

Effects of ECB Policies



REPORT by Kerstin Bernoth, Philipp König and Benjamin Beckers

ECB Asset Purchases May Affect Wealth Distribution 75

INTERVIEW with Kerstin Bernoth

»Wealth inequality set to increase in the short term« 82

REPORT by Malte Rieth, Michele Piffer and Michael Hachula

ECB Policies Effective in the Euro Area and Germany 83

INTERVIEW with Malte Rieth

»Our study shows that the ECB's measures
have been effective« 92

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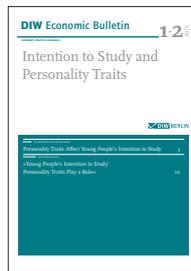
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ECB Asset Purchases May Affect Wealth Distribution

By Kerstin Bernoth, Philipp König and Benjamin Beckers

In the debate on monetary policy decisions, to date, little attention has been paid to distributional effects. One reason for this is that they are not included in the mandate of the European Central Bank (ECB). Given the loose monetary policy stance in the euro area and the large-scale program to purchase government and corporate bonds launched in January 2015, the question increasingly being asked is whether any distributional effects can be ignored any longer. The present report looks at the channels of monetary policy that are potentially relevant to distribution and conducts an initial assessment of their relevance to asset purchases in the euro area. The asset purchase program has probably led to rising asset prices, thereby mainly benefitting households at the upper end of the wealth distribution. This is likely to lead to a direct increase in wealth inequality. Whether or not this increase can be at least partially offset in the long term is uncertain. Indebted and/or low-income households could benefit if the program contributes successfully to economic recovery and higher inflation, and therefore helps to improve employment opportunities. So far, the overall distributional effect is therefore unclear. A more in-depth analysis is required in the future.

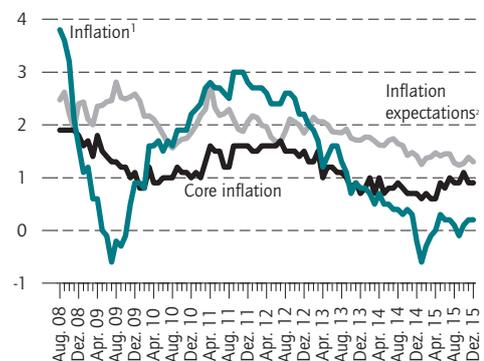
The rate of inflation in the euro area has fallen continuously since January 2012 and has been well below the ECB's medium-term two-percent target since early 2013. This trend is partly due to exceptional factors such as the sharp drop in oil and energy prices. However, also the core inflation rate (inflation adjusted for energy and unprocessed food) fluctuates around a low one percent since the end of 2013. Moreover, forecasts for longer-term inflation have also fallen well below the ECB's target (see Figure 1).¹

¹ See K. Bernoth, M. Fratzscher and P. König, "Weak Inflation and Threat of Deflation in the Euro Area: Limits of Conventional Monetary Policy," DIW Economic Bulletin, no. 7 (2014).

Figure 1

Inflation in the euro area

Annual inflation rate in percent



¹ Harmonized inflation rate.
² 5-year forward inflation expectations from inflation swaps.
 Sources: ECB Statistical Data Warehouse; Datastream

Since 2013 key indices for the (expected) inflation rate decreased far below the medium-term two percent target of the ECB.

The ECB has attempted to counter this development by lowering its key interest rates. Since December 2011, it has gradually reduced the main refinancing rate for its monetary policy transactions from 1.75 to 0.05 percent in September 2014. As this was not sufficient to avert the threat of deflation in the euro area and to raise inflation expectations again, the ECB decided to introduce a large-scale asset purchase program in January 2015.²

Under this program, the ECB has been acquiring government bonds from public and private issuers in the euro area on a monthly basis worth 60 billion euros since March 2015 and will continue to do so at least until March 2017. This program has led to controversial discussions among the general public as well as within the ECB Governing Council. In view of the already very low interest rate level in the euro area, initially the question was raised as to whether the program would be effective in bringing about a sustained recovery of overall economic demand and inflation.³ As a result, some market observers were calling for asset purchases much earlier.⁴ However, questions were asked, particularly in Germany, as to whether the ECB was even allowed to implement such a purchase program, or whether the program was actually a form of “monetary state financing” which is prohibited in the monetary union.⁵ Finally, it was noted that the purchases had a variety of unfavorable “side effects.”⁶ In terms of possible distributional effects, only the redistribution of wealth from savers to debtors due to persistently low interest rates has been discussed to date.⁷

² The ECB had already conducted smaller purchase programs prior to January 2015. However, the program adopted in January was a significant expansion of previous ones to purchase covered bonds and assetbacked securities. Further, the ECB had already used other unconventional measures such as providing liquidity aimed at improving lending conditions, or adjusting their communication policy for the future course of monetary policy (“forward guidance”).

³ For a discussion on this, see K. Bernoth, P. König, C. Raab, and M. Fratzscher “Uncharted Territory: Large-Scale Asset Purchases by the European Central Bank,” *DIW Economic Bulletin*, no. 13 (2015): 189-198.

⁴ See, for example, Wolfgang Münchau, “Why Europe needs to try unconventional policy,” *Financial Times*, November 17, 2013, <http://www.ft.com/cms/s/0/34e2106a-4df5-11e3-8fa5-00144feabdc0.html>.

⁵ For example, President of the Ifo Institute for Economic Research, Hans-Werner Sinn, http://www.cesifo-group.de/de/ifoHome/presse/Pressemitteilungen/Pressemitteilungen-Archiv/2015/Q1/press_20150122_ezb.html.

⁶ These include the effects of these purchases on financial stability and increasing risks on central bank balances (according to German Bundesbank president, Jens Weidmann, for example, see Bundesbank “Kauf von Staatsanleihen birgt Risiken,” news release, January 26, 2015, https://www.bundesbank.de/Redaktion/DE/Themen/2015/2015_01_26_weidmann_kauf_staatsanleihen_birgt_risiken.html), and the danger of moral risks for the bond issuers (see, for example, Joel Lewin, “ECB QE alchemy transforms junk bonds,” *Financial Times*, April 13, 2015, <http://www.ft.com/cms/s/0/baeb1bdce1ad-11e4-bb7f-00144feab7de.html#axzz3xgD4P3Cx>).

⁷ See dpa (Deutsche Presse-Agentur GmbH), “Nullzins: Sparer verlieren durch EZB Politik Milliarden,” *Handelsblatt*, April 9, 2015: <http://www.handelsblatt.com/finanzen/vorsorge/altersvorsorge-sparen/nullzins-sparer-verlieren-durch-ezb-politik-milliarden/11613714.html>

Asset purchases could affect wealth distribution

In contrast, little attention has been paid in the past to any effects caused by asset purchases on the distribution of wealth. This is probably also due to central banks taking a position of benign neglect on this point while referring to their mandates. The primary mandate of the ECB is to ensure price stability. Only when this objective has been achieved should the central bank support general economic policies in the euro area in order to contribute, in particular, to full employment and economic growth.⁸ The central bank normally exhausts all its options to fulfill its mandate, even if these generate adverse side effects on the income or wealth distribution. Given this long-lasting phase of low interest rates and direct bond market interventions by the central bank as part of its unconventional monetary policy measures, however, the distributional effects may become more clearly visible.

Transmission channels of monetary policy on determinants of income and wealth inequality

In the scientific literature, a distinction is made between the following channels through which the distribution of income and wealth can be affected by changes in real and financial economic variables. If the central bank influences these determinants — intentionally or unintentionally — distributional effects of monetary policy measures will occur correspondingly.

In the short term, monetary policy initially affects financial variables such as interest rates and asset prices, thereby impacting on the wealth distribution through the following channels:

Interest rate risk channel

Changes in interest rates affect the asset and liability positions of households and financial market participants. Households wanting to borrow benefit from an interest rate cut.⁹ Households that own long-term fixed-rate bonds should also benefit as the price of the bond rises when interest rates fall. A distributional effect therefore occurs when households hold investments with different maturity profiles since short-term investments barely change their market value as a result of interest rate cuts. Conversely, distributional effects occur when some house-

⁸ See Treaty on the Functioning of the European Union, Article 127 (1).

⁹ A. Auclert, “Monetary Policy and the Redistribution Channel” (working paper, MIT, 2016).

holds hold liabilities with fixed interest rates and other households hold liabilities with variable interest rates.

Financial segmentation channel

Wealthy households typically invest more in financial markets and consequently tend to hold shares of financial intermediaries, such as banks, more often. Since an expansion of money supply directly affects these intermediaries, these relevant shareholders also benefit.¹⁰

Income composition channel

Expansionary monetary policy typically leads to a direct increase in asset prices, whereas real wages only react with a certain time lag. To the extent that households depend to varying degrees on labor income or income from capital investments, expansionary monetary policy can lead to a change in income inequality. In turn, if these incomes are used for asset accumulation, wealth inequality can be affected through the composition of income.

In contrast, there is a time lag before monetary policy affects the real economy, the consequence of which is that the following channels are more relevant in the long term, if at all:

Income from employment channel

When an expansionary monetary policy successfully revives economic growth and demand for labor, this has an impact on households' labor incomes, which is an important determinant of asset accumulation. On the one hand, low-income households are likely to benefit from a stable labor market and increased employment opportunities.¹¹ On the other hand, stronger economic growth and increased demand for labor may also lead to an increase in wages, which, however, is likely not divided equally between all sectors and households. As a result, distributional effects could also occur through the earned income channel, although the direction of these effects are ambiguous.

Portfolio channel

If inflation rises following monetary policy changes, the real value of cash balances, demand deposits, and other non-inflation-protected assets falls. Given that house-

holds at the lower end or in the middle of the wealth distribution hold relatively more of such investments, an increase in inflation may induce an increase in wealth inequality.¹²

Savings redistribution channel

Similarly to the portfolio channel, the savings redistribution channel describes the effect of inflation on asset positions. However, the focus here is on the role of unexpected inflation. If inflation is higher than expected, both the real value of savings assets and the real debt burden of borrowers are reduced. A distribution effect results when different households hold different types of investment.

Current ECB asset purchases: increasing wealth inequality in the short term ...

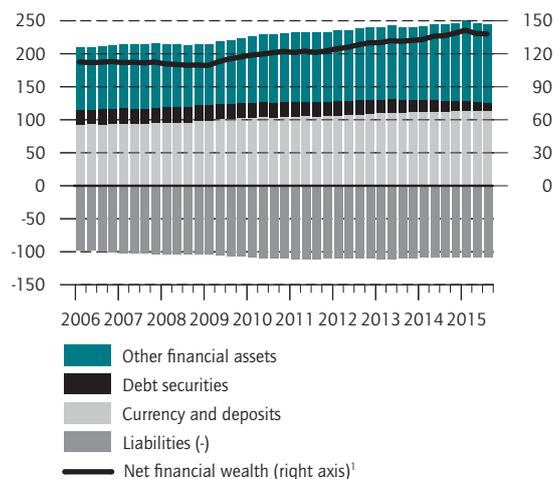
Overall, euro area households are net creditors, meaning that their total interest-bearing assets exceed their debt positions (see Figure 2). Therefore, a decrease in

¹² A. Erosa and G. Ventura, "On Inflation as a Regressive Consumption Tax," *Journal of Monetary Economics*, vol. 49, no. 4 (2002): 761-795.

Figure 2

Financial assets of European Households

In percent of disposable income



¹ Less stocks and other equity.

Sources: European Central Bank; own calculations.

Private households in the euro area are net creditors on aggregate and would therefore experience a decline in returns following a decrease in interest rates.

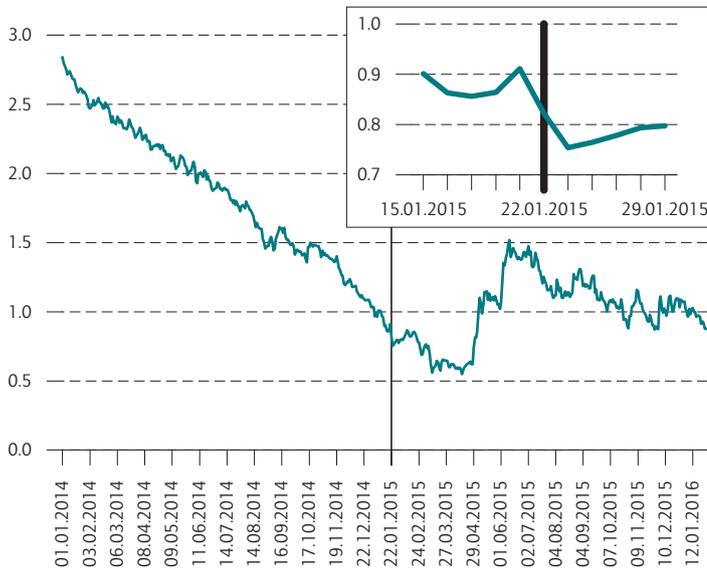
¹⁰ O. Ledoit, "The Redistributive Effects of Monetary Policy," *Working Paper Series*, no. 44 (University of Zurich, October 2011) and S. D. Williamson, "Monetary policy and distribution," *Journal of Monetary Economics*, vol. 55 (2008): 1038-1053.

¹¹ S. B. Carpenter and W. M. Rodgers III, "The Disparate Labor Market Impacts of Monetary Policy," *Journal of Policy Analysis and Management*, vol. 23, no. 4 (2004): 813-830.

Figure 3

Interest rates on government bonds in the Euro Area

Average in percent



Source: Datastream.

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Average interest rates on European government bonds decreased only by seven basis points on announcement day, which is in line with the existing, long-term trend.

the general interest rate level is likely to reduce the returns on net assets of euro area households.

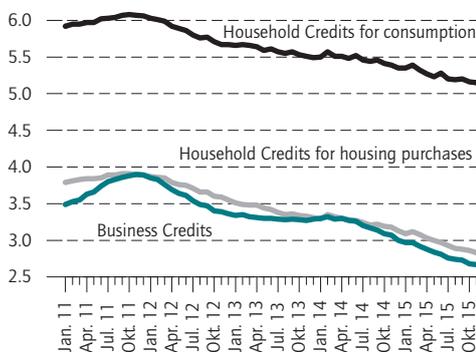
However, net assets in the euro area are not evenly distributed across different groups of households. The Household Finance and Consumption Survey (HFCS) indicates that households at the lower end or in the middle of the income distribution, as well as younger households are relatively more indebted both in nominal terms and relative to their total assets. These households are therefore likely to benefit from interest rate cuts through the interest risk channel, which in turn would decrease wealth inequality. Households holding shares in firms would also benefit from interest rate cuts. The reason for this is that firms often take out large loans and their interest burden on these loans falls when interest rates are reduced. This has a positive effect on their profits. Since shares in firms are more frequently held by wealthy households, this may lead to an increase in wealth inequality.¹³ The net effect is thus unclear.

However, the effect of interest rate cuts on the wealth distribution in the euro area is likely to be small for two reasons. First, a considerable part of existing household debt takes the form of fixed-rate mortgages which are not affected by interest rate cuts.¹⁴ Second, the interest rate cut caused by the ECB asset purchase program was rather small. Market participants would have already been expecting the program to be introduced, resulting in interest rates already falling to some degree before the anticipated announcement. However, compared to the US or the UK, interest rates in the euro area fell considerably less on the day the program was announced.¹⁵ For example, the average interest rate on government bonds of member states only fell by around seven basis points following the announcement (see Figure 3).¹⁶ Similarly, the interest rates on consumer, household, and corporate loans fell mostly as part of an already existing long-term trend (see Figure 4).

Figure 4

Bank lending rates in the Euro Area¹

In percent



1 On existing contracts.

Sources: Statistical Data Warehouse; ECB.

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Bank lending rates on existing credits decreased following the program announcement only within their existing, long-run trend.

¹³ See M. M. Grabka and C. Westermeier, "Persistently High Wealth Inequality in Germany," *DIW Economic Bulletin*, no. 6 (2014): 3-15.

¹⁴ M. Ehrmann and M. Ziegelmeier, "Household Risk Management and Actual Mortgage Choice in the Euro Area," *ECB Working Paper*, no.1631 (2014).

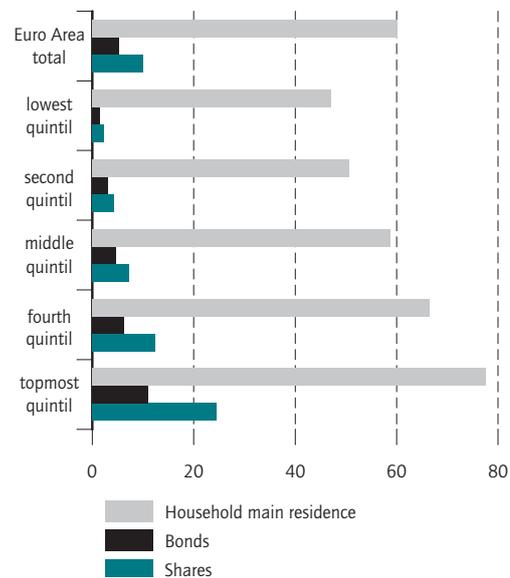
¹⁵ This direct effect is considerably less than for comparable programs in the US, UK, and Japan where interest rate cuts are estimated at 25 to 90 basis points (BPS). This has mainly to do with the already very low interest rates in the euro area, which has greatly limited the ECB's leeway. See, for example, A. Krishnamurthy and A. Vissing-Jorgensen, "The Effects of Quantitative Easing on Long-Term Interest Rates," *NBER Working Paper*, no. 17555 (National Bureau of Economic Research, 2011).

¹⁶ See G. Georgiadis and J. Gräß, "Global Financial Market Impact of the Announcement of the ECB's Extended Asset Purchase Programme," *Working Paper* 232 (Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute, 2015).

Figure 5

Participation rate in real and financial assets by income quintils

In percent



Source: The Eurosystem Household Finance and Consumption Survey (2013).

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The participation rate in real and financial assets, especially in stocks, is strongly dependent on household income. Stock holdings are particularly accumulated among the highest-earning households.

Nevertheless, increasing the money supply and directly intervening in bond markets are likely to have led to portfolio shifts toward riskier asset investments, including stocks.¹⁷ It is safe to assume that relatively wealthy households benefited most from this increase (through the channels of financial segmentation and income composition). This is because the participation of households in financial markets and their investment choices are largely dependent on household income (see Figure 5). For example, in the euro area, almost 25 percent of the top income quintile hold some of their assets directly in stocks, while only two percent of the bottom income quintile do.

Consequently, in order to make an assessment of the direct distributional effects of the ECB's asset purchase program, we need to look at corresponding stock price developments. Recent studies show that a ten-percent increase in stock prices in the euro area results in a three-percent increase in the value of net assets of the richest five percent of households, while the remaining 95 percent of households would benefit considerably less (see

¹⁷ See Georgiadis and Gräß, "Global Financial Market Impact."

Figure 6

Net wealth gains from asset price¹ increases

In percent



1 of ten percent

Source: Adam and Tzamouranis (2015).

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While in particular the middle class profits from house price increases, the wealthiest five percent benefit most from stock price increases.

Figure 6).¹⁸ If it is assumed that stock prices increased by around 15 percent as a result of the asset purchases (taking into account the strong price increases in January 2015 in anticipation of the program announcement), the net worth of the richest five percent of households would increase by up to 4.5 percent, whereas the growth in net worth of all remaining households would be just under one percent.

Since home ownership is distributed much more evenly, a comparable hike in housing prices, therefore, favors a substantially larger number of households. The increase in net worth is considerably more pronounced in this case at six to ten percent, with households in the middle-income range benefitting most. This is particularly due to the fact that the poorest households own less real estate, while the richest ones have invested a relatively smaller share of their total assets in real estate (see Figure 7).¹⁹

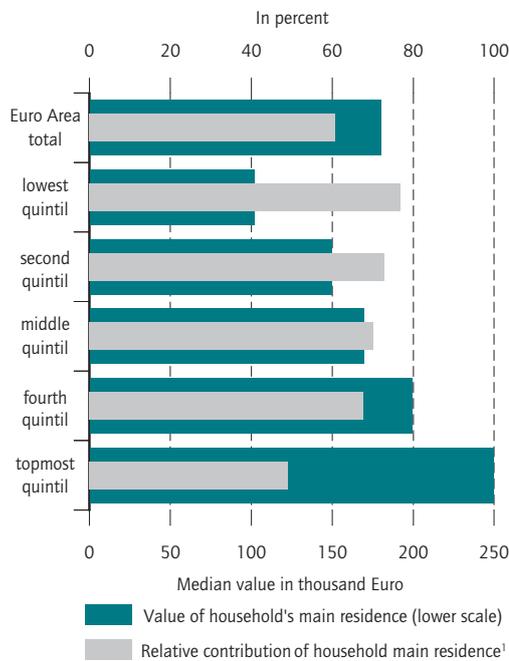
It can therefore be concluded that, overall, the observed increases in stock prices since (and in anticipation of) the ECB asset purchases are likely to have increased wealth inequality in the euro area. However, it should be noted

¹⁸ K. Adam and P. Tzamourani, "Distributional consequences of asset price inflation in the euro area," *Discussion Paper*, no. 27 (German Bundesbank, 2015).

¹⁹ K. Adam and J. Zhu, "Price Level Changes and the Redistribution of Nominal Wealth Across the Euro Area," *Journal of the European Economic Association* (forthcoming) (2015).

Figure 7

Home ownership in the Euro Area by income quintils



1 To total real assets of households.

Source: The Eurosystem Household Finance and Consumption Survey (2013).

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The value of households' main residences increases with household income, yet its relative contribution to households' total real wealth decreases simultaneously.

that these effects may differ widely among individual member countries of the euro area.

.... but reducing wealth inequality in the long term?

It is questionable whether this increase in inequality can be at least partially offset in the long run, as is argued for conventional interest policy.²⁰ It will first be necessary for economic growth to recover successfully and for inflation to increase. If the ECB achieves this through its asset purchase program, it may indeed affect the wealth distribution, but the overall effect is yet ambiguous.

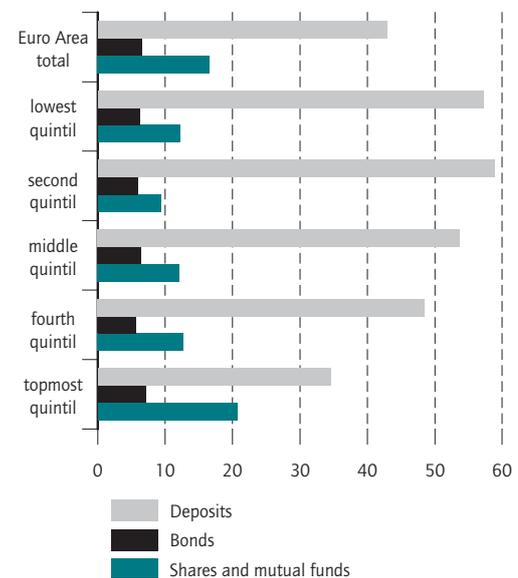
A higher inflation rate would, all else being equal, reduce inequality initially because creditor households in the euro area tend to have higher incomes and more val-

20 See C. D. Romer and D. H. Romer, "Monetary Policy and the Well-Being of the Poor," *NBER Working Paper*, no. 6793 (1998).

Figure 8

Financial wealth of households by asset class

Relative contribution to total financial assets in percent



Source: The Eurosystem Household Finance and Consumption Survey (2013).

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Less wealthy households hold the largest share of their total financial wealth in non-inflation-indexed deposits, whereas the wealthiest households invest stronger in real claims in form of stocks.

uable assets than indebted households. Since younger households are more often net debtors, this would also lead to a transfer from older to younger households.²¹

Conversely, an increase in inflation may, however, also act in the opposite direction. This occurs through the real loss of value of non-inflation-indexed investments via the portfolio composition channel. Low-income households often hold a larger share of their assets in the form of cash and savings deposits, whereas higher-income households invest more in real assets such as real estate and stocks (see Figure 8).

As a result, the ultimate effect of the ECB asset purchase program on income and wealth distribution still remains to be seen. In particular, it depends on whether and with which delay the medium- to long-term effects occur and how successfully the asset purchase program impacts on economic activity and inflation.

21 See Adam and Zhu, "Price Level Changes."

Success of the ECB asset purchase program is difficult to assess

Since there has been very little information available to date, it is difficult to estimate to what extent the ECB asset purchase program has contributed to stabilizing the euro area's economy. Its effect can be approximated from the experience of other central banks with comparable programs, however. Studies on asset purchases by the US Federal Reserve (Fed) and the Bank of England (BoE) indicate that they have considerably mitigated recessions in the respective economies. Without the programs, double-digit declines in GDP and price falls of up to four percent may have been recorded,²² while unemployment in the US would probably have been up to one and a half percentage points higher.²³

The corresponding effects of asset purchases by the Bank of Japan, on the other hand, were far less pronounced and occurred with a considerable lag. These purchases here only had an effect on economic growth after a time lag of up to 20 months.²⁴ Among other things, this may be due to the fact that the Japanese program, similar to the ECB program, only had a weak impact on long-term interest rates in its initial phase. Unlike the US and UK programs, both the Japanese and European purchase programs were not implemented in a time of large financial uncertainty and high interest rates in which asset purchases have proven to be particularly useful. It is therefore questionable as to whether the ECB asset purchases can actually bring forward the desired effect on economic activity and inflation in the medium and long term.²⁵

²² See C. Baumeister and L. Benati, "Unconventional Monetary Policy and the Great Recession: Estimating the Impact of a Compression in the Yield Spread at the Zero Lower Bound," *European Central Bank Working Paper*, no. 1258 (2010).

²³ See H. Chung, J.-P. Laforêt, D. Reifschneider, and J. C. Williams, "Have We Underestimated the Likelihood and Severity of Zero Lower Bound Events?," *Journal of Money, Credit and Banking*, vol. 44 (2) (2012): 47-82.

²⁴ See H. Schenkelberg and S. Watzka, "Real Effects of Quantitative Easing at the Zero Lower Bound: Structural VAR-based Evidence from Japan," *Journal of International Money and Finance*, vol. 33 (C) (2013): 327-357.

²⁵ Of course, it is still possible that the ECB purchase program has prevented an even deeper recession in the euro area. Since the corresponding "counterfactual" argument can neither be adequately identified nor observed, however, such considerations are purely speculative and cannot be studied empirically.

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Conclusion

Whether the ECB asset purchases will aggravate or lower existing wealth inequalities in the euro area as a whole still remains to be seen. In the short term, the ECB purchase program is likely to have exacerbated the wealth inequality. Yet, it is difficult to assess whether the distributional effects induced by asset price changes, in particular the increase in stock prices, are permanent in nature. On the one hand, excessive increases in asset prices that have occurred as a result of the expansionary monetary policy measures are likely to be corrected over time because monetary policy stimuli are likely not able to detach asset prices permanently from their fundamental values. On the other hand, capital gains and adjustments may well occur in different households and therefore still trigger distributional effects that are also more permanent in nature.

In addition, further distributional effects may occur in the long run if the ECB asset purchase program successfully helps to stabilize or even to revive economic growth and consequently employment and inflation. However, since it is not entirely clear which households would benefit most from these positive developments, the longer-term distributional effects of these purchases are difficult to predict.

However, this should not be mistaken for justification of adopting an attitude of benign neglect on the distributional effects of monetary policy measures. Recent literature suggests that distributional effects play a major and previously underestimated role also in the transmission of monetary policy stimuli, which should be examined in more depth in future research.²⁶ Finally, it should be noted that possible adverse distributional effects may also occur when the ultra-loose monetary policy of asset purchases is eventually phased out. For example, the current low interest rates encourage households to take on additional debt. A sudden rise in interest rates would, in this case, burden the asset positions of these (newly) indebted households.

²⁶ A. Süfi, "Out of Many, One? Household Debt, Redistribution and Monetary Policy during the Economic Slump," Andrew Crockett Memorial Lecture, Bank für Internationalen Zahlungsausgleich, June 2015, <http://www.bis.org/events/agm2015/sp150628.pdf>.

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EIGHT QUESTIONS TO KERSTIN BERNOTH

»Wealth inequality set to increase in the short term«

1. Prof. Bernoth, the European Central Bank (ECB) decided to implement a large-scale bond purchasing program in January 2015 to avert the risk of deflation in the euro area. To what extent might these bond purchases also affect wealth distribution? Considerable wealth distribution effects may occur through the impact channels of monetary policy because interest rate changes introduced by the central bank and their bond purchases will affect the general level of interest rates and asset prices in the relevant country.
2. What is the link here? On the one hand, the bond purchases and also the prolonged low interest rates in the euro area have the effect of increasing the prices of stocks and real estate, and asset prices in general. Demand for alternative investment products such as stocks and real estate increases because the interest rate is extremely low. These products then experience a rise in prices.
3. Who are the winners and losers? More research is definitely needed on this issue. However, investment products such as stocks, bonds, and real estate are mainly held by wealthier households rather than poorer ones. So it is likely that the distribution of wealth inequality will increase in the short term because wealthy households will benefit more from the asset price increases.
4. What long-term effects do you expect? In the long term, this widening of wealth inequality may decrease again slightly. This could happen if the ECB's bond purchases successfully revive the real economy and have a positive impact on the labor market. These are effects that are then more likely to benefit households with fewer assets. In other words, it now crucially depends on what the long-term effects on wealth distribution are and how successfully the bond purchase program can stimulate the economy.
5. However, to date, the bond purchase program has had practically no positive impact. Yes, but, yet again, we have to wait even longer. The ECB has only been purchasing bonds for ten months now and we've not yet seen any major impact in this short period of time.
6. How much longer do we have to wait? Well, the effects of bond purchases in other countries like the US and UK were quite successful and swift. However, the picture was quite different in Japan. The economic environment there was similar to the current one in the euro area and bonds were also purchased in a low interest rate environment. It took a long time before the real economic effects become evident—up to 20 months.
7. Does that mean the pay-off for these beneficial effects is increasing wealth inequality? In the short term, there is definitely a risk because the longer the interest rate remains at such a low level and the more the ECB intervenes in the bond markets, the more we will have to deal with the issue of distribution and the greater the distributional effects are likely to be.
8. Would a higher rate of inflation reduce inequality? Again, we can only speculate. If inflation rises, this will generally benefit households in debt because their debt burden in real terms decreases, the higher the debt becomes. Conversely, households with greater cash reserves will be more vulnerable, the higher the level of inflation. Wealth inequality should actually decrease again solely from this inflation effect. But we cannot be completely sure because it really comes down to which households hold the most cash assets relative to their total assets and which hold more asset securities such as stocks and real estate. The question is who will benefit from the ECB's bond purchases in the long term? We will have to research these very issues a lot more in the coming months and quarters.

Interview by Erich Wittenberg

ECB Policies Effective in the Euro Area and Germany

By Malte Rieth, Michele Piffer and Michael Hachula

The European Central Bank has engaged in a wide range of non-standard monetary policy measures since 2007. Each new tool was accompanied by an intense public debate on its effectiveness. This study evaluates the average effect of these measures on the macro-economy. The estimates show that unexpected changes in monetary policy that lower euro-area sovereign bond yields lead to a significant rise in real GDP, consumer prices, inflation expectations, and credit volume in the euro area. The effects on the German economy are very similar. All in all, the evaluation shows that non-standard monetary policy shocks are effective and contribute to fulfilling the central bank's mandate.

Since the onset of the financial crisis in 2007, the European Central Bank (ECB) has engaged in a wide range of non-standard monetary policy measures. These include, for instance, an enlargement of the pool of assets accepted as collateral for refinancing operations and a provision of liquidity to banks at longer maturities than before the crisis. Most recently, the ECB introduced an asset purchase program, which it then extended in December 2015, less than a year after its introduction.

Announcements of each of the new monetary stimulus measures have been accompanied by an intense public and academic debate on associated costs and benefits.¹ On the one hand, supporters of the ECB policy argue that non-standard monetary policy tools are successful in calming financial markets and in improving credit and economic conditions. Critics, on the other hand, doubt the effectiveness of these measures and stress the potential risks, such as a deterioration in financial stability or a widening of the income distribution.²

This study assesses how the ECB's non-standard monetary policy measures can affect the macroeconomy. Since criticism on the effectiveness of these policies has been coming from Germany in particular, we investigate the consequences of the monetary interventions not only for the euro area in general, but also specifically for Germany.

Previous evidence on non-standard monetary policy

The available studies that have analyzed the effects of non-standard monetary policy, particularly quantitative easing (QE) in the US and the UK, show that QE significantly low-

¹ See, for example, Bernoth, K., König, P., Raab, C., Fratzscher, M. (2015): Unchartered Territory: Large-Scale Asset Purchases by the European Central Bank, DIW Economic Bulletin 13/2015, 189–198.

² See Delivorias, A. (2015): The ECB's Quantitative Easing – Early results and possible risks, European Parliamentary Research Service, PE 572.

Box

Macroeconometric approach

The macroeconometric approach we employ here follows Gertler and Karadi (2015). We use a vector autoregressive model that includes six variables for the euro area: the two-year yield on

government bonds of euro area member countries excluding Germany, a measure of stock market volatility, the volume of credit to non-financial firms, the index of consumer prices, real GDP and the unemployment rate. The model can be written as

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + u_t$$

We use this vector autoregressive model to study the impact of a monetary intervention on the entire system of variables considered.

To separate the different driving forces of the variables included in the model, we need to construct a measure that is correlated with unexpected variations in monetary policy. To construct such a measure, we build on Altavilla, Giannone, and Lenza (2014) and extract the surprise variations in government bond yields on the days in which the European Central Bank announced shifts in monetary policy. All in all, we consider 32 policy announcements that occurred between August 2007 and May 2015. (A list with details on each announcement is given in Table 1.) We then make use of a panel model to extract the common unexpected variation in spreads vis-à-vis Germany of government bond yields of different countries and maturities. In particular, we use bond yields for Italy, Spain, Portugal, and Ireland on maturities two, five, and ten years. The model used is

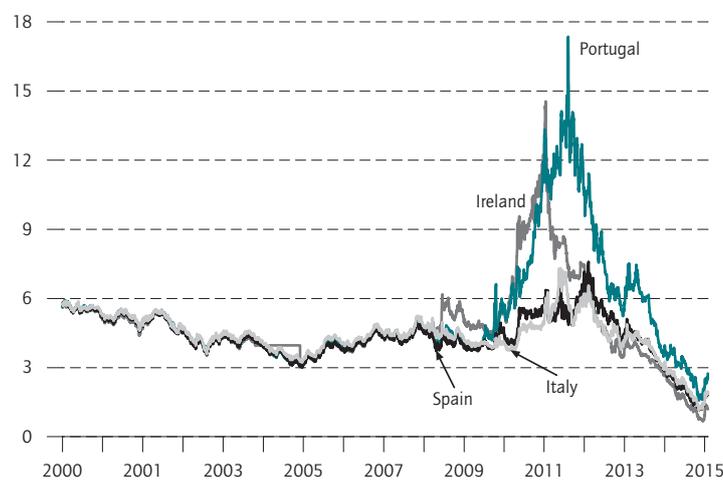
$$x_{ijt} = \alpha + \beta x_{ijt-1} + \sum \gamma_a D_{at} + \sum \delta_n z_{nt} + \eta_{ijt}$$

where the variable z_{nt} is the surprise component in economic data releases of 139 macroeconomic indicators for the euro area

Figure 1

Yields on 10 year government bonds

Percent per year



Source: Datastream.

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ered sovereign and corporate bond yields on the days that measures were announced by central banks. Moreover, QE is often found to stimulate both output and inflation. There is, however, considerable variation in the existing estimates of the magnitude of the macroeconomic effects.³

For the euro area, most studies focus on selected programs and only on the financial market effects of non-standard monetary policy—for example, on the effect of long-term refinancing operations (LTROs) on credit conditions, the impact of the securities market program (SMP) on bond yields, or the consequences of the announcement of outright monetary transactions (OMT) on euro area finan-

cial markets more generally. The announcements of OMT, for instance, significantly reduced sovereign bond yields in most member countries.⁴ Similarly, the SMP lowered yields on sovereign bonds, particularly for those countries that were covered by the program, with large declines in yields on days information on the program was disclosed.⁵ LTROs, in turn, seem to have unlocked the bank lending channel and stimulated credit growth.⁶

³ See Bernoth, K., König, P., Raab, C. (2015): Large-Scale Asset Purchases by Central Banks II: Empirical Evidence, DIW Roundup 61.

⁴ See Altavilla, C., Giannone, D., Lenza, M. (2014): The financial and macro-economic effects of OMT announcements, ECB working paper No. 1707.

⁵ See Eser, F., Schwaab, B. (2016): Evaluating the impact of unconventional monetary policy measures: Empirical evidence from the ECB's Securities Markets Programme, Journal of Financial Economics, 119, 147-167.

⁶ See Darracq Paries, M. and R. De Santis (2015): A non-standard monetary policy shock: the ECB's 3-year LTROs and the shift in credit supply, Journal of International Money and Finance 54 (2015): 1-34.

as a whole, the individual member countries, the UK, and the US. We include them to control for other factors that could influence the daily evolution of spreads.

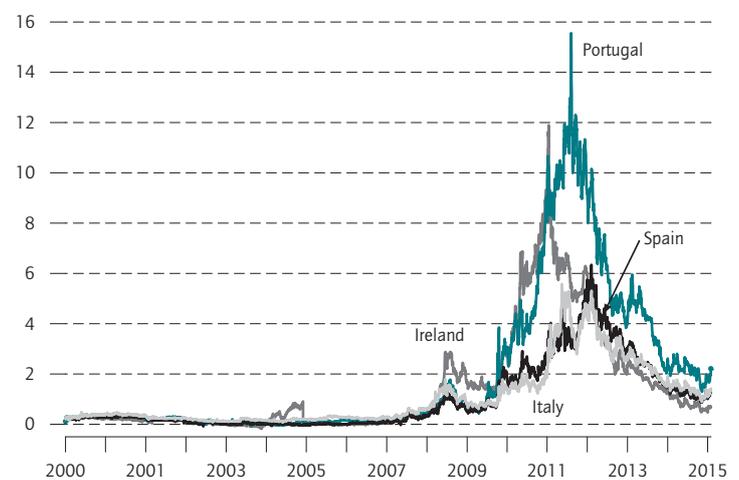
The yields on the ten-year maturity used in the estimation are shown in Figure (see Figure 1). The yields on the other maturities used here look very similar. From this figure, we see very clearly that prior to the run-up to the euro debt crisis, yields moved closely together. Starting from the euro crisis, a divergence is clearly visible, with progressive increases in yields initially for Ireland, then for Portugal. A progressive reduction in the differences across yields is instead visible after 2013. Figure (see Figure 2) shows the variation in spreads rather than in yields. We see that the initial decrease in yields between the year 2000 and the euro crisis had been met with generally constant spreads, and that spreads behaved similarly to yields during the crisis.

The estimation delivers a measure of exogenous variations of monetary policy. We then make use of this estimated measure to recover the structural monetary policy shock that drives the variables included in the vector autoregressive model, following Stock and Watson (2012) and Merten and Ravn (2013). This approach exploits the explanatory power that the estimated exogenous monetary interventions have on the residual part of the variables in the vector autoregressive model, and allows isolating the impact of a monetary policy shock on the endogenous variables, holding constant the other driving forces of the variables. To improve the accuracy of the estimation, we follow Rogers, Scotti, and Wright (2015)

and compute estimates directly using daily data for the variables available on a daily frequency, rather than on a monthly frequency.

Figure 2

Spreads on 10 year government bonds vis-à-vis Germany
Percentage points



Sources: Datastream; calculations of DIW Berlin.

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Boeckx et al. (2014) and Gambacorta et al. (2014) show that unexpected ECB balance sheet enlargements have a positive impact on economic activity and prices in the euro area.⁷ By construction, these estimates exclude ECB policies that are not associated with shifts in the balance sheet. In particular, they do not take into account the effects that function through policy announcements. Communication, however, is typically considered a main pol-

icy tool of central banks.⁸ In our empirical assessment of the effectiveness of ECB policies, we therefore use the unexpected changes in sovereign bond yields on those days when the ECB communicated its policy to the public, and assess how these movements in government bond yields affect financial markets and the macroeconomy (see Box 1).

Non-standard policies are effective ...

We consider non-standard policy measures that the ECB employed from the beginning of the global finan-

⁷ See Boeckx, J., Dossche, M., Peersman, G. (2014): Effectiveness and Transmission of the ECB's Balance Sheet Policies, CESifo Working Paper No. 4907, and similar earlier studies from Peersman, G. (2011): Macroeconomic Effects of Unconventional Monetary Policy in the Euro area, ECB Working Paper No. 1397, and Gambacorta, L., Hoffmann, B., Peersmann, G. (2014): The Effectiveness of Unconventional Monetary Policy at the Zero Lower Bound: A Cross-Country Analysis, Journal of Money, Credit and Banking, 46, 615-642.

⁸ See Blinder, A., Ehrmann, M., Fratzscher, M., De Haan, J., Jansen, D. (2008): Central Bank Communication and Monetary Policy: A Survey of Theory and Evidence, Journal of Economic Literature, 46(4), 910-945.

cial crisis in 2007 until May 2015 (see Table). These measures include liquidity and funding operations (like LTROs) and measures of quantitative easing (like SMP, OMT, and the extended asset purchase program), as well as forward guidance and credit easing. We do not distinguish between these different policies. Instead,

we pool them and analyze the average reaction of the euro area and German economy to these non-standard measures.

We discuss the effectiveness of the policies by means of estimated impulse response functions to a non-standard monetary policy innovation. The idea of these impulse functions is to feed the estimated model with a hypothetical monetary policy shock and to see how this shock propagates through the economy, holding constant the other driving forces of the variables. We scale the hypothetical shock such that it lowers the two-year yield on euro-area government bonds (excluding Germany) by 0.25 percentage points.⁹

... in the euro area

We first study whether non-standard policies are effective in the euro area as a whole, and then consider the case of Germany. Figure 1 reports the results for the euro area benchmark specification. The solid green line shows the point estimate, while the black lines and shaded areas depict the 90 percent confidence bands, which are used to evaluate whether the point estimate is statistically significantly different from zero. The top left panel shows that the two-year rate drops on impact, before slightly overshooting and then returning to the level where it would have been without the surprise expansion. This leads to a significant and prolonged reduction in uncertainty on financial markets, as measured by the VStoxx.¹⁰ The volume of credit to non-financial corporations gradually increases and reaches a peak after three years. This overall change in financial conditions is associated with a gradual increase in prices as well as in the real GDP, with output peaking after 18 months, slightly earlier than prices. The responses of output and inflation are mirrored in the unemployment rate, which reaches its minimum after approximately two years, before returning to trend. All in all, the simulation shows that on average, the different non-standard measures of the ECB can lead to a significant stimulation of the macroeconomy.

While our results generally confirm previous estimates of the effectiveness of non-standard monetary policy, there are several interesting differences. Specifically, the above-

Table

Dates of the ECB monetary policy announcements considered in the analysis

Date	Policy Announcement
22.08.2007	Supplementary liquidity-providing longer-term refinancing operation (LTRO) with a maturity of three months
28.03.2008	LTROs with a maturity of six months
29.09.2008	Special-term refinancing operation
08.10.2008	Fixed rate tender procedure with full allotment on the main refinancing operation (MROs)
15.10.2008	Expansion of the list of assets eligible as collateral in Eurosystem credit operations
07.05.2009	LTROs with a maturity of one year
04.06.2009	Details on purchase program for covered bonds (CBPP)
03.12.2009	Phasing out of 6-month LTROs, indexation of new 1-year LTROs
04.03.2010	Phasing out of 3-month LTROs, indexation of 6-month LTROs
10.05.2010	Securities Markets Program (SMP)
28.07.2010	Review of risk control measures in collateral framework
03.03.2011	Further LTROs
09.06.2011	MROs as fixed-rate tender procedures with full allotment (FRFA) for as long as necessary, at least until October 2011
04.08.2011	Further LTROs with a maturity of three and six months
08.08.2011	ECB will actively implement its Securities Market Program
06.10.2011	New covered bond purchase program (CBPP2)
08.12.2011	Two additional LTROs with a maturity of three months
21.12.2011	Results of first 3-year LTRO
09.02.2012	ECB's Governing Council approves eligibility criteria for additional credit claims
28.02.2012	Results of second 3-year LTRO
06.06.2012	FRFA on MROs as long as necessary, and at least until January 2013
26.07.2012	"Whatever it takes" speech by ECB President Mario Draghi in London
02.08.2012	Outright Monetary Transactions program (OMT)
06.09.2012	Technical features of OMT
06.12.2012	FRFA on MROs as long as necessary, and at least until July 2013
22.03.2013	Collateral rule changes for some uncovered government-guaranteed bank bonds
02.05.2013	FRFA on MROs as long as necessary, and at least until July 2014
04.07.2013	Open-ended forward guidance: The Governing Council expects the key ECB interest rates to remain at present or lower levels for an extended period of time
08.11.2013	FRFA on MROs as long as necessary, and at least until July 2015
05.06.2014	Targeted longer-term refinancing operations (TLTROs)
03.07.2014	Details on TLTROs published
22.01.2015	Expanded asset purchase program

Source: DIW Berlin.

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The ECB has announced a number of different non-standard policy measures between 2007 and 2015.

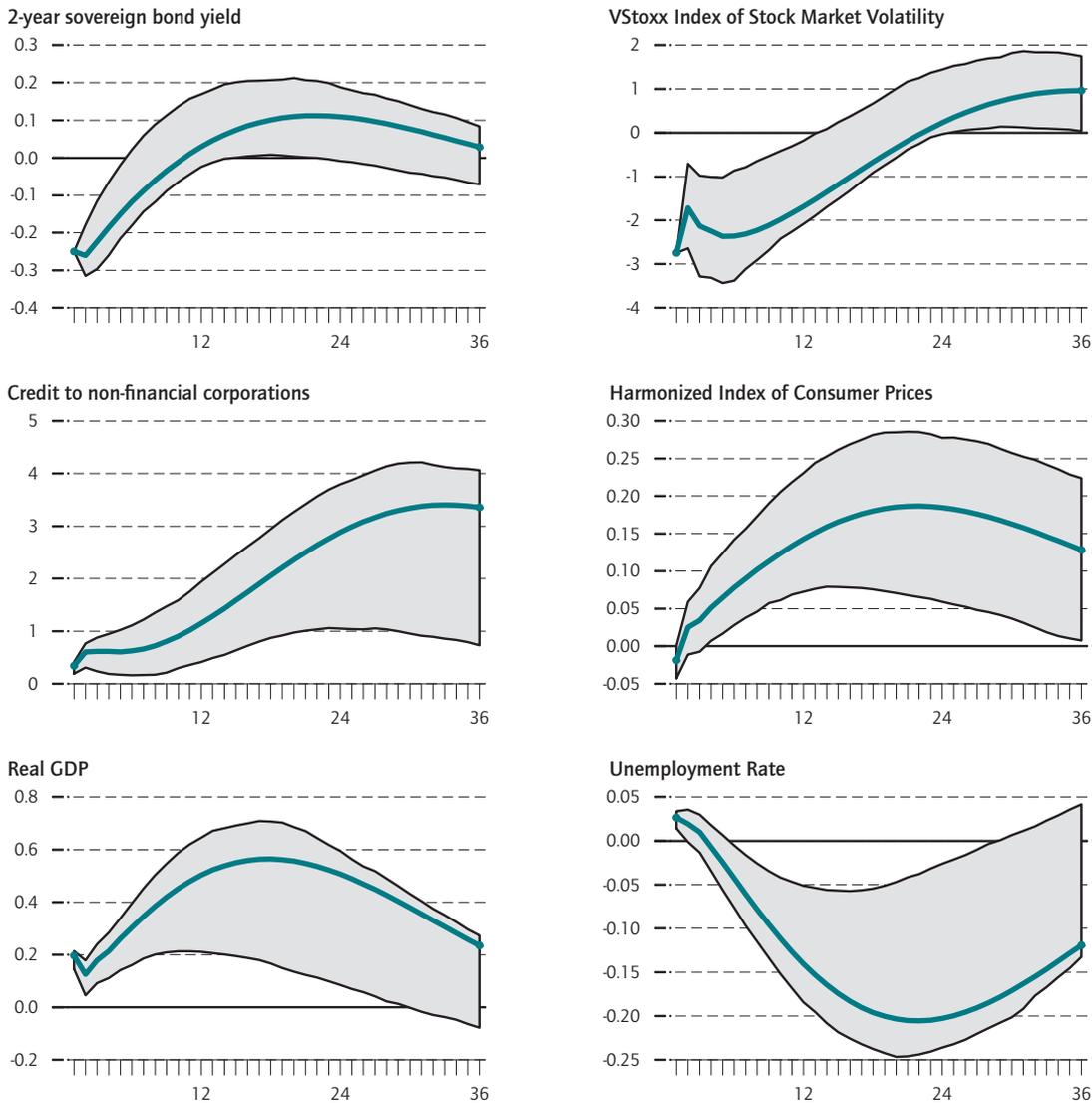
⁹ The two-year yield is computed as a GDP-weighted average of bond yields for the following countries: Austria, Belgium, Finland, France, Ireland, Italy, Netherlands, Portugal, and Spain. Germany is excluded, as German bonds played a particular role as a safe haven asset during the euro crisis. They are analyzed separately in the section on Germany.

¹⁰ The VStoxx is an index based on Euro Stoxx 50 realtime options prices and is designed to capture market expectations of near-term up to long-term financial market volatility. In the literature, the VStoxx and similar measures are often used as a measure for financial market risk aversion and uncertainty. See, for instance, Bekaert, G., Hoerova, M., Lo Duca, M., (2013): Risk, Uncertainty and Monetary Policy, *Journal of Monetary Economics*, 60(7), 771-788.

Figure 1

Macroeconomic effects of ECB policy in the euro area

In percent / percentage points deviations from trend¹



¹ Green solid lines are point estimates, black lines and shaded areas are 90 % confidence bands.

Source: calculations of DIW Berlin.

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An unexpected monetary expansion decreases government yields, stock market volatility and the unemployment rate, and increases credit, prices and real GDP.

mentioned studies that measure the stance of monetary policy using central bank balance sheets rather than government bond yields typically find that output and prices respond more quickly, peak earlier (after about six months), and reach their maximum simultaneously. Instead, we find a more sluggish response of both variables, peaking only after roughly two years, and with output leading prices. Interestingly, the output and price dynamics implied by our

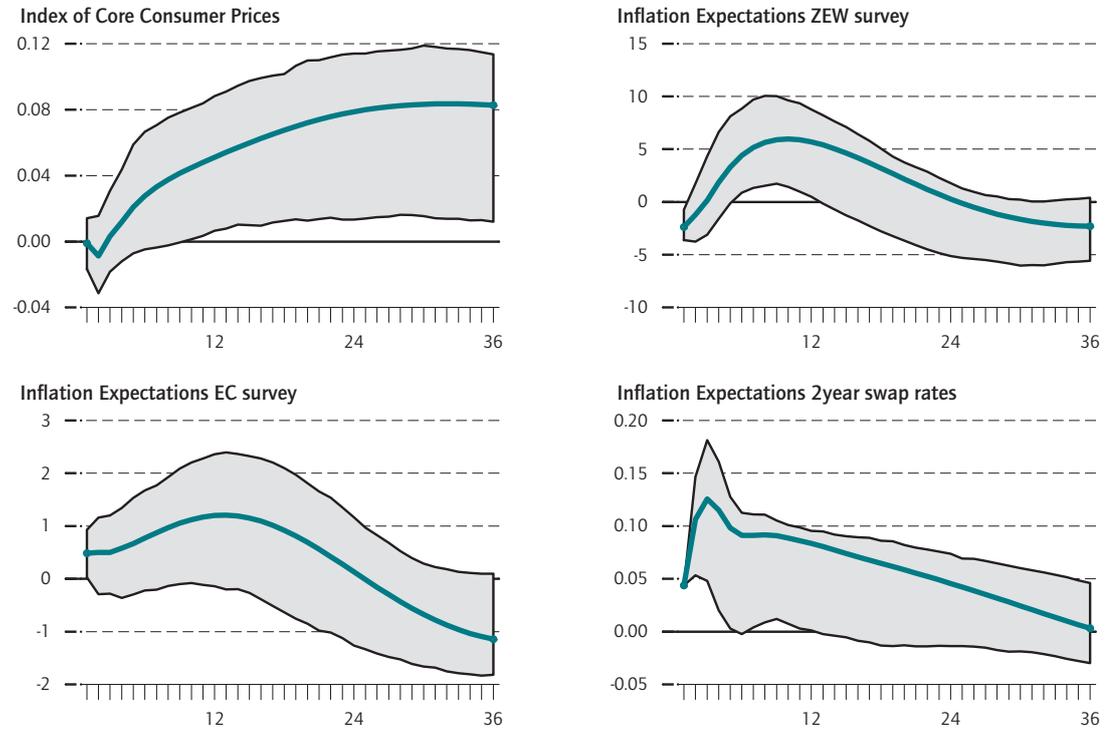
estimates are more similar to the behavior of these variables following a “standard” (conventional) monetary policy shock that works through changes in the policy rate.¹¹

¹¹ See, for example, Gertler, M., Karadi, P. (2015): Monetary policy surprises, credit costs, and economic activity, *American Economic Journal: Macroeconomics*, 7(1), 44-76.

Figure 2

Effects of ECB policy on euro area inflation expectations

In percent / percentage points deviations from trend¹



¹ Green solid lines are point estimates, black lines and shaded areas are 90 % confidence bands.

Source: calculations of DIW Berlin.

An unexpected monetary expansion increases inflation expectations.

As the primary mandate of the ECB is to stabilize inflation, and since inflation expectations play a crucial role for actual inflation, we next evaluate the effects of non-standard monetary policy innovations on core consumer prices and several measures of inflation expectations.¹² Figure 2 shows the impulse response functions. Core prices increase gradually and peak after approximately two years. The increase is both statistically and economically significant.

The next two panels show the responses of two survey-based measures of inflation expectations. The first one is a survey conducted by the Centre for European Economic Research (ZEW) among financial market experts. The experts are asked for a qualitative assessment of their inflation expectations for the euro area over the next six months.

The figure shows that, as headline and core prices increase, the difference between the share of analysts who expect a rising inflation rate and the share who anticipate a falling inflation rate widens significantly, by about five percentage points five months after the monetary policy shock.

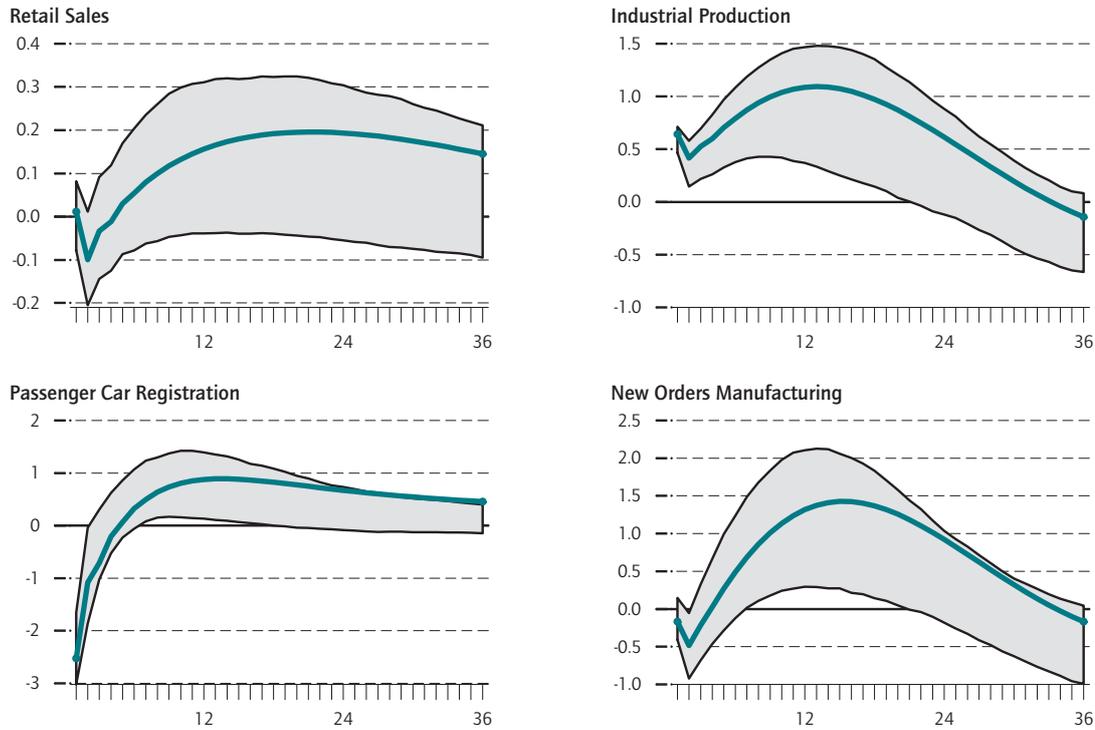
The second measure of inflation expectations is taken from the European Commission consumer survey. It gives a qualitative assessment of respondents' expectations about the development of consumer prices over the following twelve months. While inflation expectations increase on impact and for about one year according to this measure, the increase is not statistically significant. We also analyze the behavior of a financial market-based measure of inflation expectations following the shock, namely, of the euro inflation-linked swap rate with two-year maturity. The impulse response shows that the swap rate increases significantly, indicating an increase in inflation expectations.

¹² We add each variable to the benchmark six-variable VAR model, one at a time, and combine the responses of the marginal variables into one graph.

Figure 3

Effects of ECB policy on euro area real activity

In percent / percentage points deviations from trend¹



¹ Green solid lines are point estimates, black lines and shaded areas are 90 % confidence bands.

Source: calculations of DIW Berlin.

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An unexpected monetary expansion increases real activity.

As a final step in the evaluation of the effectiveness of non-standard monetary policy, we investigate the impact on several alternative measures of economic activity.¹³ Figure 3 reports impulse responses of retail sales, industrial production, car registrations, and new orders. Except for the first measure, all activity indicators increase significantly, either on impact or some months after the monetary surprise. The strongest response is found for new orders and industrial production, even exceeding the peak response of GDP.

As a word of caution, however, the results should not be necessarily interpreted as supporting the recent extension of the asset purchasing program. Sovereign bond yields in the euro area are currently on a low-

er level than they have been during most of the analyzed sample period. Thus there is potentially less room for beneficial macroeconomic effects from non-standard monetary policy measures through lowering bond yields further.

... and in Germany

We now investigate the effects of the ECB non-standard monetary policy measures on Germany's macroeconomy. The results are shown in Figure 4.¹⁴ Contrary to the average two-year yield in the euro area, German sovereign bond yields increase in response to the monetary expansion. The two-year yield rises by 0.1 percentage points and for roughly six months. The reaction of the

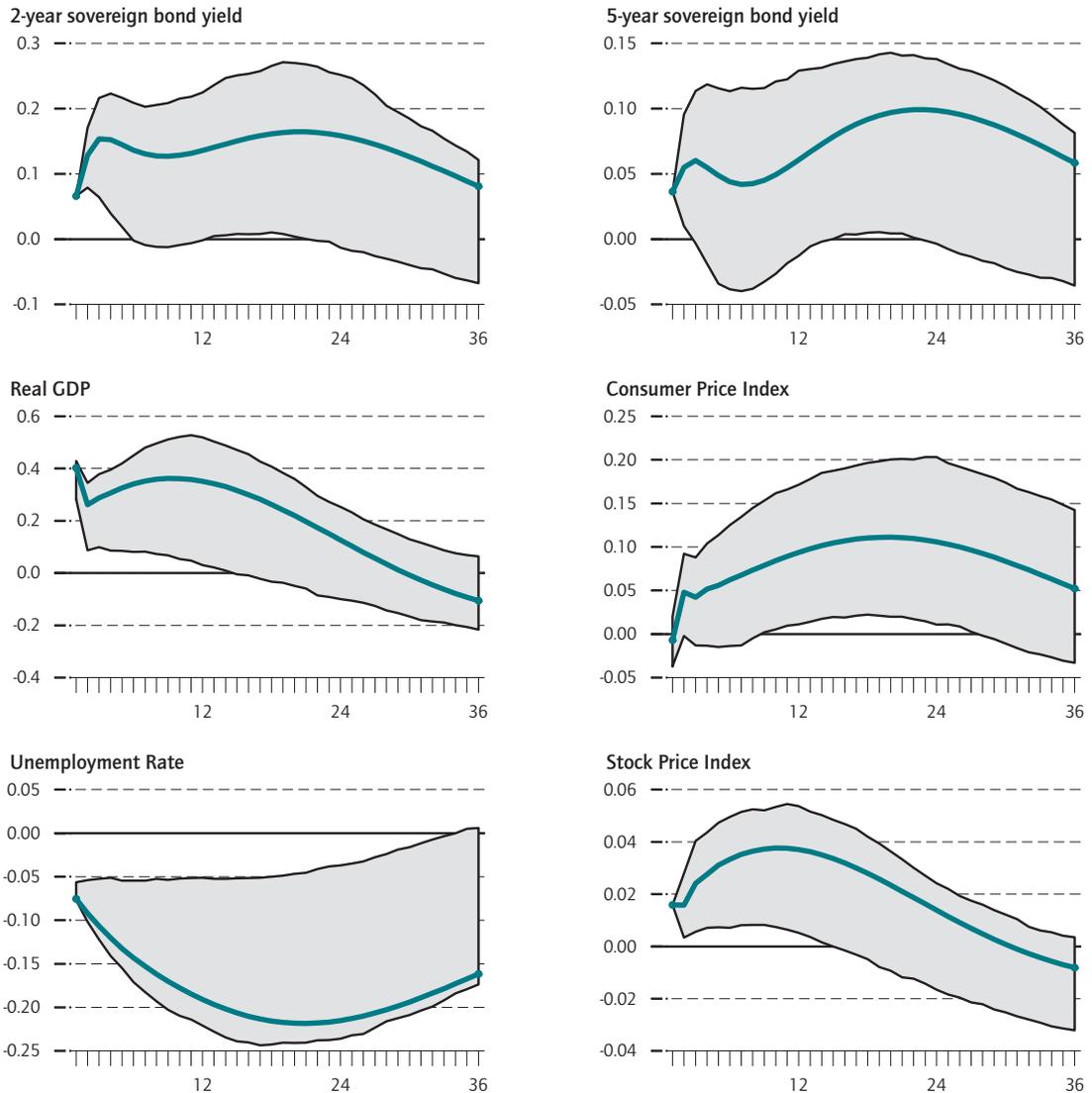
¹³ As the measures of economic activity are a proxy for real GDP, we do not add them as a seventh variable to the baseline model, but instead replace GDP.

¹⁴ As before, we compute the impulse responses of the variables for Germany by adding them as a seventh variable to the euro area baseline model.

Figure 4

Macroeconomic effects of ECB policy in Germany

In percent / percentage points deviations from trend¹



¹ Green solid lines are point estimates, black lines and shaded areas are 90 % confidence bands.

Source: calculations of DIW Berlin.

In Germany, an unexpected monetary expansion decreases the unemployment rate and increases government yields, prices and real GDP.

five-year yield is about half as large and less significant. This positive (rather than negative) reaction of German Bund yields to the surprise expansion can be explained by a flight-to-safety phenomenon. Particularly during the height of the euro-area debt crisis, German government bonds were seen as a safe haven for financial investors. As the non-standard monetary policy innovations of the

ECB reduced financial market uncertainty, the demand for safe-haven assets declined.

Remarkably, despite the increase in sovereign bond yields, the responses of the other variables show that the German economy does profit from the monetary stimulus. Real GDP increases significantly on impact and

for roughly two years, and a similar response can be observed for the price level. The increase in real output is accompanied by a decrease in the unemployment rate, which falls by up to 0.2 percentage points. The last panel shows that stock prices in Germany also increase after the policy innovation, indicating that financial markets do not perceive the non-standard expansion as harmful for the growth prospects of German companies.

Conclusion

This study estimates the effects of non-standard ECB policy on the macroeconomy in the euro area and in Germany. For the euro area, it shows that unexpected monetary expansions, associated with a decline in sovereign bond yields, lead to a rise in real GDP and prices.

Importantly, inflation expectations also increase. Moreover, financial market uncertainty decreases and the volume of credit to non-financial corporations rises. These results suggest that the ECB's non-standard monetary policy measures have supported the real economy and prices in the euro area over the past few years.

The reaction of the macroeconomy in Germany is qualitatively similar to that of the euro area. Even though sovereign yields tend to increase in response to the expansionary surprises, prices and output rise, and the unemployment rate falls. Overall, the results indicate that the German economy profited from the monetary interventions, possibly due to its close financial and economic ties with the rest of the euro area.

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SEVEN QUESTIONS TO MALTE RIETH

»Our study shows that the ECB's measures have been effective«

1. Mr. Rieth, your analysis examines the effects of the ECB's unconventional monetary policy measures. How did you go about it? We've conducted an empirical study of how various measures introduced by the European Central Bank (ECB) over the past seven years have impacted the economy in the euro area and in Germany, respectively. We didn't just consider the individual measures: we also calculated their average effect by estimating a macroeconomic model and then running a simulation.
2. How do you define an "unconventional monetary policy measure"? We chose a relatively simple definition and excluded all measures related to the ECB's key interest rate, because this rate has been close to zero since 2009. The ECB was not able to use the interest rate to further stimulate the euro area's economy and had to resort to other measures, like making it easier for the banks to have access to credit or, in some cases, buying government bonds. Another example of such a measure is the OMT program (Outright Monetary Transactions).
3. The public response to the ECB's measures has been quite critical. What are the risks here, theoretically? This is an important point. We look primarily at the "good side" of these measures, so to speak – but at the same time, we don't want to hide the fact that there are also risks. Such risks may include distributional effects, for instance, because the member countries in the euro area – as well as households, groups of people, and companies – are all impacted in different ways by the measures. In the worst-case scenario, these measures could also lead to bubbles in certain financial markets.
4. What effects have these measures had on the euro area? Our research shows that these measures have been very effective – that is, they've had an economically significant effect on prices as well as GDP and inflation expectations. We can therefore conclude that these measures, by stabilizing prices and price expectations, have helped to fulfill the ECB's mandate.
5. How have these measures affected the German economy? The effects in Germany differ very little from those that we've observed in the euro area as a whole. Fears that a monetary policy that's good for Europe is bad for Germany appear unfounded – in fact, we've observed the opposite. Our analysis indicates that the reaction of prices as well as production in Germany is similar to the reaction in the euro area as a whole.
6. How do the ECB's unconventional measures affect German government bonds? Measures that reduce interest rates in other countries lead to an increase in German sovereigns yields – even if it's only minimal. The effect we're seeing here can be explained by a reduction in safe-haven demand for German government bonds. This demand is lower when the ECB does something that is perceived to be beneficial for the euro area as a whole, and therefore German yields tend to increase. Nevertheless, our estimates show that output and prices in Germany also rise. This positive effect is primarily due to the fact that the German economy is closely connected to the rest of Europe, both financially as well as through the real economy.
7. What do your results indicate about the effectiveness of the ECB policy of the past few years? Based on our analysis, we have come to the conclusion that the ECB policy was very effective. It gave the economy a boost and helped the ECB stabilize prices and inflation expectations – and thus combated the risk of deflation quite effectively.

Interview by Erich Wittenberg