U.S. MONETARY POLICY SPILLOVER ON BRICS COUNTRIES

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Abstract- This study examine the spill over effect of U.S. monetary policy on BRICS economies during the current decade start form May 2004 to February 2016. The study use the VAR model for data analysis and use the Federal Reserve balance sheet as the proxy for the U.S. monetary actions, the results show that, overall U.S. monetary policy has influence on BRICS' outputs, policy rate, real effective exchange rate, trade balance and treasury yield but has no influence on inflation. Overall, the extent to which BRICS macro-variable response to U.S. monetary policy are very across countries. In addition, Trade and Interest rate are transmission channels of U.S. monetary policy spill over to BRICS countries.

Keywords- Spillover, Monetary Policy, Macro-economic

I. INTRODUCTION

According to the World Financial Crisis 2008, Central banks in the United States adopted a series of unconventional monetary policies by expanding its balance sheet to restore the functioning of financial markets and intermediations, Fed UN-constrain its conventional tool, the repo-rate, by provide the information and commit to the future path of rate to provide further monetary policy accommodation at the zero lower bound. Since the conduct of the unconventional policies are very large and together withintensify financial integration, these cheap money not only flowing into the US financial market but also leaked to other economies. In the era of Hyper-globalization. There are the evidence that world economic integration has become more intensify.

Although, There is less co-movement in core CPIs across countries that more likely to move along with the underlying economic conditions. This reflect the power of domestic monetary policy and help support the claim that central banks still the masters of their domestic destinies. There are the arguments that, the conduct of the QE not only resulted in large amount of liquidity flowing into the US financial markets but due to economic integration, this liquidity money has also leaked to other economies. The change in conduct of U.S. monetary policy is coincide with large scale of capital inflow to the emerging markets. According to the believe that the growth in the emerging markets during that period was due to the capital inflow, it is interesting to see whether the use of monetary policy in the U.S. during the current decade has contributed to this emerging market growth, and effect the their state of economies.

This study using Vector Auto Regression method to examine the spillover effect of U.S. monetary policy and on BRICS countries' economies during the current decade. In addition, two main transmission channels which are trade channel and interest rate channel are also examined

Contribution

This study expect to contribute the understanding about U.S. Monetary Policy Spillover on BRICS countries during the current decade that would benefit the authorities and the investors. Policy makers could view the effect as the current trend since the study period is over the current decade. The result about the effect on Output and Inflation and their transmission channels will benefit the central bank for trade off policy making decision. The degree of how Central Economy can explain the domestic monetary policy will benefit the investor who want to invest in BRICS as they have more information to predict the domestic government action in response to the external change. In addition, the information about the sensitivity of BRICS macroeconomic to the U.S. monetary policy would benefit those who invest in U.S. and want to diversify the risk through portfolio diversification.

II. LITERATURE REVIEW

There was the evidence that U.S. monetary expansion decreased the world interest rate, which in turn stimulated the global aggregate demand, and increased foreign output. When Fed cut its Federal Fund rate (FFR), there were decreasing in the world interest rate and the increasing in G6 countries outputs. At that time, foreign outputs increased by a quarter to a half of the increase in U.S. output. Refer to those evidence at that time, Kim (2001) concluded that interest rate appear to be the important transmission channel while trade balance, another theoretical transmission channel, seems to play minor role. Later, the role of trade channel in the international monetary spillover mechanism was re-emphasized again when the Exchange rate regime found to play the important role in the spillover over mechanism. Floating function of exchange rate regime being as the buffer that absorb the effect of spillover through the trade. Based on the study about transmission of U.S. monetary policy shocks to a group of the Latin American countries that have different rate regime, there is the founding that the countries with fixed exchange rate regime had stronger response to the shocks than the countries

with floating regime (Canova 2005). In addition, there are the founding that countries that hold more foreign assets, having higher degree of trade opens, or having the same economic cycle with the central economy had response to the shocks two or three time more than countries with less integration (Ehrmann and Fratzcher 2006). Monetary spillovers can be originated from many channels for example through the trade channel, capital channel, and market expectation channel. Firstly, in trade channel, the implementation of monetary policy will affect the exchange rate and therefore effect the demand of import and export of home countries on foreign markets which can lead to the change in foreign output. Secondly, capital channel, if the home country is the large open economy like U.S.A. and the world capital market is integrated to some extent, the change in home country interest could affect the world real interest rate and then affect the world aggregate demand for current goods, including foreign current goods. As a result, foreign output may grow. In addition, the interest rate difference between markets might cause the shifts in money from home to other market, those inflows could lead to economic booms in recipient countries. Beside from trade and capital channels that have been examine much in literature concerning the transmission channel, other possible channels of monetary policy spillover for example is the market expectation. Market participants could have expectations on the effectiveness of the policies in many way which can lead to unexpected demand for certain assets then effect the markets prices. There is the empirical evidence that QE announcements delayed an anticipated rate hike cycle by the Federal Reserve on the yield curve of the federal fund future contract (Krishnamurthy and Vising Jorgensen, 2011). In the scope of unconventional monetary policy, Quantitative Easing experiment was successful in stimulating real activity in the short-run (Schenkelberg and Watzka 2011). The estimated output effects turn out to be qualitatively similar to the ones found in the literature on the effects of conventional monetary policy, while the impact on the price level is weaker and less persistent. (Gambacorta and Hoftmann 2013). They studied the macroeconomic effects of unconventional monetary policies on eight advanced economies over the global financial crisis. They finds that an exogenous increase in central bank balance sheets at the zero lower bound leads to a temporary rise in economic activity and consumer prices. Individual country results suggest that there are no major differences in the macroeconomic effects of unconventional monetary policies across countries.

III. RESEARCH QUESTIONS

As discussed above, in the integrated financial word and open economy, it is impossible for central bank to stay independent and completely shield their economies. So that the main research question is to what extent and how are macroeconomic fluctuations in major emerging markets, BRICS economies, caused by U.S. monetary policy shocks? Following are the main research question of this study,

(i) How U.S. Monetary Policy Action (USCBA) can explain the variation in domestic macroeconomic variables which are Output (IP), Price level (CPI), Policy Rate (INT) and Real Effective Exchange Rate (FX) of BRICS countries. .
(ii) Whether the trade and interest rate are the channels of international monetary transmission mechanism from U.S. to BRICS countries?

IV. METHODOLOGY

Vector Auto Regression (VAR) model is used for the analysis and the lag length criteria is defined by Akaike Information Criterion (AIC)**.** Data using in this study is monthly data for Thomson Reuters Data Stream. The period start from May 2005 to February 2015. All data are standardized in to the same based month, using May 2005 as the based month since it is the first month of in data length.
Model Y = [IP, USCBA, CPI, INT, FX, VIX, WCP].
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The vector of domestic variable include the measurement of domestic output (proxy with Industrial Production Index -IP), inflation (proxy with Consumer Price Index-CPI), monetary policy action (proxy with Policy Rate-INT), and Exchange Rate (proxy with Real Effective Exchange Rate-FX). In order to examine two main spillover distribution channels which are trade channel and interest rate channel, this study examine the response of Trade Balance (proxy with Trade Balance-TB), and Government Bond Yield (proxy with 10 years government bond yield-GY)

The Vector of Foreign Variables include the variable of U.S. monetary policy action proxy by Central Bank Asset (CBA), as the change in Central Bank Asset is the interesting proxy for U.S. monetary policy measurement. In this study, the Central Bank Asset is used instead of the monetary base as it is the better gauge if unconventional monetary policies during the crisis (Leonardo et. al. 2012).Vector of Global Variables, all global variables are assumed to be exogenous variable in the model. World Commodity Price (WCP): are popularly used as proxy of the Global price shocks and the Chicago

Board Options Exchange Market Volatility Index (VIX) is the proxy of the world financial risk and risk aversion.

Empirical Results

Overall there are the spillover effect of U.S. monetary policy on BRICS economies but the effect are vary across countries. Shock in U.S. central bank asset can explain BRICS macro-variables from 2%-60% at peak. There are significant response in BRICS macro variables except for Price level that only show the significant response in South Africa. For variance decomposition, at peak, U.S. central bank asset can explain the variation in its macro-variables from 23%-60% in Brazil, 8-36% in China, 2%-46% in India, 4%-53% in Russia and 7%-47% in South Africa. For impulse response. The response of price level is significant only in South Africa. There are significant response of policy rate in all BRICS countries except for Brazil. There are significant response of 10 years treasury yield in all BRICS countries except for South Africa. The response in BRICS output, real effective exchange rate and trade balance are quite vary. There are significant response in output and trade balance only in Brazil, Russia, and South Africa. In addition, the response in real effective exchange rate are only significant in Brazil, China, and South Africa. Following are the summery about impulse response and variance decomposition results. The impulse response graph showing in Figure 1 while the variance decomposition of each variable showing in table 1

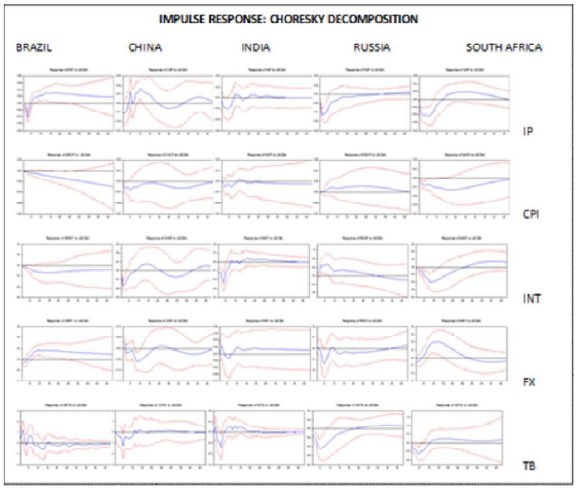

Figure 1 Impulse Response of Domestic Variables to 1 SD shock in U.S. Monetary Policy Variable

Table 1 Variance Decomposition of Domestic Variables to the shock in U.S. Monetary Policy

Variance Decomposition of Domestic Variables to shock on U.S. monetary policy					
	BRAZIL	CHINA	INDIA	RUSSIA	SOUTH AFRICA
IP	60.17616	18.13344	11.76733	53.87918	46.71768
CPI	56.47744	7.981507	2.332061	4.849033	25.65731
INT	46.44922	35.91943	46.18631	14.79586	38.23179
FX	65.78111	16.92563	2.304927	3.821276	34.44899
TB	23.41041	12.87519	13.45648	32.31919	22.71820
GY	26.26772	20.60823	35.41737	15.99061	7.978223

Response in Output:

Base on variance decomposition, U.S. monetary policy can explain the variation in BRICS output around 12%-60%. Shock in U.S. central bank asset account for relatively large portion of variation in Brazil, Russia, and South Africa which are 60%, 54%,47% (at peak) respectively While it account for relatively small portion of variation in China and India outputs which are 18% and 12% (at peak) respectively. Based on impulse response function, Brazil, Russia, and South Africa show significant response to shock in U.S. monetary policy while the response on China and India output are insignificant. Overall, BRICS' output statistical significantly drop around 40-48 basis points in the first five periods and become positive and peak around 20-30 basis points and continuously move back to the origin.

Response in Price Level:

Base on Variance Decomposition, U.S. monetary policy can explain the variation in BRICS price level around 5%-56%. Shock in U.S. central bank asset, at peak, account for large portion of variation in Brazil price level (56%), medium in South Africa (26%), and relatively low in China (8%), India (2%), and Russia (5%).

Base on Impulse response function, overall, the response of BRICS' price level are insignificant except for South Africa price level that show negative significant response in the first year. South Africa price level reach the bottom at minus 13 basis point in the eighteenth month and moving back toward origin.

Response in Policy Rate:

Base on Variance Decomposition, U.S. monetary policy can explain the variation in BRICS policy rate around 15%-46%. Shock in U.S. central bank asset, at peak, account for large portion of variation in Brazil (46%), China (36%) India (46%), and South Africa (38%) and mediumportion in Russia (14%).Based on Impulse response function, overall the response of BRICS' policy rate are significant except for Brazil. China, India and South Africa firstly drop in response to positive shock in U.S. central bank asset and the moving back toward origin while Russia policy rate increase in response to the shock before moving toward origin.

Overall, BRICS' policy rate statistical significantly drop around 170 -400 basis points and peak around 10-60 basis points

Response in Real Effective Exchange Rate:

Base on Variance Decomposition, U.S. monetary policy can explain the variation in BRICS real effective exchange rate around 2%-65%. Shock in U.S. central bank asset, at peak, account for large portion of variation in Brazil (66%) and South Africa (34%), medium portion China (17%) and relatively small portion in India (2%), and Russia (4%). Base on Impulse Response Function, overall Brazil, China,

and South Africa show significant response to shock in U.S. monetary policy while the response on India and Russia real effective exchange rate are insignificant. Brazil and South Africa response negatively in the first month and continuously increase and become positive after 3-4 months. China response positively in the first month and continuously decrease and become negative in the third month. Overall, BRICS' real effective exchange rate statistical significantly drop around 60 -100 basis points and increase around 30-200 basis points.

Response in Trade Balance:

Base on Variance Decomposition, U.S. monetary policy can explain the variation in BRICS trade balance around 13%-32%. Shock in U.S. central bank asset, at peak, account for large portion of variation in Russia (32%) and medium portion in Brazil(23%), China (13%), and India (13%), and South Africa (23%). Base on Impulse Response Function,overall Brazil, Russia, and South Africa show significant response to shock in U.S. monetary policy while the response on China and India trade balance are insignificant. Brazil trade balance positively response in the first month and peak in the second month, increasing around 1200 basis points and then sharply decrease to origin.in the fourth month. While Russia and South Africa trade balance show negative response in the before moving to the origin. Overall, BRICS' trade balance drop around 400 -550 basis points and increase around 80-1200 basis points.

Response in 10 years Treasury Yield:

Base on Variance Decomposition, U.S. monetary policy can explain the variation in BRICS trade balance around 8%-35%. Shock in U.S. central bank asset, at peak, account for large portion of variation in India (35%) and medium portion in Brazil (27%), China (21%), and India (16%), and account for relatively small portion in South Africa (8%).Based on Impulse Response function, overall all BRICS countries show significant response to shock in U.S. monetary except South Africa that show insignificant response. Brazil and Russia show positive response in the first month while China and India show negative response in the first month. Brazil and Russia treasury yield increase to the peak with in five month before dropping to origin while China treasury yield become negative the continuously increase to the peak in the sixth month while India treasury yield become negative in the first month and continuously drop to the bottom in the fourth month then rebound back to origin. Overall, BRICS' 10 years treasury yield drop around 100 -230 basis points and increase around 90-420 basis points.

Summery

In summary, there are the spillover effect of U.S. monetary policy on BRICS economies. Overall the effect are vary across countries. Shock in U.S. central bank asset can explain BRICS macro-variables from 2%-60% at peak. Overall, there are significant response in BRICS macro variables except for Price level that only show the significant response in South Africa. Trade are significant transmission channel of shock for Brazil, Russia, and South Africa while Interest rate are the transmission channel of shock for all BRICS countries except for South Africa.Based on the empirical result, BRICS authorities must pay attention on U.S. monetary as it create spillover effect on BRICS economies. For the investor, among 5 BRICS countries investor who invest in U.S. or U.S. asset might consider India for portfolio diversification as its show relatively less significant response in macro variables to U.S. monetary policy comparing to other BRICS countries. While Brazil and South Africa shows relatively more response to U.S. monetary policy shocks.

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