



The changing international transmission of U.S. monetary policy shocks: Is there evidence of contagion effect on OECD countries[☆]

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ABSTRACT

We study the changing international transmission of U.S. monetary policy shocks to 14 OECD countries over the period 1981Q1–2010Q4. The U.S. monetary policy shock is defined as unexpected change in Effective Federal Funds Rate (FFR). We use a *time varying parameter factor augmented VAR* approach (TVP-FAVAR) to study the EFFR shocks together with a large data set of 265, major financial, macroeconomic and trade variables for U.S., Canada, France, Germany, Italy, UK, Japan, Australia, Spain, Norway, Sweden, Switzerland, Finland and New Zealand. Our main findings are as follows. First, negative U.S. monetary policy shocks have considerable negative impact on GDP growth in the U.S., Canada, Japan and Sweden while most of the other member countries benefits. Second, the transmission to GDP growth has increased in OECD countries since the early 1980s. We also detect a more depressed GDP over medium term in the U.S., Canada, Japan, Australia, Norway and Sweden over the recent *global financial crisis*. Third, the size of U.S. monetary policy shocks during financial turmoil periods were unusual than normal periods and varies overtime. The *financial crisis* (2008–2009) is evidenced by decline in residential investment in the U.S. and propagation of this shock to Canada, Germany, Japan, Switzerland and New Zealand over the recent period. U.S. monetary policy shocks reduce share prices in most of the OECD countries; this impact is more pronounced over the turmoil period. Asset prices, interest rates and trade channel seem to play major role in propagation of monetary policy shocks.

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1. Introduction

There is strong evidence that the world economies have become more integrated globally over the last thirty years (Fecht et al., 2009; Saving, 2006). The development and widespread liberalization of financial markets in the 1980s has resulted in increasing integration, and made capital ever more mobile. In spite of different exchange rate arrangements, U.S. dollar continues to retain its place as the world's principal international currency.¹ The most important aspect of this financial integration is that global economies show co-movements in most of the economic variables such as inflation,

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¹ Reinhart and Rogoff (2004), looked at the exchange rate arrangement classification issue by introducing a novel approach of reclassifying historical exchange rate regimes. Their approach substantially differed from IMF official classification, based on monthly data on market determined parallel exchange rates, they found that de jure exchange rate regimes or exchange rate arrangements could be misleading as significant number of floats could be better described as pegs and vice versa. See Ilzetzki et al. (2009), for updates to the exchange rate regime classifications.

unemployment, GDP growth in general and asset prices for example housing prices and stock prices in particular. Along with these facts, since 2006, the collapse of housing prices in the U.S. as a result of collapsing residential investments, followed by a wave of crisis and sharp decrease in housing prices in Ireland, Japan and U.K. have raised the issues concerning the international transmission of these shocks across different countries. One possible explanation for this transmission of shocks is that channels of transmission being time varying result in “contagion effects”, at the times when the prices are falling, or in times of crisis, importantly leading to global crisis.

The eruption of banking crisis in 2008 as a result of “sub-prime mortgage bubble”, and exceptionally loose monetary policy instance in the U.S. from 2001 to 2006 resulted in the outbreak of *global financial crisis*.

Most researchers now recognize that a key element of this inexorable trend towards globalization, rapid pace of financial markets integration on international level through asset price co-movements and growing capital mobility is the role of U.S. monetary policy as the driver of global financial and economic movements (Ehrmann and Fratzscher, 2009) and possibly the contagion of risk at the times of financial crisis (Carmassi et al., 2009). The recent global financial crisis has triggered heated debate among researchers and policy analysts on how to regain financial stability and economic growth.

In this regard the roles and responsibilities of the Federal Reserve are now on the table, a major innovation in financial regulation is the explicit incorporation of macro-prudential considerations for financial oversight, and the aim is to minimize the risk of financial disruptions that are sufficiently severe to inflict significant damage on the broader economy. The participation of central banks is based on the notion that combining financial supervision with monetary policy tasks can lead to synergies through information gains and better conduct of monetary policy therefore resulting in more effective crisis management (Borio, 2009). As suggested by Blinder (2010), central banks should monitor and regulate systematic risk as conserving financial stability is closely associated with conventional objective of monetary policy and is likely to require lender of last resort powers. Feldstein (2010), suggests that loose monetary policy in the early 2000's did not appropriately account the possible repercussions on the asset prices and the risk of bursting bubble hence he suggests that Federal Reserve should systematically incorporate systemic risk considerations in its monetary policy process.

To achieve financial stability and stable economic growth, monetary authorities require an accurate assessment of the impact of monetary policy and a good understanding of the transmission mechanism through which it impacts the economy, in this regard a large body of empirical evidence is based on *vector autoregression* (VAR), approach (Boivin and Giannoni, 2006; Dedola and Lippi, 2005; Owyang and Wall, 2009; Peersman, 2004; Potts and Berger, 2010; Primiceri, 2005), to study the impact of monetary policy shocks. However using VAR approach has important limitations when it comes to policy analysis and structural inference because of its low dimensionality and omitted variable bias. The recent strand of literature (Bernanke et al., 2005; Rangan, 2010; Vargas-Silva, 2008), has used FAVAR approach to get around these problems in VAR modeling. One question that has received very little attention is that to what extent the size of monetary policy shocks and transmission mechanism change over time at domestic and international level and whether this transmission is different during turmoil periods than normal periods. There is very small literature investigating the time varying transmission of monetary policy shocks at domestic level (Korobilis, 2011).

In this paper we offer a first pass at filling this gap by examining the transmission of U.S. monetary policy shocks both domestically and internationally during normal and turmoil periods and explore the role of monetary policy as a major contributing factor to economic and asset price imbalances. Taylor (2007), concludes that loose monetary policy stance was the major contributing factor to the imbalances in the housing and credit markets. Borio (2008), Gorton (2009) and Brunnermeier (2009), provide detailed analysis of the causes of recent financial turmoil.

Motivated by the above discussion, the three main questions that we address are: first, how large is the impact of U.S. monetary policy shocks on the major OECD countries, and have their size and transmission changed over time? Second, what are the important channels through which U.S. monetary policy shocks are transmitted both domestically and internationally to the OECD countries, and can we identify changes in transmission mechanism over time? Third, is there evidence of contagion effects on major financial and economic variables during financial turmoil periods and normal periods and through which channels?

For this purpose, we employ two approaches. First approach is *factor augmented vector autoregressive* (FAVAR) approach, proposed by Bernanke et al. (2005). The novelty of this approach is that it allows us to study the impact of policy shock on 265 quarterly major financial and economic variables of OECD countries included in our data set, in the form of impulse responses. By allowing contractionary monetary policy shocks to Federal Funds Rate (FFR), FAVAR approach allows to answer the above mentioned questions. Moreover, another advantage of using this approach is that it allows us to compare our

results to previous findings, and also can highlight the heterogeneity of policy effects within these countries as well as facilitates cross country comparisons.

The second approach is *time varying parameters* FAVAR (TVP-FAVAR) approach, suggested by Koop and Korobilis (2010), which extends the constant parameters FAVAR framework introduced by Bernanke et al. (2005).

Increased financial and economic integration, because of globalization, may have altered the process of shock transmission. By allowing the parameters to vary over time, we can study the international transmission of shocks, as recent developments in financial sector have major impact on real sector. Our model can account for time variation in the size for financial shocks.

Our data base to study the international transmission of U.S. monetary policy shocks to analyze contagion effects on OECD countries is unique, it includes, U.S. Effective Federal Funds Rate (FFR), as policy instrument, real GDP, gross fixed capital formation, short term and long term interest rates, all share price index, housing price index, consumer price index, unemployment rate, export, and import prices for U.S. and other OECD countries, over a period of 1981Q1–2010Q4, as a broad measure of financial and economic integration.

The main contributions of this study to the literature of domestic and international transmission of contagion effects are as follows.

First, while most of the previous work such as Rigobon and Sack (2003), Helbling et al. (2011) and Bagliano and Morana (2012), has just focused on stock market, credit and real shocks where as our study is based on the notion of increasing capital mobility, international role of dollar, we give one standard deviation shock to Federal Funds Rate to provide the evidence that how the contractionary monetary policy stance has implications for OECD economies. Our model takes into consideration the co-movements of international variables, by including many variables for the countries under study in our data set, we allow the variables to interact with each other and there by capturing the international transmission of shocks and possible contagion effects.

Second, most of the studies mentioned above applied constant parameters VAR and FAVAR approaches whereas we apply TVP-FAVAR methodology to study the international transmission of U.S. monetary policy shocks to OECD countries.

Third, most of the studies use traditional trade channel to study the transmission mechanism where as we include major variables such as stock prices, house prices, government bond and interest rates as channels of transmission of these shocks to financial and asset markets.

Fourth, we study the impact of monetary policy shocks also over different turmoil periods including *global financial crisis* period, 2008–2009. We find strong evidence of the transmission of these shocks in terms of direction and magnitude to OECD countries. Linear constant-parameter approaches have failed to account for the transmission of shock volatility over different periods, thus have limitations to study the impact of *global financial crisis*.

The rest of the paper is structured as follows. Section 2 describes literature review. Section 3 describes empirical framework. Section 4 describes monetary policy shocks and large international data set. Section 5 explains the changing transmission of monetary policy shocks to growth and major financial variables in the U.S. and other countries and determines the major transmission channels. Section 6 concludes.

2. Literature review

This study aims to bridge two strands of the literature on the contagion effects by studying the impact of monetary policy shocks on major macroeconomic variables in general and asset market linkages in particular: first the literature on domestic financial markets and effects of monetary policy on domestic economy (Section 2.1) and second, the literature on international transmission of U.S. monetary

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