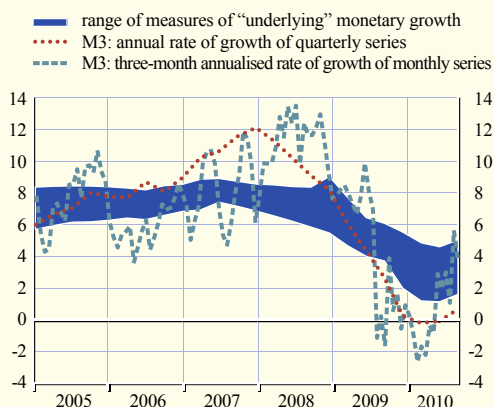## THE IMPACT OF THE YIELD CURVE ON RECENT DEVELOPMENTS IN MONETARY AGGREGATES

Since mid-2010 the annual growth rate of M3 has strengthened somewhat. This follows a period of stagnation in monetary growth in the first half of 2010, after the sharp deceleration observed in late 2008 and throughout 2009. In order to assess the implications of this recent development for price stability over the medium term, it is essential to gauge the extent to which this strengthening is mirrored in the pace of underlying monetary expansion. Analysing underlying monetary expansion provides the relevant signal regarding risks to price stability over the medium term. The range of measures of underlying monetary expansion typically monitored indicates that the gap that has built up over the last year and a half between these measures and the lower headline rate of monetary growth has narrowed (see Chart A).[1] A broad-based monetary analysis conducted by the ECB points to the changing slope of the yield curve as the main factor driving this gap. This box presents the analysis that underpins the assessment of the role of the interest rate constellation, drawing on both qualitative and quantitative evidence. The model-based analysis used to address this question draws on the more comprehensive toolkit now available for the purposes of monetary analysis, which was presented in a recent ECB publication.[2]

Chart A M3 and underlying M3

(percentage changes)

- range of measures of "underlying" monetary growth
- M3: annual rate of growth of quarterly series
- M3: three-month annualised rate of growth of monthly series

Sources: ECB and ECB calculations.

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1 These measures of underlying monetary growth are derived using some of the methods described in the box entitled "Underlying monetary dynamics: concept and quantitative illustration", *Monthly Bulletin*, ECB, Frankfurt am Main, May 2008. The empirical measures used are obviously imperfect proxies for the concept of underlying monetary expansion. In addition, it must be borne in mind that the signalling quality of different empirical measures may vary over time.

2 See Papademos, L.D. and Stark, J. (eds.), *Enhancing monetary analysis*, ECB, Frankfurt am Main, 2010.

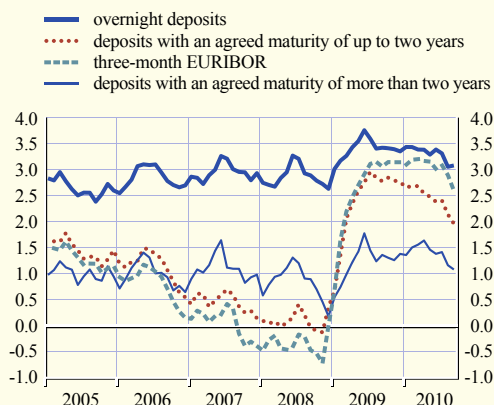## Developments in the yield curve since late 2008

The decisive policy action undertaken in the aftermath of the collapse of Lehman Brothers in late 2008 led to a sharp decline in short-term interest rates and, as a result, an unprecedented steepening of the yield curve. The steepening observed in the slope of the yield curve – as measured, for instance, by the spread between the yield on ten-year euro area government bonds and the three-month EURIBOR – resulted in similar adjustments in differentials between interest rates on MFI deposits and government bond yields (see Chart B). In mid-2009 most of these differentials, which are a typical measure of the opportunity cost of holding MFI deposits, stabilised at elevated levels. Incidentally, developments in the differential relating to rates on MFI short-term time deposits (i.e. deposits with an agreed maturity of up to two years) were not fully in line with other differentials, as banks appeared to increase the value they attached to the reduced liquidity risk that securing funding through such deposits exposed them to.[3] All interest rate differentials have gradually declined since mid-2010, but they remain well above the levels prevailing prior to the collapse of Lehman Brothers.

Qualitative evidence of the impact of interest rate developments on portfolio allocation

The slope of the yield curve has an impact on M3 through the broad decision to invest funds in shorter-term monetary assets or longer-term non-monetary assets. One way of gauging this impact is to look at the share of M3 flows in total financial investment by euro area households and firms (see Chart C). Data suggest that until early 2010 the sharp adjustment seen in the relevant risks and returns led to financial investment being shifted towards non-monetary instruments. In particular, financial investment in non-MFI

Chart B Differentials between interest rates on MFI deposits and ten-year government bond yields
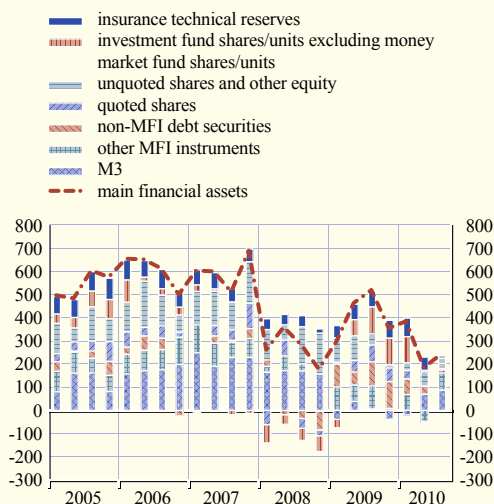
(percentage points)

—— overnight deposits
······ deposits with an agreed maturity of up to two years
------ three-month EURIBOR
—— deposits with an agreed maturity of more than two years

Sources: ECB and ECB estimates.
Note: The ten-year government bond yield is the spot rate yield on all euro area government bonds.

Chart C Financial investment of the money-holding sector

(quarterly flows; EUR billions; adjusted for seasonal effects)

■ insurance technical reserves
▥ investment fund shares/units excluding money market fund shares/units
≡ unquoted shares and other equity
▨ quoted shares
▨ non-MFI debt securities
▦ other MFI instruments
▨ M3
‑ ‑ ‑ main financial assets

Sources: ECB and ECB estimates.
Notes: Excludes the financial investment of general government. Data from the integrated euro area accounts are available up to the second quarter of 2010, while MFI data include the third quarter of 2010. Data on investment fund shares/units for the third quarter of 2010 are estimates based on investment fund statistics. The bar with the grey and white pattern in the third quarter of 2010 denotes an estimate of financial investment in assets other than: (i) MFI instruments; and (ii) investment fund shares/units.

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3 Besides the maturity features of these short-term time deposits, their attractiveness as a source of MFI funding may also result from the fact that they are collected from the non-financial private sector, which may be considered less likely to suddenly stop or reverse the supply of funding than the financial sector.

debt securities, investment fund shares and equity increased markedly during this period. At the same time, investment in longer-term MFI instruments also increased, suggesting that remuneration considerations had a larger role to play in the reorientation of financial investment than possible concerns regarding the riskiness of the MFI sector. In the period between late 2006 and late 2008, which preceded the sharp slowdown in annual M3 growth, short-term time deposits were better remunerated than longer-term deposits. This interest rate configuration was reversed sharply (by approximately 250 basis points) by the steepening of the yield curve in late 2008, rendering investment outside M3 substantially more attractive. In the last few quarters, the impact of interest rate developments has again been visible in money holdings, as the gradual flattening of the yield curve has reduced the incentive to shift funds out of M3 and has thus been accompanied by monetary instruments regaining a significant share of total financial investment flows.

Insights from model-based analyses assessing the role of the yield curve in shaping monetary developments

In order to confirm the robustness of these conclusions regarding the impact of the yield curve on monetary aggregates, it is useful to complement this analysis with more formal model-based approaches. Such approaches are necessary in order to properly take into account the fact that there are typically a multitude of factors (i.e. in addition to interest rates) that affect monetary developments at any given point in time.

One empirically driven approach that can be brought to bear on this question involves the use of a large-scale vector autoregression model estimated using Bayesian methods (i.e. a BVAR model).[4] This model captures the dynamic interaction between: a rich set of interest rates and yields; a broad array of business cycle indicators; and an extensive range of monetary variables from both sides of the MFI balance sheet. Thus, it represents a tool with which to study the effects of the yield curve on different monetary aggregates, taking due account of the macroeconomic environment. To gauge the size of these effects, counterfactual simulations are run, holding the interest rate constellation unchanged at the configuration prevailing in October 2008. The evolution of the main monetary aggregates is then compared with that implied by a model simulation in which interest rates follow their actual path.

The results confirm that the steepening of the yield curve exerted considerable downward pressure on M3 growth (see Chart D). Moreover, this impact is significant at conventional levels of confidence. At the same time, the changes observed in the interest rate configuration since early 2009 have also had a profound effect on the allocation of funds to instruments within M3, prompting a significant

Chart D Effect of the steepening of the yield curve based on a large-scale BVAR model

(percentage points)

— M1
····· M2
‑‑‑‑ M3
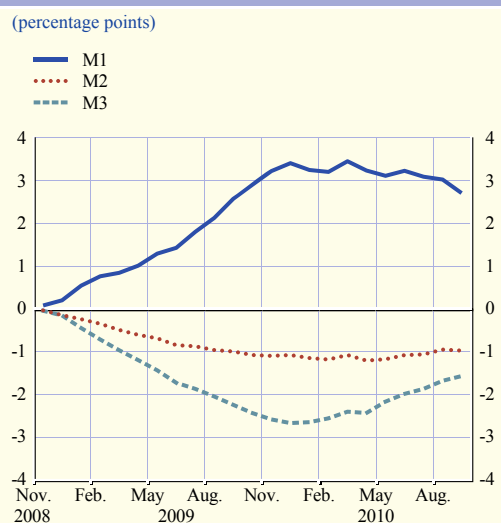
Sources: ECB and ECB calculations.
Note: This effect is based on the model described in Annex 1 to Chapter 4 of Papademos, L.D. and Stark, J. (eds.), op. cit.

4 This model is presented in Annex 1 to Chapter 4 of Papademos, L.D. and Stark, J. (eds.), op. cit.

reallocation of holdings of monetary assets, with shifts towards the most liquid instruments. This is confirmed by the model, which points to a large positive impact on M1 growth. A negative impact is also estimated for M2, although this is weaker than that estimated for M3 on account of the larger share of more liquid components in M2. The analysis based on the BVAR model points to the impact of the yield curve waning in 2010. While this is the case for all aggregates, it is more pronounced in the case of M3.

The effects of the yield curve on M3 growth as identified using the BVAR model are broadly confirmed by an analysis based on a more theoretical (yet empirically consistent) approach, namely a dynamic stochastic general equilibrium (DSGE) model.[5] The incorporation in this model of financial frictions and a banking

Chart E Impact of the yield curve on annual M3 growth on the basis of a structural model

(percentage points)

- range of differentials between M3 and estimates of underlying monetary growth
- impact of the slope of the yield curve

Sources: ECB and ECB calculations.
Note: This impact is derived on the basis of the model described in Chapter 5 of Papademos, L.D. and Stark, J. (eds.), op. cit.
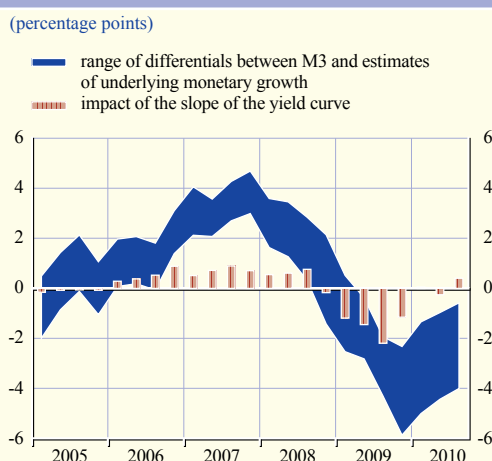
sector allows the formulation of structural interpretations of monetary developments. In particular, it permits the identification of the structural shocks that, according to the model, shape economic, monetary and financial developments at each point in time. The model suggests that in recent years the slope of the yield curve has been driven largely by the monetary policy response to the financial crisis. This, in turn, exerted a significant downward impact on the annual M3 growth observed during 2009 and, indeed, goes a long way towards explaining the switch from a positive gap between headline and underlying monetary expansion before the crisis to a negative one as of the last quarter of 2008 (see Chart E). Indeed, in 2009 the outcomes of the theoretically oriented DSGE model and the empirically driven BVAR model were also very similar in quantitative terms (with the impact derived from the BVAR model peaking at around 2.5 percentage points, while that derived from the DSGE model peaked at around 2 percentage points). In 2010 this downward impact has disappeared, with the contribution to M3 growth turning slightly positive in the third quarter of the year.

Conclusion

The ability to identify factors driving headline M3 growth and quantify their impact over time is instrumental in the assessment of underlying monetary expansion. The analysis presented here shows that the recent strengthening of annual M3 growth is, to a large extent, a result of the gradual waning of the downward impact of the yield curve and should not be expected to lead to a one-to-one strengthening in underlying monetary expansion. This notwithstanding, the moderate pace of underlying monetary expansion is currently still well above the low rate of headline M3 growth on account of the yield curve effect, signalling that medium-term risks to price stability are contained.

5 This model is presented in Chapter 5 of Papademos, L.D. and Stark, J. (eds.), op. cit.