

# **U.S. Balance Sheet Policy and International Capital Flows: Preliminary Empirical Evidence from Emerging Economies**

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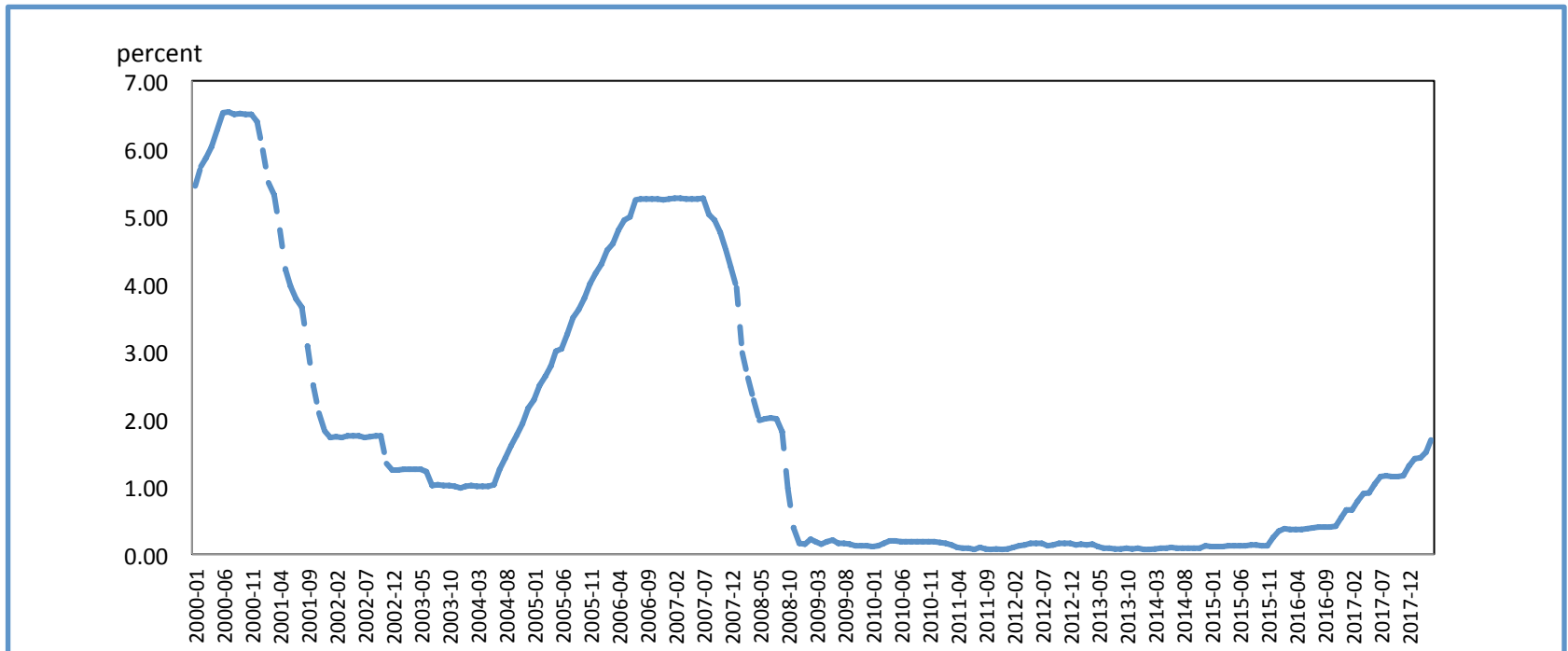
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3<sup>rd</sup> TIAC-BNM Monetary and Financial Economics Workshop  
July 16, 2018, Conference Hall 1, Sasana Kijang, Bank Negara Malaysia

# Motivation I

- The Global Financial Crisis, circa 2007-2008, has affected the financial markets in both developed and emerging economies immensely.
- One of the circumscriptive responses by the U.S. Federal Reserve was to reduce the U.S. interest rates to the range of 0% and 0.25% in December 2008

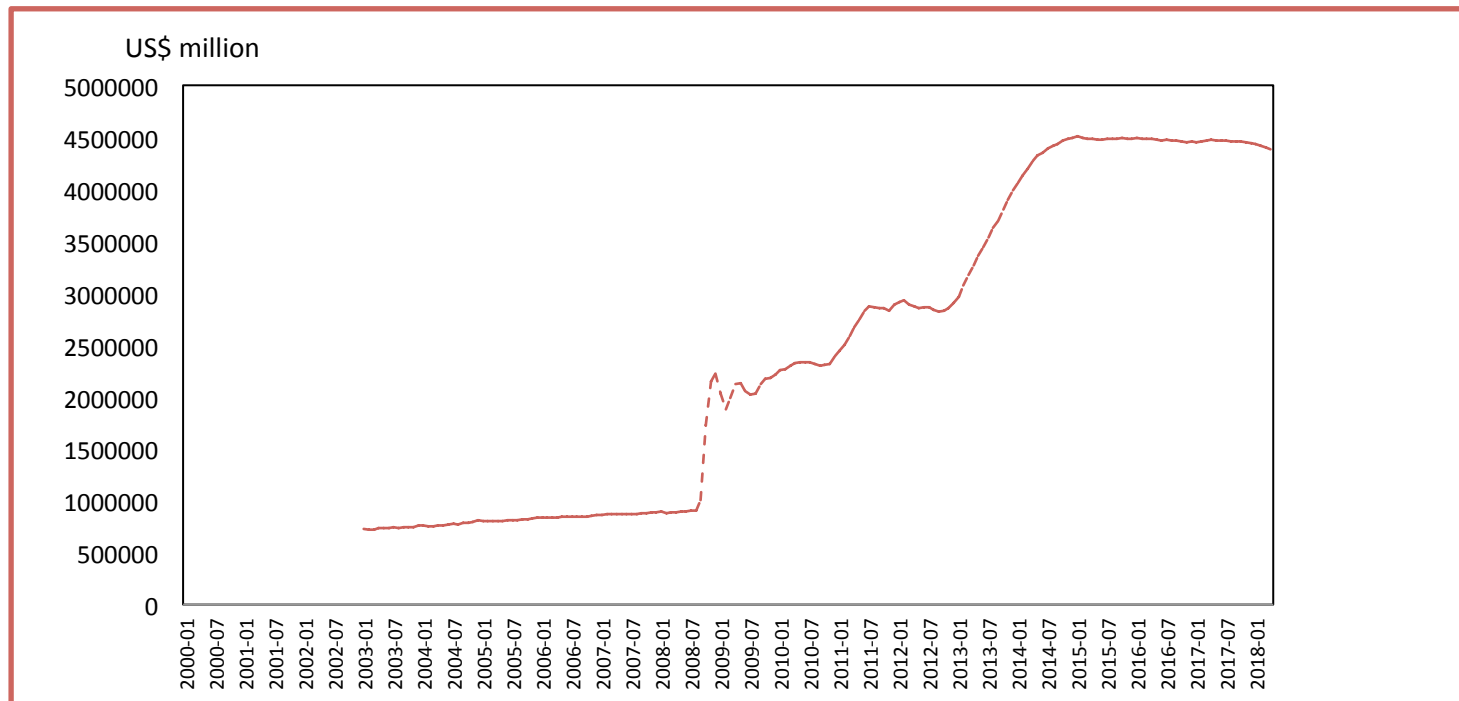
Figure: Federal Funds Rate Since 2000



# Motivation I

- Successive rounds of quantitative easing (QE) since 2008 have inflated the size of the balance sheet held by the Fed to over US\$4.5 trillion as of October 2014.

Figure: Federal Reserve Balance Sheet Since 2003



# Motivation I

- Now that the Fed has gradually raised its policy rate - the Federal Funds rate, it is plausible that the Fed is in a better position at the current juncture to end the LSAP or to otherwise reduce the size of the balance sheet.
- **Potential adverse effects:**
  - When the Fed first announced its intention in May 2013 to pare its large-scale asset purchases (LSAP), the impact to emerging markets was substantial.
  - The balance sheet tapering engenders a range questions in regards to the effects of the changing in size of balance sheet on the volatility of capital flows in emerging markets.
  - Uncertainty on which types of capital flows in emerging markets are most vulnerable to the balance sheet tapering

# Motivation II

- The U.S. monetary policy has a pervasive impact on a global scale.
- Most studies have focused narrowly on the international spillover effects deduced from the announcements of the U.S. large-scale asset purchase (LSAP) programs,
- Only a handful of studies investigate the international spillover effect of the actual operations and asset purchases.
- **Moreover, the volatility spillover effect from the U.S. LSAP has largely been ignored.**

# Literature Review I

- The Fed's conventional monetary policy shocks are important driver to the international capital flows.
- On the other hand, investigation on the spillover effects of the Fed's balance sheet policy is still scarce and inconclusive.

# Literature Review II

- Most studies are focused narrowly on the international spillover effects of announcements of the large-scale asset purchase (LSAP) programs (Moore et al., 2013; Ahmed and Zlate, 2014; Lim et al., 2014):
  - i. These event studies in general are focused on the short intervals around the key dates of LSAP program announcements.
  - ii. As such, these studies overlook the potential shock that could reverberate the financial markets inside and outside the U.S. when the actual operational exercises are executed.

# Literature Review III

- Only a handful of studies investigate the international spillover effect of the actual operations and asset purchases (Fratzscher, Lo Duca and Straub, 2013; Gambacorta, L., Hofmann, B., Peersman, 2014; Anaya, Hachula and Offermanns, 2017):
  - These studies reckon that new information is incorporated in the actual operations or that they are more potent compared to the prior key program announcements.



# Literature Review IV

- Fratzscher et al. (2013) were among the first to examine the spillover effects of the Fed's actual balance sheet operations at the international level:
  - i. actual balance sheet operations veritably have a larger effect to the market compared to the initial announcements of intent.
  - ii. the dominant factor to the reaction of investor is the actual operations, not announcements.
  - iii. actual market operations in contrary could contain new information that is consequential enough to trigger a market reaction

# The Data

- The research uses the monthly data from January 2003 to April 2018
- The capital flows data are obtained from the U.S. Treasury International Capital (TIC) System:
  - i. the TIC is the official data source for among others, the U.S. capital flows, the purchases and sales of all types of foreign long-term securities in the U.S from and to the emerging market economies.

# The Data

- The Fed's balance sheet is obtained from the Federal Reserve Bank of St. Louise database (FRED).
- The emerging markets pre-selected for the research are China, India, Indonesia, Malaysia, the Philippines, Thailand, South Korea, Argentina, Brazil, Chile and Mexico.

# Empirical Approach

- This research uses the method which is similar to that in Ng (2000), who employed a two-step GARCH approach to examine the volatility spillover effects of the U.S. and Japanese stock markets on stock markets in the Asia Pacific-Basin region.

# Empirical Approach – Step 1

- The research first measures the volatility of the Fed's balance sheet using the specification of GARCH(1,1) model:

$$r_{Fed,t} = \alpha_{Fed} + \sqrt{\sigma_{Fed,t}^2} z_{Fed,t} \quad z_{Fed,t} \sim N(0,1) \quad (1)$$

$$\sigma_{Fed,t}^2 = \omega_{Fed} + \beta_{Fed} r_{Fed,t-1}^2 + \gamma_{Fed} \sigma_{Fed,t-1}^2 \quad (2)$$

$$\varepsilon_{Fed,t} = r_{Fed,t} - \alpha_{Fed} - \sqrt{\sigma_{Fed,t}^2} z_{Fed,t} \quad (3)$$

# Empirical Approach – Step 2

- In Step 2, the research uses the innovations in equation (3) to estimate the volatility spillovers from the Fed's balance sheet:

$$r_{EM,t} = \alpha_{EM} + \phi \epsilon_{Fed,t} + \sqrt{\sigma_{EM,t}^2} z_{EM,t} \quad z_{EM,t} \sim N(0,1) \quad (4)$$

$$\sigma_{EM,t}^2 = \omega_{EM} + \beta_{EM} r_{EM,t-1}^2 + \gamma_{EM} \sigma_{EM,t-1}^2 \quad (5)$$

- In equation (4), if the coefficient of the innovations of the change in the Fed's balance sheet is different from zero, then hypothesis of volatility spillovers occurrence is not rejected and vice versa

# Empirical Results

- Tables 2 and 3 show **the estimated volatility spillover coefficients** originating from the changes in the size of the Federal Reserve balance sheet.

**Table 2**  
**The Sales of Non-U.S Long Term Securities by the U.S. Residents to**  
**Emerging Market Economies**

Country	Bonds	Stocks	Total Long Term Securities
China	<b>-0.2229***</b>	-0.1333	0.4410
	(0.0088)	(0.5391)	(0.7436)
India	-0.0705	-0.0905	-0.3760
	(3.4699)	(0.8699)	(0.5858)
Indonesia	-1.8369	-0.1905	-0.6277
	(37.3785)	(1.2263)	(4.8312)
Malaysia	<b>6.9961**</b>	0.7063	1.6361
	(2.7513)	(0.4525)	(0.9956)
Philippines	-0.0680	0.5771	0.5290
	(3.3092)	(0.3830)	(1.6821)
Korea	0.2051	-0.5216	-0.4018
	(4.4255)	(0.4095)	(0.7739)
Thailand	-2.0693	0.5554	0.5470
	(8.3431)	(0.6388)	(0.5419)
Argentina	-0.5018	-0.3511	-0.3879
	(3.0956)	(0.2518)	(2.8135)
Brazil	-0.2798	-0.2831	-0.4062
	(3.0684)	(0.4813)	(1.1364)
Chile	<b>2.9729***</b>	-0.1963	<b>1.5722***</b>
	(0.8977)	(0.9769)	(0.2653)
Mexico	1.1919	-0.2979	0.1547
	(1.1927)	(0.2967)	(0.2414)



**Table 3**  
**The Purchases of Non-U.S Long Term Securities by the U.S. Residents from**  
**Emerging Market Economies**

Country	Bonds	Stocks	Total Long Term Securities
China	0.8844	0.1964	0.1430
	(9.2842)	(0.8342)	(0.9738)
India	-0.0707	-0.0901	-0.0976
	(2.0444)	(1.0442)	(1.3141)
Indonesia	1.0135	-0.2669	-0.6066
	(116.2416)	(1.5283)	(0.8540)
Malaysia	1.0449	<b>1.57055**</b>	<b>1.605826*</b>
	(8.1209)	(0.4306)	(0.9174)
Philippines	0.4144	0.7281	-1.7213
	(24.6816)	(0.4568)	(1.4615)
Korea	-0.8995	-0.4251	-0.4912
	(8.1900)	(0.5346)	(0.6569)
Thailand	-0.5183	-0.1157	-0.3809
	(1.5393)	(0.7248)	(0.7376)
Argentina	<b>-2.8443**</b>	-0.0110	-1.0885
	(1.0359)	(1.5681)	(1.3294)
Brazil	0.8727	-0.4616	-0.4288
	(3.0394)	(1.1464)	(1.5173)
Chile	-0.4228	-0.5409	-0.5380
	(3.5812)	(1.3109)	(1.9563)
Mexico	0.4183	-0.1943	-0.1125
	(1.4393)	(0.3358)	(0.6068)

# Empirical Results I

- The preliminary findings show limited evidence of volatility spillovers to the flows of capital to emerging market economies.

# Empirical Results II

- That sales of non-U.S long term securities from the U.S. residents are found to be more vulnerable to volatility spillovers stemming from the changes in the size of Fed's balance sheet compared to the purchases of non-U.S long term securities to emerging market economies by the U.S. residents.

# Empirical Results III

- More volatility spillovers are observed from the changes in the size of the Fed's balance sheet to **the sales and purchases of non-U.S. bonds** to and from emerging market economies compared to the sales and purchases of stocks, in term of the number of economies affected.

# Empirical Results IV

- The sign of the estimated volatility spillover coefficient represent a useful indicator to show if volatility spillover from the changes in the size of the Fed's balance sheet had dampened or amplified volatility in the flows of capital.

# Conclusion

- The preliminary findings of the research that show limited evidence of volatility spillovers to the flows of capital into emerging market economies could be attributed to the cautious measures adopted by the Fed in its quest of monetary policy normalisation.
- The research expects the impact in the foreseeable future to remain subdued as long as the Fed's intentions are well communicated, the balance sheet adjustment is conducted gradually, and financial conditions remain supportive.

# Forthcoming Works I

- The preliminary findings, notwithstanding are below expectation.
- Moving forward, the research will consider using alternative measures for volatility i.e.:
  - i. standard deviations derived over a rolling window
  - ii. standard deviations estimated by an ARIMA(1,1,0) model

# Forthcoming Works II

- To explore alternative capital flows measures such as
  - i. the international portfolio flows as accounted in the balance of payments (BoP) and
  - ii. the high-frequency equity and bond flows data maintained by the Emerging Portfolio Fund Research Global (EPFR) (if possible).



**THANK YOU**

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