# **International Spillovers of Monetary Policy**

Prepared for the Hong Kong Monetary Authority, Federal Reserve Board, and Federal Reserve Bank of Atlanta Joint Conference: *"Unconventional Monetary Policy: Lessons Learned"* 

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Disclaimer: This presentation represents my own views and not necessarily those of the Federal Reserve Board of Governors or its staff.



### **Quantitative Easing: A "Monetary Tsunami"?**

- Dilma in 2012: QE is a "monetary tsunami" that has caused a depreciation in the value of currencies of developed countries, thus impairing growth" in other nations.
- Reflects still-prominent view that unconventional monetary policies generate unusually large spillovers, pushing waves of capital to EMEs, appreciating their currencies, blowing bubbles.
- Do unconventional policies really generate larger spillovers than conventional policies?
- Difficult question, including because there are different types of unconventional policies: asset purchases (QE), forward guidance, negative interest rates

#### I. Introduction

### **Quantitative Easing: A "Monetary Tsunami"?**

### Plan of talk:

- Channels of monetary policy spillovers
- Conventional and unconventional monetary policy effects on exchange rates
- Conventional and unconventional monetary policy spillovers to foreign bond yields

### **II. Channels of Monetary Policy Spillovers**

The case of US monetary easing, whether conventional or unconventional:

• Depreciates the dollar: this boosts US net exports, lowers foreign net exports and GDP.

### **Figure 1: Response of Dollar to US Treasury Yield Surprises**



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- Depreciates the dollar: this boosts US net exports, lowers foreign net exports and GDP.
- Boosts US domestic demand: this raises US imports, foreign exports, and foreign GDP.
- Eases US interest rates and financial conditions: this leads through portfolio balance effects to lower foreign interest rates and higher asset prices.

### Figure 2: Response of German Yields to US Treasury Yield Surprises



### **II. Channels of Monetary Policy Spillovers**

Ammer, DePooter, Erceg, and Kamin (2016) back-of-the-envelope estimate:

- Net effect of US monetary easing: higher foreign GDP
  - Negative effect of lower dollar offset by positive effect of higher US domestic demand
  - Easing of foreign financial conditions boosts foreign output

Requires further study.

### **II. Channels of Monetary Policy Spillovers**

Key implications of this framework for analyzing spillovers:

- Any all-in assessment of monetary spillovers must consider all three channels.
- Any all-in comparison of the spillovers from conventional and unconventional monetary policy must consider all three channels.
- Today I'll focus on the first and third:
  - Exchange rates
  - Bond yields

- Prominent view: unconventional monetary easing is "beggar-thyneighbor" policy with greater effects on exchange rates than conventional policy easing.
- May reflect findings that monetary policy exerts greater effects on exchange rates since the global financial crisis (GFC), when conventional policy rates were pinned at the zero lower bound and unconventional policies were more common.
  - Glick and Leduc (2015)
  - Ferrari, Kearns, and Schrimpf (2016)
  - Curcuru (2017)

### **Figure 3: Response of Dollar to US Treasury Yield Surprises**



- Just because exchange rate sensitivity to interest rate surprises increased in the post-GFC period doesn't mean unconventional policies affect exchange rates more than conventional policies.
- Wrenching economic dislocations of the post-GFC period may well have been responsible for increased sensitivity.

**II.** The Effect Of Monetary Policy on Exchange Rates Figure 4: Time-Varying Sensitivity of the Dollar with Respect to Interest Rate Surprises



Note: Estimation using rolling 2-year robust regressions on FOMC announcement days. Dollar is tradeweighted index against advanced economies. Interest rates are 1-month OIS rates, 2 years forward. Citation: Curcuru (2017)

Alternative approach to comparing spillover effects of conventional and unconventional policies (QE):

- Compare the effects of changes in the two building blocks of the yield curve:
  - Expected short-term interest rates
  - Term premiums

- Bond yield = Average expected interest rate + term premium
- In principle:
  - Conventional policies affect expected interest rates
  - Unconventional (balance-sheet) policies alter supply/demand balance in bond market and change the term premium
- Therefore, can compare the effects of conventional and unconventional policies by comparing the effects of changes in expected interest rates and changes in term premiums.

#### Caveats:

- Conventional policy may affect term premiums.
- Balance sheet policy may affect expected rates through signaling effects.
- Unconventional policy in the form of forward guidance should affect expected rates.

#### Nevertheless:

 Understanding how expected rates and term premiums affect exchange rates would be an important step toward understanding spillovers from conventional and unconventional policies. **II. The Effect Of Monetary Policy on Exchange Rates Figure 5: Decomposition of US Treasury Yield Surprises after FOMC Announcements** 



- Unfortunately, there's no single, reliable way of decomposing bond yields into expected rates and term premiums.
- But different approaches generate broadly similar results.

II. The Effect Of Monetary Policy on Exchange Rates Figure 6: Correlations of Alternative Measures of Expected Interest Rates and Term Premiums

#### 6a. Correlation of Measures of Term Premiums

	10 year minus 1 year*	10 year on OIS 1 year**	Model-based Term Premium***			
10 year minus 1 year*	1	0.956	0.841			
10 year on OIS 1 year*	**	1	0.866			
Model-based Term Premium***			1			
6b. Correlation of Measures of Expected Interest Rates						
			Model-based			
	1 year yield*	OIS 1 year**	Model-based Expected Interest Rates***			
1 year yield*	<b>1 year yield*</b> 1	<b>OIS 1 year**</b> 0.692	Model-based Expected Interest Rates*** 0.580			
1 year yield* OIS 1 year**	1 year yield* 1	<b>OIS 1 year**</b> 0.692 1	Model-based Expected Interest Rates*** 0.580 0.838			

\* The term premium is defined as the difference between the 10 and the 1-year treasury yields, and the expected short rate is the yield on a 1-year treasury.

\*\* This measure is based on a regression of 10-year treasury yields on 1-year OIS rates. The term premium estimates are the residuals from this regression and the 1-year OIS rates serve as expected short rates.

\*\*\*This uses measures of term premia and expected short rates based on an estimated affine term structure model, similar to that proposed in Adrian et al. (2013).

- Using estimates of expected rates and term premiums derived from our affine term structure model,
- Let's get down to business.

### **Figure 7: Response of Dollar to US Treasury Yield Surprises**



**II. The Effect Of Monetary Policy on Exchange Rates Figure 8: Response of Advanced Economies' Exchanges Rates to US Expected Interest Rates and Term Premiums** 



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.

**II.** The Effect Of Monetary Policy on Exchange Rates Figure 9: Response of Advanced Economies' Exchanges Rates to US Expected Interest Rates and Term Premiums



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.

II. The Effect Of Monetary Policy on Exchange Rates Figure 10: Response of EME Exchange Rates to US Treasury Yield Surprises



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Figure 11: Response of EME Exchange Rates to US Treasury Yield Surprises



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**II. The Effect Of Monetary Policy on Exchange Rates Figure 12: Response of EME Exchange Rates to US Expected Interest Rates and Term Premiums** 



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.

**7.** The Effect Of Monetary Policy on Exchange Rates Figure 13: Response of EME Exchange Rates to US Expected Interest Rates and Term Premiums



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.

Based on this admittedly preliminary work, key take-away lessons:

- Exchange rates more responsive to expected interest rates (conventional policy) than to term premiums (QE)
- The rise in exchange rate sensitivity to monetary policy surprises after GFC owes mainly to rising sensitivity to expected interest rates.
- Results hold similarly for advanced economies (AEs) and emerging-market economies (EMEs).

### **IV. Bond Yield Spillovers**

- As noted earlier, three key channels of monetary policy spillover:
  - Exchange rates
  - Domestic demand
  - Transmission to foreign financial conditions (bond yields, etc.)

### **IV. Bond Yield Spillovers**

- Skipping the second (not finance-y enough!), let's discuss the third channel:
  - Exchange rates
  - Domestic demand
  - Transmission to foreign financial conditions (bond yields, etc.)

Figure 14: Response of German Yields to US Treasury Yield Surprises



### **Figure 15: Response of German Yields to US Treasury Yields**



Figure 16: Response of German Yields to US Expected Interest Rates and Term Premiums



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.

Figure 17: Response of German Expected Interest Rates and Term Premiums to US Yields



The data are changes in German expected interest rates and term premia in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.

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### Figure 18: Response of EME Yields to US Treasury Yield Surprises



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. \* Brazil 10-year yield data begins Jan. 4, 2006.

### Figure 19: Response of EME Yields to US Treasury Yield Surprises



The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. \* Brazil 10-year yield data begins Jan. 4, 2006.

### **Table 1: Regression Results for Bond Yield Spillovers**

Regression Results for Bond Yield Spillovers					
Dependent Variable:	U.S. Explanatory Variables; Surprises in:				
<u>10-year Yield</u>	Expected Interest Rate	<u>Term Premium</u>	<u>R-squared</u>		
Germany	0.318***	0.382***	0.22		
Pre-GFC	0.146	0.285**	0.07		
Post-GFC	0.403***	0.388***	0.31		
Korea	0.364***	0.315***	0.21		
Pre-GFC	0.142	-0.149	0.05		
Post-GFC	0.513***	0.37***	0.47		
Mexico	0.336***	0.217***	0.04		
Pre-GFC	0.072	0.052	0		
Post-GFC	0.604***	0.24***	0.23		
Brazil	0.823***	0.261	0.07		
Pre-GFC	0.596	0.438	0.03		
Post-GFC	1.157***	0.242*	0.16		

The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model. Brazil 10-year yield data begins Jan. 4, 2006.

Based on this admittedly preliminary work, key take-away lessons for bond yield spillovers:

- Surprises in US Treasury yields lead to significant changes in foreign yields, and of roughly similar magnitudes in AEs and EMEs.
- The responsiveness of foreign yields to US Treasury yield surprises has risen since the GFC, and more for EMEs than AEs.

Based on this admittedly preliminary work, key take-away lessons for bond yield spillovers (continued):

- In the post-GFC period, foreign yields are more sensitive to US expected rates than US term premiums (in both AEs and EMEs),
  - and increases in the sensitivity of foreign yields to US expected rates appear to account for most of the increase in the sensitivity of foreign yields to US Treasury yield surprises overall.
- This suggests that conventional monetary policies may exert larger spillovers to foreign financial conditions than balance-sheet policies.

Based on this admittedly preliminary work, key take-away lessons for bond yield spillovers (continued):

- US Treasury yield surprises affect German term premiums, not expected interest rates.
  - Suggests that these spillovers affect financial conditions, not economic activity or inflation.
  - Implies that, all else equal, foreign authorities may need to "lean against the wind" to offset such spillovers.

### V. Conclusion

#### Two key lessons:

- Methodological:
  - Estimates of expected rates and term premiums can help compare spillovers from conventional and unconventional monetary policy.
- Policy:
  - Preliminary findings suggest that conventional monetary policies may exert greater spillovers to exchange rates and foreign bond yields than balance sheet policies.

### V. Conclusion

Many unanswered questions for further research:

- Do event studies around monetary policy announcement provide a good read on the persistent effects of monetary policies?
- Why do expected rates exert larger spillovers than term premiums, especially for exchange rates?
- How robust are these results to different measures of expected rates and term premiums?
- What accounts for the greater spillovers of monetary policy in the post-GFC period?
- How can we predict the impact of monetary policy decisions on expected rates and term premiums?
- What are the implications of these findings for optimal monetary policy?
  - Brainard (2017): Examines implications for domestic and foreign net exports and economic activity using conventional policy vs. balance sheet adjustment.

# Thank you!

### **Regression Results for Exchange Rate Spillovers**

Regression Results for Exchange Rate Spillovers					
Dependent Variable:	ependent Variable: U.S. Explanatory Variables; Surprises in:				
Exchange Rate	Expected Interest Rate	Term Premium	R-squared		
			<u> </u>		
AFE Index	6.453***	2.489***	0.15		
Pre-GFC	4.396***	2.193	0.14		
Post-GFC	12.436***	2.674***	0.25		
EUR	6.794***	2.226**	0.11		
Pre-GFC	3.062*	0.659	0.05		
Post-GFC	14.269***	2.797**	0.22		
EME Index	3.216***	1.221**	0.09		
Pre-GFC	0.764	-1.781**	0.08		
Post-GFC	7.608***	1.463**	0.22		
KRW	3.584***	2.393***	0.05		
Pre-GFC	0.859	-0.326	0.01		
Post-GFC	10.394***	2.334**	0.2		
MXN	4.312***	0.786	0.06		
Pre-GFC	0.822	-3.464**	0.08		
Post-GFC	10.055***	1.319	0.15		
BRL	3.585**	1.936*	0.02		
Pre-GFC	1.315	-4.018	0.03		
Post-GFC	4.976*	2.795**	0.06		

The data are changes in a one-day window around FOMC announcement dates. The sample starts in January 2002. The post-crisis period begins in November 2008. Estimates of term premia and expected short rates based on an estimated affine term structure model.