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# Monetary policy's time-varying impact on the US bond markets: Role of financial stress and risks

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ABSTRACT

This paper provides a novel analysis on the Treasury yield curve's response to monetary policy shocks and the role of financial market volatility and risks in assessment of the monetary policy impact. The results show that unlike the fixed coefficient approach usually used in the literature, the time varying parameter framework of the paper is needed to aptly unveil the latent dynamics of monetary policy impact on the bond markets. Wide time variation exists in the response of bond yields across all the maturities to the Federal Reserve's policy surprises. While the short-term rates respond more widely even the long-term rates show significant variation. Further, these time varying policy effects on interest rates are inversely related with the level of financial risks and economic uncertainty. These results are robust to several alternative aspects of risk and uncertainty.



## 1. Introduction

The impact on the bond markets is the first and foremost link in the transmission of monetary policy shocks which propagates to other assets and ultimately on the broader economy. Presence of economic risks and uncertainty adds another dimension in the assessment of monetary policy's

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effect on the interest rates. But does the impact of monetary policy on the term structure remain constant over time? And if they do vary, what is the role of risk and uncertainty in explaining these time variations? While these two interrelated questions are important for policy makers and financial market participants, they are yet far from being completely answered. This paper models the impact of U.S. monetary policy on the yield curve using a flexible time varying parameter framework and scrutinizes these reactions through the lens of financial market stress and uncertainty.

Following Kuttner (2001) technique of identifying monetary policy shocks from high frequency futures market data, several studies have undertaken Cook and Hahn (1989) style event study to evaluate the Treasury bond market's reaction to Federal Reserve (Fed) policy shocks.[1] However, wide variation in estimates are reported. The estimated response of the short-term interest rates to Fed's policy shocks range between 56 and 81 basis points and the long-term interest rates from an insignificant response to 32 basis points (Jorda & Demiralp, 2004; Poole, Rasche, & Thornton, 2002; Swiston, 2007). All these studies so far have used a fixed coefficient approach implicitly assuming the impact of Fed's policy surprises on bond markets remains constant over time.

In contrast, anecdotal and formal evidence suggest that the impact of monetary policy possibly varies across time. The differences in the point estimates across studies (and time) highlights this point clearly. Further, the Fed's pursuit to make the "black box" increasingly transparent has greatly influenced the relationship between monetary policy and the yield curve (Jorda & Demiralp, 2004). Studies have also found the impact of monetary policy on asset markets to be driven by the state of the economy and regime shifts in the policy across time.[2] Hence, to fully understand the bond market dynamics it is imperative to use a framework that does not restrict the policy impact to just one or few possible states and flexibly capture latent time variations. Since the state of the economy is found to play a significant role in assessing policy, it also necessary to explicitly estimate the link between uncertainty and policy effectiveness. The Lucas (1973) model predicts that when the variance of aggregate demand shocks is higher, the estimated real impact of a demand shock on output is lower. Several studies have used the cross-sectional approach to reveal the negative impact of uncertainty on most macroeconomic variables (Ball, Mankiw, & Romer, 1988; Drechsler & Yaron, 2011; Ramey & Ramey, 1995; Romer, 1990). However, to avoid the problems associated with averaging variables across countries we take a time-series approach for a single country – the U.S. This also enables us to acknowledge the presence of unique central bank operating procedures and transmission mechanisms of each economy.

This paper adopts the approach of modeling several possible states of the policy impact at each point in time and in that sense lets the data speak. Using time-varying parameter (TVP) framework, we estimate the gradual evolution of monetary policy impact on the U.S. term structure of interest rates. The time varying response coefficients are modeled as a driftless random walk process following Cooley and Prescott (1976). After uncovering the hidden time dynamics, we analyze these interest rate responses to bring forth more clearly the role of risks and uncertainty. Since the true underlying uncertainty is unobserved, several individual and aggregate measures capturing different aspects of risks and financial market stress are considered.

Evidence suggests that the fixed coefficient approach provides only an incomplete view of the monetary policy impact. There is significant time variation in the response of the bond rates of all maturities to Fed's policy surprises in the 1989–2008 period. The time variations are more pronounced at the shorter end of the yield curve as compared to the longer end. While it is typical that an unexpected increase (decrease) in policy rates would push the yield curve upward (downward) there are also

[1] Gurkaynak and Wright (2013) argue that many important macro-finance questions can only be answered using event studies with the high-frequency financial market data. The methodology is preferred because it largely solves the problem of endogeneity and identification involved in evaluating the impact of the monetary policy (Bernanke & Kuttner, 2005; Gürkaynak, Sack, & Swanson, 2007; Hausman & Wongswan, 2011; Krueger & Kuttner, 1996; Kuttner, 2001).

[2] Berument and Froyen (2006) show long-term interest rates response to Fed's policy innovations change with changes in the monetary policy regime. Ang, Boivin, Dong, and Loo-Kung (2011) find the Fed's reaction to inflation has changed over time, as a result of this regime shift the yield curve slope is directly affected. Evidence of regime shifts is also found in Abdymomunov and Kang (2011), Bae, Kim, and Kim (2012), Beckworth, Moon, and Toles (2012), Cogley (2005).