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# Time-varying monetary-policy rules and financial stress: Does financial instability matter for monetary policy?

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ABSTRACT

We examine whether and how selected central banks responded to episodes of financial stress over the last three decades. We employ a recently developed monetary-policy rule estimation methodology which allows for time-varying response coefficients and corrects for endogeneity. This flexible framework applied to the USA, the UK, Australia, Canada, and Sweden, together with a new financial stress dataset developed by the International Monetary Fund, not only allows testing of whether central banks responded to financial stress, but also detects the periods and types of stress that were the most worrying for monetary authorities and quantifies the intensity of the policy response. Our findings suggest that central banks often change policy rates, mainly decreasing them in the face of high financial stress. However, the size of the policy response varies substantially over time as well as across countries, with the 2008–2009 financial crisis being the period of the most severe and generalized response. With regard to the specific components of financial stress, most central banks seemed to respond to stock-market stress and bank stress, while exchange-rate stress is found to drive the reaction of central banks only in more open economies.



## 1. Introduction

The recent financial crisis has intensified the interest in exploring the interactions between monetary policy and financial stability. Official interest rates were driven sharply to historical lows, and many unconventional measures were used to pump liquidity into the international financial system. Central banks pursued monetary policy under high economic uncertainty coupled with large financial shocks in many countries. The financial crisis also raised new challenges for central bank policies, in particular the operationalization of issues related to financial stability for monetary-policy decision making (Goodhart, 2006; Borio and Drehmann, 2009).

This paper seeks to analyze whether and how monetary policy interest rates evolved in response to financial instability over the last three decades. The monetary policies of central banks are likely to react to financial instability in a non-linear way (Goodhart et al., 2009). When a financial system is stable, the interest-rate-setting process largely reflects macroeconomic conditions, and financial stability considerations enter monetary policy discussions only to a limited degree. On the other hand, central banks may alter their monetary policies to reduce financial imbalances if these become severe. In this respect, Mishkin (2009) questions the traditional linear-quadratic framework[1] when financial markets are disrupted and puts forward an argument for replacing it with non-linear dynamics describing the economy and a non-quadratic objective function resulting in non-linear optimal policy.

To address the complexity of the nexus between monetary policy and financial stability as well as to evaluate monetary policy in a systematic manner, this paper employs the recently developed time-varying parameter estimation of monetary-policy rules, appropriately accounting for endogeneity in policy rules. This flexible framework, together with a new comprehensive financial stress dataset developed by the International Monetary Fund, will allow not only testing of whether central banks responded to financial stress, but also quantification of the magnitude of this response

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[1] That is, linear behavior of the economy and a quadratic objective function of the monetary authority.

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and detection of the periods and types of stress that were the most worrying for monetary authorities.

Although theoretical studies disagree about the role of financial instability for central banks' interest-rate-setting policies, our empirical estimates of the time-varying monetary-policy rules of the US Fed, the Bank of England (BoE), the Reserve Bank of Australia (RBA), the Bank of Canada (BoC), and Sveriges Riksbank (SR) show that central banks often alter the course of monetary policy in the face of high financial stress, mainly by decreasing policy rates.[2] However, the size of this response varies substantially over time as well as across countries. There is some cross-country and time heterogeneity as well when we examine central banks' considerations of specific types of financial stress: most of them seemed to respond to stock-market stress and bank stress, and exchange-rate stress drives central bank reactions only in more open economies.

The paper is organized as follows. Section 2 discusses related literature. Section 3 describes our data and empirical methodology. Section 4 presents our results. Section 5 concludes. An appendix with a detailed description of the methodology and additional results follows.

## 2. Related literature

First, this section gives a brief overview of the theory as well as empirical evidence on the relationship between monetary policy (rules) and financial instability. Second, it provides a short summary of various measures of financial stress.

### 2.1. Monetary policy (rules) and financial instability – some theories

Financial friction, such as unequal access to credit or debt collateralization, is recognized as having important consequences for monetary policy transmission, and Fisher (1933) has already presented the idea that adverse credit-market conditions can cause significant macroeconomic disequilibria.

During the last two decades, the effects of monetary policy have been studied mainly within New Keynesian (NK) dynamic stochastic general equilibrium (DSGE) models, which assume the existence of nominal rigidities. The common approach to incorporating financial market friction within the DSGE framework is to introduce the financial accelerator mechanism (Bernanke et al., 1996, 1999), implying that endogenous developments in credit markets work to amplify and propagate shocks to the macro economy. Tovar (2009) emphasizes that the major weakness of the financial accelerator mechanism is that it only addresses one of many possible financial frictions. Goodhart et al. (2009) note that many NK DSGE models lack the financial sector completely or model it in a rather embryonic way. Consequently, more recent contributions within this stream of literature have examined other aspects of financial friction, such as balance sheets in the banking sector (Choi and Cook, 2004), the portfolio-choice issue with complete (Engel and Matsumoto, 2009) or incomplete markets (Devereux and Sutherland, 2007), and collateral constraints (Iacovello and Neri, 2010).[3]

A few studies focus more specifically on the relationship between the monetary-policy stance (or the monetary-policy rule) and financial stability. However, they do not arrive at a unanimous view of whether a monetary-policy rule should include some measure of financial stability. Brousseau and Detken (2001) present an NK model where a conflict arises between short-term price stability and financial stability due to a self-fulfilling belief linking the stability of inflation to the smoothness of the interest-rate path and suggests that monetary policy should react to financial instability. Akram et al. (2007) investigate the macroeconomic implications of pursuing financial stability within a flexible inflation-targeting framework. Their model, using a policy rule augmented by financial-stability indicators, shows that the gains of such an augmented rule vis-à-vis the rule without financial-stability indicators highly depends on the nature of the shocks. Akram and Eitrheim (2008) build on the previous framework, finding some evidence that the policy response to housing prices, equity prices or credit growth can cause high interest-rate volatility and actually lower financial stability in terms of indicators that are sensitive to interest rates. Cecchetti and Li (2008) show, in both a static and dynamic setting, that a potential conflict between monetary policy and financial supervision can be avoided if the interest-rate rule takes into account (procyclical) capital-adequacy requirements, in particular, that policy interest rates are lowered when financial stress is high. Bauducco et al. (2008) extend the current benchmark NK model to include financial systems and firms that require external financing. Their simulations show that if a central bank responds to financial instability by policy easing, it achieves better inflation and output stabilization in the short term at the cost of greater inflation and output volatility in the long term, and vice versa. For the US Fed, Taylor (2008) proposes a modification of the standard Taylor rule to incorporate adjustments to credit spreads. Teranishi (2009) derives a Taylor rule augmented by the response to credit spreads as an optimal policy under heterogeneous loan-interest-rate contracts. He finds that the policy response to a credit spread can be both positive and negative, depending on the financial structure. However, he also proposes that when nominal policy rates are close to zero, a commitment rather than a discretional policy response is the key to reducing credit spreads. Christiano et al. (2008) suggest augmenting the Taylor rule with aggregate private credit and find that such a policy would raise welfare by reducing the magnitude of the output fluctuations. Cúrdia and Woodford (2010) develop a NK DSGE model with credit friction to evaluate the performance of alternative policy rules that are augmented by a response (1) to credit spreads and (2) to aggregate the volume of private credit in the face of different shocks. They argue that the response to credit spreads can be welfare improving, but the optimal size of such a response is probably rather small. Like Teranishi (2009), they find little support for augmenting the Taylor rule by the credit volume, given that the size and even the sign of the desired response is sensitive to the sources of shock and their persistence, which is information that is not always available during operational policy making.

A related stream of literature focuses on the somewhat narrower issue of whether or not monetary policy should respond to asset prices. Bernanke and Gertler (1999, 2001) argue that the stabilization of inflation and output provides a substantial contribution to financial stability and that there are few, if any, gains to responding to asset prices. Faia and Monacelli (2007) extend the model developed by Bernanke and Gertler (2001) by a robust welfare metric, confirming that strict inflation stabilization offers the best solution. Cecchetti et al. (2000) take the opposite stance, arguing that developments in asset markets can have a significant impact on both inflation and real economic activity, and central banks might achieve better outcomes by considering asset prices provided they are able to detect asset-price misalignments. Borio and Lowe (2002) support this view, claiming that financial imbalances can build up

[2] Our choice of countries is based on data availability and on the suitability of the data for our econometric framework. Due to limited data availability, we do not include the Reserve Bank of New Zealand, the ECB, and emerging countries. The Bank of Japan could not be included either, given that its policy rates were flat for an extended period.

[3] A survey of this literature is provided by Tovar (2009).