U.S. monetary policy uncertainty and RMB deviations from covered interest parity

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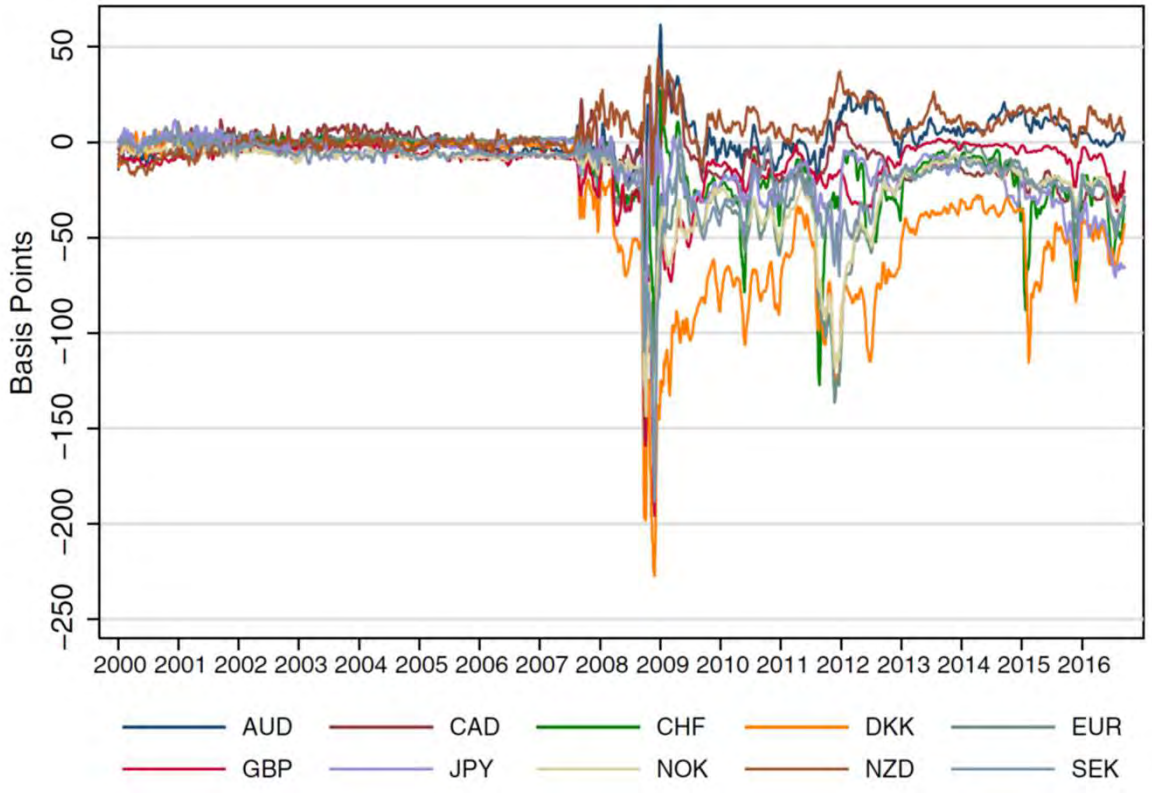


Source: Du et al., 2018

Motivation

- Main reason: restrictive regulation on financial intermediaries post-crisis creates constraints on FX arbitrage fund, particularly, US dollar fund, and causes deviations from CIP.
  - Ivashina et al. (2015): US dollar fund shortfall in USD-Euro swap market leads to the violation of CIP
  - Borio et al. (2018): changes in FX hedging demand and supply has first order impact on deviations from CIP
  - Du et al. (2018) attribute to regulatory filings that reduce banks' supplies of FX hedge products
  - Avdjiev et al. (2019): contraction on cross-border bank lending in U.S. dollars
  - Iida et al. (2019): Limited participation of investors as suppliers of U.S. dollars in the FX swap market

Motivation

- Those findings are related to world's major currencies.

- Research questions:
  - Do constraints on U.S. dollar fund spillover the CIP in emerging markets that have capital controls and less flexible exchange rate regime?
  - How do capital controls and FX regime influence the effect of arbitrage fund constraints on CIP?

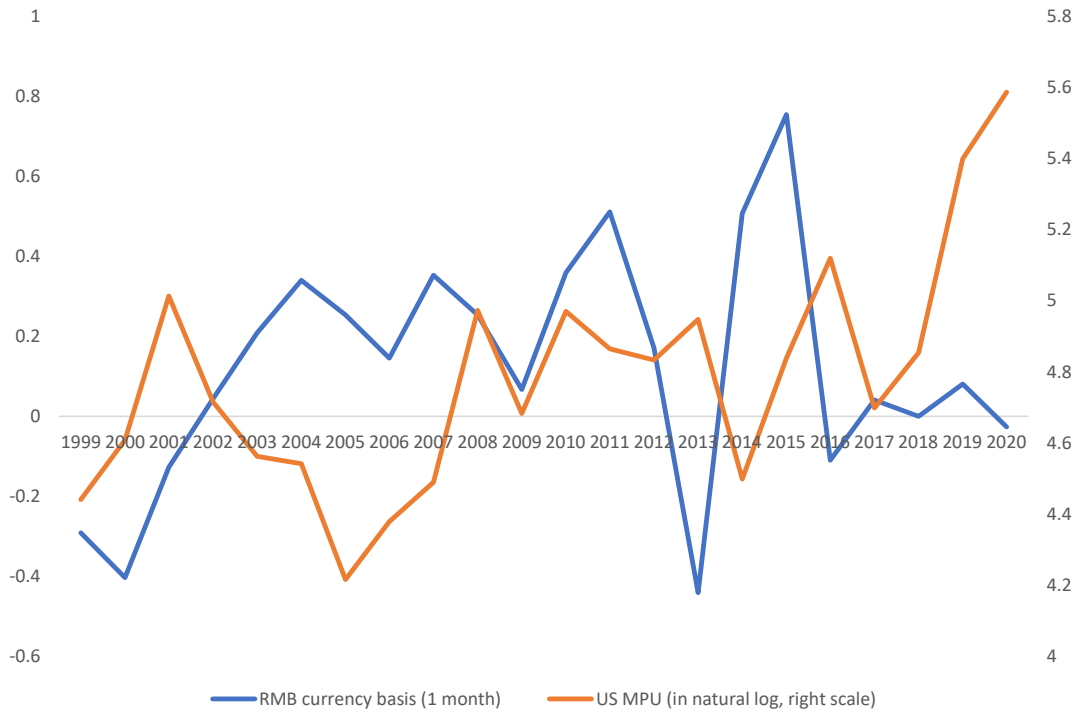
Motivation

- Use Chinese renminbi as a laboratory
  - A major EMs currency subject to capital controls and less flexible FX regime
  - Data availability (e.g. NDF data)
- Use U.S. monetary policy uncertainty (MPU) to proxy constraints on dollar arbitrage fund on RMB market
  - U.S. monetary policy shocks have substantial impact on cross-border fund flow in EMs ("sudden stops": Calvo et al., 1996; Fratzscher, 2012; Forbes and Warnock, 2012. "global financial cycle": Miranda-Agrippino and Rey, 2015; Rey, 2015).

The postulated mechanism

- High U.S. MPU leads to lower dollar fund in RMB market.
- Distorts demand and supply of RMB assets aligned with China's macroeconomic conditions
- Generates a wedge between onshore and offshore RMB asset yields and thus a deviation from RMB CIP

- Use cross-currency basis to measure deviation from CIP (Borio et al. 2018; Du et al., 2018).
- CIP holds, if currency basis is zero.
- A positive RMB currency basis suggests higher onshore interest rate than offshore rate.



Contributions

- Identify an external determinant (U.S. MPU) of RMB deviations from CIP
  - Country risk/credit risk (Keynes, 1923; Frankel, 1991)
  - Cross-border transaction costs, e.g. capital controls (Dooley and Isard, 1980; Ito, 1983)
- Examine how policies that limit U.S. MPU transmitting channel influence the effect of MPU on RMB deviations from CIP?

Basic empirical specification

$$Y_t = \alpha_0 + \alpha_i Y_{t-i} + \beta_1 MPU_t + \gamma Z_t + \varepsilon_t \qquad (1)$$

- Y_t is the RMB currency basis in month *t*; basis = (r-r*)/(1+r*) – (F-S)/S;
- MPU_t uses the monetary policy uncertainty index of Baker et al. (2016); in addition, the VIX and Fed's shadow rate (Wu and Xia, 2016);
- Standard control variables in Z_t, including M2/GDP growth, inflation, trade opennes, and NEER.

- Monthly data from January 1999 to June 2020;
- ARDL regression with lags in Y_{t-i} determined by BIC (Cheung and Qian, 2011).

Table 1: U.S. monetary policy uncertainty and RMB cross-currency basis

	1	2	3	4	5	6
Basis(-1)	0.849***	0.857***	0.840***	0.857***	0.865***	0.847***
	(0.032)	(0.032)	(0.034)	(0.032)	(0.032)	(0.034)
MPU	-0.060**			-0.067**		
	(0.030)			(0.031)		
VIX		-0.138*			-0.152*	
		(0.078)			(0.087)	
Fed rate			-0.010*			-0.010
			(0.006)			(0.006)
M2				0.009*	0.010*	0.008
				(0.005)	(0.005)	(0.005)
Inflation				-0.092	0.758	0.785
				(2.451)	(2.455)	(2.460)
Trade Open				-2.729	-2.882	-1.307
				(4.159)	(4.192)	(4.173)
NEER				-0.037***	-0.033***	-0.035***
				(0.012)	(0.012)	(0.012)
Constant	0.304**	0.019	0.035**	0.342**	0.021	0.038**
	(0.145)	(0.014)	(0.017)	(0.150)	(0.015)	(0.018)
Obs.	257	257	257	251	251	251
Adj. R^2	0.738	0.737	0.737	0.747	0.746	0.745

- 1 standard deviation (approximately 0.46) shock of U.S. MPU lowers the RMB basis by approximately 0.03 percent (0.36 percent of the annual percentage rate)

A multiplicative regression specification

$$Y_t = \alpha_0 + \alpha_i Y_{t-i} + \beta_1 MPU_t + \beta_2 X_t + \beta_3 MPU_t \times X_t + Z_t + \varepsilon_t \qquad (2)$$

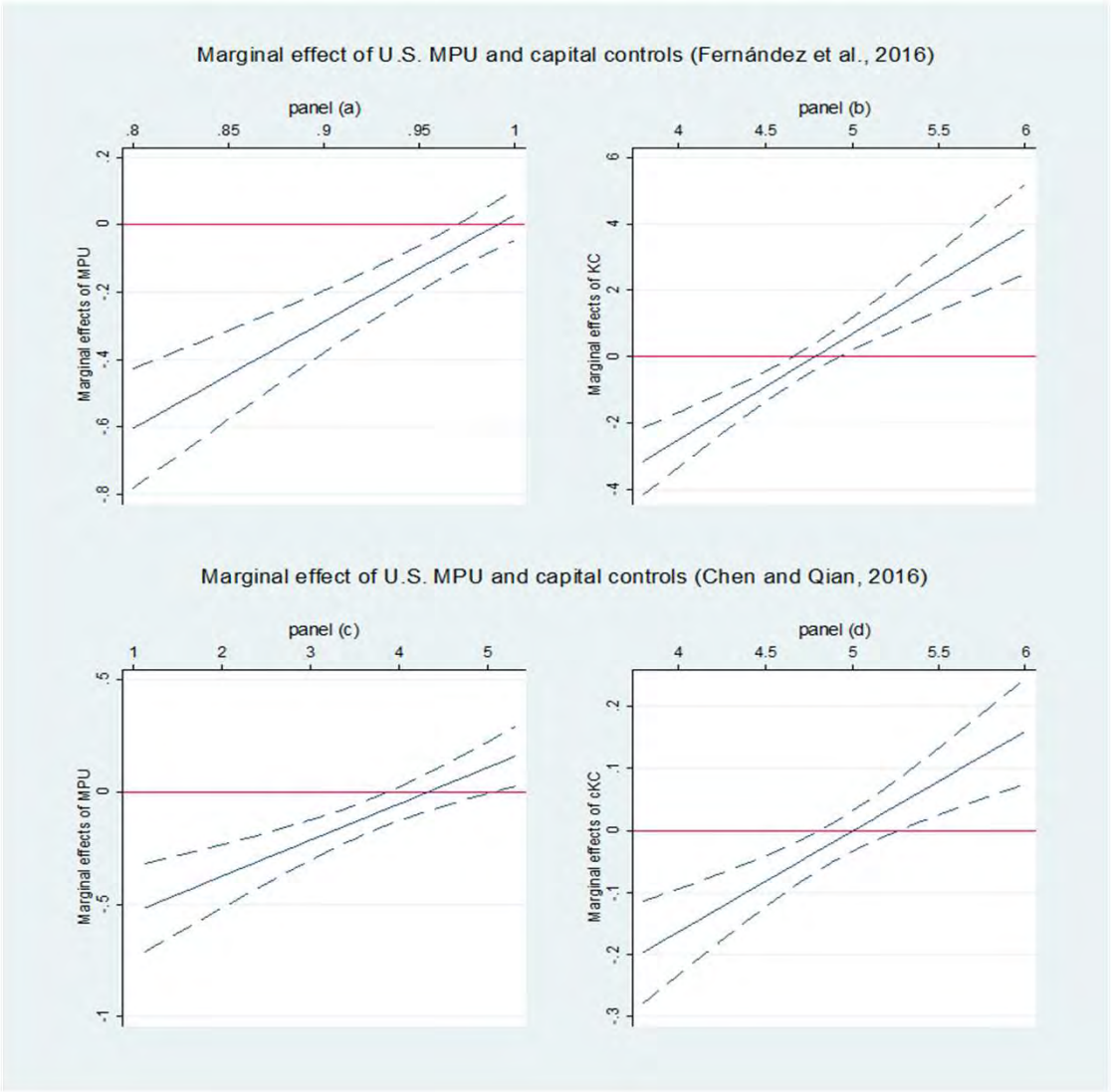
- X_t lists *KC*, *RMB rgm*, and *reserves,* that are analyzed individually and collectively;
- *KC* uses the capital control index of Fernández et al. (2016) and Chen and Qian (2016); in addition, *KCi* and *KCo* are used.

- A significant estimate for β_3 suggests capital controls influence the effect U.S. MPU on RMB basis;
- The marginal effect of MPU on RMB basis is measured by $\beta_1 + \beta_3 * KC$

Table 2: U.S. monetary policy uncertainty, capital controls, and RMB cross-currency basis

	1	2	3	4	5	6
MPU	-3.134***	-2.941***	-3.212***	-0.699***	-0.663***	-0.445***
	(0.494)	(0.488)	(0.494)	(0.138)	(0.123)	(0.107)
KC	-15.128***			-0.808***		
	(2.423)			(0.175)		
KC×MPU	3.164***			0.161***		
	(0.512)			(0.036)		
KCi		-14.109***			-0.756***	
		(2.388)			(0.153)	
KCi×MPU		2.970***			0.151***	
		(0.506)			(0.031)	
KCo			-15.530***			-0.532***
			(2.415)			(0.148)
KCo×MPU			3.236***			0.106***
			(0.510)			(0.031)
Obs.	227	227	227	215	215	215
Adj. R^2	0.790	0.786	0.792	0.776	0.778	0.769

- The marginal effect of MPU: $\beta_1 + \beta_3 * KC = -0.104$
- The marginal effect of KC: $\beta_2 + \beta_3 * MPU = -0.052$


Marginal effect of U.S. MPU and capital controls (Fernández et al., 2016)
panel (a)
.8
.85
.9
.95
1
.2
0
-.2
-.4
-.6
-.8
Marginal effects of MPU
panel (b)
4
4.5
5
5.5
6
6
4
2
0
-2
-4
Marginal effects of KC
Marginal effect of U.S. MPU and capital controls (Chen and Qian, 2016)
panel (c)
1
2
3
4
5
.5
0
-.5
-1
Marginal effects of MPU
panel (d)
4
4.5
5
5.5
6
.2
.1
0
-.1
-.2
-.3
Marginal effects of cKC

An important finding of KC

- Common understanding: KC limit capital mobility and raise the cost of cross-border arbitrage capital, driving a deviation from CIP;

- We find that KC insulate external shock (e.g. Zeev, 2017; Han and Wei, 2018), mitigating the effect of external shocks on deviations on CIP.

The role of RMB exchange rate regime

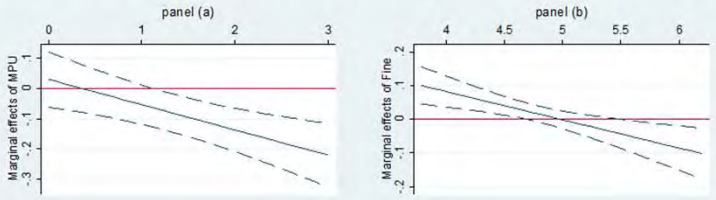
- Mundell-Fleming's trilemma: a country must adopt a flexible exchange rate to maintain monetary autonomy in the presence of free capital mobility - Frankel et al. (2004) and Obstfeld et al. (2005; 2019)
- Rajan (2014) and Edwards (2015): in the presence of external shocks, flexible exchange rates sometimes magnify rather than equilibrating such shocks;
- Rey (2015) and Miranda-Agrippino and Rey (2015) "dilemma, not trilemma" : monetary policy autonomy is possible when capital accounts are managed, regardless of exchange rate regimes.

- RMB exchange regime: the fine and coarse measure of Ilzetzki et al. (2019); in addition, *Reform* and *Rgm libl.*
- High of these FX regime measures, more flexible the exchange rate regime

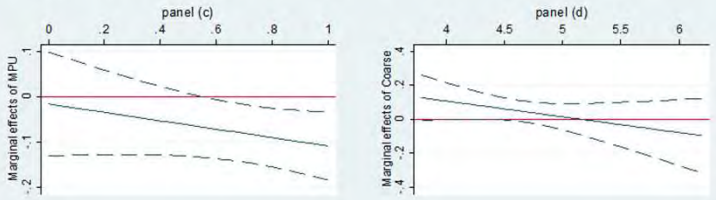
Table 3: U.S. monetary policy uncertainty, RMB exchange rate regime, and RMB cross-currency basis

	1	2	3	4
MPU	0.030	-0.016	0.016	0.028
	(0.047)	(0.059)	(0.054)	(0.049)
Fine	0.416***			
	(0.123)			
Fine×MPU	-0.084***			
	(0.026)			
Coarse		0.481		
		(0.326)		
Coarse×MPU		-0.093		
		(0.070)		
Reform			0.409*	
			(0.209)	
Reform×MPU			-0.085*	
			(0.043)	
Rgm libl				0.230***
				(0.079)
Rgm libl×MPU				-0.046***
				(0.016)
Obs.	251	251	251	251
Adj. R^2	0.758	0.750	0.749	0.754

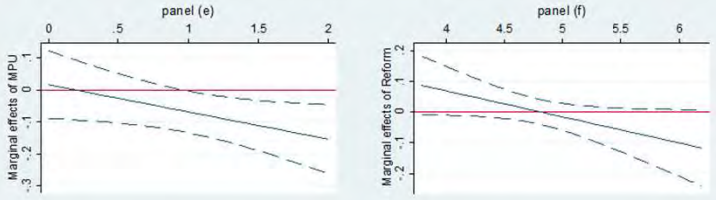
Marginal effect of U.S. MPU and RMB exchang rate regime (fine measurement, Ilzetzki et al., 2019)



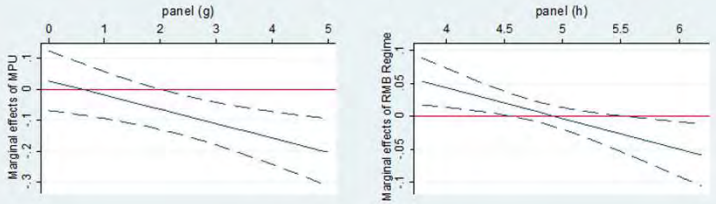
Marginal effect of U.S. MPU and RMB exchang rate regime (coarse measurement, Ilzetzki et al., 2019)



Marginal effect of U.S. MPU and RMB exchange rate reform



Marginal effect of U.S. MPU and RMB exchang rate regime evolution



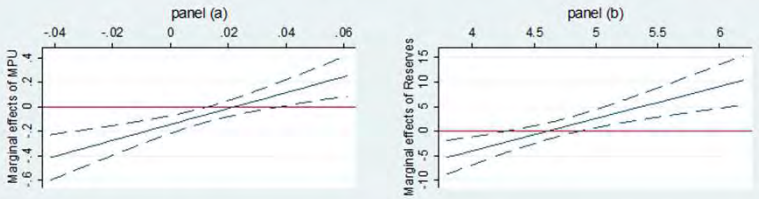
The role of international reserves

- Active reserve management: Central banks accumulate reserves in good times while selling during crises
- provides buffer stock as protection from adverse external shocks, bolstering macroeconomics and financial performance (Dominguez et al, 2012; Aizenman and Jinjarak, 2020)

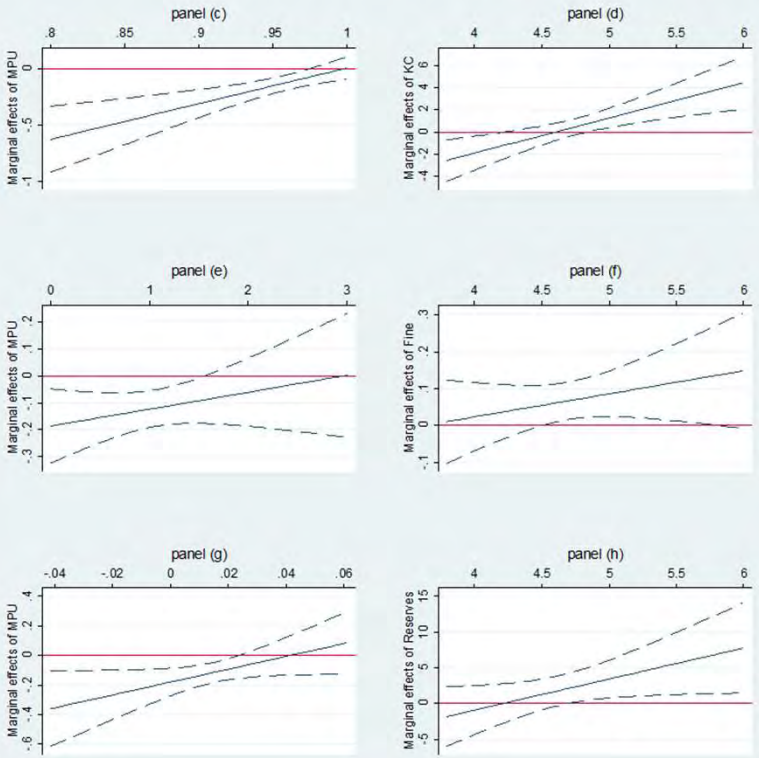
Table 4: U.S. monetary policy uncertainty, international reserves, capital controls, RMB exchange rate regimes, and the RMB cross-currency basis

	1	2	3	4	5
MPU	-0.146***	-3.308***	-2.881***	-3.213***	-3.574***
	(0.038)	(0.922)	(0.636)	(0.712)	(0.863)
Reserves	-30.192***	-18.235*	-13.944	-15.304	-16.921
	(7.814)	(10.316)	(10.018)	(10.349)	(10.356)
Reserves*MPU	6.548***	4.338*	3.319	3.645	4.037*
	(1.645)	(2.218)	(2.136)	(2.223)	(2.225)
KC		-14.695***	-13.366***	-14.859***	-16.242***
		(4.386)	(3.126)	(3.375)	(4.064)
KC×MPU		3.197***	2.779***	3.115***	3.451***
		(0.920)	(0.661)	(0.720)	(0.858)
RMB rgm		-0.227	-0.353	-0.321	-0.200
		(0.273)	(0.362)	(0.325)	(0.161)
RMB rgm×MPU		0.063	0.091	0.078	0.048
		(0.058)	(0.078)	(0.070)	(0.034)
Obs.	251	227	227	227	227
Adj. R^2	0.762	0.795	0.793	0.792	0.793

Marginal effect of U.S. MPU and international reserves



Marginal effect of U.S. MPU, capital controls, RMB exchange rate regime and international reserves



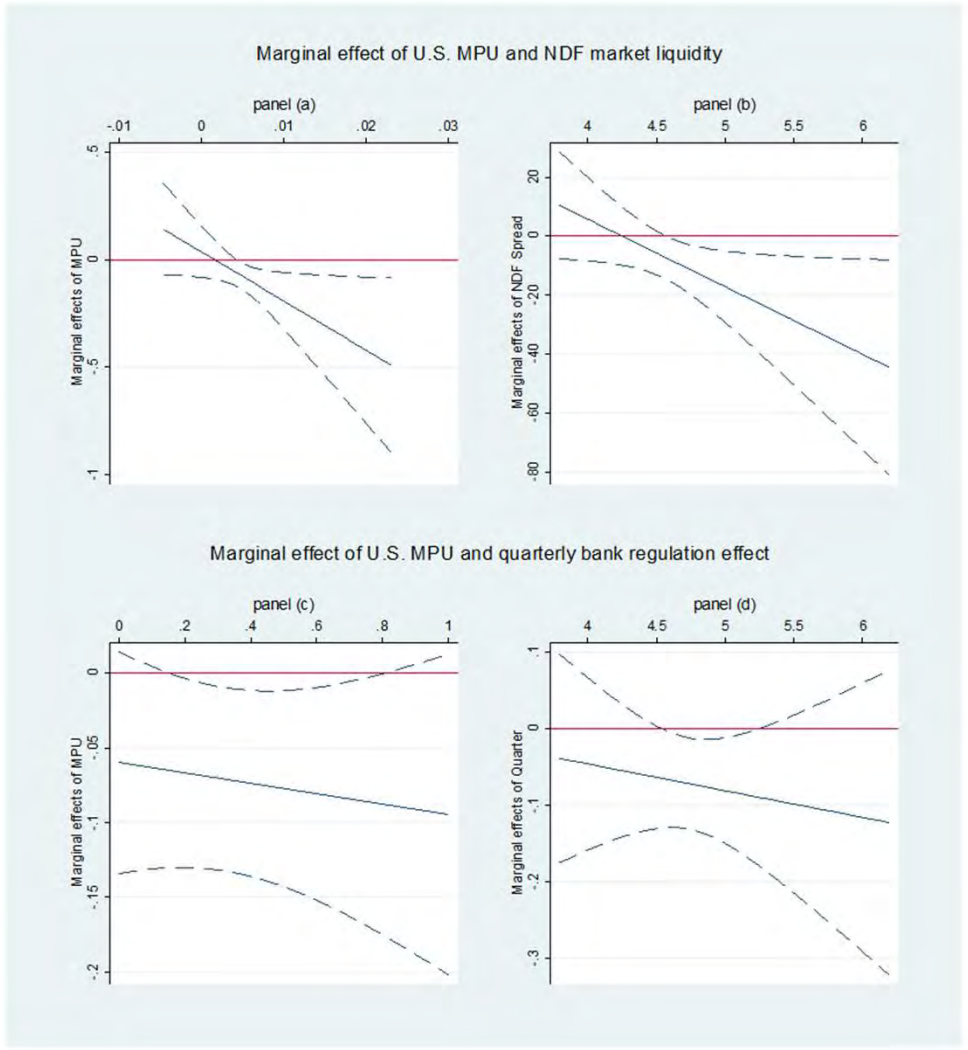
Additional analyses

- Alternative spillover channel: MPU affects the supply and demand of FX hedge market (Borio et al, 2018; Iida et al, 2019)
  - NDF bid and ask spread
  - Quarter dummy (t= 1 if month = “February, May, August, or November”) (Du et al., 2018)

- The effect of the 2008 global financial crisis (*GFC* = 1 if month >= Sept. 2008)

Table 5: U.S. monetary policy uncertainty, NDF market liquidity, and the RMB cross-currency basis

	1	2	3	4
MPU	0.036	-0.060	0.013	0.084
	(0.061)	(0.038)	(0.048)	(0.069)
NDF Spread	97.307*			86.229
	(50.847)			(52.939)
NDF Spread×MPU	-22.898**			-20.182*
	(11.131)			(11.627)
Quarter		0.093		0.140
		(0.315)		(0.310)
Quarter×MPU		-0.035		-0.044
		(0.066)		(0.065)
GFC			0.876***	0.663**
			(0.313)	(0.321)
GFC*MPU			-0.178***	-0.130*
			(0.066)	(0.068)
Obs.	251	251	251	251
Adj. R^2	0.753	0.751	0.754	0.761


Marginal effect of U.S. MPU and NDF market liquidity
panel (a)
-.01
0
.01
.02
.03
.5
0
-.5
-1
Marginal effects of MPU
panel (b)
4
4.5
5
5.5
6
20
0
-20
-40
-60
-80
Marginal effects of NDF Spread
Marginal effect of U.S. MPU and quarterly bank regulation effect
panel (c)
0
.2
.4
.6
.8
1
0
-.05
-.1
-.15
-.2
Marginal effects of MPU
panel (d)
4
4.5
5
5.5
6
.1
0
-.1
-.2
-.3
Marginal effects of Quarter

Concluding remarks

- U.S. MPU creates spillover effect on deviations from RMB CIP.
- Some evidence that capital controls, RMB exchange rate regime, and international reserves that constrain the spillover channel of MPU alter the effect of MPU on RMB deviation from CIP.
- It is capital controls play prominent role to mitigate MPU spillover [Rey (2015) the “dilemma” paradigm].
- a trade-off between capital controls serve as a Tobin tax that creates CIP deviations and mitigate external shocks to reduce deviations from CIP.