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Structural changes in the US economy: Is there a role for monetary policy?

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ABSTRACT

This paper investigates the contribution of monetary policy to the changes in output growth and inflation dynamics in the US. We identify a policy shock and a policy rule in a time-varying coefficients VAR using robust sign restrictions. The transmission of policy shocks has been relatively stable. The variance of the policy shock has decreased over time, but policy shocks account for a small fraction of the level and the variations in inflation and output growth volatility and persistence. Finally we find little evidence of a significant increase in the long run response of the interest rate to inflation.

1. Introduction

There is considerable evidence suggesting that the US economy has fundamentally changed over the last three decades. In particular, several authors have noted a marked decline in the volatility of real activity and in the volatility and persistence of inflation since the early 1980s (see e.g. Blanchard and Simon, 2000; McConnell and Perez Quiros, 2000; Stock and Watson, 2003). What are the reasons behind such a decline? A stream of literature attributes these changes to alterations in the mechanisms through which exogenous shocks spread across sectors and propagate over time (see Giannone et al., 2008, for a detailed review). Since the transmission mechanism depends on the structure of the economy, such a viewpoint implies that important characteristics, such as the behavior of consumers and firms or the preferences of policymakers, have changed over time. The literature has paid particular attention to monetary policy. Several studies, including Clarida et al. (2000), Cogley and Sargent (2001, 2005), and Lubik and Schorfheide (2004), have argued that monetary policy was 'loose' in fighting inflation in the 1970s but became more aggressive since the early 1980s and see in this change of attitude the reason for the observed changes in inflation and real activity. This view, however, is far from unanimous. For example, Bernanke and Mihov (1998), Leeper and Zha (2003), Orphanides (2004), and Hanson (2006) suggest that the same policy rule prevailed over the last 30 years, while Sims and Zha (2006) indicate that changes in the variance of exogenous shocks may be responsible for the fall in volatility and persistence. McConnell and Perez Quiros

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(2000) and Campbell and Herkowitz (2006), on the other hand, point out that alterations in the parameters of the private sector can account for the observed changes.

This controversy is not new. In the past rational expectations econometricians (e.g. Sargent, 1984) have argued that policy changes involving regime switches dramatically alter private agent decisions and, as a consequence, the dynamics of the macroeconomic variables, and searched for historical episodes supporting this view (see e.g. Sargent, 1999). VAR econometricians, on the other hand, often denied the empirical relevance of this argument suggesting that the systematic portion of monetary policy has rarely been altered and that policy changes are better characterized as random variations for the non-systematic part (Sims, 1982). This long standing debate has now been cast into the framework of 'bad policy' (failure to adequately respond to inflationary pressures), or 'bad luck' (shocks are drawn from a distribution with time-varying moments), and new evidence has been collected thanks to the development of empirical methods which allow for time variations in the structure of the economy and in the variance of the exogenous processes. Overall, the role that monetary policy had in shaping the observed changes in the US is still under debate.

This paper provides new evidence on this issue, by estimating a structural time-varying coefficients VAR with stochastic volatility and identifying monetary policy using robust sign restrictions. We innovate upon the literature in three important aspects. Relative to Cogley and Sargent (2005), we take a structural rather than a reduced form approach, while relative to Primiceri (2005), who use a-theoretical Cholesky scheme, we identify monetary policy shocks using restrictions consistent with a large class of currently used DSGE models. Relative to Stock and Watson (2003) and Boivin and Giannoni (2006), we propose a method to trace out the effects of changes in the parameters of the policy rule, which builds on the work of Gallant et al. (1993) and Koop et al. (1996). Finally, rather than associating the timing of the changes in monetary policy with variations in output growth and inflation dynamics, we quantify the contribution of the systematic and non-systematic part of monetary policy to the observed variations.

We work with sign restrictions in the identification process for two reasons. The contemporaneous zero restrictions conventionally used are often absent in those theoretical models one employs to guide the interpretation of the results. In addition, while the restrictions we employ are robust to the parameterization, common to both flexible and sticky price models (see e.g. Gambetti et al., 2005), and independent of whether the economic environment delivers determinate or indeterminate solutions (see e.g. Lubik and Schorfheide, 2004), those imposed by more standard approaches leave the system underidentified if indeterminacies are present. Our methodology to conduct counterfactuals is preferable because the conditional covariance structure implied by the structural model is used to trace out the effect of different policy scenarios. Hence, changes in policy parameters may trigger changes in the parameters of the private sector, if the two set of parameters are correlated.

We show that the transmission of policy shocks has been relatively stable over time and detect significant changes – which make monetary shocks more powerful in affecting inflation and real activity – only in the latter part of the sample. As in Sims and Zha (2006), we find posterior evidence of a considerable decrease in the variance of the policy shock. However, we document that policy shocks explain a small fraction of the average variability and persistence of output growth and inflation and that the decline in inflation variability comes from sources other than the monetary policy shocks. Our posterior analysis does not support the idea that monetary policy has become significantly more aggressive in fighting inflation since the early 1980s, nor do we find overwhelming evidence that a weak response of interest rates to inflation is sufficient to explain the 1970s. However, we do find that the posterior median of the long run inflation coefficient in the policy equation was low in the 1970s, and that increased after Volker was appointed chairman of the Fed. Finally, we show that a more aggressive inflation policy would have reduced the level and the persistence of inflation, but the real costs would have been substantial.

Overall, while the crudest version of the 'bad policy' hypothesis has low posterior support, the evidence we uncovered is consistent both with more sophisticated versions of this proposition (see Schorfheide, 2005), as well as with alternative hypotheses suggested in the literature. To disentangle the various possibilities, a model in which preferences, technologies and the distributions of the shocks are allowed to change along with the preferences of the Fed is needed. While such a model is still too complex to be estimated (see e.g. Rubio Ramirez and Fernandez Villaverde, 2007), approximations of the type employed in Canova (2005), can shed important light on this issue.

The rest of the paper is organized as follows. Section 2 presents the empirical model, Section 3 the estimation procedure, Section 4 the results and Section 5 the conclusions.

2. The empirical model

Let y_t be a vector including a short term interest rate, the inflation rate, output growth and M2 growth in that order. We assume that y_t admits the representation

$$y_t = A_{0,t} + A_{1,t}y_{t-1} + \cdots + A_{p,t}y_{t-p} + \varepsilon_t \tag{1}$$

where $A_{0,t}$ contains time-varying intercepts, $A_{i,t}$ are matrices of time-varying coefficients, $i = 1, \ldots, p$ and ε_t is a Gaussian white noise with zero mean and time-varying covariance matrix Σ_t. Let $A_t = [A_{0,t}, A_{1,t}, \ldots, A_{p,t}]$, and $\theta_t = vec(A_t')$, where $vec(\cdot)$ is the column stacking operator. We assume that all the roots of the VAR polynomial lie outside the unit circle at every t.