Journal of International Money and Finance 28 (2009) 1165–1181

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

# Do monetary indicators lead euro area inflation?

Boris Hofmann*

*European Central Bank, Kaiserstraße 29, D-60311 Frankfurt am Main, Germany*

*JEL classification:*
E31
E40
C32

*Keywords:*
Euro area
Inflation
Leading indicators
Money

A B S T R A C T

This paper assesses based on euro area data whether the strong in-sample long-run link between money growth and inflation that has been highlighted by a number of recent empirical studies is exploitable to predict inflation out of sample. The results from standard bivariate forecasting models suggest that no monetary (nor any other) single indicator significantly outperforms a simple benchmark forecast. The further analysis shows that it would be premature however to discard based on such evidence the usefulness of monetary (and all other) indicators. First, it is shown that based on judgemental adjustments to monetary indicators correcting for the effects of identifiable, persistent velocity shifts, it appears possible to significantly improve predictive ability in real time. Second, I find that a factor forecasting model combining monetary and economic indicators, which can be regarded as a generalized quantity theory- or two-pillar Phillips Curve-forecasting model, delivers a fairly good and stable forecasting performance.



## 1. Introduction

Empirical research on the link between money growth and inflation has experienced a remarkable revival over the last couple of years. Based on extended Phillips Curve specifications (Gerlach, 2003, 2004; Neumann, 2003; von Hagen and Hofmann, 2003; Neumann and Greiber, 2004), frequency domain analysis (Assenmacher-Wesche and Gerlach, 2007, 2008a,b,c; Benati, 2009) or cointegration analysis (Carstensen, 2007; Kaufmann and Kugler, 2008), it has been shown that there exists a close long-run causal link going from money growth to inflation. Due to the important role of money in the ECB's monetary policy strategy, most of this literature focuses on the euro area. However, a number of recent studies have shown that the long-run money growth-inflation nexus exists also in other

* Tel.: +49 69 1344 6647; fax: +49 69 1344 7604.
*E-mail address:* boris.hofmann@ecb.int

0261-5606/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jimonfin.2009.06.003

countries, including the US (Assenmacher-Wesche and Gerlach, 2007), and, in particular, that it is robust across monetary regimes (Benati, 2009).

These studies make a strong case that the long-run link between money growth and inflation that is implied by the quantity theory remains intact. An important follow-up question is whether the existing in-sample long-run link between money growth and inflation is exploitable to predict future risks to price stability out of sample. This paper takes up this point by exploring the performance of monetary indicators in predicting inflation in the euro area Harmonized Index of Consumer Prices (HICP) over the coming one, two and three years out of sample over the period 1999Q1 till 2006Q3.

Exploring the out-of-sample predictive ability in the euro area is of particular interest because of the prominent role of money in the ECB's monetary policy strategy. The main elements of the ECB's monetary policy strategy are a quantitative definition of price stability and a so-called "two-pillar" framework for the assessment of the outlook for price developments and the current risks to price stability. The ECB's definition of price stability is an annual increase in the HICP of below, but close to two percent. The two-pillar framework for the assessment of the risks to price stability combines a broad based economic analysis of the short-to medium term risks to price stability assessing a "wide range of economic and financial variables" and a broad based monetary analysis for the medium- to longer-term risks to price stability which takes into account developments in a "wide range of monetary indicators, including M3, its components and counterparts, notably credit, and various measures of excess liquidity" (ECB, 2003). While the two pillars were originally described as two parallel analytical perspectives, the ECB (2003) has clarified in the evaluation of its monetary policy strategy that the money pillar "mainly serves as a means of cross-checking, from a medium to long-term perspective, the short-to medium term indications coming from economic analysis."

The prominent role assigned to money in the ECB's monetary policy strategy was motivated by the notion that the development of the price level in the medium to longer term is a monetary phenomenon (ECB, 1999). This view was supported by a number of empirical studies showing that the long-run euro area M3-demand function was stable (Coenen and Vega, 1999; Brand and Cassola, 2000; Calza, Gerdesmeier, et al., 2001) and that M3-based indicators were leading euro area inflation at medium-term horizons (Nicoletti Altimari, 2001; Trecroci and Vega, 2002). However, the ECB's special emphasis on monetary analysis has been exposed to intense criticism from the very beginning. Besides theoretically motivated reservations against the money pillar,[1] it has also been argued that money is an unreliable indicator for inflation because of frequent shifts in velocity.[2]

The analysis of this paper starts by assessing the forecasting performance of simple bivariate forecasting models considering aggregate euro area monetary indicators, as well as a large number of aggregate euro area economic and financial indicators. The forecasting performance of the indicators is evaluated against a simple random walk benchmark forecast. The results of this exercise reveal that none of the bivariate forecasting models is able to significantly outperform the benchmark model, which echoes the finding of Stock and Watson (2007) for the U.S. that it has become more difficult to beat simple univariate forecasts of inflation in the environment of low inflation that has prevailed since the mid 1980s.

The bivariate forecasting models including M3 growth are the best performing models with average forecast errors up to 30% lower than those of the benchmark model. However, also for these models tests of equal predictive ability vis-à-vis the benchmark model by far fail to reject. A look at the forecasting performance over time reveals that the predictive power of the forecasting models including M3 growth has substantially deteriorated in recent years, producing systematically higher forecast errors than the benchmark since 2001.

The point this paper wants to make is that it would be premature to discard based on such evidence the usefulness of monetary indicators for out-of-sample forecasting. Indeed, the quantity theory implies that pinning down the link between money growth and inflation requires controlling for

[1] For a rigorous discussion of the (lack of a) theoretical foundation of the money pillar from the perspective of New Keynesian models see Woodford (2006).

[2] Estrella and Mishkin (1997) have argued that volatility in money demand dominates movements in money growth in an environment of subdued inflation and money growth, giving rise to a low signal-to-noise ratio of money growth with respect to inflation. The same line of reasoning has also been brought forward by Begg et al. (2002) and De Grauwe and Polan (2005).