厦门大学
Xiamen University
王亚南经济研究院
Wang Yanan Institute for Studies in Economics

Is RMB increasingly important? A Network Approach

Yiming Wang and Yinggang Zhou*

(Xiamen University)

Outline

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- Contributions
- Data
- Methodology
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- Conclusions
- Future research

Motivation

The battle of midpoint

When the PBoC initiates market reform of its currency in August 2015, the RMB's midpoint immediately fell by 1.9%, the biggest single-day drop in the RMB's modern history, and global currency market has braced for renminbi weakness since then.

RMB joins SDR

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- Is SDR entry akin to China joining WTO?
- Will this be a blessing for China?
- Is RMB increasingly important and if so, in what sense? (our research question)

	Pre-Inclusion Weights (2010)	Original IMF Formula (2015)	New IMF Formula (2015)
U.S. Dollar	41.9	38.7	41.7
Euro	37.4	31.7	30.9
Pound	11.3	7.6	8.1
Yen	9.4	7.8	8.3
Renminbi	-	14.2	10.9

Contributions

- Use daily exchange rates (FX) to identify network structure of FX spillovers
- Develop a new set of RMB important indices to see spillover from RMB to other currencies
- Yes, RMB is increasingly important in the sense that its spillover effects have intensified in recent years

Literature

- International spillover effects
  - Engle, Ito, and Lin (1990),
  - Hamao, Masulis, and Ng (1990)
  - King, Sentana, and Wadhwani (1994)
  - Fleming, Kirby, and Ostdiek (1998)
  - Diebold and Yilmaz (2009)
  - Yang and Zhou (2013)
- Network structure across international markets
  - Diebold and Yilmaz (2014)
  - Yang and Zhou (2016)

Data

- Daily FX of 18 currencies from Bloomberg.
  - Three RMB exchange rates
    - onshore Chinese Yuan (CNY)
    - Midpoint (CNYMUSD)
    - offshore RMB in Hong Kong (CNH).
  - Seven major developed market currencies.
  - Eight major Asian currencies.
- Our sample starts on August 23, 2010, and ends on September 15, 2015
  - CNH data is only available from August 23, 2010
  - We are updating data to include recent developments

Summary Statistics of FX change

	Nobs	Mean	Std	Skew	Kurt	Min	Max
CNY	1320	-0.005	0.091	3.720	53.719	-0.432	1.398
CNYMUSD	1320	-0.005	0.088	9.319	163.213	-0.268	1.723
CNH	1320	-0.004	0.126	3.418	41.242	-0.531	1.735
DXY	1320	0.010	0.328	0.128	1.056	-1.399	1.440
JPY	1320	0.027	0.407	0.250	2.900	-2.064	2.377
EUR	1320	0.008	0.419	0.158	1.447	-1.649	1.780
GBP	1320	0.000	0.322	0.121	0.419	-1.106	1.303
CHF	1320	-0.005	0.613	-4.411	81.203	-9.760	4.475
CAD	1320	0.017	0.335	0.268	1.672	-1.285	1.767
AUD	1320	0.017	0.480	0.128	1.083	-1.873	2.668
HKD	1320	0.000	0.020	-0.563	10.677	-0.177	0.112
INR	1320	0.027	0.376	0.606	8.032	-2.320	3.395
KRW	1320	0.000	0.337	0.342	1.000	-1.232	1.628
MYR	1320	0.024	0.309	0.032	1.842	-1.574	1.378
PHP	1320	0.002	0.222	0.229	1.120	-0.742	0.998
GSD	1320	0.002	0.251	0.467	3.436	-1.142	1.720
THB	1320	0.010	0.213	0.017	1.364	-1.051	0.780
IDR	1320	0.036	0.350	0.421	8.424	-2.070	2.683

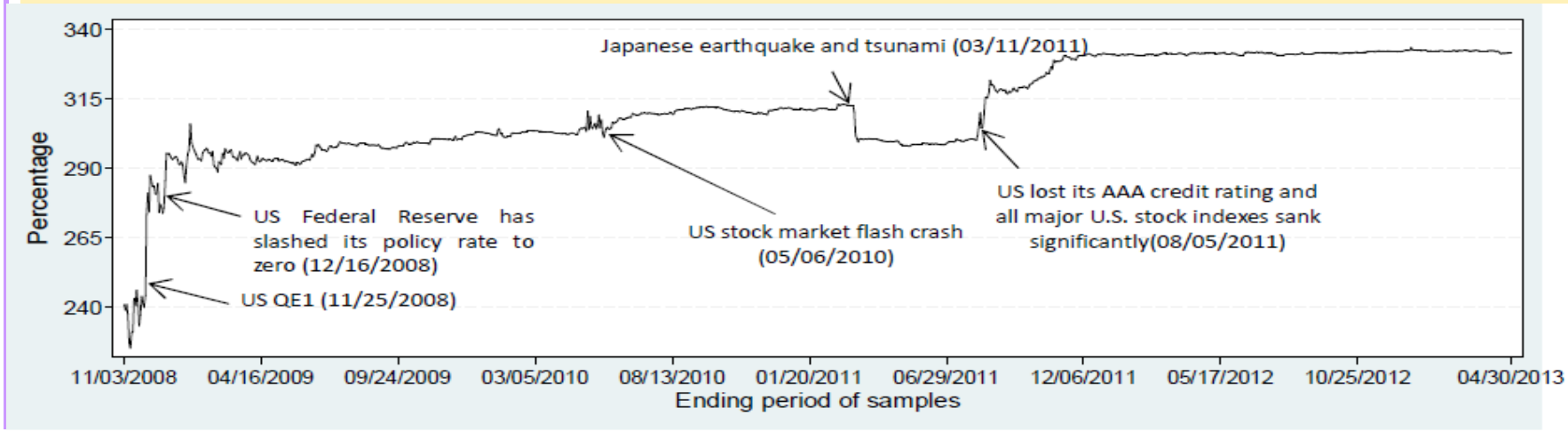
Methodology

- Construct FX spillover network based on forecast error variance decompositions of generalized VAR (Diebold and Yilmaz, 2014)
  - measure the direction and intensity of FX spillover from one market to others
  - percentage of variation of one or more FX change series explained by innovations in another FX change series

	ΔR_1	ΔR_2	…	ΔR_N	From
ΔR_1	$S^H_{1\leftarrow 1}$	$S^H_{1\leftarrow 2}$	…	$S^H_{1\leftarrow N}$	$\sum_j S^H_{1\leftarrow j}$, $j\neq 1$
ΔR_2	$S^H_{2\leftarrow 1}$	$S^H_{2\leftarrow 2}$	…	$S^H_{2\leftarrow N}$	$\sum_j S^H_{2\leftarrow j}$, $j\neq 2$
…	…	…	…	…	…
ΔR_N	$S^H_{N\leftarrow 1}$	$S^H_{N\leftarrow 2}$	…	$S^H_{N\leftarrow N}$	$\sum_j S^H_{N\leftarrow j}$, $j\neq N$
TO	$\sum_i S^H_{i\leftarrow 1}$, $i\neq 1$	$\sum_i S^H_{i\leftarrow 2}$, $i\neq 2$	…	$\sum_i S^H_{i\leftarrow N}$, $i\neq N$	$\sum_i \sum_j S^H_{i\leftarrow j}$, $i\neq j$
NET	$\sum_i S^H_{i\leftarrow 1}$ - $\sum_j S^H_{1\leftarrow j}$	$\sum_i S^H_{i\leftarrow 2}$ - $\sum_j S^H_{2\leftarrow j}$	…	$\sum_i S^H_{i\leftarrow N}$ - $\sum_j S^H_{N\leftarrow j}$	

Methodology (continued)

- The dynamics of FX spillovers is based on recursive variance decompositions
  - Recursive estimation uses the full sample information and is not sensitive to the rolling window length (Diebold and Yilmaz,2009, 2014)
  - Yang and Zhou (2016) use recursive estimation to show stock volatility spillover from US to others as follows



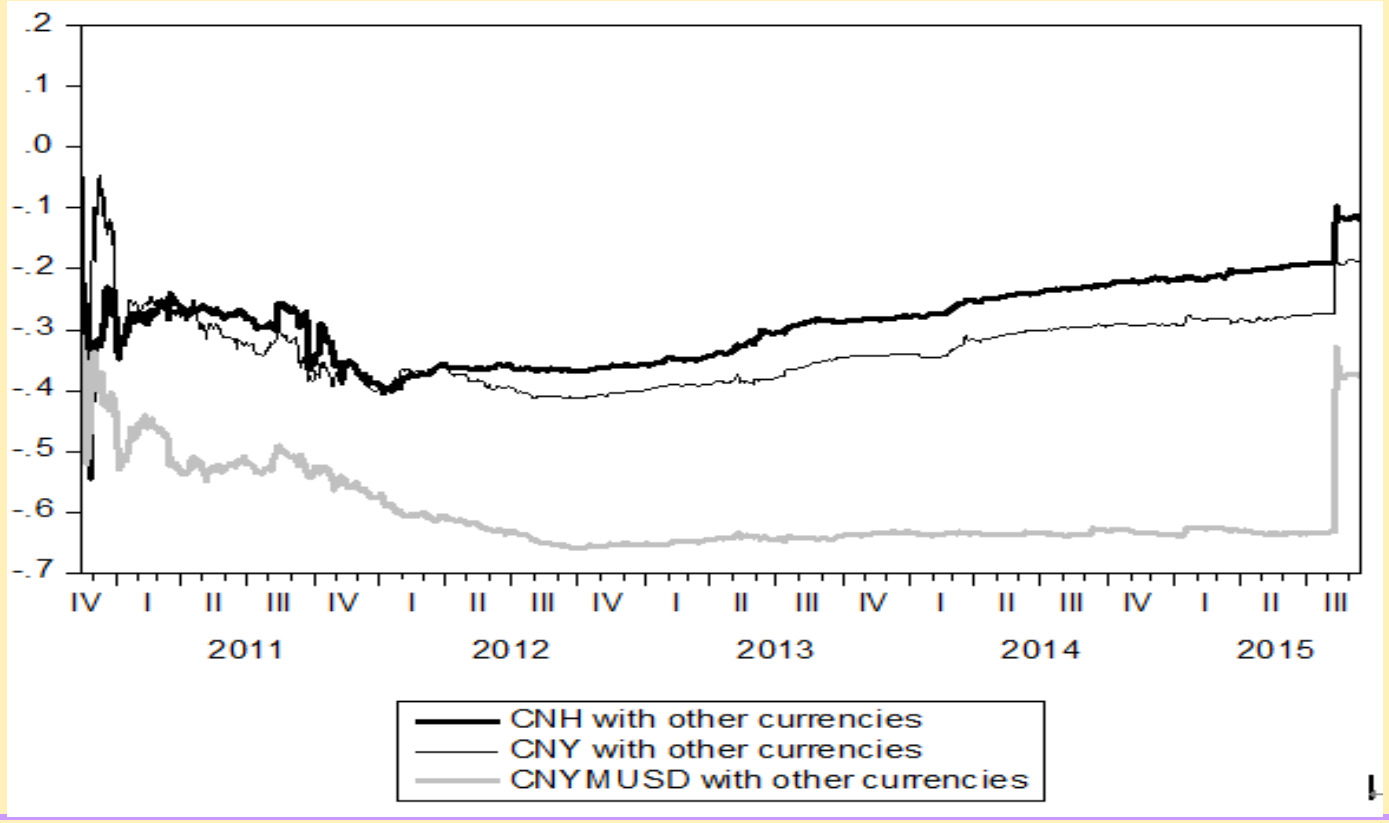
Result on Network Structure

- RMB is NOT at the center of global FX spillover network yet

	CNY	CNYMUSD	CNH	DXY	JPY	EUR	GBP	CHF	CAD	AUD	HKD
CNY	0	0.143	0.198	0.026	0.008	0.023	0.008	0.005	0.015	0.027	0.024
CNYMUSD	0.143	0	0.119	0.057	0.019	0.050	0.025	0.020	0.024	0.043	0.020
CNH	0.168	0.078	0	0.029	0.005	0.023	0.017	0.002	0.027	0.048	0.030
DXY	0.002	0.002	0.012	0	0.040	0.214	0.109	0.063	0.076	0.081	0.011
JPY	0.001	0.001	0.003	0.101	0	0.039	0.026	0.054	0.011	0.025	0.009
EUR	0.002	0.003	0.010	0.242	0.018	0	0.098	0.060	0.065	0.073	0.010
GBP	0.001	0.002	0.012	0.155	0.017	0.125	0	0.036	0.073	0.081	0.008
CHF	0.001	0.001	0.004	0.135	0.046	0.117	0.058	0	0.024	0.039	0.005
CAD	0.002	0.000	0.013	0.098	0.005	0.077	0.067	0.013	0	0.149	0.013
AUD	0.002	0.001	0.019	0.086	0.012	0.070	0.063	0.020	0.127	0	0.023
HKD	0.010	0.006	0.021	0.045	0.002	0.040	0.020	0.007	0.049	0.091	0
INR	0.008	0.003	0.023	0.029	0.001	0.025	0.025	0.012	0.033	0.066	0.017
KRW	0.008	0.005	0.023	0.066	0.015	0.051	0.042	0.017	0.076	0.095	0.031
MYR	0.017	0.008	0.031	0.051	0.006	0.038	0.042	0.014	0.066	0.095	0.013
PHP	0.009	0.003	0.021	0.041	0.008	0.033	0.032	0.010	0.040	0.070	0.020
SGD	0.006	0.003	0.023	0.102	0.024	0.087	0.069	0.032	0.090	0.127	0.021
THB	0.007	0.005	0.022	0.061	0.014	0.048	0.036	0.022	0.050	0.080	0.018
IDR	0.010	0.003	0.017	0.023	0.002	0.017	0.015	0.006	0.029	0.047	0.011
TO	**0.397**	**0.267**	**0.571**	**1.347**	**0.243**	**1.075**	**0.752**	**0.393**	**0.877**	**1.237**	**0.284**
NET	**-0.218**	**-0.417**	**-0.047**	**0.578**	**-0.101**	**0.347**	**0.074**	**-0.141**	**0.199**	**0.518**	**-0.220**
Degree centrality	**0.023**	**0.016**	**0.034**	**0.079**	**0.014**	**0.063**	**0.044**	**0.023**	**0.052**	**0.073**	**0.017**

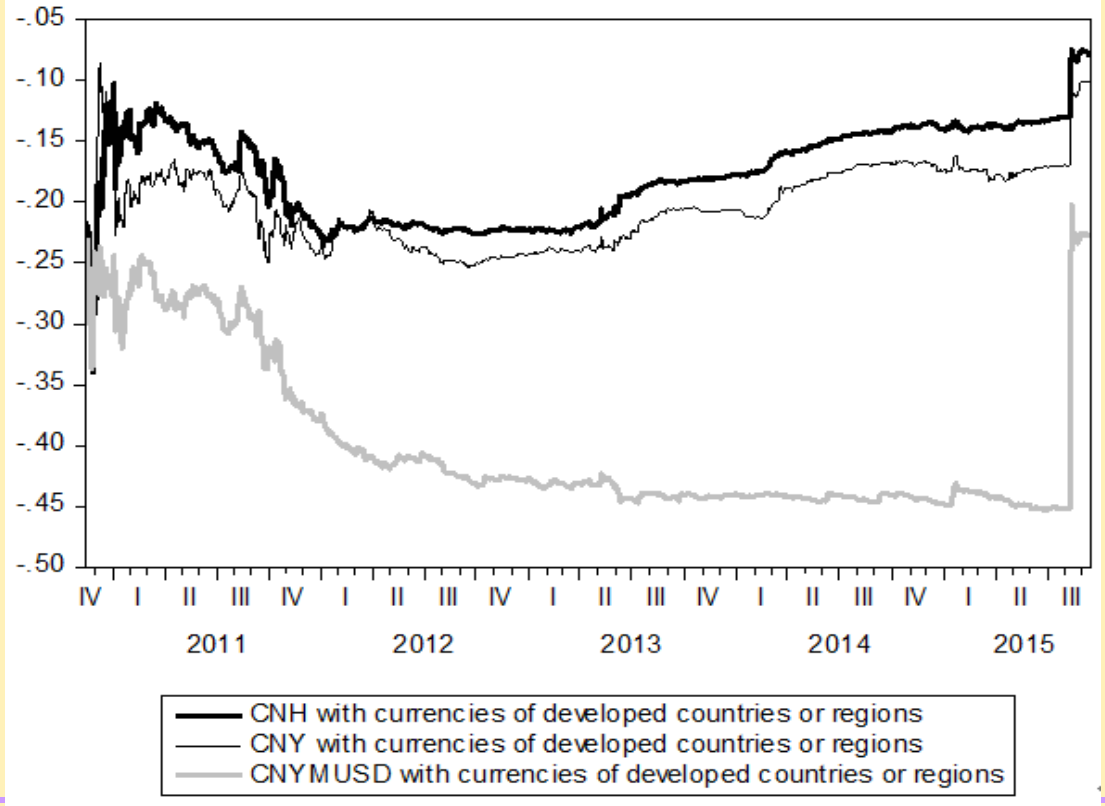
Result 1 on RMB spillover effects

- Aggregate NET RMB spillover indices with all other currencies



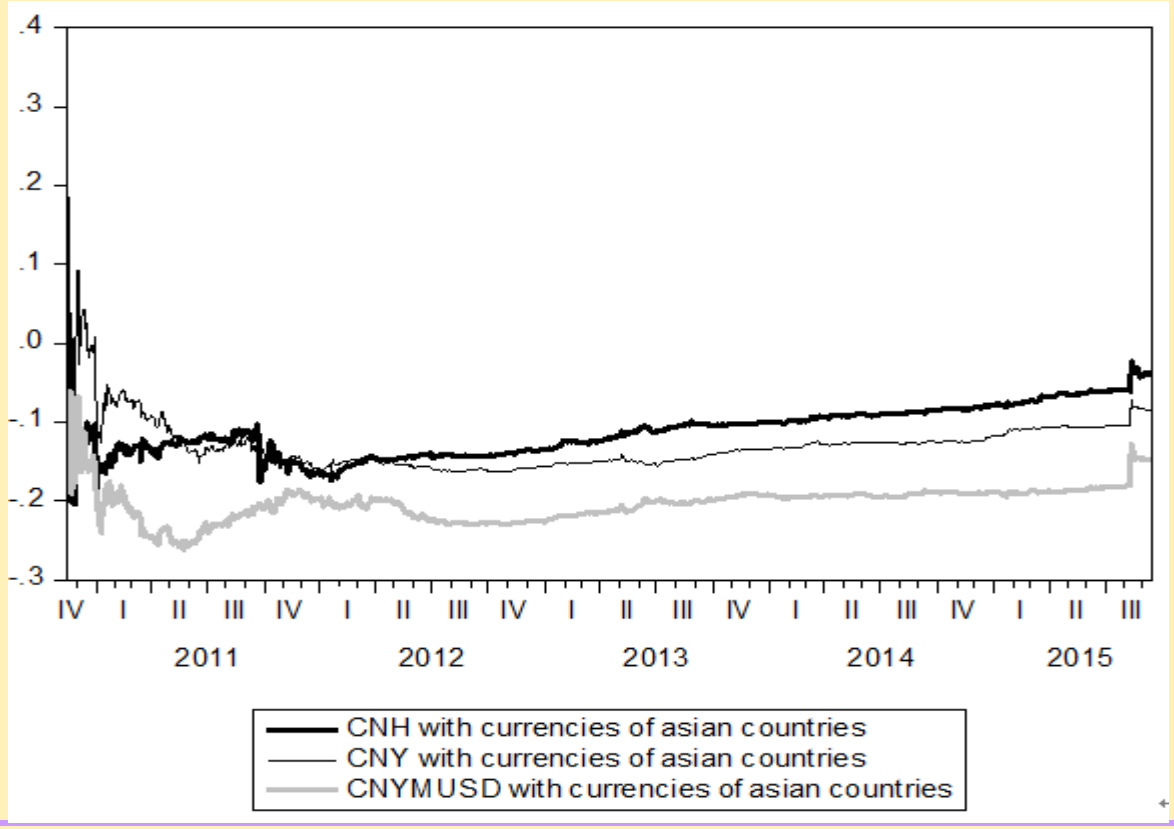
Result 2 on RMB spillover effects

- Aggregate NET RMB spillover indices with developed market currencies



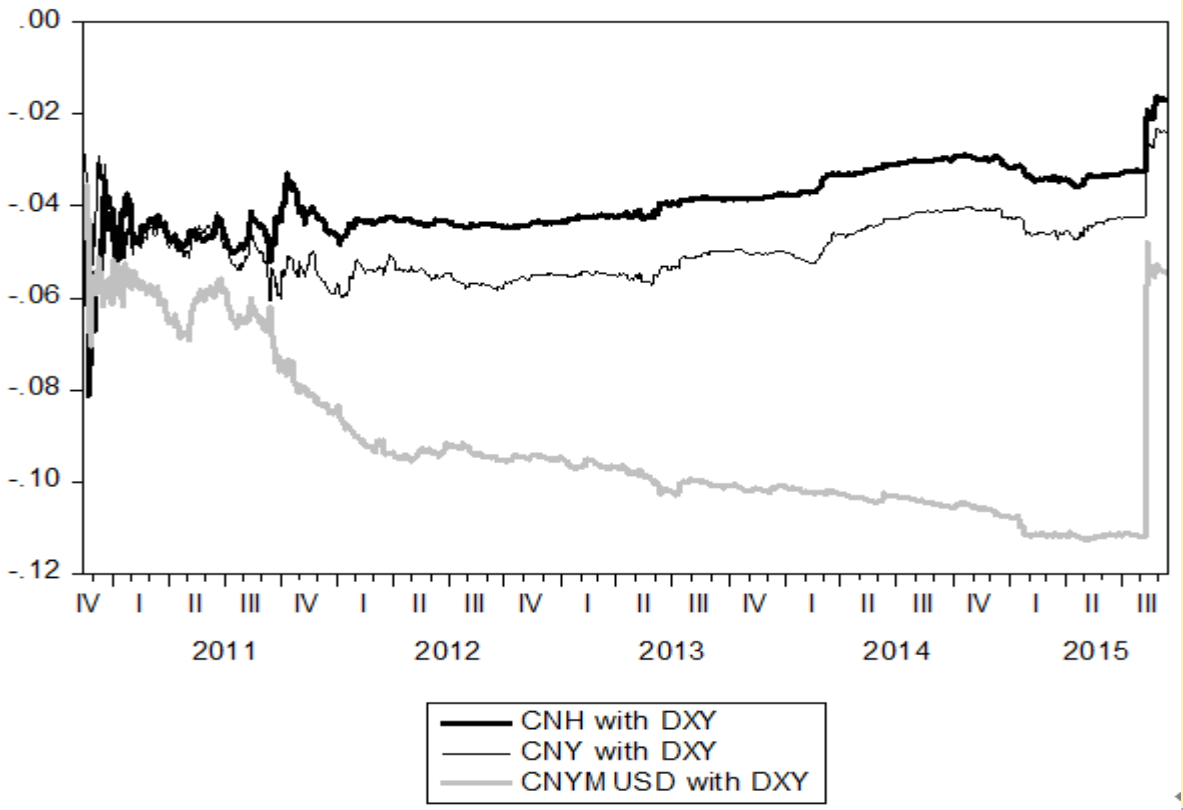
Result 3 on RMB spillover effects

- Aggregate NET RMB spillover indices with Asian market currencies



Result 4 on RMB spillover effects

- NET RMB spillover indices with the DXY (US Dollar index)



Conclusions

- RMB is NOT at the center of spillover network of global currency system yet
- RMB spillover effects have intensified during our sample period of greater exchange rate flexibility and RMB internationalization.
  - Highlight that RMB is increasingly important as China initiates market reforms of its currency
- CNH spillover effect appears to be much stronger than mid-price and CNY counterparts
  - offshore markets for a currency provide an important dimension when measuring the regional and global influence of that currency
  - But, who controls pricing power of offshore markets?

Future research

- Is RMB at the center of spillover network of Asian currencies?
  - estimate VAR-based network using Asian FX data separately
- Is RMB increasingly important in other emerging markets?
  - include more currencies such as latin American countries
- Is RMB still important in the recent FX market turmoil?
  - update the data to include the most recent period
- Why is RMB increasingly important?

Thank you