Interest-Rates-Free Monetary Policy Rule

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Abstract

Interest rates are unreliable indicators of appropriate monetary policy; low nominal rates do not indicate easy money. This paper attempts to assess the stance of monetary policy without relying on interest rates. A new monetary policy rule is developed based on a forward-looking generalization of the Taylor rule. Two complementary approaches are investigated. First, this new monetary indicator is used to evaluate the stance of monetary policy in real time, based on expectations from the Survey of Professional Forecasters in the euro area and in the United States. Second, an ex post analysis based on the latest available data gauges the monetary policy stance in retrospect. The real-time analysis evaluates how the monetary policy stance was judged, and the ex post analysis offers a more objective evaluation of the monetary policy stance. This study highlights that conventional wisdom on monetary policy is often incorrect, even when rates are high. Furthermore, tight monetary policy explains the historical collapse in nominal gross domestic product during the Great Recession, the slow recovery, and the resulting low nominal interest rates.

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Keywords: monetary policy stance, interest rates, Taylor rule

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Acknowledgments

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A central bank needs to ascertain what policy stance is needed in order to achieve its objectives. If the stance of monetary policy is misdiagnosed, the central bank will fail to fulfill its task. However, defining the stance of monetary policy is harder than it looks, and assessing the monetary policy stance in real time is always a challenging exercise.

The Taylor rule (Taylor 1993) has become a popular yardstick for assessing monetary policy. It establishes a multiple linear relationship between the target interest rate and the annual inflation rate; the output gap, which is the deviation of actual output from estimated potential level; and the equilibrium real interest rate, which is the real short-term interest rate that would occur when inflation is steady and the economy is growing at its potential.[1] Woodford (2001) emphasizes that the Taylor rule may be used as a guiding principle for monetary policy because it resembles the recommendations from certain theoretical models.

However, the Taylor rule has some major drawbacks. Such a simple monetary policy rule relies on significant assumptions, especially because of the difficulty of measuring potential output and the equilibrium real interest rate accurately in real time (Orphanides and Wieland 2013; Marcellino and Musso 2010). For instance, estimates of both the natural rate of output and equilibrium real interest rate have been subject to dramatic shifts following the Great Recession. The effects on the appropriate setting of policy according to the Taylor rule during the recession are sizeable (Daly et al. 2015).

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[1] The potential output is the maximum amount of goods and services an economy can turn out at full capacity.

Moreover, this rule is overly simplistic when the short-term interest rate approaches zero. At the zero bound, the stance of monetary policy can no longer be measured with a short-term interest rate instrument (Orphanides 2007).

Above all, the main problem with the Taylor rule is that interest rates are unreliable indicators of appropriate monetary policy, as Bernanke (2003) notes: "As emphasized by Friedman . . . nominal interest rates are not good indicators of the stance of policy. . . . The real short-term interest rate . . . is also imperfect. . . . Ultimately, it appears, one can check to see if an economy has a stable monetary background only by looking at macroeconomic indicators such as nominal GDP growth and inflation." Unfortunately, the old fallacy of identifying tight money with high interest rates and easy money with low interest rates is still not dead (Friedman 1992a, 1997).[2] However, tight money is partly responsible for weak growth and thus causes low interest rates. If monetary conditions are tight, then inflation and growth expectations decrease, and as a consequence, bond yields will also fall. Hence low interest rates are not a symbol of easy monetary policy; rather, they are an outcome of excessively tight monetary policy. Thinking about monetary policy in terms of interest rates is thus very misleading.

This paper's objective is to elaborate a monetary policy rule assessing the stance of monetary policy without any reference to any interest rate. This rule should thus be able to measure the stance of monetary policy in conventional and unconventional environments without any distinction. To that end, this study develops a new monetary indicator based on the forward-looking generalization of the Taylor rule introduced by Koenig (2012).

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[2] The Fisher effect, named after economist Irving Fisher (1867–1947), is an important concept in the fields of economics and finance. It establishes a positive relationship between the nominal interest rate and inflation, at least in the long run. A new economic theory referred to as "Neo-Fisherism" says that a long period of low interest rates actually holds prices down instead of pushing them up (Cochrane 2016). Garín et al. (2016) argue that a textbook New Keynesian model may exhibit Neo-Fisherian behavior: a central bank must increase, rather than decrease, nominal interest rates in the short run in order to implement higher inflation. Hence in a Neo-Fisherian world, low interest rates do not signal easy money, and higher interest rates do not indicate tight money.

Two complementary approaches are investigated. First, this new monetary indicator is used to assess the monetary policy stance in real time based on expectations from the Survey of Professional Forecasters (SPF) conducted by the European Central Bank (ECB) in the euro area and by the Federal Reserve Bank of Philadelphia in the United States. Second, the latest available data are considered to gauge the monetary policy stance in retrospect. The real-time analysis evaluates how the monetary policy stance was judged, and the ex post analysis offers a more objective evaluation of the monetary policy stance.

This paper confirms that Milton Friedman was correct in saying that the conventional wisdom on monetary policy is often incorrect (Friedman 1992b), even when interest rates are high. Moreover, central banks bear some responsibility for the length and severity of the Great Recession. Indeed, too-tight monetary policy explains the historical collapse in nominal GDP during the Great Recession, the slow recovery in the United States, and the lack of recovery in the euro area. As always, tight monetary policy causes lower nominal interest rates.

The rest of the paper is organized as follows: the first section itemizes the creation of the proposed monetary policy rule, the second section defines the underlying conditioning assumptions, the third section focuses on the monetary policy stance in the euro area, and the last section analyzes monetary policy in the United States.

1. Interest-Rates-Free Monetary Policy Rule

Koenig (2012) describes the monetary policy implications of the Taylor rule without any reference to the short-term interest rate. Monetary policy should be restrictive. In other words, monetary policy is too loose whenever the sum of the deviation of inflation from long-term

target inflation and the deviation of output from estimated potential output is positive. Thus the Taylor rule prescribes tighter policy if, and only if,

$$(\pi - \pi^*) + (y - E_{-1}(y^*)) > 0, \tag{1}$$

where π is the current one-period annual GDP inflation rate, π^* is the inflation target, y is the logarithm of the real GDP, y^* is the logarithm of the real potential GDP, and $E_{-1}(y^*)$ is the central bank's estimate of potential GDP.

However, Svensson (2003) argues that central banks should target the forecast, setting policy such that the central bank's forecast for the economy is exactly equal to the policy goal. Kocherlakota (2012) confirms that the appropriateness of current monetary policy should always be judged using the best possible forecast of inflation, not current inflation. Former Fed chairman Ben Bernanke (2015b) confirms that the Fed has adopted a targets-based framework. The expectation generalization of the Taylor tighter-policy criterion is thus

$$(p - p_{-T} - T \times \pi^*) + (y - E(y^*)) > 0, \tag{2}$$

where p and y extrapolate the price level and real GDP, $E(y^*)$ is today's best estimate of future potential GDP, and T is the medium-term forecast horizon.

To be more consistent with all kinds of mandates from central banks around the world, a further generalization would prescribe tighter monetary policy if, and only if,

$$(p - p_{-T} - T \times \pi^*) + \alpha(y - E(y^*)) > 0, \tag{3}$$

where α is the relative weight given to real activity in policy deliberations.

The stance of monetary policy is thus defined as a particular linear combination of inflation and output gap expectations.

2. Specifications and Assumptions

The number of conditioning assumptions is extensive, and defining them is an important part of the estimation process. The rest of the paper focuses on the euro area and the United States, but the proposed monetary indicator rule could be applied in other countries, too.

2.1. Inflation Measure and Inflation's Target

Since May 2003,[3] the ECB has been aiming to maintain consumer price index (CPI) inflation below but close to 2 percent over the medium term.

Since January 2012,[4] the Federal Reserve Bank (Fed) has set an explicit goal for inflation of 2 percent, as measured by the annual change in the price index for personal consumption expenditures (PCE). The CPI tracks the average change in consumption of a representative basket of goods and services. However, the PCE accounts for product substitution as prices change, while the CPI focuses on a fixed basket of goods and services. The PCE also tracks the changes in consumption across all households, not just urban households, and includes consumption by nonprofits on behalf of households. Because of those differences in product coverage and statistical methodologies, CPI inflation in the United States tends to average 0.25 to 0.50 percentage points higher than PCE inflation. The Fed's 2 percent target on PCE inflation would translate to 2.3 to 2.5 percent for CPI inflation (Evans 2014). For comparison issues, a target of CPI inflation just below 2.5 percent has been chosen for the United States.

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[3] European Central Bank, "The ECB's Monetary Policy Strategy," press release, May 8, 2003, https://www.ecb .europa.eu/press/pr/date/2003/html/pr030508_2.en.html.
[4] Board of Governors of the Federal Reserve System, "Federal Reserve Issues FOMC Statement of Longer-Run Goals and Policy Strategy," press release, January 25, 2012, http://www.federalreserve.gov/newsevents/press /monetary/20120125c.htm.

It should be added that the GDP deflator, which reflects prices of all goods and services produced within the country, is the most relevant measure of inflation when it comes to debt deleveraging. The difference between measures can be substantial and very misleading (see appendix A). However, expectations for the GDP deflator are quite rare (especially in the euro area) and central banks do not communicate on this measure of inflation.

2.2. Medium Term

The meaning of "medium term" has not been precisely or officially defined by the ECB or the Fed. However, Coeure (2014) states that the academic definition of medium term, according to Milton Friedman, is about 18 months.[5] But Coeure considers that the medium term is probably more extended now. Moreover, Bernanke (2004) confirms that medium term corresponds to the next six to eight quarters. As a result, a period of two years has been chosen.

2.3. Real Activity's Relative Weight

There is no consensus about how much emphasis to place on the real activity's relative weight. For instance, Taylor (1993) incorporates a fairly modest response to economic slack. In a later study, Taylor (1999) considers a variant of that rule that is twice as responsive to slack.

The ECB's mandate is more complex than is often thought. According to the European treaties (article 127), the ECB does have an employment mandate next to its inflation mandate: "Without prejudice to the objective of price stability, the Eurosystem shall also support the

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[5] "On the average, the effect on prices comes about six to nine months after the effect on income and output, so the total delay between a change in monetary growth and a change in the rate of inflation averages something like 12–18 months. That is why it is a long row to hoe to stop an inflation that has been allowed to start. It cannot be stopped overnight" (Friedman 1970).

general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union."[6] Thus α is set to 0.5 in the euro area in line with Taylor (1993).

In the United States, the twin objectives of the Fed are to control inflation and to promote employment. Therefore, Janet Yellen favors the Taylor rule that incorporates a sufficiently strong response to resource slack (Yellen 2012). Thus α is set to one, following Taylor (1999).

2.4. Potential Growth Estimation

An important drawback of monetary policy rules is the dependence on unobservable measures. Even if the proposed rule does not require the evaluation of the equilibrium real interest rate, the potential output must still to be estimated using statistical or modeling techniques.

Purely statistical techniques rely on different data-filtering methods to extract the trend. Modeling techniques focus on incorporating data into representations of the economy that account for factors such as changes in supply and demand and the reaction of prices. Any estimate of potential output will have its shortcomings, and methods for the real-time assessment of output relative to productive potential need to be improved.

In the euro area and in the United States, standard estimates of potential output are computed by the European Commission and the Congressional Budget Office. Calculations are based on estimates of the component parts of potential output. By definition, potential output is the product of potential output per worker (productivity) and the total number of workers when the economy is at full employment (labor supply). Thus, any output gap measure constructed using this methodology would reflect measurement error for each of these variables. As a consequence, the estimates are often significantly revised when they are updated. Orphanides

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[6] Constancio (2014) explained, "The treaty says that provided price stability is insured we should pursue other objectives, like unemployment and growth. Clearly there is a secondary mandate" (quoted in Reuters 2014).

and Wieland (2013) provide an example of how misleading the information embedded in real-time estimates of the output gap from the European Commission can be. For instance, they note that the 2011 estimation of the output gap was significantly positive in 2006, suggesting the euro area economy was overheated before the crisis. But according to the European Commission in 2006, the economy was operating below its potential. Had policymakers relied on this information, they would have loosened policy, a serious mistake in light of the information now available.

To improve comparisons and to facilitate a generalization of the rule, this paper employs purely statistical techniques. Indeed, the comparison between countries could lead to curious or even spurious results since the estimation of the potential output might stem from different methods.

A classical Hodrick-Prescott filter (Hodrick and Prescott 1997) has been employed to estimate the potential real GDP. A relatively high value of lambda (150,000)[7] has been chosen to avoid short-term over-evaluation or under-evaluation of the potential.[8] Indeed, Mark Thoma (2012) and Reifschneider et al. (2013) identify a short-run path for potential output: they demonstrate that demand shocks can temporarily depress the supply side of the economy. Moreover, Mark Thoma argues that policymakers should not focus too intensely on short-run potential output because capacity will grow as the economy recovers. It is important to note that the estimation of the potential growth rate, and thus the output gap, should be less revised with the chosen smoothing factor.

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[7] For quarterly data, a smoothing factor of 1,600 has become somewhat like an industrial standard. However, a higher value of lambda penalizes changes in the trend component relatively more than in standard applications. Moreover, it reduces the impact of measurement error without losing information on output drops that may come from both the "trend" and "cycle," as extracted in the business cycle literature (Mauro and Becker 2006).
[8] Other filters have been tried (see Christiano and Fitzgerald 2003); they lead to almost the same monetary policy rules.

The major weakness of the proposed rule is that this monetary indicator still relies on the output gap, which is subject to considerable uncertainty. Technically speaking, nominal GDP targeting is one option to circumvent this issue. Nominal GDP targeting is a flexible alternative to strict inflation targeting. In particular, in the event of an adverse supply shock or shift in the terms of trade, a nominal GDP target says to hold aggregate demand steady.[9] The traditional approach to selecting a nominal target rate is to add the current targeted inflation rate and the estimated potential growth rate. Orphanides and Wieland (2013) note that the revisions in the growth rates of potential are small—just a few tenths of a percentage point—but they accumulate into noticeable differences on the level of the output gap. Hence an advantage of nominal GDP targeting is that monetary policy rules would be more reliable in real time.[10]

Koenig (2012) demonstrates that the Taylor rule is a special case of nominal GDP growth targeting. Hence, the conclusions of this article would almost have been the same in a nominal GDP targeting framework (except for the latest years in the euro area since the CPI index and the GDP deflator have been diverging).

2.5. Real-Time Expectations and Analysis in Retrospect

Orphanides (2001) highlights that real-time policy recommendations differ considerably from those obtained with the ex post revised data. Two approaches are thus investigated in this study: a real-time analysis to evaluate how the monetary policy was judged and an ex post analysis to estimate the stance of monetary policy in retrospect.

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[9] For more on nominal GDP targeting, see Sumner (2014).

[10] The Fed considered a change to a nominal GDP target in November of 2011 but opted to stay with the inflation-focused framework (Bernanke 2015a).

The real-time monetary indicator requires forecasts. The Survey of Professional Forecasters (SPF) is a quarterly survey of macroeconomic forecasts conducted by the ECB in the euro area and by the Federal Reserve Bank of Philadelphia in the United States. The SPF provides expectations for the rates of inflation and real GDP growth for several horizons (see figures 13 and 14 in appendix B).

To avoid a misleading historical analysis of policy actions and to estimate a true real-time indicator, this paper uses the data set that was available when forecasts were made. For instance, the survey reported in Q1 is taken in late January when GDP data are available for Q3 of the prior year. As regards inflation, the one-year forecast refers to a horizon about three quarters away from the date of the survey. The real-time dataset is downloaded from the websites of the European Central Bank (2016) and the Federal Reserve Bank of Philadelphia (2016).

The history of central banking is highly instructive when it comes to defining the future of central banking. To gauge the stance of monetary policy in retrospect, the latest price index and GDP data along with the latest estimation of the potential output are considered. Instead of forecasts, actual future values are thus used to estimate the rule, as if forecasts were proven totally correct. This version of the rule may thus be seen as a reality check, because it reveals whether monetary policy was tight or loose according to the actual data. It should be noted that the forward-looking rule implies that the two most recent years cannot be reviewed—the current monetary policy is loose if and only if inflation and growth accelerate during the two ensuing years.

The two approaches are complementary: the first one highlights how monetary policy was judged, and the second one uses actual revised data to highlight a more objective assessment of monetary policy.
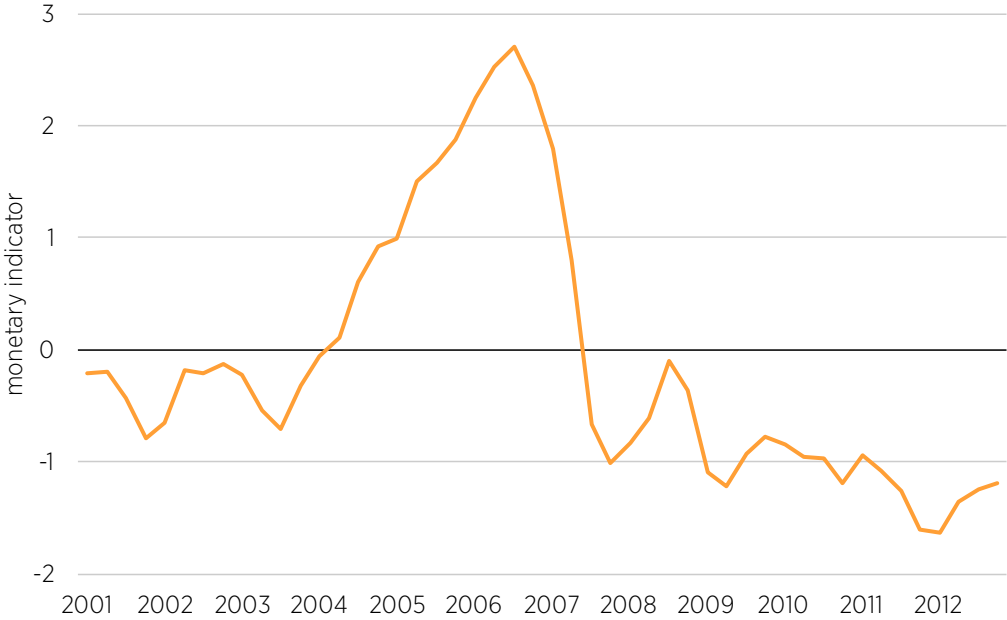
3. Monetary Policy in the Euro Area

The analysis in retrospect (figure 1) highlights that monetary policy was too loose from 2004 to 2007: nominal growth was above 5.5 percent (see figure 4), which indicates that the economy was overheating. Indeed, the potential growth rate was estimated at around 1.7 percent before the crisis and the inflation target is 2 percent. Moreover, figure 1 also emphasizes the inadequacy of the monetary policy since mid-2007. However, the real-time monetary rule (figure 2) points out that monetary policy has been judged as too tight since 2009, but was unfortunately considered as too loose in 2008 (many economists misjudged the oil shock of 2007–2008, which was only a transitory negative supply shock). If monetary policy had been widely seen as highly contractionary in 2008, the recession would have been far milder because people would have demanded an easier monetary policy.

As the consequence of ECB decisions, the CPI annual inflation rate has been running under the ECB's target since November 2012, and the GDP deflator has been running under the target since 2008 (figure 3). Moreover, the euro area experienced an unprecedented fall in nominal GDP (figure 4).

It should be added that the large drop in nominal GDP cannot be explained by structural problems even though many European policymakers like to suggest so. Indeed, typical results of an adverse supply shock are declining output and accelerating inflation. However, since 2008, the euro area has experienced low inflation rates, low growth rates, and high unemployment.

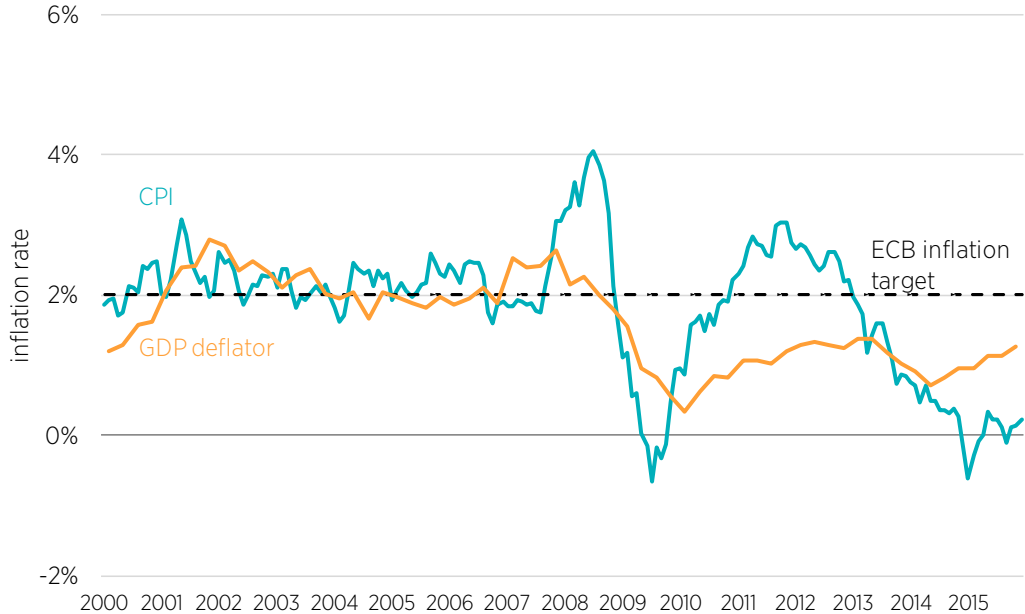**Figure 1. Monetary Indicator in the Euro Area in Retrospect**

Source: Thomson Reuters Datasteam and author's calculations.

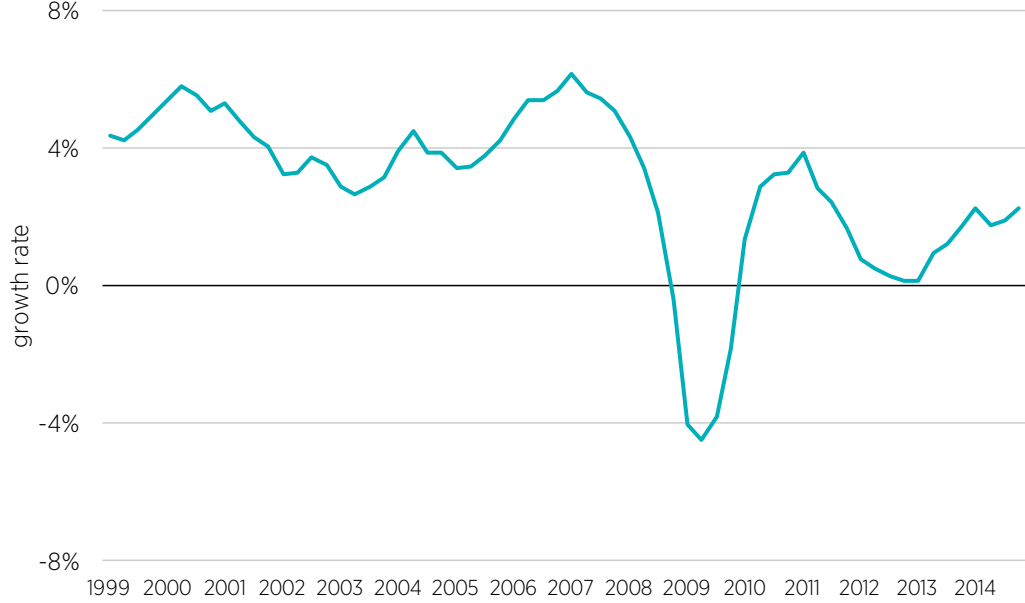**Figure 2. Real-Time Monetary Indicator in the Euro Area**
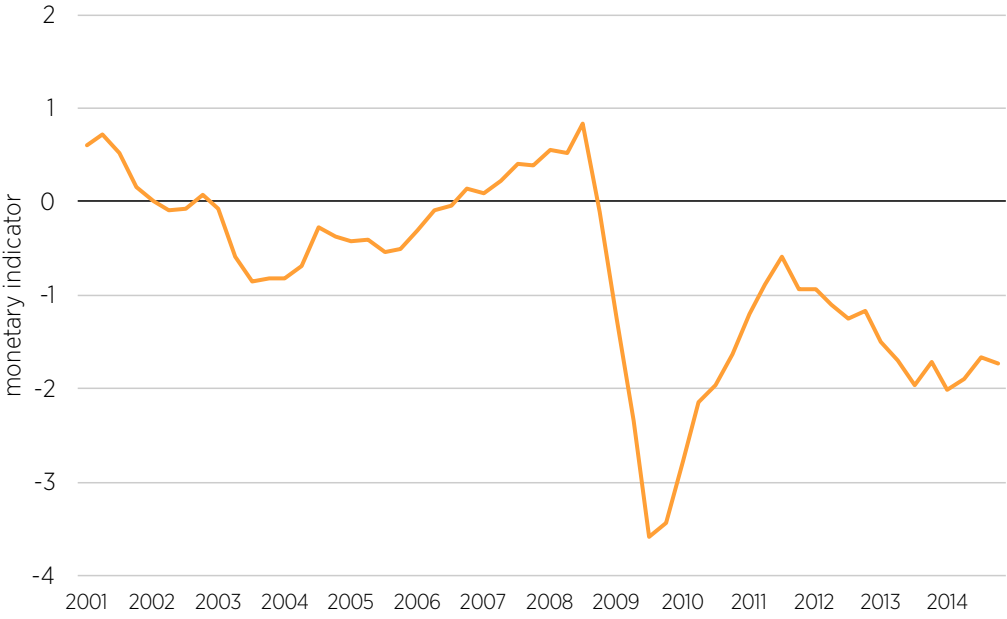
Source: Thomson Reuters Datasteam and author's calculations.

Figure 3. Inflation Measures in the Euro Area

Source: Thomson Reuters Datasteam.

Figure 4. Nominal GDP Growth in the Euro Area

Source: Thomson Reuters Datasteam.

The ECB is mainly responsible for keeping aggregate demand stable but clearly failed to do so. Undershooting the inflation target is very costly; it leads to higher unemployment rates and a higher household debt ratio (Svensson 2015). When determining how much debt to take on, borrowers consider their ability to repay that debt. If inflation is surprisingly low, income gains are more likely to fall short of these expectations, and interest and principal payments will become more of a burden than people were prepared to handle. Problems of debt overhang become that much worse for the economy.

Moreover, the lack of adequate answer to the crisis is weighing on private sector confidence. Friedman and Schwartz (1963) believed pessimism among households and businesses contributed to the severity and persistence of the Great Depression: economic depression contributed to psychological depression and vice-versa, forming a feedback loop.

Tight monetary policy can have lasting effects: a cyclical fall in growth may become structural, thereby causing a permanent downward shift in productivity. Indeed, if the economy grows slowly for an extended period of time and causes the unemployment rate to remain high, then some of what began as cyclical unemployment may become structural unemployment.

Workers are unemployed for so long that they become unemployable. As the economic recovery begins to take hold and increases the demand for labor, long-term unemployed are not hired since their skills no longer match the skill requirements of available jobs (Levine 2013). Moreover, lower growth expectations create a vicious circle in which firms and households reduce their consumption and investment due to diminished expectations, which in turn further reduces potential growth (Mersch 2014).

Since the economy is weak, nominal rates are low (see figure 5). Indeed, the expectations theory of the term structure holds that the long-term interest rate is a weighted average of present

and expected future short-term interest rates plus a term premium. If inflation is running under the target and the activity is slow, the short-term interest rates should be expected to stay low (or lower) for a very long time, thereby reducing long-term rates (see figure 15 in appendix C).

Figure 5. Long-Term Interest Rates in the Euro Area
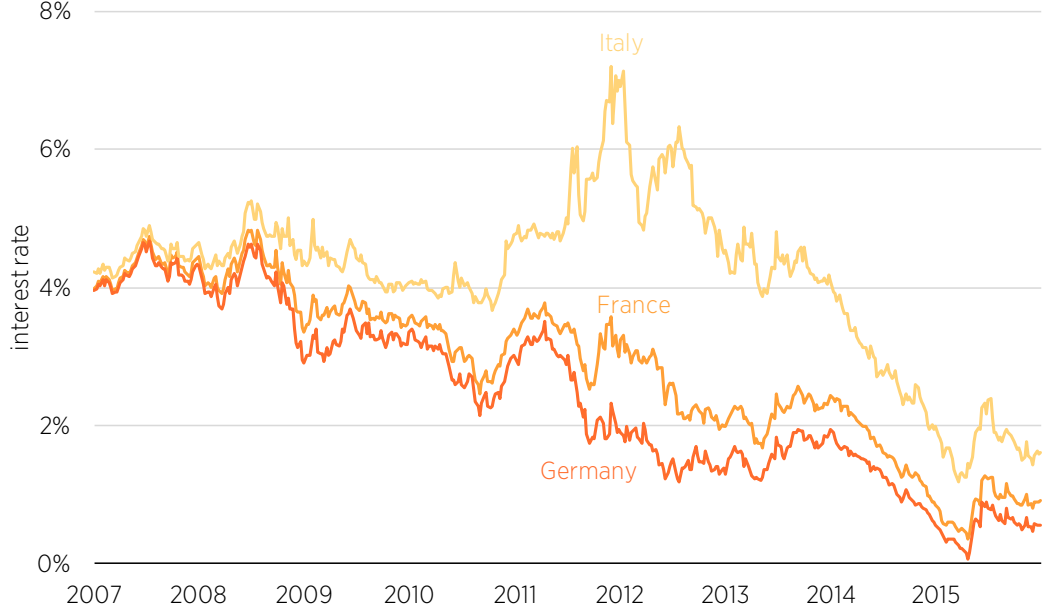
Source: Thomson Reuters Datasteam.

To prove that too-tight monetary policy stance leads to a decrease in long-term rates, a classical Granger causality test (Granger 1969) is computed. Granger causality is a term for a specific notion of causality in time-series analysis. The idea of Granger causality is simple: a variable X Granger-causes Y if Y can be better predicted using the histories of both X and Y than it can using the history of Y alone. The two quarterly variables tested are the "reality check" monetary indicator and German long-term rates evolution. It is important to note that a look-ahead bias is voluntarily introduced since the current monetary policy stance should influence future long-term rates. The test confirms that the reality check monetary indicator does Granger-

cause long-term rates evolution (p-value of 0.025) and that long-term rates evolution does not

Granger-cause the reality check monetary indicator (p-value of 0.20).
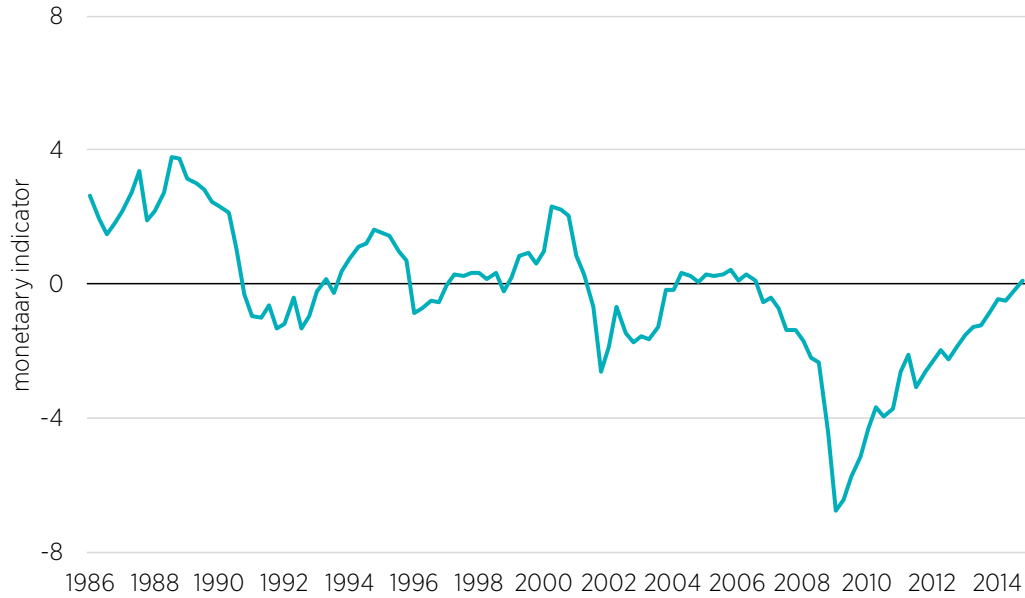
4. Monetary Policy in the United States

Friedman (1992b) argued that the Fed was responsible for the slow recovery from the 1990

recession, although the conventional wisdom on Wall Street was that monetary policy had been

extremely easy since the Fed had cut the federal fund rates from 10 percent to 3 percent. The two

interest-rates-free monetary indicators (figures 6 and 7) indicate that Milton Friedman was right:

figure 6 points out that economists judged the monetary policy as appropriate when Friedman's

article was published at the end of 1992, and figure 7 highlights that money was too tight. It

confirms that interest rates are unreliable indicators of appropriate monetary policy and that the

monetary policy stance is hard to assess, even when rates are high.

Friedman and Schwartz (1963) demonstrated that the Federal Reserve's failure to prevent

the contraction of the money supply explains the length and severity of the Great Depression.
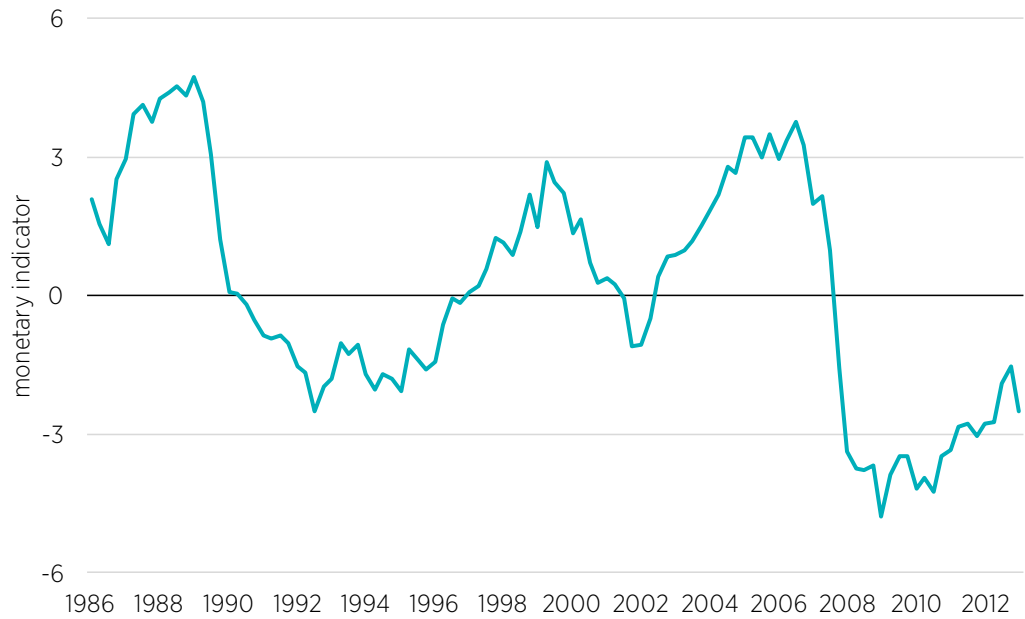
Bernanke (2003) confirmed the Fed's responsibility and promised it would never happen again.

Figure 6. Real-Time Monetary Indicator in the United States

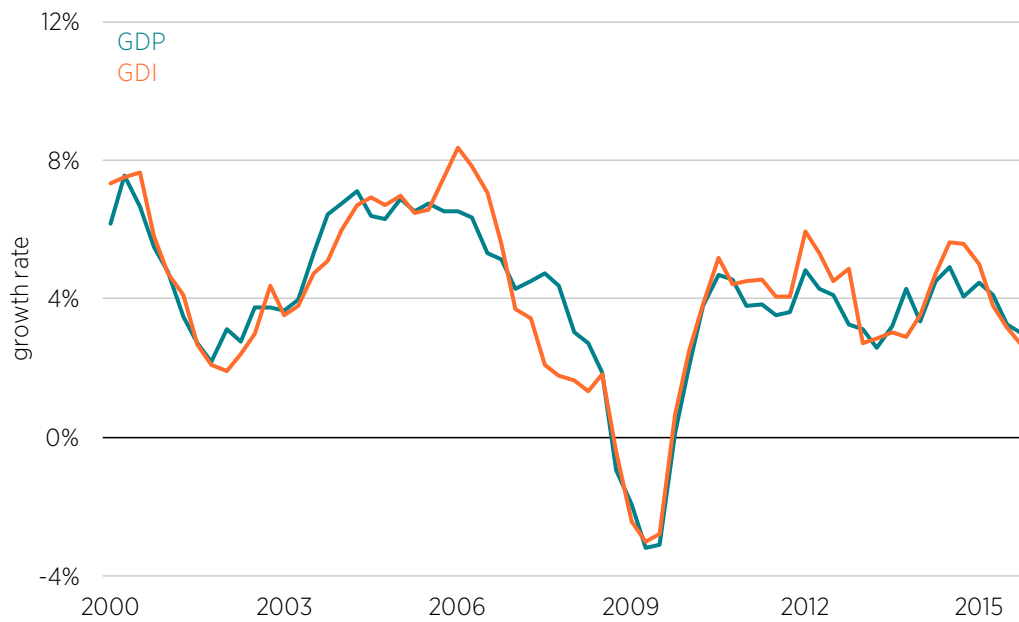Source: Thomson Reuters Datasteam and author's calculations.

Figure 7. Monetary Indicator in the United States in Retrospect

Source: Thomson Reuters Datasteam and author's calculations.

Figure 8 displays nominal GDP growth and nominal gross domestic income (GDI) growth. In principle, nominal GDP and nominal GDI are equal so that value added is equal to the value of purchases. However, the estimated figures often diverge substantially. Nalewaik (2012) argues that GDI may be more useful in making inferences about recessions.[11] Figure 8 confirms that monetary policy was too loose from 2004 to 2006: the nominal growth, as measured by the GDI, peaked at more than 8 percent. The activity started to slow in 2006, and the recession began in December 2007. The severe decline in economic activity was the worst since the Great Depression, seeing as nominal growth bottomed at around −3 percent in 2009. Nominal growth has been stabilizing at around 4 percent since 2010, which is low by recent historical standards, especially after such a collapse in nominal growth.

**Figure 8. Nominal Growth in the United States**

Source: Thomson Reuters Datastream.

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[11] GDI may capture informative variation in income and employment data not fully reflected by GDP.

Figure 9 shows that despite many earlier predictions of unacceptably high inflation, PCE inflation has been undershooting its target since 2012. Other inflation measures are also well below their related benchmarks.

Figure 9. Inflation Measures in the United States
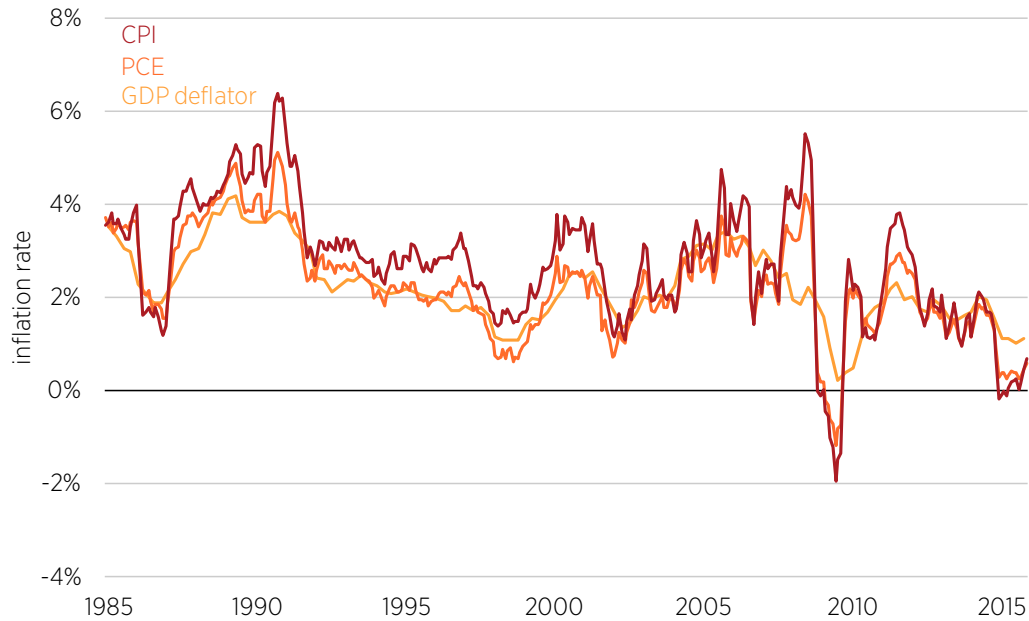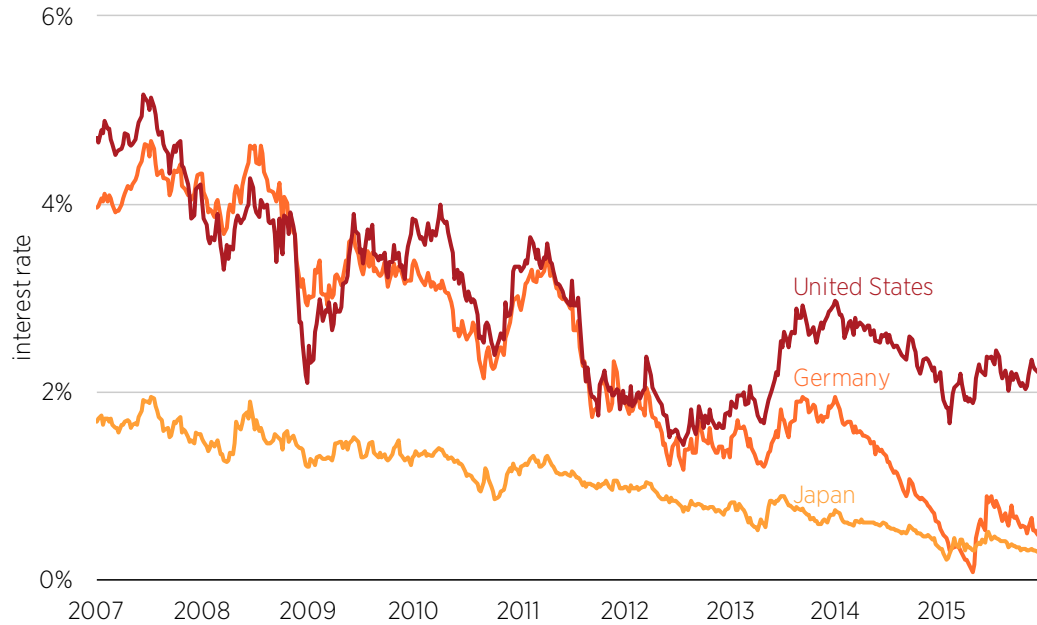

Source: Thomson Reuters Datastream.

The Fed's response to economic developments during the Great Recession revealed that the Fed was decidedly more cautious than the literature suggested. As a matter of fact, Sumner (2015) argues that Friedman would have blamed the Fed for insufficient expansionary monetary policy during 2008 and 2009, a view that is quite different from the conventional conservative interpretation of events. For instance, the transcripts from the 2008 meetings of the Federal Open Market Committee (FOMC 2008) clearly indicate that the Fed was focused on inflation. During much of the year, FOMC members were worried that monetary policy was too easy and should be tightened, even if the monetary policy was already seen as too tight by professionals.

In 2009 the Fed adopted a more expansionary stance, but forward guidance and several rounds of quantitative easing were insufficient to significantly boost nominal growth. The Fed could and should have done more, as Posen (2010) states: "I think that it is not enough for a central bank to say, 'Look, we expanded our balance sheet more than any time in history' or 'we did things we never did before' and argue that 'therefore we must have done a lot, if not too much.' In my opinion, that is backwards logic. It would be like saying that 'the fire must be out because we've already pumped more water than for any previous fire we've fought' or 'we must have gotten to our destination because I've been driving for hours and we've already used a full tank of gas.'"

The Fed's inadequate actions weaken growth and inflation expectations, resulting in low nominal rates. The classical Granger causality test confirms that the reality check monetary indicator does Granger-cause long-term rates evolution (p-value of 0.047) and that long-term rates evolution does not Granger-cause the reality check monetary indicator (p-value of 0.92).

However, compared to other central banks, such as the ECB or the Bank of Japan in the 1990s, the Fed did a much better job of stimulating economic activity after the crisis. This explains why long-term rates in the United States are now higher than those in Germany and Japan (see figure 10).

Figure 10. International Comparison: Long-Term Interest Rates

Source: Thomson Reuters Datastream.

Conclusion

Since interest rates are an inaccurate indicator of the monetary policy stance, a monetary policy rule is created based on a forward generalization of the Taylor rule without relying on interest rates.

Two versions of the monetary policy rule are proposed. First, a real-time monetary indicator is developed to assess the current stance of monetary policy. It is based on expectations from the SPF conducted by the ECB in the euro area and by the Federal Reserve Bank of Philadelphia in the United States. This real-time analysis evaluates how the current monetary policy stance is judged. The second variant takes into account the latest available data. This ex post analysis enables an estimation of the true monetary policy stance.

The two interest-rates-free monetary indicators highlight that the current monetary policy stance is difficult to gauge and is often misdiagnosed, whatever the level of interest rates:

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Furthermore, too-tight monetary policy has led to low nominal growth since the Great Recession and persistently low long-term interest rates, in both the euro area and the United States.

Last but not least, this paper opens the door for further research. For instance, the creation of an interest-rates-free monetary policy rule without any unobservable measure would constitute a real breakthrough. Moreover, links between the monetary indicators and the asset prices (housing prices, exchange rates, equities, bond yields, asset allocation, and the like) need to be deepened.
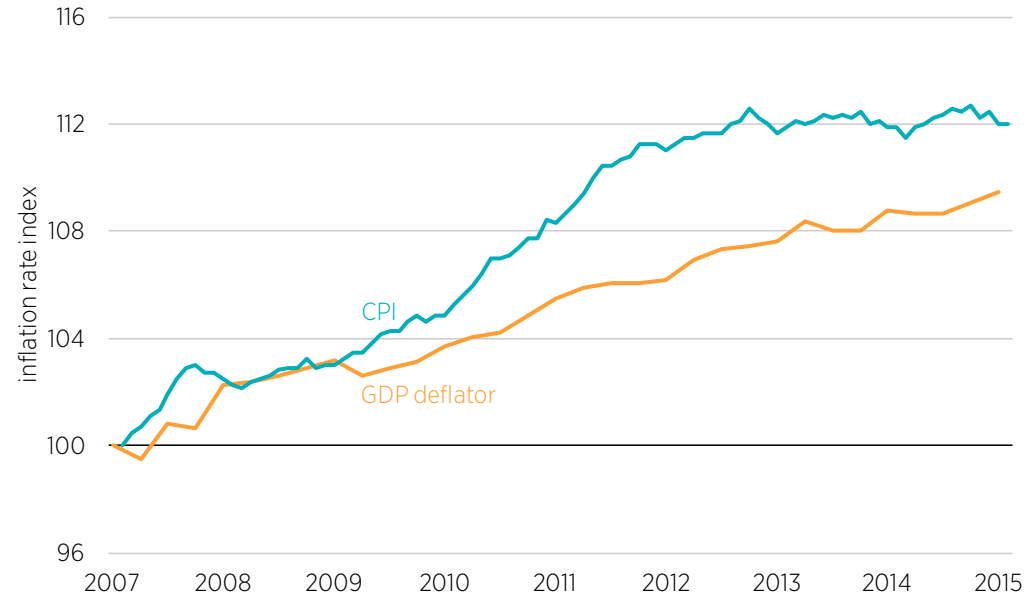
Appendix A: Inflation Measures

Figure 11. Inflation Measures in Spain
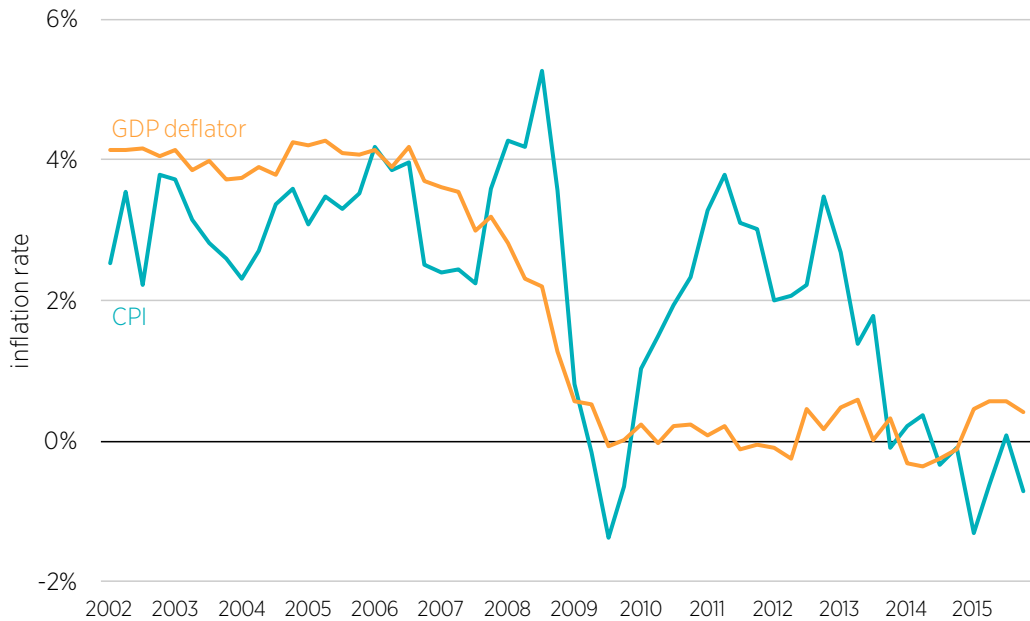
Source: Thomson Reuters Datastream.
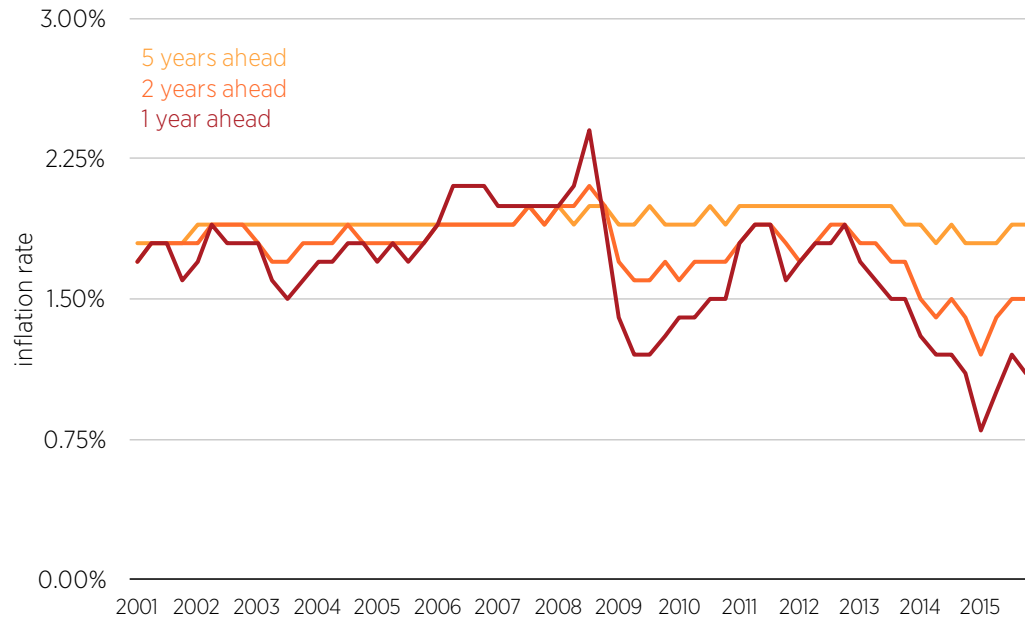
Figure 12. Inflation Measures in Italy

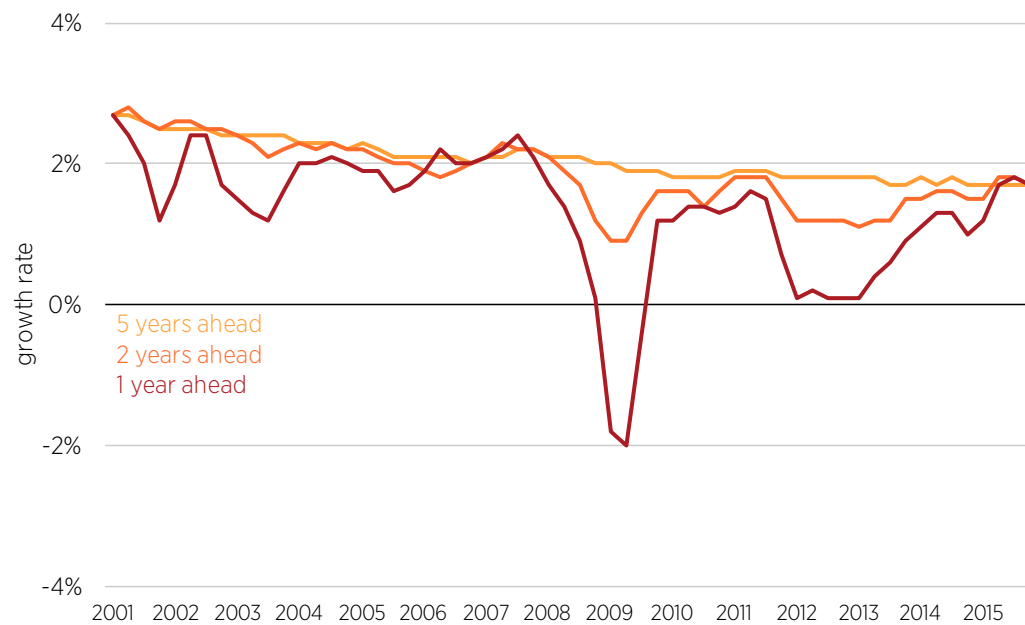Note: Base = 100, December 2007.

Source: Thomson Reuters Datastream.

Appendix B: Survey of Professional Forecasters

Figure 13. Inflation Expectations from the Survey of Professional Forecasters in the Euro Area

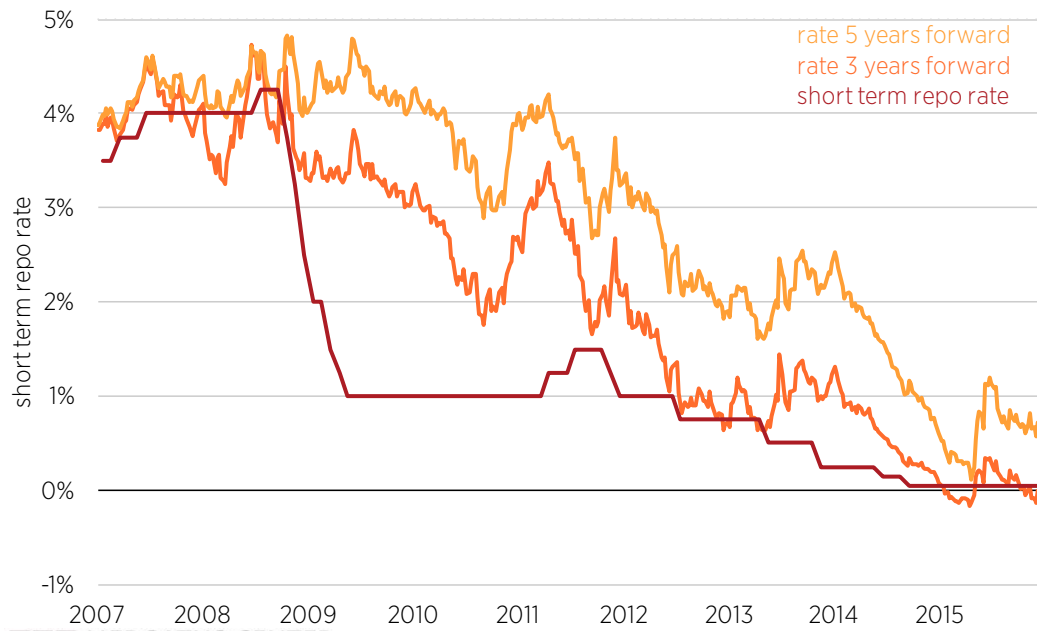Source: Thomson Reuters Datastream.

Figure 14. Growth Expectations from the Survey of Professional Forecasters in the Euro Area

Source: Thomson Reuters Datastream.

Appendix C: Short-Term Interest Rates and Expectations

Figure 15. Short-Term Interest Rates and Expectations in the Euro Area

Source: Thomson Reuters Datastream.

References

Bernanke, Ben. 2003. Remarks at the Federal Reserve Bank of Dallas Conference on the Legacy of Milton and Rose Friedman's Free to Choose, Dallas, TX, October 24.

Bernanke, Ben. 2004. "The Logic of Monetary Policy." Remarks before the National Economists Club, Washington, DC, December 2.

Bernanke, Ben. 2015a. *The Courage to Act: A Memoir of a Crisis and Its Aftermath*. New York: W. W. Norton & Company, Inc.

Bernanke, Ben. 2015b. "Monetary Policy in the Future." *Brookings.* April 15. http://www .brookings.edu/blogs/ben-bernanke/posts/2015/04/15-monetary-policy-in-the-future.

Christiano, Lawrence, and Terry Fitzgerald. 2003. "The Band Pass Filter." *International Economic Review* 44 (2): 435–65.

Cochrane, John. 2016. "Do Higher Interest Rates Raise or Lower Inflation?" Technical report. Hoover Institution, Stanford University, Stanford, CA, February 10.

Coeure, Benoît. 2014. Interview with Bloomberg. January 16. https://www.ecb.europa.eu/press /inter/date/2014/html/sp140116.en.html.

Constancio, Victor. 2014. *Reuters*. http://www.reuters.com/article/ecb-constancio-idUSL6N0KO 2SV20140114.

Daly, Mary C., Fernanda Nechio, and Benjamin Pyle. 2015. "Finding Normal: Natural Rates and Policy Prescriptions." *FRBSF Economic Letter* 2015–22. Federal Reserve Bank of San Francisco, July 6.

European Central Bank. 2016. "Real Time Database (Research Database)." *Statistical Data Warehouse*. Last updated July. https://sdw.ecb.europa.eu/browseExplanation.do?node= 9689716.

Evans, Charles. 2014. "Thoughts on Accommodative Monetary Policy, Inflation and Fiscal Instability." Speech at the Credit Suisse Asian Investment Conference, Hong Kong, March 28.

Federal Reserve Bank of Philadelphia. 2016. "Real-Time Data Set for Macroeconomists*." Federal Reserve Bank of Philadelphia.* Last modified November 28, 2016. https://www .philadelphiafed.org/research-and-data/real-time-center/real-time-data/.

FOMC. 2008. "FOMC: Transcripts and Other Historical Materials." *Board of Governors of the Federal Reserve System.* Last modified March 21, 2014. http://www.federalreserve.gov /monetarypolicy/fomchistorical2008.htm.

Friedman, Milton. 1970. "The Counter-Revolution in Monetary Theory: First Wincott Memorial Lecture." Occasional paper delivered at the Senate House, University of London, September 16. Published for the Wincott Foundation by the Institute of Economic Affairs.

Friedman, Milton. 1992a. "Do Old Fallacies Ever Die?" *Journal of Economic Literature* 30 (4): 2129–32.

Friedman, Milton. 1992b. "Too Tight for a Strong Recovery." *Wall Street Journal,* October 23.

Friedman, Milton. 1997. "Rx for Japan: Back to the Future." *Wall Street Journal*, December 17, A22.

Friedman, Milton and Anna Schwartz. 1963. *A Monetary History of the United States*. Princeton: Princeton University Press.

Garín, Julio, Robert Lester, and Eric Sims. 2016. "Raise Rates to Raise Inflation? Neofisherianism in the New Keynesian Model." Working Paper 22177. National Bureau of Economic Research, Cambridge, MA.

Granger, C. W. J. 1969. "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods." *Econometrica* 37 (3): 424–38.

Hodrick, Robert J., and Edward C. Prescott. 1997. "Postwar US Business Cycles: An Empirical Investigation." *Journal of Money, Credit and Banking* 29 (1): 1–16.

Kocherlakota, Narayana. 2012. "Opening Remarks." Speech at a Duluth town hall meeting held at the University of Minnesota, Duluth, October 30.

Koenig, Evan F. 2012. "All in the Family: The Close Connection between Nominal-GDP Targeting and the Taylor Rule." *Staff Papers,* no. 17 (March).

Levine, Linda. 2013. "The Increase in Unemployment since 2007: Is It Cyclical or Structural?" Technical report. Congressional Research Service of the Library of Congress, Washington, DC.

Marcellino, Massimiliano and Alberto Musso. 2010. "Real-Time Estimates of the Euro Area Output Gap: Reliability and Forecasting Performance." Working Paper Series 1157. European Central Bank, Frankfurt, Germany.

Mauro, Paolo and Torbjörn Becker. 2006. "Output Drops and the Shocks That Matter." IMF Working Papers 06/172. International Monetary Fund, Washington, DC.

Mersch, Yves. 2014. "Reviving Growth in the Euro Area." Speech at the Institute of International European Affairs, Dublin, February 7.

Nalewaik, Jeremy. 2012. "Estimating Probabilities of Recession in Real Time Using GDP and GDI." *Journal of Money, Credit and Banking* 44 (1): 235–53.

Orphanides, Athanasios. 2001. "Monetary Policy Rules Based on Real-Time Data." *American Economic Review* 91 (4): 964–85.

Orphanides, Athanasios. 2007. "Taylor Rules." Working paper. Finance and Economic Discussion Series. Federal Reserve Board, Washington, DC, January.

Orphanides, Athanasios and Volker Wieland. 2013. "Complexity and Monetary Policy." *International Journal of Central Banking* 9 (1): 167–204.

Posen, Adam S. 2010. "The Central Banker's Case for Doing More." Policy Briefs PB10-24. Peterson Institute for International Economics, Washington, DC.

Reifschneider, Dave, William Wascher, and David Wilcox. 2013. "Aggregate Supply in the United States: Recent Developments and Implications for the Conduct of Monetary Policy." Working paper. Finance and Economic Discussion Series. Federal Reserve Board, Washington, DC, November.

Sumner, Scott. 2014. "Nominal GDP Targeting: A Simple Rule to Improve Fed Performance." *Cato Journal* 34 (2): 315–37.

Sumner, Scott. 2015. "What Would Milton Friedman Have Thought of the Great Recession?" *American Journal of Economics and Sociology* 74 (2): 209–35.

Svensson, Lars E. O. 2003. "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules." *Journal of Economic Literature* 41 (2): 426–77.

Svensson, Lars E. O. 2015. "The Possible Unemployment Cost of Average Inflation below a Credible Target." *American Economic Journal: Macroeconomics* 7 (1): 258–96.

Taylor, John. 1993. "Discretion versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy* 39 (1): 195–214.

Taylor, John. 1999. "A Historical Analysis of Monetary Policy Rules." In *Monetary Policy Rules*, 319–48. Chicago: University of Chicago Press / National Bureau of Economic Research, Inc.

Thoma, Mark. 2012. "The Gap in Monetary and Fiscal Policy." *Economist's View.* March 18. http://economistsview.typepad.com/economistsview/2012/03/the-gap-in-monetary-and-fiscal-policy.html.

Woodford, Michael. 2001. "The Taylor Rule and Optimal Monetary Policy." *American Economic Review* 91 (2): 232–37.

Yellen, Janet. 2012. "The Economic Outlook and Monetary Policy." Speech at the Money Marketeers of New York University, New York, April 11.