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Financial crises and monetary policy: Evidence from the UK☆

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ABSTRACT

We analyse UK monetary policy using monthly data for 1992–2010. We have two main findings. First, the Taylor rule breaks down after 2007 as the estimated response to inflation falls markedly and becomes insignificant. Second, policy is best described as a weighted average of a "financial crisis" regime in which policy rates respond strongly to financial stress and a "no-crisis" Taylor rule regime. Our analysis provides a clear explanation for the deep cuts in policy rates beginning in late 2008 and highlights the dilemma faced by policymakers in 2010–11.

1. Introduction

The global economic crisis that began in 2007 has presented a series of severe challenges to monetary policy. Deep and rapid reductions in output opened up an output gap of over 5% in many countries. Profound shocks to the financial system disrupted the transmission mechanism linking monetary policy to the real economy and created fears for the stability of the system. Objections have been raised to low and stable inflation being the main aim of monetary policy and dissatisfaction has been expressed with the New Keynesian and DSGE models that provided the theoretical underpinning for that aim. In this context, it would not be surprising if the behaviour of policymakers had changed during the crisis.

This paper explores the interest rate setting behaviour of monetary policymakers in the UK using monthly data for the period 1992–2010. We have two main findings. First, although policymaking can be described using a simple Taylor rule in the period before the 2007 financial crisis, the Taylor rule then breaks down. The estimated response of the policy rate to inflation falls markedly and becomes insignificant, while the estimated response to the output gap is sharply reduced. Second, policy rates over the period from 1992 can best be described as a weighted average of two regimes, a "financial crisis" regime and a "no-crisis" regime, where the weights on these regimes reflect the probability of a financial crisis. The no-crisis regime is a conventional Taylor rule, whereas the financial crisis regime has a reduced response to the output gap, a strong response to measures of financial stress but no response to inflation.

This model gives a plausible account of UK monetary policy. The no-crisis regime is dominant in 1992–2007, explaining the success of the Taylor rule over that period. But the onset of the major financial crisis in 2007 led to a marked change: the policy rate ceased to respond to inflation and the weight on the output gap fell as financial stress became the dominant influence on UK monetary policy. On this account, the sharp fall in interest rates beginning in late 2008 reflected difficulties in financial markets and the urgent need for policy measures to respond to the crisis. The rapid fall in the policy rate occurred despite inflation being above target and exceeding 3% for much of the crisis period; in our view, this explains the failure of the Taylor rule after 2007. This account also highlights the dilemma facing policymakers in early 2010. The no-crisis regime increasingly pointed to higher policy rates through early 2010 to the end of our sample in July, driven by persistently high rates of inflation. By contrast, our measure of financial stress pointed to a continuation of the financial crisis and so argued for a continuation of the policy of exceptionally low interest rates.

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The paper is structured as follows. In Section 2, we estimate a simple Taylor rule representation of monetary policy. We show that estimates of this model using a sample that ends in 2007 conform to expectations with a response to inflation in excess of unity and a strong response to the output gap. Estimates that use the full sample that ends in 2010 are very different. Although the crisis period represents less than 20% of the sample, the estimate on inflation becomes insignificant and the point estimate is negative. The response to output remains significant but is more than halved. We detect a structural break around the time the crisis began.

In Section 3, we investigate whether the addition of measures of financial stress to a Taylor rule gives more satisfactory estimates. Some writers, most prominently Curdia and Woodford (2009), have suggested that including the determinants of credit spreads in a policy rule may be optimal in the presence of financial frictions. We use two measures of financial stress as determinants of credit spreads. Our first measure is a composite index of financial stress compiled by the IMF, providing a broad spectrum measure of stress across money, foreign exchange and equity markets in the UK. Given that the recent crisis originated in the US, our second measure is the US Financial Stress Index provided by the Federal Reserve Bank of Kansas City.[1] We find that inclusion of these measures in a Taylor rule does not give satisfactory estimates. We continue to detect a structural break and still observe a marked reduction in the estimated response to inflation after 2007. From this we conclude that no model with a constant response of interest rates to inflation, the output gap and financial stress can explain UK monetary policy over 1992–2010.

This evidence suggests that models of monetary policy must allow for changes in the behaviour of policymakers. Accordingly in Section 4, we develop a model in which the policy rate is a weighted average of two alternative policy regimes and where the weight of these regimes reflects the probability of a financial crisis. We find that this model provides a satisfactory explanation of UK monetary policy and that the estimates are econometrically superior to those of the constant parameter policy rules considered above. We find a strong response to inflation in the no-crisis regime but no response in the financial crisis regime. Our estimates suggest a strong response to the output gap in the no-crisis regime and a much weaker response in a crisis. We find a strong response to measures of financial stress in the crisis regime but none in the no-crisis regime. Section 5 concludes the paper.

2. Taylor rules and the financial crisis

In this section we present evidence on a Taylor (1993)-type rule model of monetary policy using monthly data for the period 1992M10–2010M7. Following the literature on empirical policy rules we use a simple partial adjustment process to capture interest rate dynamics:

$$i_t = \rho_i i_{t-1} + (1-\rho_i)\hat{i}_t \tag{1}$$

where i is the nominal policy rate and $\hat{i}$ is the desired steady-state nominal policy rate. We assume the steady-state policy rate is set with reference to expected inflation and output gaps one period ahead.[2] The appropriate mapping from a time period in a theoretical model to a real-world time interval is unclear, but we follow convention in interpreting a time period in the underlying theoretical model as representing three calendar months. We therefore assume that policymakers respond to forecasts of inflation and the output gap over the coming quarter, giving

$$\hat{i}_t = \bar{i} + \rho_\pi \sum_{k=1}^{3}(E_{t-1}\pi_{t+k} - \pi^T) + \rho_y \sum_{k=1}^{3}(E_{t-1}y_{t+k}) \tag{2}$$

where $\bar{i}$ is the equilibrium nominal policy rate, assumed constant, $(\pi - \pi^T)$ is the inflation gap, the difference between the targeted rate of inflation and the inflation target and y is the output gap. The assumption of a 3-month horizon makes our specification similar to models estimated on quarterly data in which policymakers react to expected inflation and output in the next period. Combining (1) and (2), our empirical model is

$$i_t = \rho_i i_{t-1} + (1-\rho_i)\left\{\bar{i} + \rho_\pi \sum_{k=1}^{3}(E_{t-1}\pi_{t+k} - \pi^T) + \rho_y \sum_{k=1}^{3}(E_{t-1}y_{t+k})\right\} + \xi_t \tag{3}$$

where ξ is an error term.[3]

We measure i using the policy rate set by the Bank of England. For π, we use the RPIX measure of the inflation rate from 1992 to 2003 and the CPI inflation rate for 2004–2010; this matches the inflation rate targeted by monetary policy at different dates. Correspondingly, the inflation target is 2.5% for the 1992–2003 period and 2% for 2004–2010. The output gap, y, is constructed as the proportional difference between an ex-post measure of monthly GDP (available from the National Institute of Economic and Social Research) and its Hodrick and Prescott (1997) trend.[4] Fig. 1 plots these data.

Column (i) presents Generalised Method of Moments (GMM, see Hansen, 1982) estimates of (3) using monthly data for 1992M10–2010M7. We treat all variables as endogenous and use the first four lags of each as instruments, exploiting the moment restrictions implied by (3).[5] We find no evidence of a monetary policy response to inflation. The estimate of ρ_π is insignificant and the point estimate is negative: $\rho_\pi = -0.76$. We find a significant response to the output gap, $\rho_y = 1.12$, estimate the equilibrium nominal interest rate to be 4.8% and find the usual high degree of interest rate smoothing, $\rho_i = 0.93$. The estimates fail a test of parameter stability as the Quandt-Andrews breakpoint test detects a single structural break, dated at 2007M4.[6]

[1] Other measures of financial stress include a composite world FSI, as well as an alternative UK FSI (Slingenberg and de Haan, 2011).

[2] This policy rule can be shown to be optimal in a structural model where the real interest rate affects aggregate demand with a one-period lag and where aggregate demand affects inflation with a similar lag (eg Svensson, 1997).

[3] We experimented with other values of k as policy-makers may adjust their policy horizon in periods of financial stress; we obtained similar results to those reported below.

[4] To tackle the end-point problem in calculating the Hodrick-Prescott trend (see Mise et al., 2005a,b), we applied an autoregressive AR(n) model (with n set at 4 to eliminate serial correlation) to the output measure. The AR model was used to forecast twenty-four additional months that were then added to the output series before applying the Hodrick–Prescott filter. In calculating the filter, we use the Ravn and Uhlig (2002) adjustment.

[5] Alternative lag lengths were considered; 4 lags gave the lowest value of the J-test.

[6] The finding of a single structural break may be questionable. Since the Quandt-Andrews test has been found to be unreliable at the extremes of the sample, it is usual to trim 15% of observations from the start and end of the sample. This trimming excludes the period from September 2008 when the financial crisis entered its most intense phase. We also ran the Quandt-Andrews test with trimming rate of 5%; in this case two structural breaks were detected, in October 2008, and again in April 2007. There are too few observations on the post-Lehmann period in our sample to permit estimation of a separate policy rule for this period.