area financial markets in 2008**

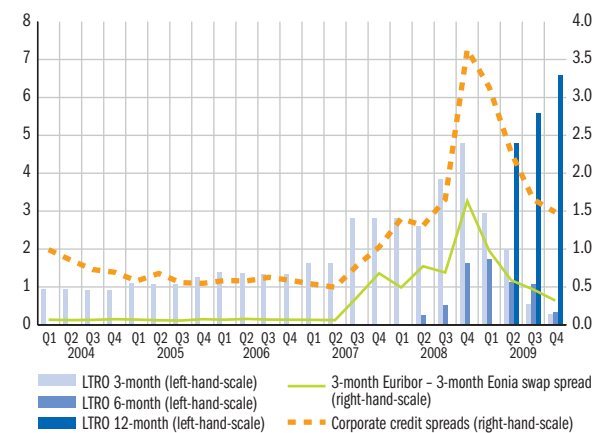
Chart 1 shows the outstanding amounts borrowed under the LTROs (as a share of euro area annual GDP), broken down by maturity, together with two indicators of financial stress: (i) the spread between corporate bonds and the German Bund; and (ii) an interbank market spread (i.e. the spread between the 3-month Euribor and the 3-month overnight interest rate swap). Both spreads, which measure premia for holding credit risk, highlight the unusual degree of financial stress that peaked at the end of 2008.

<sup>1</sup> In normal circumstances, euro area banks use the Eurosystem's refinancing operations to meet their reserve requirements. The main refinancing operations have a one-week maturity and were conducted under the variable rate tender procedure. See ECB (2011) for further details

## C1 LTRO draw-downs and corporate credit spreads

(as a % of euro area annual GDP)

(in %)



Note. Left axis: Breakdown of LTRO outstanding amounts by maturity. Right axis: Corporate credit spreads based on Gilchrist and Mojon (2016) and 3-month Euribor - 3-month Eonia swap spread. Source: ECB, Datastream and authors' calculations.

However, the chart suggests that they shrank substantially throughout 2009, at a time when banks were increasing their borrowing of long-term liquidity from the central bank. The sharpest declines in these spreads appear to be concomitant with the 6-month and 12-month LTROs and the adoption of the FRFA tender procedure.

This picture suggests that the enhanced credit support policy package may have contributed to taming the wild behaviour of interest rate spreads right after the peak of the crisis. However, we are ultimately interested in quantifying the effects of LTROs/FRFA on investment, GDP and inflation. We propose measuring the effects of the enhanced credit support policy package through a counterfactual simulation in which the policy measures of 2008-2009 have been switched off.

## Modeling the enhanced credit support policy package

### A macroeconomic model with a frictional banking sector

To implement this analysis, we use a macroeconomic model which includes an explicit banking sector.<sup>2</sup> In the model, depositors are never sure *ex ante* that the bank to which they lend will act in their best interest. This fundamental trust issue is called an agency problem in economists' jargon.

As a consequence of this problem, lenders force bankers to invest their own wealth in the projects that they finance, resulting in a balance sheet constraint, and bankers charge a higher interest rate on loans than they pay on deposits.

This credit spread turns out to be counter-cyclical: in times of crisis, the net worth of bankers is depleted. Due to the agency problem, this leads to a lower supply of credit from banks and to higher interest rates on bank loans, which in turn result in fewer investment projects and, ultimately, in lower levels of production and employment. Lower production then feeds back negatively on bankers' wealth, thus triggering an adverse loop with potentially dire macroeconomic consequences.

### Enhanced credit support policy in action

To model the enhanced credit support policy package, we incorporate an endogenous demand for central bank liquidity (as implied by the FRFA tender procedure) together with LTRO facilities replicating those of 2008-2009.

In the model, the central bank takes up an intermediation role and provides a substitute for interbank and deposit funding thanks to **two key advantages**. First, the central bank is not liquidity-constrained. This is important because, in the climate of financial stress that followed the Lehman bankruptcy, some banks started to hoard liquidity for precautionary motives, which further dried up the interbank market. Second, because of extra collateralisation, funds borrowed under the LTROs are less susceptible to the agency problem just described.

How do LTROs work in our analysis? Because central bank liquidity is less susceptible to the agency problem, the inflow of LTROs into the banking sector relaxes the credit constraint. As a result, the credit spread shrinks, enabling more investment projects to be launched. In turn, this bids up the price of capital, thus reinforcing the banking sector's net worth and leading to a further compression of credit spreads. In effect, LTROs in the model work their way into the real economy precisely by putting an end to the adverse loop triggered by the recession.

<sup>2</sup> The model is an extension of the set-up proposed by Gertler and Kiyotaki (2010), allowing for central bank liquidity injections of arbitrary maturity and featuring sticky prices and wages together with a number of real frictions.

LTROs are all the more powerful because they stay longer on the liability side of private banks' balance sheets. The bottom line is that, by securing a source of funding at longer maturities, LTROs (i.e. 6-month and 12-month LTROs in addition to the standard 3-month LTROs) help relax the credit friction above and beyond what standard refinancing operations would permit.

**Taking the model to the data**

To conduct our counterfactual analysis, we estimate the model using euro area data. In a nutshell, this step consists in assigning to the model parameter values maximising the probability that observable fluctuations in key macroeconomic variables (inflation, GDP, investment, credit spreads, etc.) were indeed generated by the model. This ensures that the results we derive afterwards are based on an objective and transparent, data-driven procedure.

**Counterfactual analysis**

We now come to the counterfactual question at the core of our analysis: What if the ECB had not implemented its Enhanced Credit Support policy package?

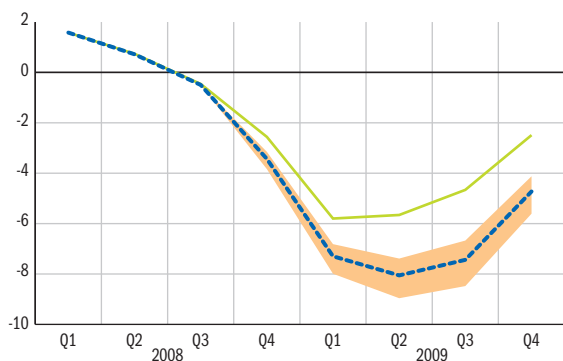
To answer this question, we simulate our model over the period 2008-2009 and perform a counterfactual analysis in which we impose that: (i) only 3-month LTROs were in place over 2008-2009; (ii) the FRFA tender procedure was not in place over this period. This corresponds to the pre-crisis monetary policy.

The results are reported in Chart 2. The green lines correspond to the actual paths of per capita GDP, per capita investment, the GDP deflator and the credit spread. The blue lines correspond to the counterfactual simulations. GDP, investment and the GDP deflator are expressed as year-on-year percentage changes.

**C2 Counterfactual analysis**

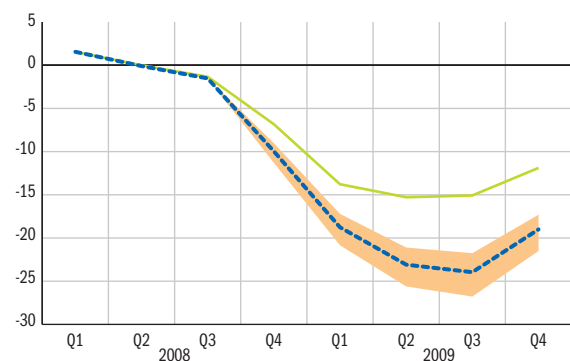
**GDP**

(as year-on-year percentage changes)



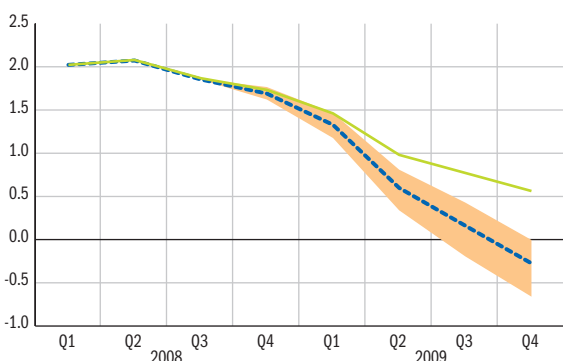
**Investment**

(as year-on-year percentage changes)



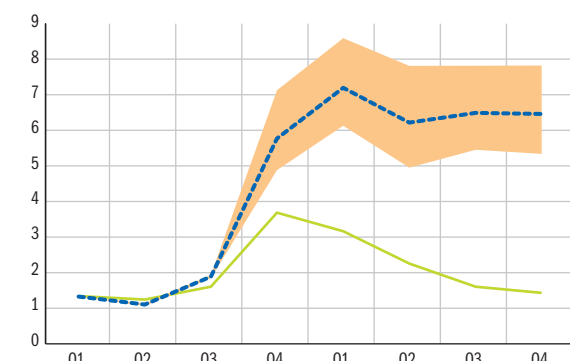
**GDP deflator**

(as year-on-year percentage changes)



**Credit spread**

(in percentage per annum)



— Actual path of the data      - - - Median counterfactual path      ■ Bounds of the 68% confidence region surrounding the counterfactual path

Source: ECB and authors' calculations.

As a by-product of the estimation, we can also quantify the uncertainty surrounding the simulated dynamics of the variables under the counterfactual scenario. This corresponds to the orange-shaded area, which indicates the bounds of the 68% confidence region.<sup>3</sup>

Absent the enhanced credit support policy package, euro area GDP would have declined by a larger amount in the counterfactual scenario than in actual data. What is more, it would have picked up at a much slower pace after mid-2009. All in all, year-on-year GDP growth would have been about 2.2 percentage points lower on average than the actual level observed over 2009. Much of the effect found on GDP stems from the very large decline in investment. Indeed, absent the non-standard policy package, year-on-year investment growth would have been, on average, about 7.2 percentage points lower than the actual level observed over 2009.

This very large effect on investment originates from the dramatic impact of LTROs/FRFA on the credit spread. Under our counterfactual scenario, the latter would have been higher than its actual level by approximately 400 basis points on average over 2009, i.e. an even larger increase than that observed in the fourth quarter of 2008.

More importantly, in the counterfactual scenario, the credit spread shows no sign of declining over 2009 and stays stuck at about 600 basis points while in the actual data it decreased steadily after 2008Q4. Thus, our counterfactual analysis suggests that the non-conventional LTRO facilities implemented by the ECB contributed significantly to averting an extremely severe credit crunch and helped to insulate output and investment from the shocks that triggered the 2008 financial crisis.

The effects of these facilities on inflation are less pronounced. Absent the 6-month and 12-month LTROs and FRFA, the year-on-year growth rate of the GDP deflator would have been about 50 basis points lower on average over 2009. The price level would have followed a downward path whereas it actually rose in the data (albeit at a slower pace than before the crisis). From this point of view, the non-standard policy package also helped to avert what would have been a negative inflation episode in 2009.

Note that, in spite of a fair amount of uncertainty (the orange-shaded area is the 68% confidence region), the counterfactual simulation is significantly different from the actual path of the key macroeconomic variables studied here.

### Interactions between interest rate policy and the enhanced credit support policy package

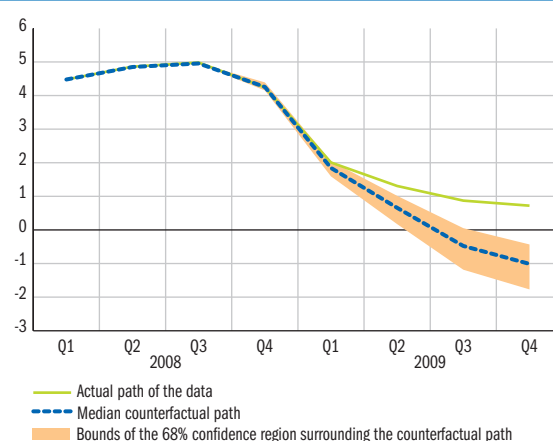
It could be argued that standard interest rate policy too can be effective in mitigating the negative effects of a crisis. Thus, the next step is to assess how the enhanced credit support policy package and standard monetary policy combined during the crisis. This is explored in Chart 3.

Absent LTROs/FRFA, the Eurosystem would have lowered its policy rate further, leading to a significantly lower 3-month Euribor rate. This result suggests that standard and non-standard monetary policies actually were complementary. According to our simulation, resorting to LTROs allowed the ECB to save some ammunition for use in the event of further negative shocks (something that, alas, materialised in the form of the sovereign debt crisis).

Because of the dramatic effects of the crisis on output and inflation in the counterfactual simulation, standard monetary policy reacts with a sharp decline in the policy rate.

Lastly, it is important to note that the drop in the nominal rate under the counterfactual scenario is sufficiently pronounced to reach the zero lower bound (ZLB) in the second half of 2009. Even though the exact location of the effective lower bound for the nominal interest rate is now controversial in the euro area, reaching negative levels

### C3 Counterfactual trajectory of the short-term rate



Note. See Chart 2.

Source: ECB and authors' calculations.

<sup>3</sup> This corresponds to plus/minus one standard error around the mean, in a Gaussian set-up.

for the 3-month Euribor was not a policy option in 2009.<sup>4</sup> From this point of view, our counterfactual scenario must be interpreted as delivering a lower bound estimate of the effects of LTROs/FRFA on aggregate activity. Indeed, because of the constraint imposed by the ZLB, monetary policy could not have been as accommodative as in the counterfactual scenario. All other things being equal, this would probably have led to an even more severe crisis.

## Concluding remarks

A fair assessment of the 2008-2009 Enhanced Credit Support policy package requires that we infer what would have happened absent these liquidity injections. In this Rue de la Banque, we propose such a counterfactual analysis, based on a medium-scale macroeconomic model featuring an explicit banking sector subject to the dire consequences of an acute confidence crisis.

As always, because our model is, by construction, highly abstract and stylised, and because our estimation procedure hinges in part on our choice of priors, the results must be interpreted with caution. Subject to

this caveat, our analysis suggests that the enhanced credit support policy package was useful in combating the crisis. In particular, according to our counterfactual simulations (i) output growth would have been about 2.2 percentage points lower on average over 2009 without the LTROs/FRFA; (ii) the zero lower bound on the nominal interest rate would have been hit in mid-2009; (iii) non-standard monetary policy contributed to averting a major credit crunch, which would have otherwise resulted in a negative inflation episode.

Beyond the specific case of the 2008-2009 LTROs, our analysis suggests that the various forms of liquidity provision at extended maturities (VLTROs in 2011-2012, TLTROs in 2014) might have played a role in dissipating the risks to the banking sector.

<sup>4</sup> In particular, former Bundesbank President Axel Weber gave an interview to the Financial Times in February 2016 where he explained that 1% was, at that time, the effective lower bound for the ECB interest rate on its main refinancing operations.

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