

The importance of financial indicators for macroeconomic modelling with an application to the UK

Costas Milas

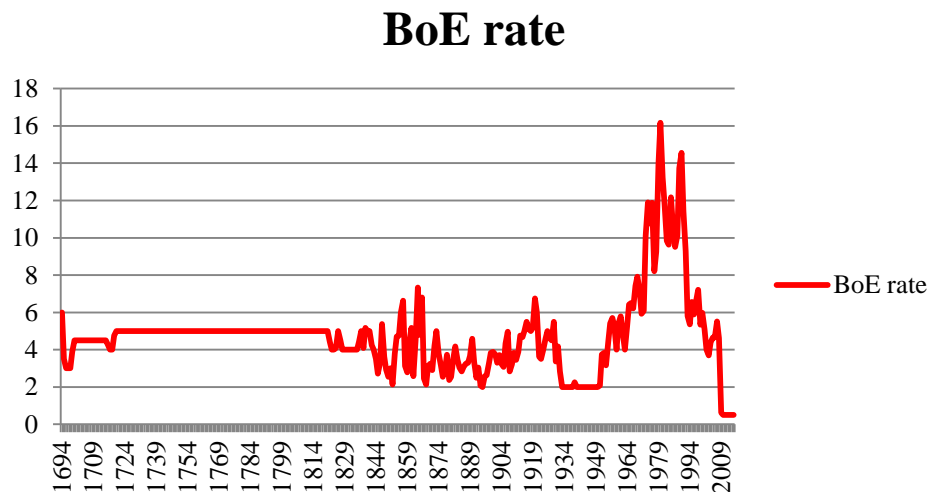
University of Liverpool and Rimini Centre for Economic Analysis

Birmingham, March 2015

Note: Some the research ideas discussed here are based on the paper "On Stock Market Illiquidity and Real-Time GDP Growth", *Journal of International Money and Finance*, 44, (2014), pp 210-229. (With **Florackis, C., Giorgioni, G. and Kostakis, A.**). We acknowledge financial support from the *Bank of England's Research Donation Committee*. The views expressed here reflect those of the authors and not those of the Bank of England.

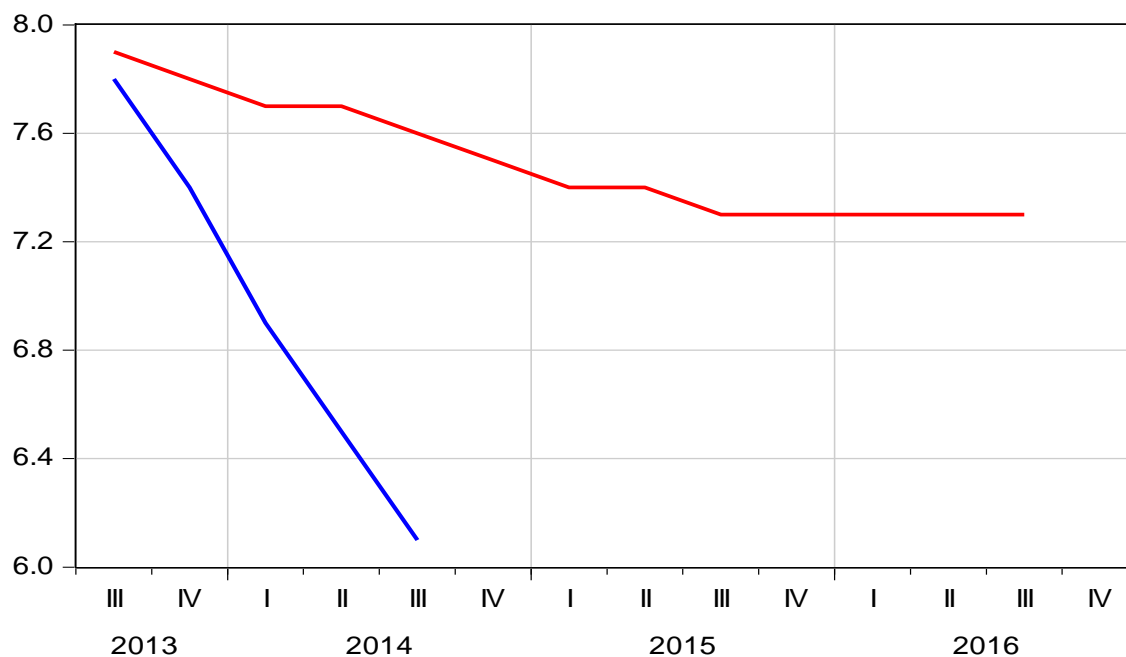
Financial indicators and macroeconomic modelling

- In response to the recent financial crisis, monetary policy has become exceptionally loose. In the UK, £375bn of QE has been put in place. The BoE base rate remains at 0.5%, 3.5 percentage points below its median value (over the 1694-2015 period).



Financial indicators and macroeconomic modelling

- In August 2013, Mark Carney introduced forward guidance which linked the rise in the policy rate to the unemployment rate dropping below the 7% threshold. Forward guidance was "abandoned" in February 2014 when it became clear unemployment was dropping much faster than initially predicted.

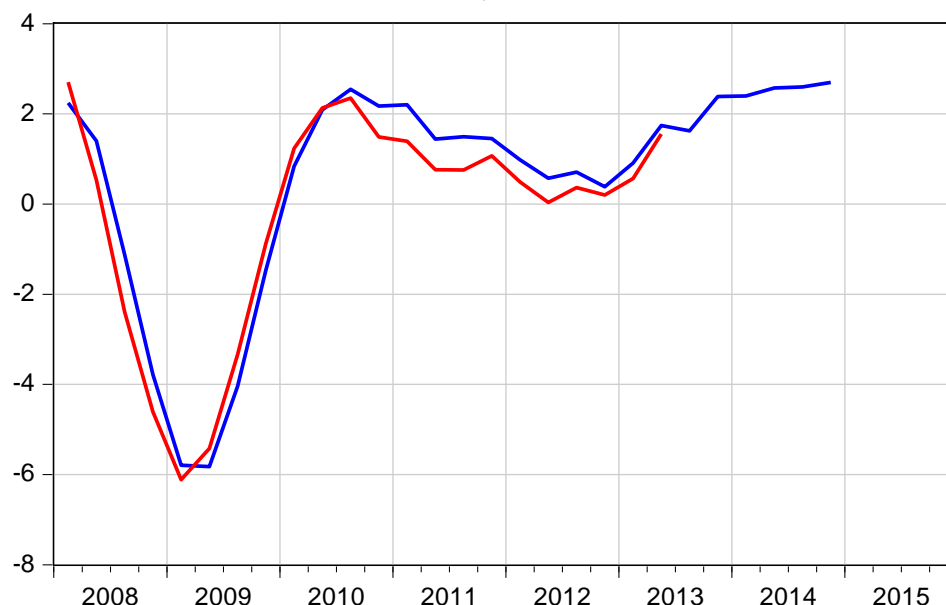


— Actual unemployment rate
— BoE median forecast (August 2013 inflation report)



Financial indicators and macroeconomic modelling

- This spectacular forecasting failure might have been (in part) due to extensive revisions in GDP data. Indeed, earlier data suggested median growth of 0.55% p.a. (in 2008-2013) **almost half** of what is suggested by latest data: Perhaps the BoE missed the momentum in the data because, at the time forward guidance was introduced, ONS data did not show such momentum.



— GDP growth (2015Q1 vintage)
— GDP growth (2013Q3 vintage)



Financial indicators and macroeconomic modelling

However, forecasting failure might also be related to:

- Models ignoring financial indicators.
- Models ignoring non-linearities.
- Borio (2014) noted that for most of the postwar period *“financial factors in general progressively disappeared from macroeconomists’ radar screen”*.
- Writing in the FT (November 2012), DeAnne Julius (former MPC member) flagged the importance of adding financial channels in the BoE’s econometric model. She noted: *“And now that QE has become the dominant policy instrument, a model that lacks detailed financial channels to analyse how QE actually works is a **major problem**”*.
- We argue that an important channel through which QE may affect economic growth is by improving liquidity conditions in the stock market.

Financial indicators and macroeconomic modelling-

Main Findings

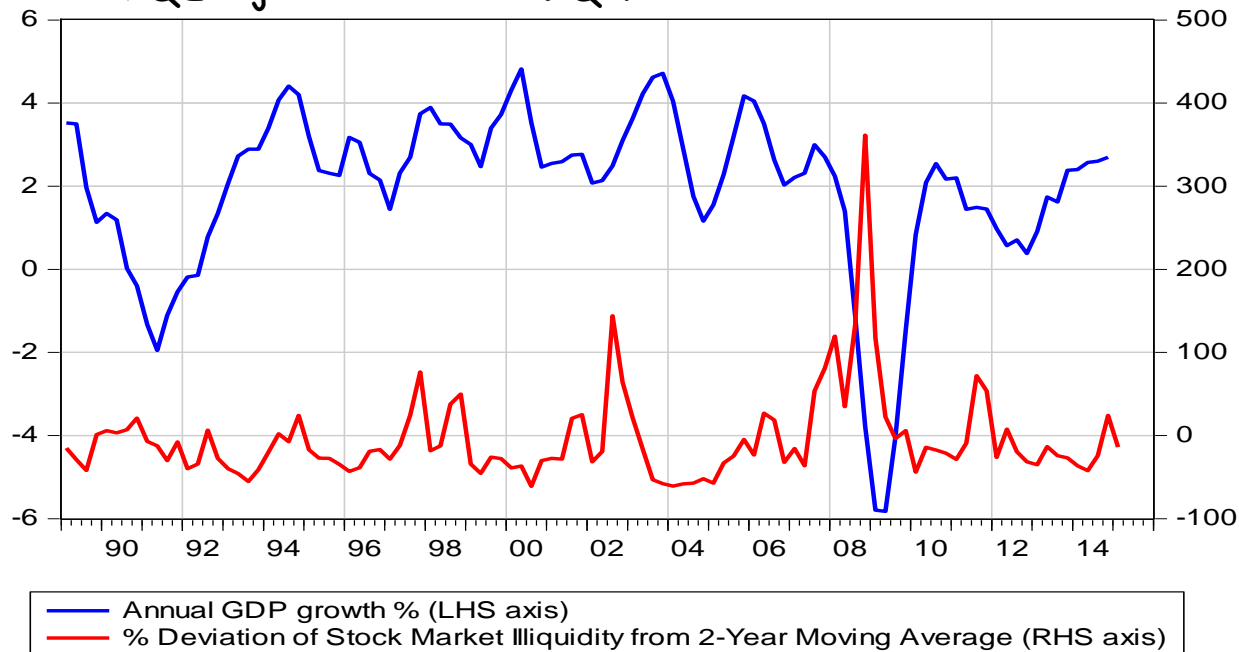
1. Significant impact of **stock market illiquidity** over and above the usual macroeconomic controls of economic growth (e.g. real money and global activity).
2. **Divisia money** (which has a close relationship to aggregate spending as it weighs the components of the money supply in proportion to their usefulness in making transactions) is a better predictor of UK growth than the routinely used M4 money measure and therefore, a useful monetary indicator for policymakers to pay attention to.
3. Impact of both market liquidity and divisia money is regime dependent. Their impact becomes stronger during periods of illiquid conditions.
4. This model **outperforms** (using formal statistical tests) the forecasts published in the Bank of England's *Inflation Report*.

Financial indicators and macroeconomic modelling

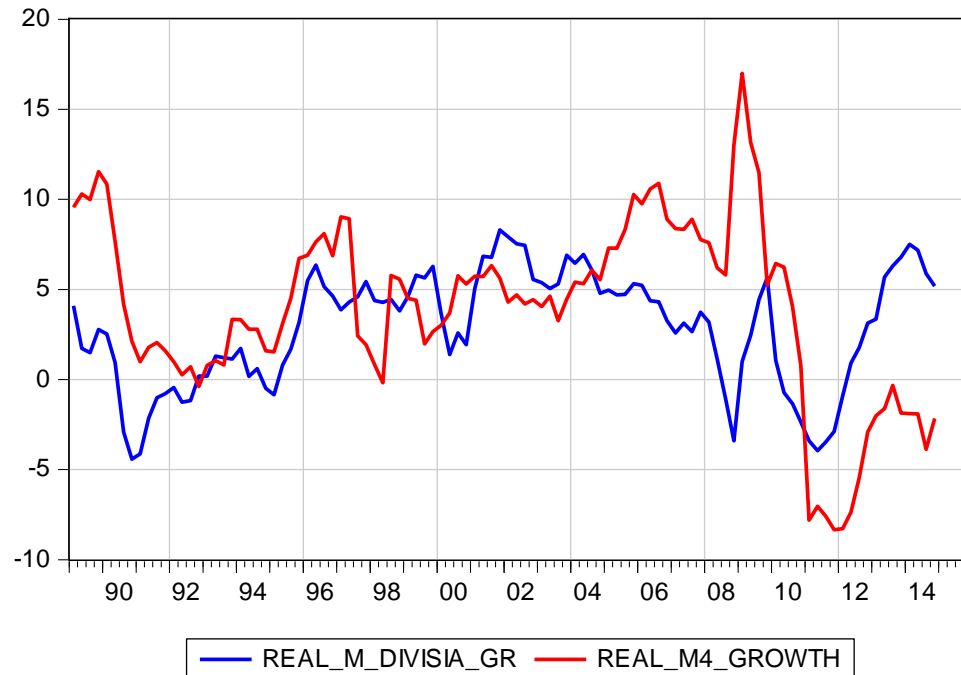
- Stock market liquidity can be an informative leading indicator for future economic conditions through an **investment channel**: a liquid secondary market can facilitate the financing of long-run projects in the real economy (Levine and Zervos, 1998).
- Liquidity also affects the premium that investors demand to withhold risky assets. As a result, a liquid stock market may lower the **cost of capital** for firms, and hence boost high return projects that stimulate earnings and productivity growth.

Financial indicators and macroeconomic modelling

- Illiquidity ([Amihud, 2002](#)) is defined as the average monthly ratio of daily absolute returns to daily trading volume in monetary terms. I plot illiquidity relative to 2-year Moving Average (% deviation). Some illiquidity episodes: (a) Asian fin. crisis & Russian default, 1997-1998. (b) Following the dot-com bubble (adverse impact reached height in 2002q3). (c) 2007-2009 fin. crisis.
- Liquidity deteriorates rapidly. Recession deepens. Having cut the policy rate to 0.5%, BoE responds with QE injections in 2009Q1.



Following from QE injections, divisia money growth (not M4) picks up!



Empirical Models

- We estimate over 1989q1-2012q4 using **real-time** GDP data. The first data window runs from 1989q2 to 2002q4 and uses the first release of the 2003q1 real-time data vintage. Each successive data window is extended by one observation; hence, the last data window runs from 1989q2 to 2012q4 and uses the 2013q1 real-time data vintage (this setup delivers 41 expanding windows).
- **Linear Model:**
$$y_t = \beta_0 + \beta_{illiq} illiq_{t-l} + \beta_{\mathbf{X}}' \mathbf{X}_{t-l} + v_t$$

where y_t is annual GDP growth, $illiq_{t-l}$ is a measure of illiquidity, \mathbf{X}_{t-l} are control variables (lagged GDP growth, slope of term structure, global growth and real money growth based on M4 and divisia money). v_t is an error term.

Empirical Models

- Non-linear Model:

$$y_t = \beta_0 + (\beta_{illiq,1} illiq_{t-1} + \beta_{\mathbf{X},1}' \mathbf{X}_{t-1}) \theta^s_{t-1} + (\beta_{illiq,2} illiq_{t-1} + \beta_{\mathbf{X},2}' \mathbf{X}_{t-1}) (1 - \theta^s_{t-1}) + u_t$$

where

$$\theta^s_{t-1} = 1 - \frac{1}{1 + e^{-\gamma^s (s_{t-1} - \tau^s) / \sigma(s_{t-1})}}$$

is the logistic transition function discussed in van Dijk et al (2002) and s_{t-1} is the transition variable.

When $s_{t-1} < (>)$ threshold, theta tends to 1 (0).

Empirical Models

s_{t-l} choices:

- $illiq_{t-1}$ relative to -16% threshold
- y_{t-1} relative to 1.22% threshold (weak growth vs relatively normal or better)

Financial indicators and macroeconomic modelling- Conclusions

Our non-linear model with stock illiquidity and divisia money growth comfortably beats (out-of-sample) a number of linear models and BoE forecasts (over the period 2003Q1-2012Q1).

Therefore, forecasting improvement might come through:

- The use of financial indicators.
- Non-linear modelling.

On-going work (with Mr. Ellington, ESRC funded PhD student) looks at the same ideas in models of UK inflation.

Together with Dr. Florackis and Mr. Ellington, we are currently looking at illiquidity in the housing market.