

Drometer, Marcus; Siemsen, Thomas; Watzka, Sebastian

Working Paper

The Monetary Policy of the ECB: A Robin Hood Approach?

CESifo Working Paper, No. 4178

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Drometer, Marcus; Siemsen, Thomas; Watzka, Sebastian (2013) : The Monetary Policy of the ECB: A Robin Hood Approach?, CESifo Working Paper, No. 4178, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/71177>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Working Papers

www.cesifo.org/wp

The Monetary Policy of the ECB: A Robin Hood Approach?

Marcus Drometer
Thomas Siemsen
Sebastian Watzka

CESIFO WORKING PAPER NO. 4178
CATEGORY 7: MONETARY POLICY AND INTERNATIONAL FINANCE
MARCH 2013

An electronic version of the paper may be downloaded

- *from the SSRN website:* www.SSRN.com
- *from the RePEc website:* www.RePEc.org
- *from the CESifo website:* www.CESifo-group.org/wp

The Monetary Policy of the ECB: A Robin Hood Approach?

Abstract

We derive four sets of counterfactual national interest rate paths for the 17 Euro Area countries for the time period 1999 to 2012. They approximate desirable national interest rates countries would have liked to implement if they could still conduct independent monetary policy. We find that prior to the financial crisis the counterfactual interest rates for Germany trace the realized EONIA rate very closely, while monetary policy has been too loose especially for the southern European countries. This situation was inverted with the onset of the financial crisis. To shed light on the underlying decision rule of the ECB, we rank different rules according to their ability to aggregate the national counterfactual paths to the EONIA rate. In addition to previous literature we find that those mechanisms which care for countries who fare economically worse than the Euro Area average perform best.

JEL-Code: E020, E420, E470, E520, E580.

Keywords: monetary policy, ECB, Bundesbank, decision rule, counterfactual interest rate paths.

Marcus Drometer
Ifo Institute – Leibniz Institute
for Economic Research
at the University of Munich
Poschingerstraße 5
Germany – 81679 Munich
drometer@ifo.de

Thomas Siemsen
Department of Economics
University of Munich
Ludwigstraße 28
Germany – 80539 Munich
Thomas.Siemsen@econ.lmu.de

Sebastian Watzka
Department of Economics
University of Munich
Ludwigstraße 28
Germany – 80539 Munich
Sebastian.Watzka@econ.lmu.de

First Version: December, 2012

This Version: March 15

1 Introduction

After a fairly smooth starting period when the Euro was introduced in January 1999, the ECB has gone through pretty tumultuous years recently. Tensions arose particularly strongly when the financial crisis hit some Euro Area countries and increased unemployment and government bond yields to seemingly ever-higher levels. Some feared the ECB's monetary policy transmission mechanism was broken and the ECB should be taking more aggressive steps; others instead warned that the ECB's prime mandate of price stability might be endangered through more aggressive policy measures and warned against those steps.

Taking for granted that it is extremely difficult if not impossible to ever find out what the ECB's truly optimal response would have been, we try to shed light on how the ECB decides on its interest rates. In particular, we ask how the diverging interests of the different Euro Area member countries are considered in the ECB's decision process. Therefore, we first need to find out how national central banks would have set their interest rates in case they were still in a position to do so. We then employ various potential policy rules to aggregate the counterfactual national interest rates and test which resulting interest path best fits actual monetary policy in the Euro Area.

To simulate counterfactual national policy rates for the individual Euro Area countries we employ a Taylor Rule framework. Our simple baseline counterfactual path is derived from a standard Taylor (1993) rule estimated for the Bundesbank for the period 1979 to 1989. Thereby, we draw on the dominant role of the Bundesbank in determining continental Europe's monetary policy. The comparison of actual interest rates (EONIA) with counterfactual national policy rates that would have been set if the various countries all followed Bundesbank policy is interesting for various reasons: First, the Bundesbank was arguably one of the only truly independent central banks in continental Europe prior to the introduction of the Euro. Thus, to study counterfactual *national* interest rate paths which cater to domestic needs one has to study the Bundesbank. Second, the Bundesbank was very successful in its policy.

Despite that dominant role and its success in conducting monetary policy for Germany, one might question the assumption that the other Euro Area countries would necessarily want to pursue the same policy now. With the introduction of a single monetary policy the structure of the Euro Area changed fundamentally and it is not at all obvious that even the Bundesbank would conduct the same monetary policy now. Therefore, we use three different alternatives for robustness: the original rule suggested by John Taylor (Taylor, 1993). Also, to account for more sophisticated policy functions we estimate two additional Bundesbank rules which allows for interest rate smoothing and forward-lookingness.

To shed light on how the ECB's Governing Council might systematically have reached its decisions, we compare different decision rules and analyze which of them aggregates

the counterfactual national interest rate paths closest to the EONIA path, thereby following and extending the work of [Hayo and Méon \(2011\)](#). Most importantly, we include additional decision rules in our analysis which are based on the member countries' current economic characteristics. Specifically, we study decision rules in which the ECB takes into account the economic need of a country and focuses on members in unfortunate economic conditions, the "weakest links" of the Euro Area. Under such a "*Robin Hood*" approach of central banking, it is willing to trade-off stability in booming countries to accommodate the needs of countries under distress. Finally, we extend the previous literature by studying a longer sample period which also includes the recent financial crisis.

These exercises yield various interesting results. We show that prior to the financial crisis the counterfactual interest rate paths for Germany traced the EONIA paths very closely. This was a period when Germany was considered the "weak man of Europe". The contrast is especially striking when compared to the southern European countries and Ireland for which monetary policy has been far too loose. This picture changed with the onset of the financial crisis. While Germany experienced a solid rebound most of the other Euro Area countries remained in economic distress now requiring much lower rates than Germany. The ECB seems to have accommodated some of these needs by keeping the EONIA rate low and closer to the rates required by weak-performing countries than to the rate required in Germany.

We take this result as suggestive for the view that next to its key emphasis on independence and price stability, the ECB has at least some focus on "weakest links" in the Euro Area by being especially considerate to their economic needs. We test this hypothesis formally and show that compared to the standard decision rules used in the literature like bargaining with GDP weights ([Hayo and Méon, 2011](#)) and supermajority votes ([Riboni and Ruge-Murcia, 2010](#)) the decision rules which care for economic need can explain the actual path of the EONIA best. Based on this Robin Hood approach the ECB would currently need to set negative nominal interest rates. This could explain why the ECB introduced unconventional monetary policy measures like its recently announced Outright Monetary Transactions.

Our paper is structured as follows: After briefly discussing the most important literature and our contribution to it, Section 3 derives our counterfactual policy rates for Euro Area member countries. Section 4 then describes the various possible ECB decision rules that we compare. Results are shown in Section 5. Section 6 provides three additional sets of counterfactual interest rate paths and various other specifications of "economic need". Finally, Section 7 concludes.

2 Related Literature

There exists a large body of literature using counterfactual interest rate paths both for positive and normative analysis. [Hayo and Hofmann \(2006\)](#) compare the ECB's monetary policy stance on inflation and real activity to a Bundesbank counterfactual, estimating a monthly Taylor rule for the period 1979 to 1998. They find that ECB and Bundesbank reacted similarly to inflation while the ECB pursued a somewhat tougher stance on the output gap. The judgment on whether the ECB has been too loose or too tight compared to the Bundesbank hinges crucially on the estimated constant. While [Hayo and Hofmann \(2006\)](#) are solely concerned with the dichotomy between the ECB and the Bundesbank, our goal is to derive a counterfactual interest rate path for each of the Euro Area member countries.

A large literature has contributed to today's understanding of the Bundesbank's monetary policy. [Clarida and Gertler \(1997\)](#) provide a thorough narrative and empirical analysis of the Bundesbank's spell for the period 1979 to 1993. They conclude that "*the estimated coefficient on the output gap variables are very close to the ones Taylor used. Thus, [...], it is not an exaggeration to suggest that the Bundesbank policy rule during post-Bretton Woods era bears reasonable proximity to the rule Taylor employs [...].*" This implies that money growth seems not to contribute any explanatory power to the Bundesbank's behavior, a result which is in stark contrast to the official monetary goal published. [Gerberding, Seitz, and Worms \(2005\)](#) show, however, that this result might be driven by the usage of ex-post revised data. Using German real time data money growth enters the regression significantly along inflation and the output gap. Whilst we do not dispute the importance of money growth for the Bundesbank, we follow [Clarida and Gertler \(1997\)](#) and exclude money growth from our specification in order to keep our analysis simple and tractable.¹

A number of studies investigate whether regional factors influence the ECB's decisions. [Heinemann and Huefner \(2004\)](#) derive a policy rule based on Euro Area aggregates with an alternative determined by the median inflation rate and median output gap of all member countries. While regressions based on Taylor rules turn out to be inconclusive, they find some evidence for the influence of regional developments when focusing on actual changes in the interest rate based on an ordered probit approach. [Sturm and Wollmershaeuser \(2008\)](#) investigate the adequacy of the single monetary policy by calculating country-specific monetary stress for the Euro Area countries. For that purpose, they calculate counterfactual scenarios for all member countries based on a Taylor rule calibrated on the ECB and Euro Area aggregates. Among others, they find that business cycles within the Euro Area only converge if more than proportional weight is attached to small member countries when calculating monetary stress for the Euro Area members.

[Riboni and Ruge-Murcia \(2010\)](#) study the interest rate setting of five central banks

¹In all our estimation specifications M3 growth enters only insignificantly.

to understand the decision-making of committees. Among the different voting rules tested in their analysis, a consensus model, where a supermajority is required to change the interest rate, performs best. The main argument behind this result is that such a rule creates a gridlock interval where no changes occur thus producing a high level of persistence of the interest rate. In contrast, with a majority voting rule, the identity of the crucial median committee member and hence the interest rate selected are likely to change from one to another meeting. Yet, [Riboni and Ruge-Murcia \(2010\)](#) abstract from the origins of preference heterogeneity among committee members, i.e. differences in the economic situation of the members / regions of a currency area, which are central to our analysis.

The paper closest to our analysis is [Hayo and Méon \(2011\)](#) who also construct hypothetical interest rate paths based on various estimated Taylor rules. They test different mechanisms to aggregate the resulting country specific optimal policies in order to discover the decision rule of the Governing Council. In contrast to their analysis, we test whether the relative economic situation of the Euro Area countries plays a role in the decision process. Moreover, we extend the time period studied to include the Euro crisis until 2012. Finally, we prefer to calibrate a Taylor rule on the behavior of the Bundesbank and Taylor's original specification instead of averaging different Taylor rules, derived from different estimation procedures. On the one hand, averaging several counterfactual paths leaves ambiguous what the average exactly captures. On the other hand, as discussed below, it is not clear whether the estimation of independent Taylor rules for each of the Euro Area countries is admissible due to limited discretion over monetary policy in some countries.

3 Derivation of Counterfactual Interest Rate Paths

As no information on the decisions of the Governing Council are made public, we need to infer its policy rule from the interest rate set by the ECB and observable economic characteristics of the Euro Area member countries. We do so by analyzing different mechanisms which aggregate the national counterfactual rates to the EONIA rate. To this end, we first need to derive counterfactual national interest rate paths for these countries, i.e. the interest rate paths the central bankers would like to set *if they could still conduct independent monetary policy*.

Several avenues can be used to derive these counterfactual interest rate paths. For example [Hayo and Méon \(2011\)](#) and [Hayo \(2006\)](#) estimate Taylor rules for the pre-ECB period (1979-1998) for each of the Euro Area countries and use the estimated Taylor rule coefficients to expand the national interest rate series beyond 1998. This approach implicitly assumes that each of the central banks was indeed in the position to conduct an unconstrained monetary policy, adjusting the interest rate level to changes in inflation

and the output gap according to its own national needs. We argue, however, that this assumption might not hold for the central banks of smaller countries during this time. Instead it is rather undisputed in the literature that the Bundesbank played the dominant role in setting the monetary policy stance in continental Europe² and that most central banks closely followed the Bundesbank's lead, adjusting their policy rates *quid pro quo* with the German. An example worth mentioning is the ERM crisis that resulted from Bundesbank tightening after German reunification (Clarida, Gali, and Gertler (1998)). A further piece of evidence is provided in Table 3.1 which shows the correlation for the money market rate between Germany and the six largest Euro Area countries. Especially for the small neighboring countries, the money market rates show a very strong correlation with the German Frankfurt day-to-day rate.

Table 3.1: Correlations in Euro Area Countries

Correlation between Germany and	Money Market Rate
Austria	0.97
Netherlands	0.96
Belgium	0.89
France	0.78
Italy	0.63
Spain	0.59

NOTES: all correlations are for the period 1980-1998. Source: IMF IFS

Thus, it is not clear whether the observable national interest rate paths were indeed steered by a catering for domestic needs, i.e. inflation and output gap, and could therefore readily be captured by a Taylor rule, or were simply set in response to exogenous changes in the German monetary policy stance. Then country-specific Taylor rule coefficients might not be adequate as a measure for the central banks policy stance and the derivation of the counterfactual interest rate paths.

Nikolsko-Rzhevskyy and Papell (2011) pursue another path by simply employing Taylor (1993)'s original specification with slight tweaks to the output gap coefficient. By using Taylor's original coefficients they can draw on the notion that this simple rule describes an "optimal", or rather desirable interest path. In their own words: *"With Taylor's original rule, [...], you can evaluate policy in terms of adherence to and deviation from a well-specified rule. Once you start changing the rule, as in various Taylor rules with different coefficients and/or variables, you run the risk of characterizing discretionary policy as adherence to a particular rule."* However, it is not clear whether these coefficients do indeed describe desirable policy also for the Euro Area. Most European central banks

²See for example Clarida, Gali, and Gertler (1998), Sarcinelli (1986), Fischer (1987), Giavazzi and Giovannini (1998), Gros and Thygesen (1988).

and in particular the German Bundesbank did not follow a dual mandate, targeting both inflation and real activity, but rather had an exclusive focus on price stability. This is suggestive for the notion that the weight put on the output gap would potentially be lower for European central banks compared to the Fed.

For this reason we follow yet another avenue taking advantage of the Bundesbank's dominant role in determining the monetary policy stance for continental Europe between the 1980-ies and 1998. As mentioned above it is rather undisputed that the Bundesbank conducted an independent and very successful monetary policy during this time spell, to which [Gerberding, Seitz, and Worms \(2005\)](#) refer to as the Bundesbank's most successful period. Keeping our analysis as simple as possible, we estimate a quarterly Taylor rule for the Bundesbank using the period 1979Q3 to 1989Q4.³ The estimated coefficients are then used to derive a counterfactual interest rate path for each of the up to 17 Euro Area countries for the time spell 1999 to 2012.

Of course, it is not certain that these simple counterfactual interest rate paths do indeed capture the monetary policy each Euro Area country would like to implement if monetary policy would still be under national reign. Thus, in Section 6 we repeat our exercise with three alternative sets of counterfactual paths: one using [Taylor \(1993\)](#)'s original specification and coefficients and one using Taylor's specification augmented with an interest-rate smoothing motive. A large body of literature has shown, that on the one hand interest rate smoothing is theoretically desirable and on the other hand empirically observable (for a comprehensive survey see [Sack and Wieland, 2000](#)). [Rudebusch \(2002\)](#) has shown that interest rate smoothing between quarters is not supported by empirical evidence. Therefore, we choose a monthly specification for this slightly more sophisticated counterfactual interest rate path. Last but not least, we choose a forward looking Taylor rule specification where the Bundesbank sets today's policy rate taking into account inflation expectations one year ahead. This specification also allows for interest rate smoothing. We show that our results are robust to the set of counterfactual national interest rate paths.

More specifically we estimate the following equation using ordinary least squares

$$i_t^{BuBa} = \alpha + \beta \cdot \pi_t^{Ger} + \gamma \cdot y_t^{Ger} + \eta_t ,$$

where π_t^{Ger} is the year-on-year growth rate of GDP deflator, y_t^{Ger} is the percentage deviation of real GDP from a linear trend and η_t is an error term.⁴ Table 3.2 shows the result of the regression.

³This period starts after the second oil price shock had faded off and ends prior to the reunification (see also [Clarida, Gali, and Gertler, 1998](#)).

⁴As will be shown in Section 6 using two different sets of time series for the monthly and for the quarterly estimation leads to slight quantitative deviations between the two interest rate paths. However, we prefer this approach to an intrapolation of the quarterly GDP deflator and GDP series.

Table 3.2: Bundesbank regression results

Dependent Variable:	Frankfurt day-to-day rate
Sample:	1979Q3-1989Q4
Included observations:	41
α	3.96 (0.91)
β	1.20 (0.21)
γ	0.59 (0.18)
R^2	0.70

NOTES: Standard errors in parenthesis.

All variables enter highly significant into our regression. The inflation coefficient satisfies the Taylor principle, suggesting that the Bundesbank conducted stabilizing monetary policy. Compared to the results found by [Taylor \(1993\)](#) for the Fed, the Bundesbank put relatively more weight on stabilizing real activity. This is in line with [Clarida, Gali, and Gertler \(1998\)](#). Given that the average communicated inflation target of the Bundesbank between 1979 and 1989 has been 2.9% this implies a steady state real rate of about 4.5.⁵ For our simple, purely backward looking model specification a R^2 of 0.70 is acceptable.

Armed with these coefficients we can now return to the derivation of the counterfactual national interest rate paths. In our specification the Bundesbank sets interest rates according to

$$\begin{aligned}
 i_t^{BuBa} &= r^* + \pi_t^{Ger} + \mu \cdot (\pi_t^{Ger} - \pi^*) + \gamma \cdot y_t^{Ger} \\
 &= [r^* - \mu\pi^*] + (1 + \mu) \cdot \pi_t^{Ger} + \gamma \cdot y_t^{Ger} \\
 &= \alpha + \beta \cdot \pi_t^{Ger} + \gamma \cdot y_t^{Ger}
 \end{aligned}$$

and hence the constant α is determined by

$$\alpha = r^* - \mu\pi^*,$$

with r^* being the equilibrium real rate in Germany between 1979 and 1989 and π^* being the Bundesbank's inflation target. Projecting the Bundesbank's policy stance into the time period 1999 to 2012 we have to account for potential changes in these structural parameters. Consider the inflation target first. The time period 1999-2012 stood completely under the reign of the ECB. Hence, the inflation target π^* is the same for all Euro Area countries and equal to 2%.

As for the equilibrium real rate there is no reason to assume that it has been the same

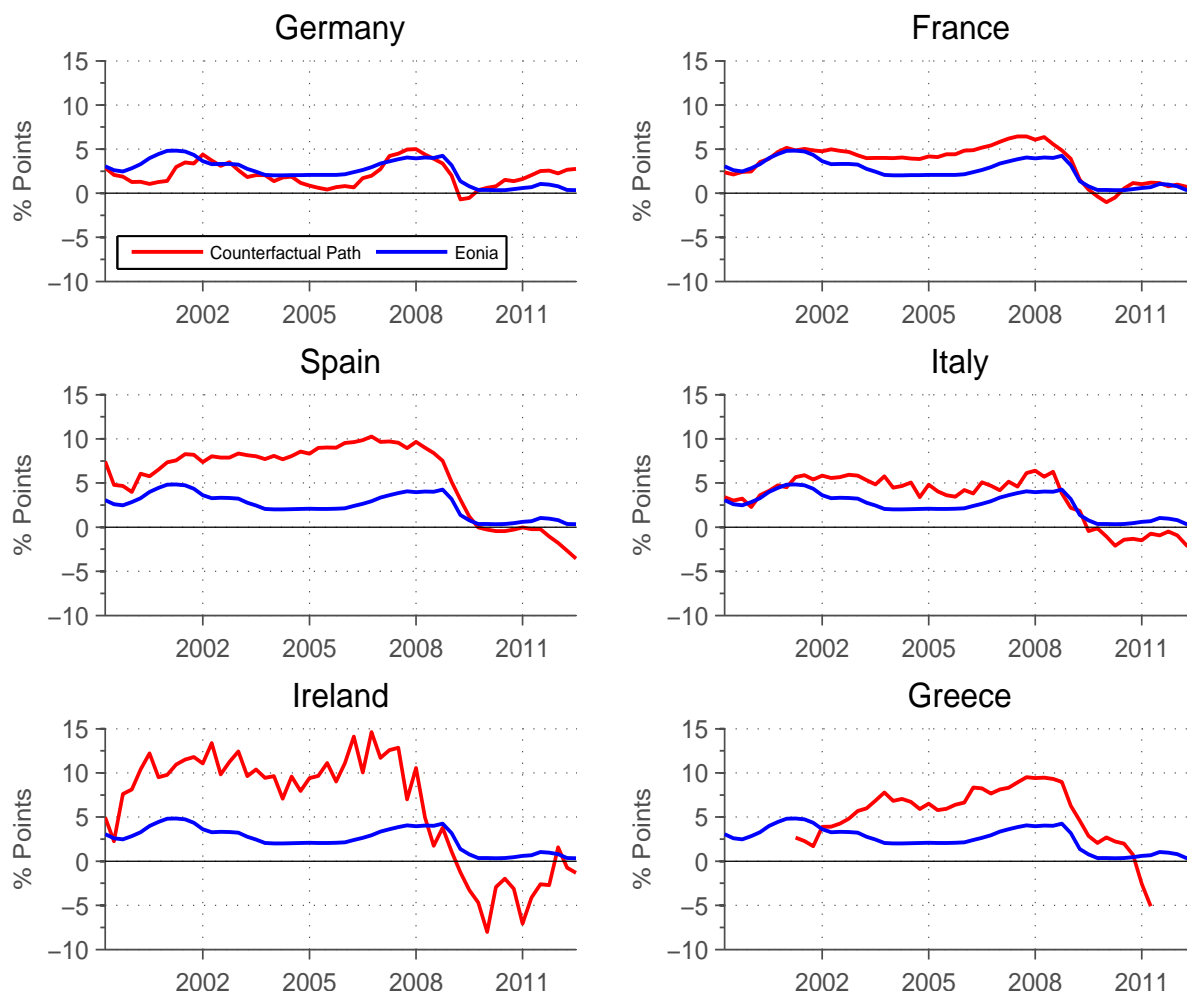
⁵The average inflation target is taken from [Clarida and Gertler \(1997\)](#), Table 10.1

for each of the Euro Area countries. Therefore, we adjust the constant to account for national heterogeneity in the real rates. Taylor (1993) justified choosing a constant of $2 - 0.5\pi^*$ since the "2-percent 'equilibrium' real rate is close to the assumed steady state [real] growth rate of 2.2 percent." We follow his approach by approximating the equilibrium real rate r^* with the average growth rate of real GDP between 1999 and 2012 in each of the Euro Area countries.⁶ Thereby we obtain a constant α^c , $c \in \{1, \dots, 17\}$ which now allows us to derive our baseline counterfactual national interest rate paths $\{i_t^c\}$ as

$$i_t^c = \alpha^c + 1.20 \cdot \pi_t^c + 0.59 \cdot y_t^c, \quad \forall c \in \{1, \dots, 17\} \quad (3.1)$$

Figure 3.1 shows the counterfactual interest rate paths for 6 of the 17 Euro Area countries.⁷

Figure 3.1: EONIA and counterfactual Bundesbank path



⁶Source OECD MEI. To see why this approximation is appropriate consider the standard Euler equation $u'(c_t) = \beta(1+r_t)u'(c_{t+1})$. Approximating c_t by y_t and using log-utility it follows that $\frac{y_{t+1}}{y_t} \equiv (1+g_t) = \beta(1+r_t)$. With $\beta \approx 1$ one arrives at $g_t \approx r_t$. And hence $r^* \approx \mathbb{E}[g]$. For a different approach to adjust the constant see Hayo (2006).

⁷See Appendix A for all 17 countries.

Compared to the other 16 Euro Area countries we find the counterfactual path for Germany being strikingly close to the EONIA rate, especially for the period 2002-2010. This might be suggestive for the view that during this period the ECB had a focus on the economic conditions in Germany, at this time considered as the *sick man of Europe*. The tight relationship between the counterfactual interest rate paths for Germany and the EONIA rate becomes especially evident if one compares the figure for Germany with those of the other large Euro countries. For all of these countries the counterfactual paths lie above the EONIA rate, suggesting that monetary policy has been too loose from a national point of view for those economies. For southern European countries like Greece, Spain and Italy, but also for Ireland the deviation has been significant, being sometimes an order of magnitude higher than in Germany. Most strikingly is the case of Ireland. At the height of the Irish boom our counterfactual measure would have prescribed an interest rate of up to 15 percentage points. This is mostly driven by the steep price increases of above 4% in 2007-2008.⁸

The overall picture changes with the onset of the Euro crisis. For most of the southern European countries which were hit strongly by rising refinancing costs the counterfactual paths dip deep into negative territory. In Germany, however, the strong economic rebound with prices increasing around 1% and a robust positive output gap required a monetary tightening already at the beginning of 2010. This time, however, the ECB did not accommodate the German needs. The EONIA rate remained closely at the zero lower bound while the counterfactual German path suggests a policy rate of above 2% in the middle of 2012. This seems supportive for the notion that the ECB ceased focusing on Germany and instead accommodating the needs of the periphery countries, now the sick men of Europe.

Interestingly, our exercise predicts counterfactual national interest rates deep in the negative range from the onset of the crisis. Since monetary policy is necessarily constrained by the zero lower bound, our results could be seen as evidence for the need to pursue unconventional policy measures like the recently announced Outright Monetary Transactions.

4 Potential decision rules of the ECB

The monetary decision of the ECB are made by its Governing Council, composed of the (currently) seventeen governors of the national central banks and six members appointed by the European Council. The rule according to which the Governing Council acts is far from being obvious as the minutes of meeting are only published with a great time lag. According to its statutes, decisions are taken by simple majority rule in the Governing

⁸In the case of Greece EUROSTAT does not feature data on the GDP deflator beyond 2011Q2.

Council.⁹ In principle, this allows for the possibility that conflicts over monetary policy result in policies against a minority of Euro Area members. Against this backdrop, some critics have proposed that voting rights should be granted according to each country's capital key. However, the ECB itself emphasizes that decisions follow a census among experts without reference to national interests.¹⁰ As no information on the decisions of the Governing Council are made public, we need to infer its policy rule from the interest rate set by the ECB and counterfactual national interest rates.

As a starting point we use a decision rule based on Euro Area aggregates, i.e. GDP weighted national inflation and output gap, since most of the literature on monetary unions assumes that monetary decisions of common central banks are based on union-wide aggregates.¹¹ This could represent a situation where the members of the Governing Council jointly maximize an objective for the Euro Area. Our major exercise is to test whether any alternative policy rule can explain the actual interest setting behavior of the ECB better than this benchmark. For that purpose, we first consider a number of political economy scenarios where the governors follow national interests. In particular, we look at majority vote (median voter), bargaining and consensus rule as in [Hayo and Méon \(2011\)](#) and [Riboni and Ruge-Murcia \(2010\)](#). Second, we test whether the Governing Council deviates from focusing on pure Euro Area aggregates in order to support countries under unfortunate economic circumstances. We thereby define weak countries by the deviation of a country's output gap from the Euro Area output gap: the worse the output gap of a country relative to the output gap of the Euro Area, the more weight does a country's counterfactual interest rate obtain. A central bank which would show some catering to the needs of the weakest countries would be willing to trade-off economic stability in strong countries for monetary easing in weak countries. Whilst we refrain from any normative judgment we refer to such an approach as Robin Hood rule.

The political economy scenarios are characterized by the assumption that the members of the Governing Council act in the best interest of their own country. In our setting each country's counterfactual policy is the interest rate based on Taylor rule estimates as described in the previous chapter. In doing so, we implicitly assume that governors do not take into account detrimental effects on other countries and abstract from potential repercussions on their own economy. Since the Governing Council is composed of the governors of the national central banks and the members of the Executive Board, there exist numerous cases depending on the assumption of how the latter behave. For example, they could vote for their own country's interest or in an Euro Area view. Since the resulting differences turn out to be qualitatively negligible in our empirical analysis, we restrict attention to the case where only the governors of the national central banks

⁹See Article 10.1 of the "Protocol of the statute of the European System of Central Banks and of the European Central Bank".

¹⁰The first president of the ECB put it the following: "The members of the Governing Council considers the interests of the Euro as a whole; they do not represent their respective countries." ([Duisenberg \(2002\)](#)).

¹¹See e.g. [Alesina and Grilli \(1992\)](#), [Gros and Hefeker \(2002\)](#) and [Sturm and Wollmershaeuser \(2008\)](#)

matter, a pure one-member-one-vote principle.

The most straightforward political economy scenario is majority voting as prescribed by ECB's official rules. Given the single dimension of monetary policy and the single-peakedness of the country-specific policy preference, the median voter theorem applies. Hence, the outcome of the process can easily be determined as the median of the distribution of the nationally optimal interest rates.

Alternatively, the members of the Governing Council might bargain over monetary policy. We depict this possibility by a simple Nash-bargaining model where the outcome is a weighted sum of individually optimal interest rates. In doing so, we first assume that each member has the same bargaining weight. However, since large countries like Germany are likely to be more influential than tiny ones like Malta, we test a version with bargaining weights based on GDP as well.

Finally, we consider a consensus rule which requires a supermajority for any changes in monetary policy. [Riboni and Ruge-Murcia \(2010\)](#) argue that such a rule best describes the decision-making of monetary committees, mainly because it produces persistence of the interest rate over time. Accordingly, in a first stage the committee decides by simple majority whether to decrease or increase the interest rate. In a second stage, a certain supermajority, in our case as in most of the literature: a two-thirds majority, is required to increase/decrease the interest rate incrementally. Otherwise, the status quo prevails. Any further changes are also taken in incremental steps and require a supermajority. As soon as no such majority is willing to change the interest rate any more, the process ends.¹² Importantly, this mechanism entails a gridlock interval thus creating persistence in monetary policy.

Our analysis in Section 3 suggests that the monetary policy stance of the ECB did feature, at least to some extent, a special caring for the economic needs of countries under distress. Therefore, and as a new contribution to the literature, we test different alternative Robin Hood rules the Governing Council might follow.

First, we only look at those countries which would require the lowest optimal interest rates according to our calculations based on Taylor rules. Second, we derive the average interest of the three countries with the lowest optimal interest rates. Third, we only take into account the lowest rate of the four largest countries. These policy rules only focus on a very limited group of countries. Therefore, we provide a more sophisticated rule which takes into account all Euro Area countries, but puts additional weight on those countries that fare worse than the Euro Area average. More precisely, we focus on each country's output gap relative to the Euro Area output gap. If a country's output gap is smaller or more negative than the Euro Area output gap, we use its GDP weight when calculating the hypothetical Euro Area interest path. All other countries which fare better than the

¹²For a detailed description see [Riboni and Ruge-Murcia \(2010\)](#). Notice that this consensus rule needs to be distinguished from a 'consensus among experts' where the members of the Governing Council jointly maximize an objective function.

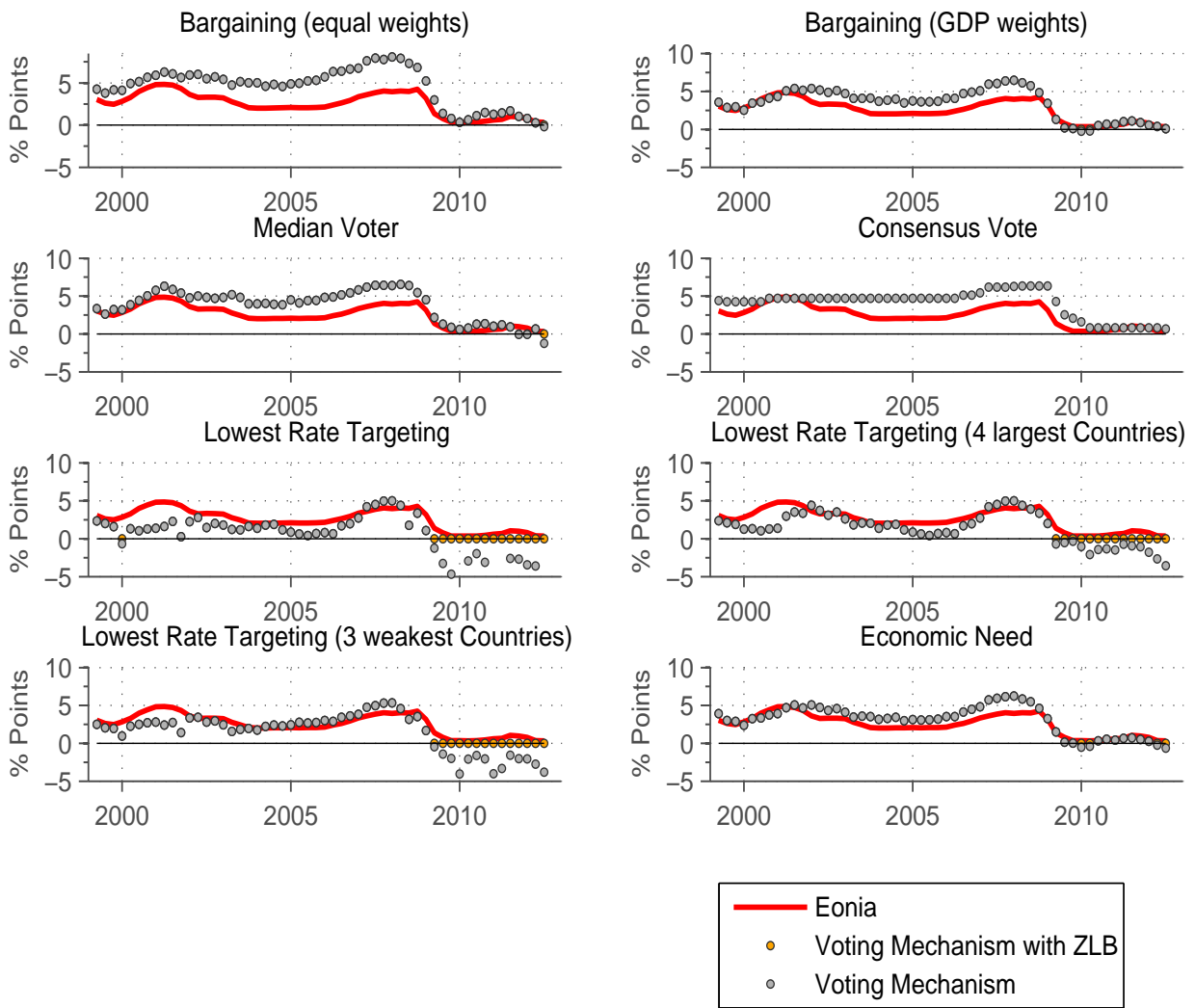
Euro Area receive a weight of zero. This policy rule is much richer than the rules based on the lowest rate, but still miss many details like the relative economic situation of the different countries. Therefore, we also provide more sophisticated alternatives in the robustness section.

When calculating the counterfactual interest rates for some countries negative interest rates are predicted - especially since the onset of the financial crisis. As negative interest rates express a country's need for lower rates, it makes sense to interpret negative values in the aggregation process as described above. However, when assessing the fit of a decision rule with respect to EONIA this is less straightforward. The ECB may use alternative measures like quantitative easing as in the current crisis, but the policy rate certainly remains strictly positive. To capture this restriction when setting interest rates, we also show results with a zero lower bound constraint for the outcome of the aggregation according to the different decision rules.

5 Results

Figure 5.1 shows the interest paths calculated according to the different decision rules analyzed on the basis of the Bundesbank counterfactual scenario for the time period 1999Q1 to 2012Q2. There is substantial variation in how well the results of the different aggregation mechanisms approximate our benchmark EONIA as represented by the red line. Interestingly, all rules seem to capture quite well the break due to the financial crisis. As in the previous literature, our benchmark based on Euro Area aggregates as well as the political economy rules predict considerably higher interest rates than observable for the time period up to the financial crisis. Not surprisingly, the decision rules focusing on the lowest rates generate negative interest rates from the onset of the financial crisis at the end of 2008. For the prior time period, however, the Robin Hood rules predict values very close to actual interest rates (bottom four panels). Overall, eyeballing evidence suggests that these rules perform better than the political economy scenarios.

Figure 5.1: EONIA and counterfactual Aggregation Mechanisms



The predicted mean and standard deviation of the different aggregation rules are summarized in Table 5.1. The figures confirm the above presumption: the average interest rate predicted by our benchmark based on Euro Area aggregates and the political economy rules is at least 0.9 percentage points higher than the average EONIA rate. On the other hand, the lowest rate scenarios considerably underestimate the average interest rate, but the decision rule based on the average of the three countries with the lowest optimal interest is closest when considering the zero lower bound constraint. As suggested by Figure 5.1 the Economic Need rule performs well and overestimates the actual average by only 0.6 percentage points. Interestingly, all decision rules show a higher degree of variation from the mean as measured by the standard deviation than EONIA. Only the consensus rule approximates the true value a bit better, whereas the low standard deviation of the lowest rate scenarios when considering the zero lower bound constraint rather is an artefact difficult to interpret.

Table 5.1: Summary statistics 1999Q1-2012Q2

		Mean	Std. Dev.
EONIA		2.50	1.36
EA aggregates	no ZLB	3.40	1.93
	ZLB	3.41	1.91
Bargaining	no ZLB	4.53	2.29
	ZLB	4.53	2.28
Bargaining (GDP)	no ZLB	3.42	1.94
	ZLB	3.43	1.93
Median Voter	no ZLB	3.81	2.03
	ZLB	3.83	1.98
Consensus Rule	no ZLB	4.04	1.79
	ZLB	4.04	1.79
Lowest rate	no ZLB	0.36	2.91
	ZLB	1.39	1.35
Low. Rate (4 largest)	no ZLB	1.39	2.04
	ZLB	1.75	1.53
Low. Rate (average 3)	no ZLB	1.50	2.51
	ZLB	2.11	1.53
Econ. Need	no ZLB	3.09	1.92
	ZLB	3.12	1.86

The first two moments of time-series only provide very rough measures for the quality of the fit. Therefore, we mainly base our selection on two other criteria: the root mean square error (RMSE) and the mean average error (MEA) of each of the different interest paths with respect to EONIA. Both measures evaluate the distance between actual and predicted interest rates and only differ in the relative weight of deviations. RMSE and MEA are used throughout the literature (e.g., [Hayo and Méon \(2011\)](#) and [Riboni and Ruge-Murcia \(2010\)](#)) as the most natural measures since they do not hinge on any further assumptions and are easy to calculate.

Table 5.2: Selection criteria 1999Q1-2012Q2

BuBa scenario			
Benchmark: EONIA			
Decision rule		RMSE	MAE
EA aggregates	no ZLB	1.32	1.06
	ZLB	1.32	1.05
Bargaining	no ZLB	2.39	2.05
	ZLB	2.39	2.05
Bargaining (GDP)	no ZLB	1.33	1.08
	ZLB	1.33	1.07
Median Voter	no ZLB	1.66	1.44
	ZLB	1.85	1.56
Consensus Rule	no ZLB	1.85	1.56
	ZLB	1.85	1.56
Low. Rate (4 largest)	no ZLB	1.57	1.30
	ZLB	1.18	0.93
Low. Rate (average 3)	no ZLB	1.86	1.45
	ZLB	1.03	0.84
Econ. Need	no ZLB	1.08	0.90
	ZLB	1.06	0.87

Table 5.2 presents the values of these two selection criteria for each decision rule during the time period 1999Q1 to 2012Q2. When focusing on Euro Area aggregates and the political economy scenarios, it is evident that none of the latter alternatives is able to outperform the simple Bundesbank Taylor rule based on Euro Area aggregates. The political economy rule which performs best is the bargaining based on GDP weights - a finding in line with the analysis of [Hayo and Méon \(2011\)](#). However, this bargaining rule is only as good as our benchmark based on Euro Area aggregates. Of course, this is not surprising since the calculation of the Euro Area aggregates is basically a GDP weighted average of national interest rates and output gaps. Nevertheless, this result nicely illustrates the difficulty of inferring a decision rule from observed facts. An average based on GDP weights may well describe actual decision-making of the ECB, but it remains an entirely open question whether this is the result of nationalist governors bargaining in the Governing Council or whether these governors are acting as experts focusing on the Euro Area as a whole without tilting towards the interests of their national government.

The decision rules focusing on the lowest rate of the four largest economies and the average of the three countries requiring the lowest interest rates perform better than our benchmark based on euro aggregates when taking into account the zero lower bound constraint. Most importantly, the simple decision rules that only considers those countries that fare worse than the Euro Area average and weighs these countries according

to their GDP performs best in terms of all selection criteria and without further adjustments. When taking into account the zero lower bound constraint, the fit becomes even considerably better. All Robin Hood rules perform better than all the political economy scenarios. This finding strongly suggests that the ECB puts special emphasis on the countries that require low interest rates in order to stimulate their economies when taking monetary policy decision. This highlights a willingness of the ECB to trade-off stability concerns in strong economies for growth concerns in economies under distress. We are agnostic about the underlying rationale as we do not observe whether this is the result of increased pressure from the national government or whether the members of the Governing Council jointly maximize such an objective for the Euro Area.

6 Robustness

6.1 Alternative counterfactual interest rate paths

Despite the Bundesbank's dominant role and success in conducting monetary policy for Germany, one might question the assumption that the other Euro Area countries would necessarily want to pursue the same policy now. With the introduction of a single monetary policy the structure of the Euro Area changed fundamentally and it is not at all obvious that even the Bundesbank would conduct the same monetary policy now. To make our analysis robust to this issue we add another set of counterfactual interest rate path following [Nikolsko-Rzhevskyy and Papell \(2011\)](#). In their paper the authors elaborate on the level of the Federal Fund Rate if the zero lower bound would not be binding. Thereby, they employ [Taylor \(1993\)](#)'s original specification, adjusting only the output gap parameter slightly to fit the rule to the stylized fact that the Fed's monetary policy had been "*about right*" in the early 1990s without doing an explicit estimation. While this approach is also related to our baseline Bundesbank counterfactual paths presented in Section 3 ¹³ it is also our motivation to use the original [Taylor \(1993\)](#) rule as a counterfactual measure. This allows us to be agnostic about the specific time period and country where monetary policy can be considered as "successful" instead drawing on the notion that the Taylor rule incorporates "optimal" monetary policy in general. We therefore derive this set of counterfactual interest rate paths as

$$i_t^c = \alpha^c + 1.5 \cdot \pi_t^c + 0.5 \cdot y_t^c, \quad (6.1)$$

where π_t^c is again the year-on-year growth rate of the GDP deflator in Euro Area country $c \in [1, \dots, 17]$ and y_t^c is the output gap measured as the percentage deviation of real GDP

¹³We draw on the notion that the Bundesbank conducted a successful monetary policy between 1979 and 1989 (see for example [Gerberding, Seitz, and Worms, 2005](#)) using also Taylor's original specification. But in contrast to [Nikolsko-Rzhevskyy and Papell \(2011\)](#) we are explicit about estimating the parameters.

from a linear trend in country c . As for our baseline counterfactual set we adjust the constant α^c to account for heterogeneity in the equilibrium real rate.¹⁴

The second alternative set of counterfactual national interest rate paths is a slightly more sophisticated version of our baseline set. As discussed in Section 3 a large body of literature has shown that on the one hand interest rate smoothing is theoretically desirable and on the other hand empirically observable (for a comprehensive survey see [Sack and Wieland, 2000](#)). [Rudebusch \(2002\)](#) has shown that interest rate smoothing between quarters is not supported by empirical evidence. Therefore, as a robustness check we estimate a monthly interest-rate-smoothing augmented Taylor rule for the same time horizon as in our baseline scenario (1979M10 to 1989M12). To be more precise we estimate

$$i_t^{BuBa} = \delta \cdot i_{t-1}^{BuBa} + (1 - \delta) \cdot [\tilde{\alpha} + \tilde{\beta} \cdot \Pi_t^{Ger} + \tilde{\gamma} \cdot Y_t^{Ger}] + \eta_t$$

by ordinary least squares using monthly data on the Frankfurt call rate (i_t^{BuBa}), the annual growth rate of the CPI index (Π_t^{Ger}) and an output gap measure (Y_t^{Ger}) derived from regression log industrial production on a linear trend.¹⁵ η_t is again an error term. As we will show below, using two different sets of time series for the monthly and for the quarterly estimation leads to slight quantitative deviations between the interest rate paths. The qualitative implications are, however, robust to these two specifications. However, we prefer this approach to an intrapolation of the quarterly GDP deflator and GDP series. Table 6.1 show the regression results.

Table 6.1: Bundesbank regression results

Dependent Variable:	Frankfurt day-to-day rate
Sample:	1979M10-1989M12
Included observations:	123
δ	0.89 (0.03)
$\tilde{\alpha}$	2.66 (0.60)
$\tilde{\beta}$	0.74 (0.17)
$\tilde{\gamma}$	1.72 (0.59)
R^2	0.98

NOTES: Standard errors in parenthesis.

Our coefficient for interest smoothing is very close to those reported in [Clarida, Gali, and Gertler \(1998\)](#) (see also [Sauer and Sturm, 2003](#)). The inflation coefficient is close to the value of 0.78 reported in [Clarida and Gertler \(1997\)](#). The fact that it does not satisfy

¹⁴More precisely the constant for this set and the baseline set are identical.

¹⁵All data was obtained from the Bundesbank.

the Taylor principle is probably driven by our simple model specification which does not allow for asymmetric central bank reactions. We identify a strong Bundesbank reaction to deviation of industrial production from trend compared to inflation deviations. Given the AR(1) specification the R^2 increases strongly.

With these coefficients at hand we proceed in two steps. First, we adjust the constant to account for heterogeneity in the equilibrium real rate. We use the same constants α^c for Euro Area countries c as for the other two sets of counterfactual rates, since the long-term equilibrium real rate is independent of the regression specification. Second, we perform a dynamic out-of-sample simulation to derive the smoothed counterfactual interest rate path for each of the 17 Euro Area countries starting at $i_0^c = \alpha^c + \beta \cdot \frac{1}{T} \sum_T \Pi_t^c + \gamma \cdot \frac{1}{T} \sum_T Y_t^c$ with T being the monthly simulation horizon from 1999 to 2012.¹⁶ Thus, our second robustness set of counterfactual national interest rate paths is given by

$$i_t^c = 0.89 \cdot i_{t-1}^c + (1 - 0.89)[\tilde{\alpha}^c + 0.74 \cdot \Pi_t^c + 1.72 \cdot Y_t^c] \quad (6.2)$$

These sets of counterfactual national interest rate paths are exclusively derived from purely backward looking specifications. However, the literature has reached the consensus that central banks when setting policy rates are rather forward looking, taking into account time lags in the policy implication and agents' expectations (see for example [Clarida and Gertler, 1997](#); [Clarida, Gali, and Gertler, 1998](#); [Faust, Rogers, and Wright, 2001](#); [Sauer and Sturm, 2003](#)). Thus, for our third robustness set we estimate a 12 month forward looking Taylor rule for the Bundesbank spell 1970M10 to 1989M12 again allowing for interest rate smoothing. We therefore estimate

$$i_t^{BuBa} = \check{\delta} \cdot i_{t-1}^{BuBa} + (1 - \check{\delta}) \cdot [\check{\alpha} + \check{\beta} \cdot \mathbb{E}_t \Pi_{t+12}^{Ger} + \check{\gamma} \cdot Y_t^{Ger}] + \eta_t \quad (6.3)$$

where i_t^{BuBa} , Π_t^{Ger} and Y_t^{Ger} are defined as above. Due to data limitation we use ex-post revised data instead of real-time data. Rewriting Equation (6.3) making use of the definition for the conditional inflation expectation allows us to write

$$i_t^{BuBa} = \check{\delta} \cdot i_{t-1}^{BuBa} + (1 - \check{\delta}) \cdot [\check{\alpha} + \check{\beta} \cdot \Pi_{t+12}^{Ger} + \check{\gamma} \cdot Y_t^{Ger}] + \iota_t$$

with $\iota_t = (1 - \check{\delta}) \cdot \varepsilon_t + \eta_t$ and $\varepsilon_t = \mathbb{E}_t[\pi_{t+12}] - \pi_{t+12}$. The estimation of a forward looking specification is bound to suffer from endogeneity. We estimate the above equation by GMM using i_{t-1}^{BuBa} to i_{t-6}^{BuBa} , Π_{t-1}^{Ger} to Π_{t-6}^{Ger} and Y_{t-1}^{Ger} to Y_{t-6}^{Ger} as instruments (see [Faust, Rogers, and Wright, 2001](#), for a similar specification). Table 6.2 shows the results.

¹⁶These starting values are the backward solution.

Table 6.2: Bundesbank GMM regression results

Dependent Variable:	Frankfurt day-to-day rate
Sample:	1979M10-1989M12
Included observations:	123
$\check{\delta}$	0.90 (0.03)
$\check{\alpha}$	2.36 (0.67)
$\check{\beta}$	1.21 (0.15)
$\check{\gamma}$	0.31 (0.14)
R^2	0.98

NOTES: Standard errors in parenthesis. HAC weighting matrix. Instruments are i_{t-1}^{BuBa} to i_{t-6}^{BuBa} , Π_{t-1}^{Ger} to Π_{t-6}^{Ger} and Y_{t-1}^{Ger} to Y_{t-6}^{Ger} .

Our results are very close to those summarized in [Sauer and Sturm \(2003\)](#). The slight deviations are probably due to different sample horizons and detrending methods of the industrial production time series.¹⁷ From here we proceed as before. First, we adjust the constant for each Euro Area country to reflect the heterogeneity in the equilibrium real rates. Second, we perform an out-of-sample dynamic simulation starting at $i_0^c = \alpha^c + \beta \cdot \frac{1}{T} \sum_T \Pi_t^c + \gamma \cdot \frac{1}{T} \sum_T Y_t^c$ with T being the monthly simulation horizon from 1999Q1 to 2011Q2.¹⁸ Our fourth set of counterfactual national interest rate paths thus reads

$$i_t^c = 0.90 \cdot i_{t-1}^c + (1 - 0.90)[\check{\alpha}^c + 1.21 \cdot \Pi_{t+12}^c + 0.31 \cdot Y_t^c] \quad (6.4)$$

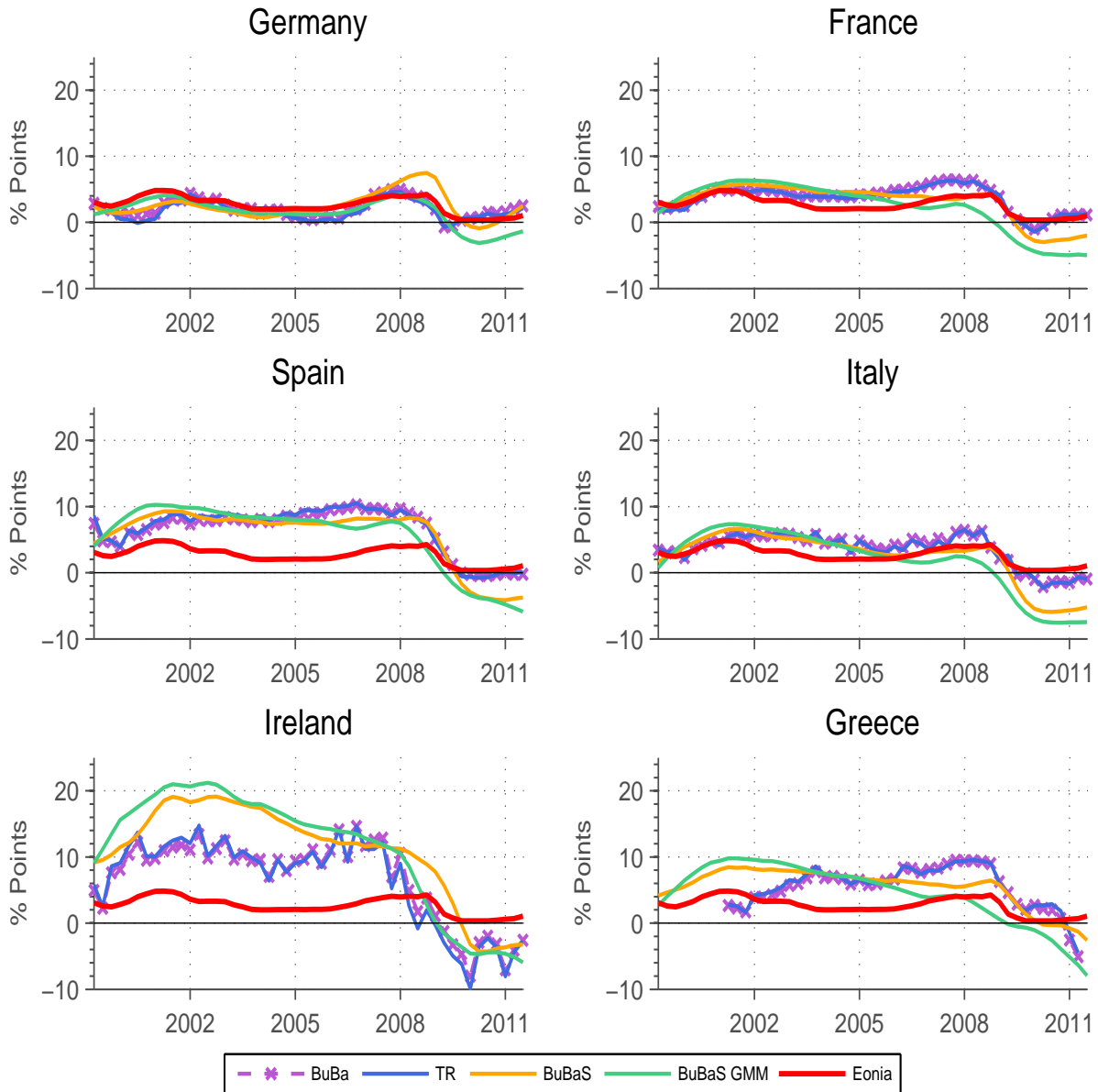
Figure 6.1 shows our four different sets of counterfactual interest rate paths for the same six Euro Area countries.¹⁹

¹⁷For example unlike [Faust, Rogers, and Wright \(2001\)](#) we do not detrend all 17 Euro Area countries over the same time horizon but rather choose the longest sample period available via the OECD MEI for each country.

¹⁸Note that compared to the backward looking specification we loose of year of observations.

¹⁹Appendix A shows the results for all 17 Euro Area countries.

Figure 6.1: EONIA and Counterfactual Interest Rate Paths



Two results are worth noting. First, the counterfactual interest rate path derived from the original Taylor rule and our baseline counterfactual path (quarterly estimated backward-looking Bundesbank rule) trace each other very closely. In fact, they are hardly distinguishable. The monthly estimated Bundesbank rules with interest rate smoothing (backward- and forward-looking) deviate sometimes considerably from the quarterly paths. As mentioned above this is driven by the usage of two different sets of variables for the quarterly (real GDP and GDP deflator growth) and the monthly (industrial production and CPI growth) counterfactual paths. That said, all four paths yield qualitatively similar results. Thus, we can be confident that the results shown in Section 5 are robust to the consideration of different counterfactual interest rate paths. This will be shown more formally below.

Second, the general picture shown in Figure 3.1 remains. All four counterfactual paths for Germany lie strikingly close to the actual realization of the EONIA rate. Especially for the southern European countries the ECB's monetary policy has been too loose according to all four counterfactuals.

This eyeballing evidence is confirmed by Table 6.3. For all four sets of counterfactual national interest rate paths the Robin Hood rules outperform the standard decision rules. Especially our "economic-needs"-rule performs exceptionally good across all four specifications. Moreover, the forward looking model performs worse than the three backward looking specifications.

Table 6.3: Comparison of the different counterfactual measures

Benchmark: EONIA		BuBa		Taylor		BuBa smooth		BuBa fwd	
Decision rule		RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE
EA aggregates	no ZLB	1.32	1.06	1.24	1.01	1.63	1.43	2.06	1.84
	ZLB	1.32	1.05	1.23	1.00	1.56	1.32	2.05	1.83
Bargaining	no ZLB	2.39	2.05	2.33	2.02	2.55	2.33	2.89	2.62
	ZLB	2.39	2.05	2.33	2.02	2.51	2.23	2.64	2.22
Barg. (GDP)	no ZLB	1.33	1.08	1.25	1.01	1.55	1.40	2.37	1.92
	ZLB	1.33	1.07	1.24	1.00	1.25	1.09	1.42	1.21
Median Voter	no ZLB	1.66	1.44	1.57	1.33	2.07	1.84	2.19	1.90
	ZLB	1.65	1.41	1.56	1.33	2.07	1.84	1.84	1.49
Consensus Rule	no ZLB	1.85	1.56	1.77	1.51	1.32	1.15	2.71	2.39
	ZLB	–	–	–	–	–	–	–	–
Lowest rate	no ZLB	2.90	2.27	3.45	2.73	4.90	3.60	5.86	3.99
	ZLB	1.54	1.24	1.89	1.50	1.75	1.41	1.87	1.41
LR (4 largest)	no ZLB	1.57	1.30	1.83	1.52	3.05	2.12	3.51	2.39
	ZLB	1.18	0.93	1.51	1.16	1.03	0.85	1.28	1.06
LR (average 3)	no ZLB	1.86	1.45	2.04	1.57	3.35	2.14	4.07	2.68
	ZLB	1.03	0.84	1.17	0.89	0.87	0.70	1.58	1.09
Econ. Need	no ZLB	1.08	0.90	0.99	0.85	1.82	1.25	2.35	1.85
	ZLB	1.06	0.87	0.97	0.82	0.73	0.57	1.26	1.10

NOTES: *BuBa* indicates our baseline counterfactual set. *Taylor* indicates the counterfactual set derived from the standard Taylor (1993) specification. *BuBa smooth* indicates the counterfactual set derived from the monthly estimated Bundesbank policy rule with interest rate smoothing. *BuBa fwd* indicates the forward-looking policy rate with smoothing. Time period 1999Q1 to 2011Q2.

6.2 Alternative measures of economic need

Our definition of economic need and the associated weighting scheme is based on the assumption that all countries with a more positive output gap than the Euro Area output gap are neglected in the decision process of the ECB. Of course, the implicit zero weight for these countries is arbitrary and it seems plausible that the ECB takes all member

countries into account. Therefore, we introduce a parameter α that determines the relative weight of the countries that fare worse than the entire Euro Area and test whether our results change if less weight is put on these countries. If $\alpha = 0$ all countries are weighted according to their GDP as in the baseline scenario, as α grows large more emphasis is put on the countries in economic need and for $\alpha \rightarrow +\infty$ we converge to the economic needs rule as defined in the previous sections.

As indicated in Table 6.4, the economic need rule outperforms the baseline rule based on Euro Area aggregates for all possible parameter values under the BuBa and the Taylor scenario. While the parameter value of the best fit depends a bit on the scenario chosen, adjusting the relative weight of the countries in economic need even improves the fit considerably. This is also the case in the BuBa smooth scenario, where the economic need rules approximates EONIA better than the baseline rule for a broad range of parameter values even without taking into account the zero lower bound constraint.

Finally, we provide a more sophisticated weighting scheme that arises naturally if one is concerned with ranking the Euro Area countries according to their economic performance. The corresponding weighting scheme is defined as follows:

1. country gap < 0 and Euro Area gap < 0
 - (a) $|\text{country gap}| > |\text{Euro Area gap}| \Rightarrow \text{Weight} = |\text{country gap}| + |\text{Euro Area gap}|$
 - (b) $|\text{country gap}| < |\text{Euro Area gap}| \Rightarrow \text{Weight} = |\text{Euro Area gap}| - |\text{country gap}|$
2. country gap > 0 and Euro Area gap > 0
 - (a) $|\text{country gap}| > |\text{Euro Area gap}| \Rightarrow \text{Weight} = 0$
 - (b) $|\text{country gap}| < |\text{Euro Area gap}| \Rightarrow \text{Weight} = |\text{Euro Area gap}| - |\text{country gap}|$
3. country gap > 0 and Euro Area gap $< 0 \Rightarrow \text{Weight} = 0$
4. country gap < 0 and Euro Area gap > 0
 - (a) $|\text{country gap}| > |\text{Euro Area gap}| \Rightarrow \text{Weight} = |\text{country gap}| + |\text{Euro Area gap}|$
 - (b) $|\text{country gap}| < |\text{Euro Area gap}| \Rightarrow \text{Weight} = |\text{Euro Area gap}| - |\text{country gap}|$

Consider the first case. If both a given country and the Euro Area as a whole have a negative output gap, a country with a larger negative output gap relative to the Euro Area average will receive a higher weight compared to a country with a lower negative output gap relative to the average. In the second case, if both a country and the Euro Area average perform above trend, only a country with a positive gap smaller than the average will receive a positive weight, since a country with a stronger performance than the average cannot be considered as weak. The same holds for the third case. If the Euro Area as a whole performs weakly but a country grows above trend it cannot be considered as weak and will therefore get a weight of zero. Only a country with performs

even worse than the aggregate will be considered. The last case is interpreted as the first. If a country has a negative gap while the aggregate performs above trend countries with a higher negative gap will receive a higher weight.

As shown in Table 6.4, the sophisticated measure of economic need (*Econ. Need (alt. weigh.)*) confirms our previous results. It generally implies about the same fit under BuBa and Taylor counterfactual scenarios but a slightly worse fit under the BuBa smooth and BuBa fwd specifications. However, also this Robin Hood rule outperforms the political economy decision rules.

Table 6.4: Comparison of the different Robin Hood rules

Benchmark: EONIA		BuBa		Taylor		BuBa smooth		BuBa fwd	
Decision rule		RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE
EA aggregates	no ZLB	1.32	1.06	1.24	1.01	1.63	1.43	2.06	1.84
	ZLB	1.32	1.05	1.23	1.00	1.56	1.32	2.05	1.83
Econ. Need	no ZLB	1.08	0.90	0.99	0.85	1.82	1.25	2.35	1.85
	ZLB	1.06	0.87	0.97	0.82	0.73	0.57	1.26	1.10
Econ. Need ($\alpha = 2$)	no ZLB	0.97	0.82	0.90	0.77	1.47	1.22	2.36	1.79
	ZLB	0.93	0.76	0.86	0.72	0.86	0.77	1.14	1.00
Econ. Need ($\alpha = 5$)	no ZLB	0.91	0.73	0.89	0.70	1.54	1.15	2.41	1.71
	ZLB	0.82	0.64	0.82	0.63	0.71	0.61	1.03	0.87
Econ. Need ($\alpha = 1000$)	no ZLB	1.10	0.85	1.18	0.92	1.81	1.25	2.59	1.77
	ZLB	0.91	0.70	1.05	0.79	0.73	0.57	1.06	0.84
Econ. Need (alt. weigh.)	no ZLB	1.10	0.88	1.12	0.91	2.03	1.54	2.84	2.16
	ZLB	0.93	0.76	1.01	0.81	1.19	0.90	1.83	1.34

NOTES: *BuBa* indicates our baseline counterfactual set. *Taylor* indicates the counterfactual set derived from the standard [Taylor \(1993\)](#) specification. *BuBa smooth* indicates the counterfactual set derived from the monthly estimated Bundesbank policy rule with interest rate smoothing. *BuBa fwd* indicates the forward-looking policy rate with smoothing. Time period 1999Q1 to 2011Q2.

7 Conclusion

We have presented a simple method, together with some robust alternatives, to calculate counterfactual optimal interest rates for Euro Area member countries. We employed different decision rules to aggregate the counterfactual national interest rates and tested which decision rules explains best the ECB's actual monetary policy.

Obviously, our proposed measures are open to debate and nobody will ever know what counterfactual interest rates might have in fact prevailed. However, our analysis does shed light on some very important monetary policy making issues in the Euro Area. First, it seems prior to the financial crisis the EONIA rate could best be seen as tracing the counterfactual interest rate path for Germany closely, with the German economy

performing relatively poor during that period. This changed with the financial crisis and the deep economic recessions in southern European countries and Ireland. The EONIA rate can now be better explained by the counterfactual interest rates for those economies. Second, and related, our empirical results show that those ECB decision rules that place emphasis on the weakly performing economies with the Euro Area perform best in explaining actual EONIA interest rates. This suggests some willingness of the ECB to trade-off stability concerns in strong economies for growth concerns in economies under distress. Whilst we certainly refrain from assessing such a policy normatively, we believe its role has as yet been understated in public and academic debate and requires further research to be better understood.

References

- ALESINA, A., AND V. GRILLI (1992): "The European Central Bank: Reshaping Monetary Politics in Europe," in *Establishing a Central Bank: Issues in Europe and Lessons from the US*, ed. by V. G. a. P. M. M. Canzoneri. Cambridge University Press, Cambridge.
- CLARIDA, R., J. GALI, AND M. GERTLER (1998): "Monetary policy in practice - Some international evidence," *European Economic Review*, 42, 1033–1067.
- CLARIDA, R., AND M. GERTLER (1997): "How the Bundesbank conducts Monetary Policy," in *Reducing Inflation: Motivation and Strategy*, ed. by C. Romer, and D. Romer. University of Chicago Press.
- DUISENBERG, W. (2002): "Some remarks on the euro in a US context," Speech at a breakfast meeting of the Council of Foreign Relations, New York, 19 April (www.ecb.int).
- FAUST, J., J. ROGERS, AND J. WRIGHT (2001): "An empirical comparison of Bundesbank and ECB monetary policy," *Board of Governors of the Federal Reserve System: International Finance Discussion Papers*, (705).
- FISCHER, S. (1987): "International Macroeconomic Policy Coordination," *NBER Working paper*, 2233.
- GERBERDING, C., F. SEITZ, AND A. WORMS (2005): "How the Bundesbank *really* conducted monetary policy," *The North American Journal of Economics and Finance*, 16, 277–292.
- GIAVAZZI, F., AND A. GIOVANNINI (1998): "Models of the EMS: Is Europe a Greater Deutschmark Area," in *Global Macroeconomics*, ed. by R. Bryant, and R. Portes. New York: St. Martin's Press.
- GROS, D., AND C. HEFEKER (2002): "One Size Must Fit All: National Divergence in a Monetary Union," *German Economic Review*, 3, 247–262.
- GROS, D., AND N. THYGESEN (1988): "Le SME: performances et perspectives," *Observations et diagnostics économiques*, 24.
- HAYO, B. (2006): "Is European Monetary Policy Appropriate for the EMU Member Countries? A Counterfactual Analysis," *Marburg Papers on Economics*, (10-2006).
- HAYO, B., AND B. HOFMANN (2006): "Comparing monetary policy reaction functions," *Empirical Economics*, 31, 645–662.
- HAYO, B., AND P.-G. MÉON (2011): "Behind closed doors: Revealing the ECB's decision rule," *Joint Discussion Paper Series in Economics*, (35-2011).
- HEINEMANN, F., AND F. P. HUEFNER (2004): "Is the View from the Eurotower Purely European? - National Divergence and ECB Interest Rate Policy," *Scottish Journal of Political Economy*, 51, 544–558.
- NIKOLSKO-RZHEVSKYY, A., AND D. PAPELL (2011): "Taylor's Rule versus Taylor Rules," *working paper*.
- RIBONI, A., AND F. J. RUGE-MURCIA (2010): "Monetary Policy by Committee: Consensus, Chairman Dominance, or Simple Majority," *Quarterly Journal of Economics*, 125, 363–416.
- RUDEBUSCH, G. (2002): "Term structure evidence on interest rate smoothing and monetary policy inertia," *Journal of Monetary Economics*, 49(6), 1161–1187.

- SACK, B., AND V. WIELAND (2000): "Interest-rate smoothing and optimal monetary policy: a review of recent empirical evidence," *Journal of Economics and Business*, 52(1-2), 205–228.
- SARCINELLI, M. (1986): "The EMS and the International Monetary System: Towards Greater Stability," *Banca Nazionale del Lavoro Quartlery Review*, 57(83).
- SAUER, S., AND J. STURM (2003): "Using Taylor Rules to Understand ECB Monetary Policy," *CESifo Working Paper*, (1110).
- STURM, J., AND T. WOLLMERSHAEUSER (2008): "The Stress of Having a Single Monetary Policy in Europe," *CESifo Working Paper*, (2251).
- TAYLOR, J. (1993): "Discretion versus policy rules in practise," *Carnegie-Rochester Conference on Public Policy*, 39, 195–214.

A Additional Figures

Figure A.1: Eonia and counterfactual Bundesbank path

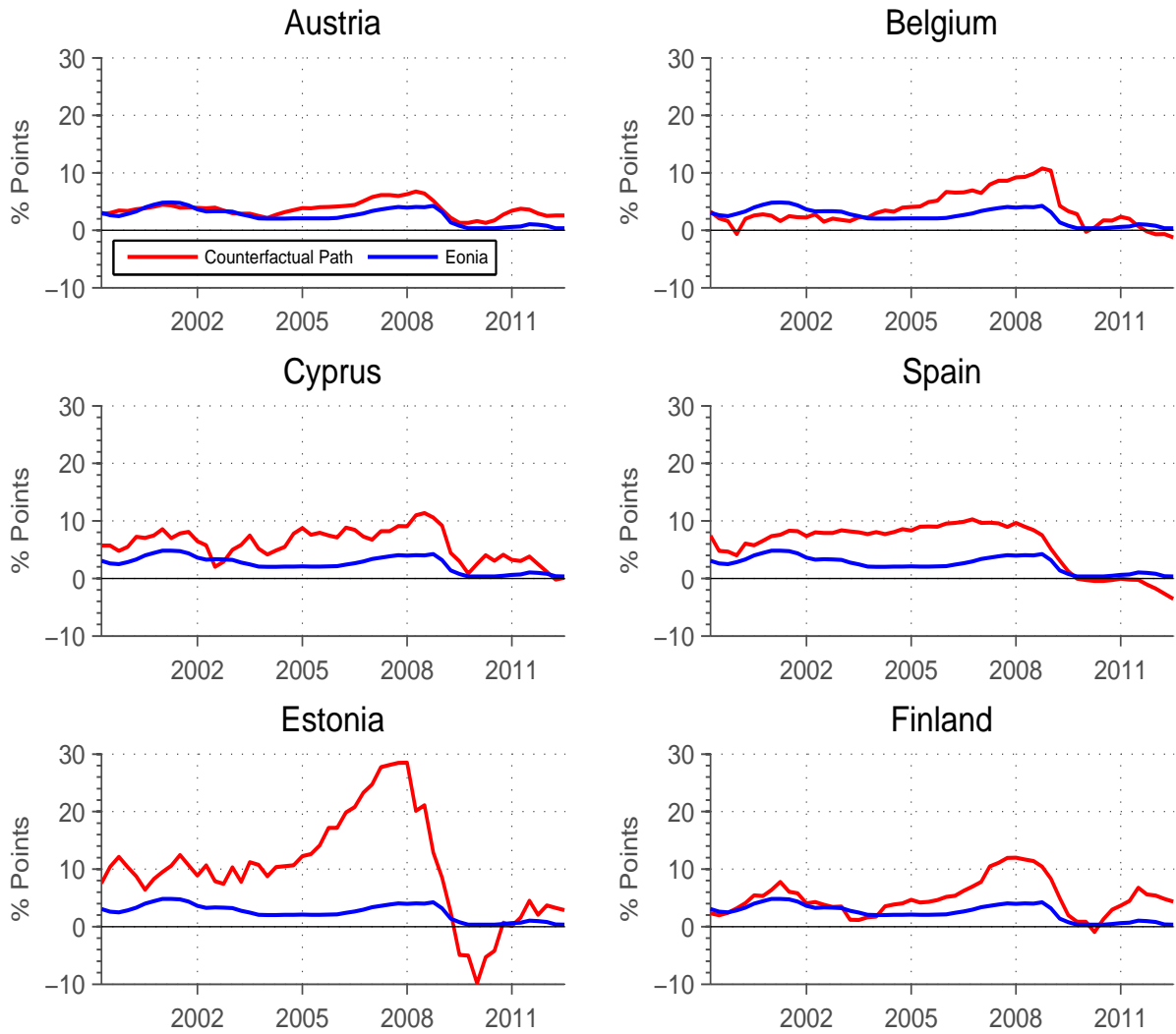


Figure A.2: Eonia and counterfactual Bundesbank path

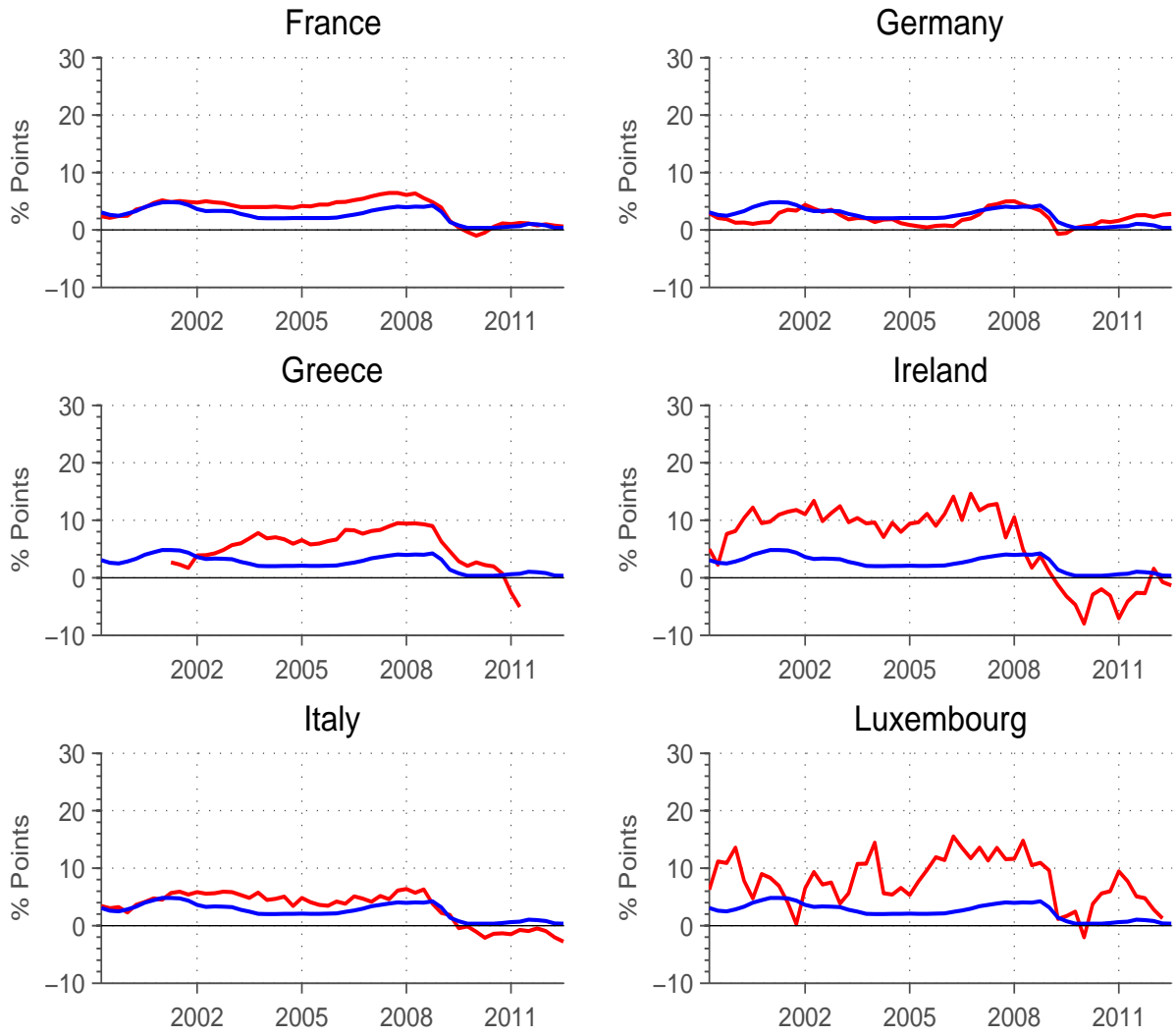


Figure A.3: Eonia and counterfactual Bundesbank path

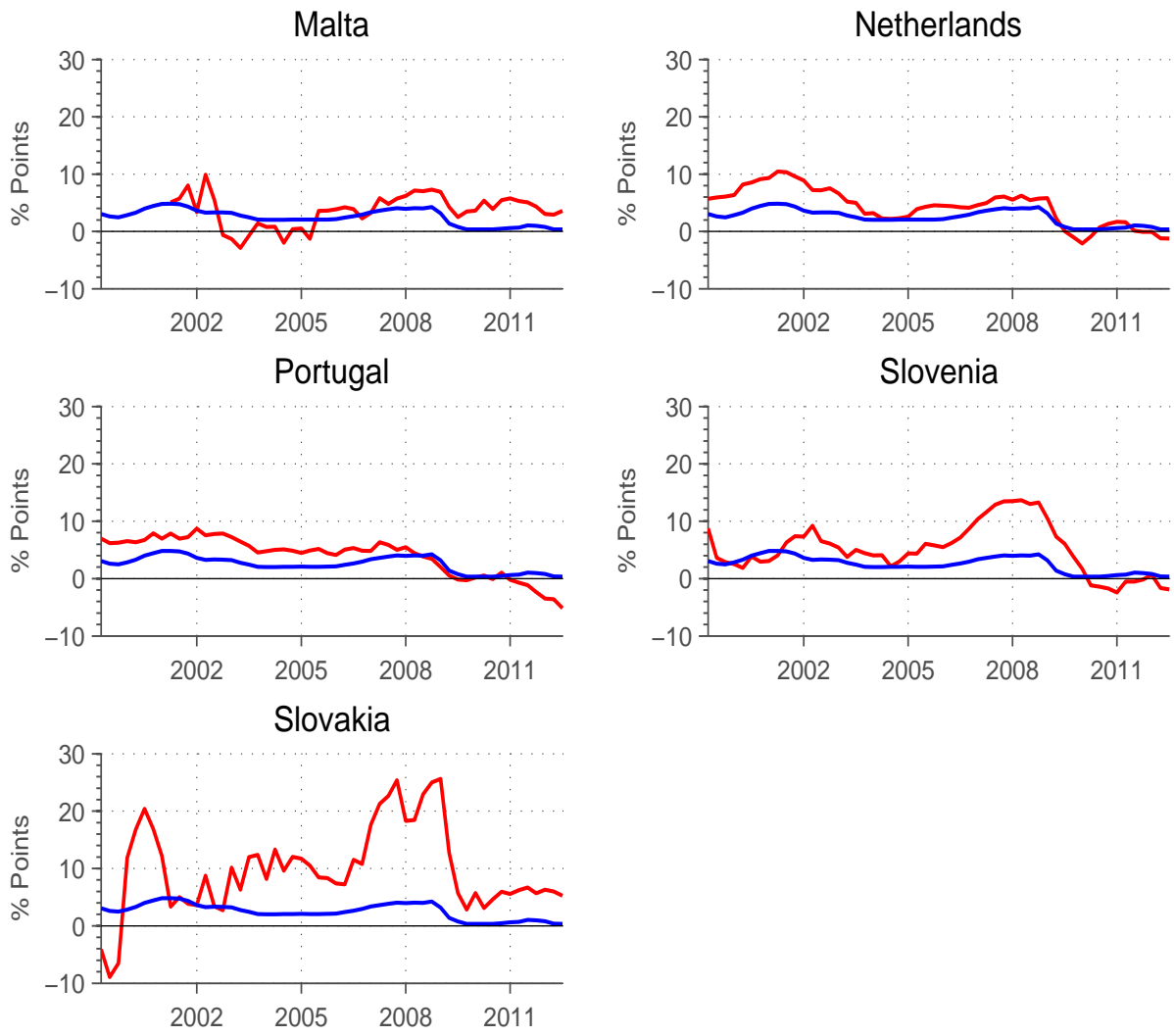


Figure A.4: Counterfactual Measures

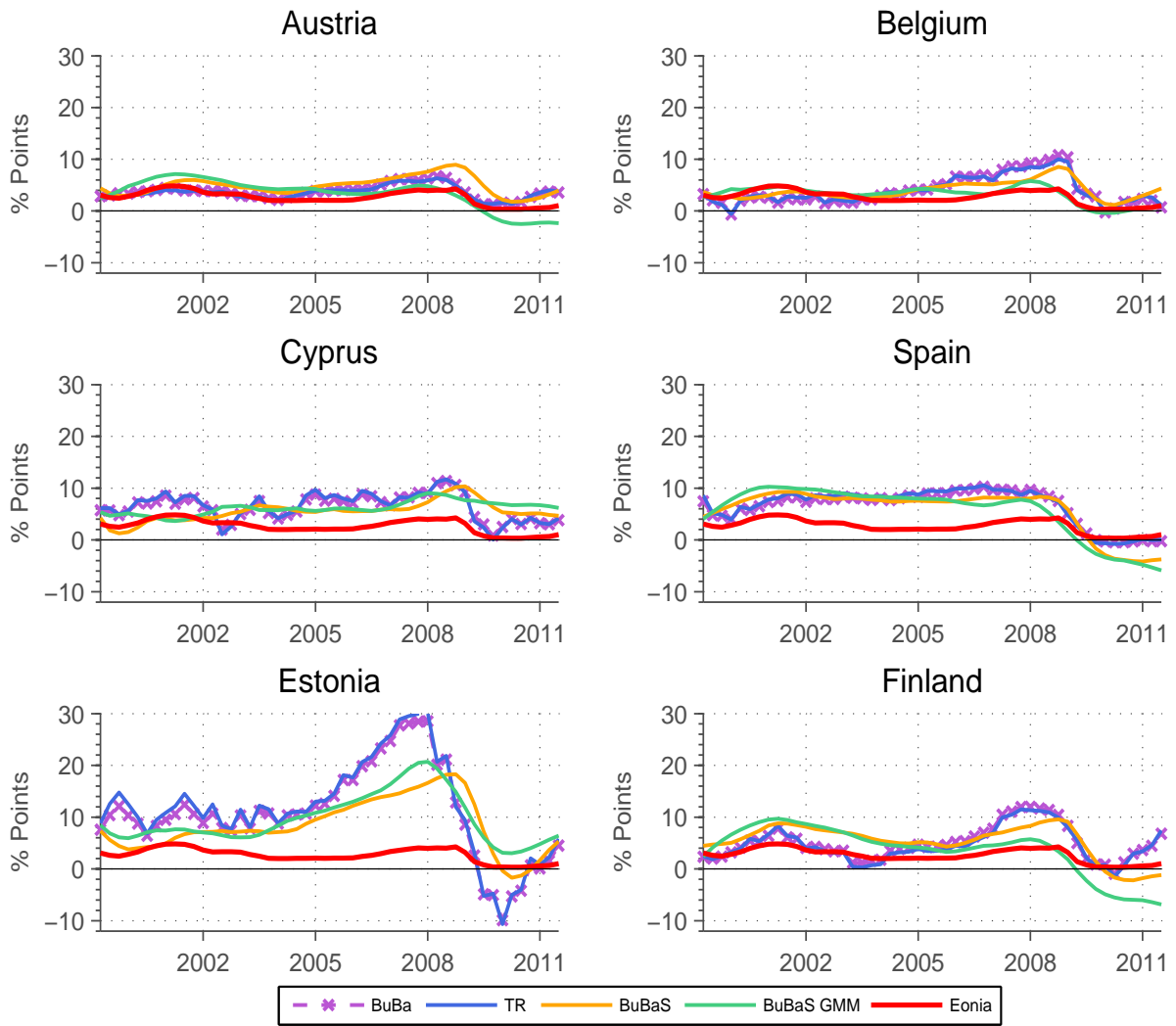


Figure A.5: Counterfactual Measures

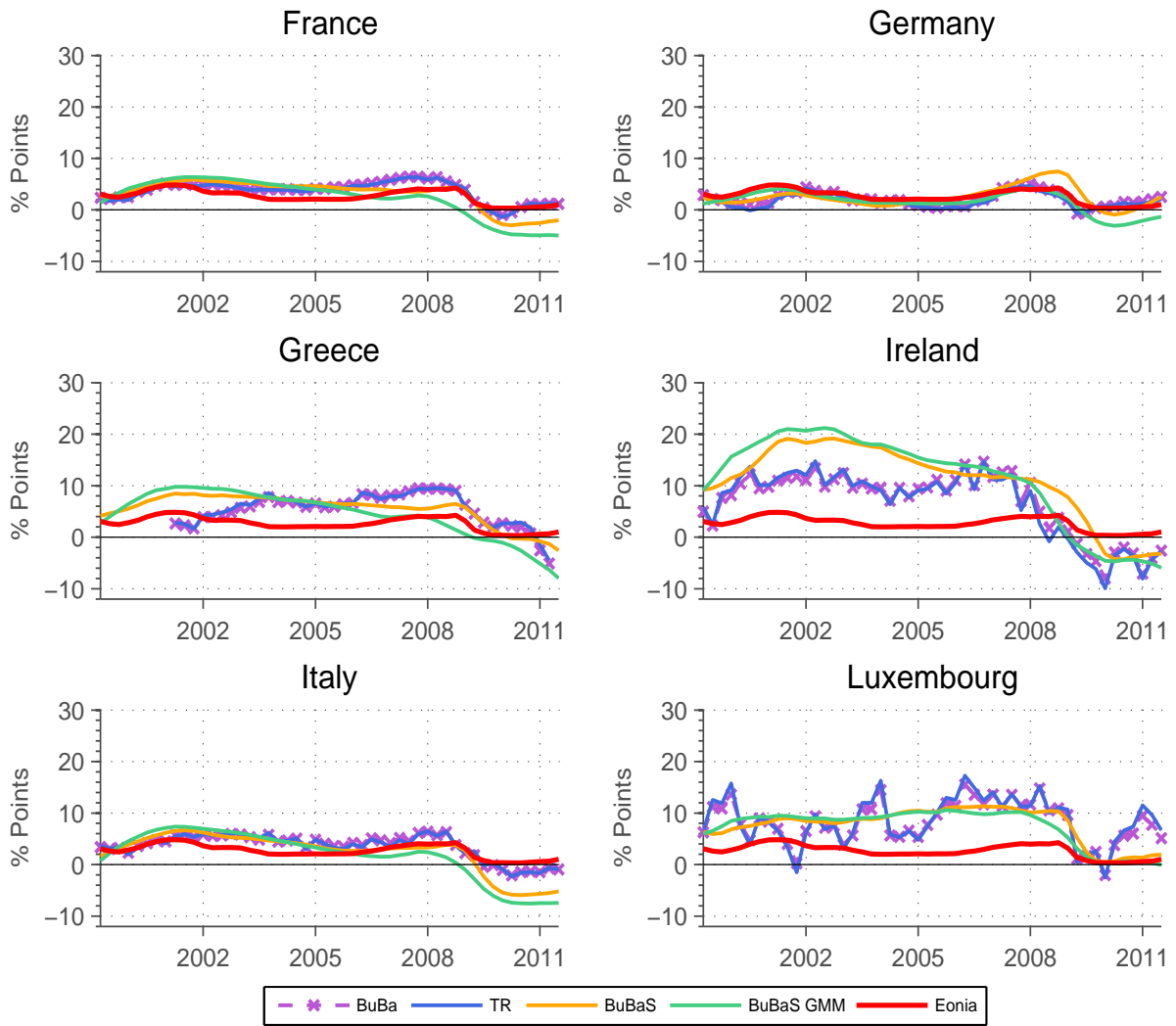


Figure A.6: Counterfactual Measures

