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Money demand and the role of monetary indicators in forecasting euro area inflation

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ABSTRACT

This paper examines the stability of money demand and the forecasting performances of a broad monetary aggregate (M3), excess liquidity and excess inflation in predicting euro area inflation. The out-of sample forecasting performances are compared to a widely used alternative, the spread of interest rates. The results indicate that the evolution of M3 is still in line with money demand, even when observations from the economic and financial crisis are included. Both excess measures and the spread are useful for predicting inflation.

1. Introduction

Achieving and maintaining the stability of the price level is the main goal of central banks all over the world. Therefore, the ECB regularly observes the evolution of money stocks in the so-called Quarterly Monetary Assessment (Fischer, Lenza, Pill, & Reichlin, 2009). However, while money balances increased and nominal interest rates decreased in the period before the financial crisis, inflation did not accelerate at all. This has led some analysts to conclude that money growth might not be well-suited for either predicting future inflation prospects or supporting monetary policy decisions. Contributing to the debate, this paper investigates how closely related to each other money and inflation are, whether a constant parameter M3 money demand equation exists, and how good the forecasting power of monetary indicators is with respect to consumer price inflation, by taking observations during the financial and economic crisis into account.

Monetary growth does not indicate future inflation per se. For that reason, money demand is crucial for monitoring the inflation process, at least as a long run reference point (ECB, 2004). The money demand function links the monetary development to its fundamental determinants, such as real income and the opportunity costs of holding money. By comparing the actual money stock with the long run equilibrium according to money demand, measures of excess liquidity can be derived and could be used to forecast inflation (Dreger & Wolters, 2010b).

Excess liquidity measures are based on the assumption of a stable money demand function. However, recent evidence has cast serious doubts on the robustness of the money demand, especially if data from after the introduction of the euro as the common currency are used; see for example Carstensen (2006) and Gerlach (2004). However, as Dreger and Wolters (2010a,b) demonstrated, the instability problem can be resolved by an appropriate specification of the opportunity costs. An almost stable money demand function for M3 is obtained if inflation is included, though there is still a minor permanent shift in the income elasticity from 2002 onwards, indicating the higher relevance of wealth effects since then, see Beyer (2009), Dreger and Wolters (2009), Fase and Winder (1998) and Greiber and Setzer (2007). However, little is known when the most recent developments are taken into account. As an exception, Beyer (2009) has reported evidence of a stable money demand function for M3 using preliminary data to the end of 2008. As with Dreger and Wolters (2010a,b, 2011), the inclusion of inflation is decisive in achieving this result.

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The importance of money growth and/or excess money measures for inflation has been discussed in various papers. Gerlach and Svensson (2003) found that both the output gap and the real money gap, i.e., the difference between the actual real M3 money stock and its equilibrium value derived from a long run money demand relationship, contain useful information with respect to one- and two-year-ahead HICP inflation rates. In contrast, the nominal M3 annual growth rate provides no information regarding future inflation. Trecroci and Vega (2002) reported similar results for GDP inflation. Following Nicoletti-Altimari (2001), the real M3 gap (overhang) is an important complement to monetary aggregates if inflation is predicted for a two year-period. Kaufmann and Kugler (2008) detected a robust cointegration relationship between money growth and inflation. Shocks in M3 growth account for substantial parts of the inflation forecast error variance. The effects of output gap and interest rate shocks on inflation are transitory, and their forecasting variance shares seem to be negligible at the medium-term horizons. Carstensen, Hagen, Hossfeld, and Neaves (2009) reported evidence that an aggregated monetary overhang can predict country-specific inflation in the four largest euro area countries, but this does not encompass measures of the country-specific monetary overhang. According to Amisano and Fagan (2010), broad money growth, corrected for trend velocity and potential output growth, is a leading indicator for switches between inflation regimes.

While most related studies are based on data ending at the very beginning of the ECB period, our analysis produces inflation forecasts for the period from 2003Q4 to 2010Q4, thus including observations during the economic and financial crisis. This period is chosen because the ECB changed its policy strategy in 2003: specifically, it decided to stop reviewing the reference value for M3 on an annual basis. Instead, the so-called monetary pillar is used as a cross-check for the medium- to long-term perspective. The short- to medium-term perspective is based on the economic analysis pillar; see for example Trichet (2003, p. 6). Due to the apparent success of monetary policy in stabilising inflation, the predictive power of monetary aggregates might have declined. In fact, the findings of Amisano and Fagan (2010) suggest that the inflation risk has fallen over recent years. Due to unconventional monetary measures, however, inflation could shift from the current benign regime of price stability to a higher inflation regime (Peersman, 2011).

The first contribution of this paper is to examine whether money demand has remained stable over an extended period, covering observations from the economic and financial crisis. Its second contribution is to explore the forecasting properties of M3 indicators with respect to HICP inflation over the recent period. Our results indicate that the demand for real money balances appears to be robust, if real house prices are included as a proxy for wealth. Moreover, models which include excess liquidity, excess inflation or the spread outperform both the autoregressive benchmark and money growth for forecasting inflation. At the longer forecasting horizons, excess inflation outperforms excess liquidity and the spread.

The rest of the paper is organized as follows. Section 2 reviews the theoretical specification of the money demand function. Section 3 discusses the time series considered in the analysis. The specification and estimation of money demand functions in error correction form has been the customary approach for capturing the nonstationary behavior of the relevant data. A system cointegration analysis is provided in Section 4. In Section 5, a single M3 money demand function with constant parameters is derived. Section 6 performs a forecasting exercise which is built upon tests of equal predictive ability and encompassing tests. Finally, Section 7 concludes.

2. Specification of money demand

A widely used specification of money demand is chosen as the starting point of the analysis; see Beyer (2009) and Ericsson (1998). This specification of the money demand leads to a long run relationship of the form

$$(m-p)_t = \delta_0 + \delta_1 y_t + \delta_2 w_t + \delta_3 R_t + \delta_4 r_t + \delta_5 \pi_t, \qquad (1)$$

where m denotes nominal money balances taken in logs, p is the log of the price level, y is the log of real income, representing the transaction volume in the economy, and w is the log of real financial wealth. The opportunity costs of holding money are proxied by nominal long (R) and short (r) term interest rates and the annualized inflation rate, i.e., $\pi = 4\Delta p$, in the case of quarterly data. The index t denotes time.

Price homogeneity is imposed as a long-run restriction in order to map the money demand analysis into a system of I(1) variables; see Holtemöller (2004). The income variable exerts a positive effect on nominal and real money balances. Often, its impact is restricted to unity for theoretical reasons; see Dreger and Wolters (2009) for a discussion. Money holdings are also related to portfolio allocation decisions. For example, a surge in asset prices may trigger an increase in the demand for liquidity, due to an increase in net household wealth. While the scale effect points to a positive impact of wealth, the substitution effect works in the opposite direction, as higher asset prices make assets more attractive relative to money holdings. If the opportunity costs of money holdings refer to earnings on alternative financial assets, relative to the own yield of money balances, their coefficients should enter with a negative sign. For the inclusion of the inflation rate, see also Dreger and Wolters (2010a). The inflation rate is part of the opportunity costs, as it represents the cost of holding money in preference to holding real assets, which would lead to a negative sign. However, its inclusion provides a convenient way to generalize the short run homogeneity restriction imposed between money and prices. Furthermore, the adjustment processes in either nominal or real terms can be distinguished (Hwang, 1985). Because of the latter arguments, the inflation rate could enter, even with a positive sign. Therefore, the overall effect of inflation cannot be predicted a priori.

The parameters $\delta_1 > 0$ and δ_2 denote the elasticities of money demand with respect to the scale variables, income and wealth. The impacts of the return of other financial assets and inflation are captured by the semi elasticities $\delta_3 < 0$, δ_4 and δ_5, respectively. The parameter δ_4 should