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Currency co-movements in Asia-Pacific: the regional role of the renminbi

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Key questions

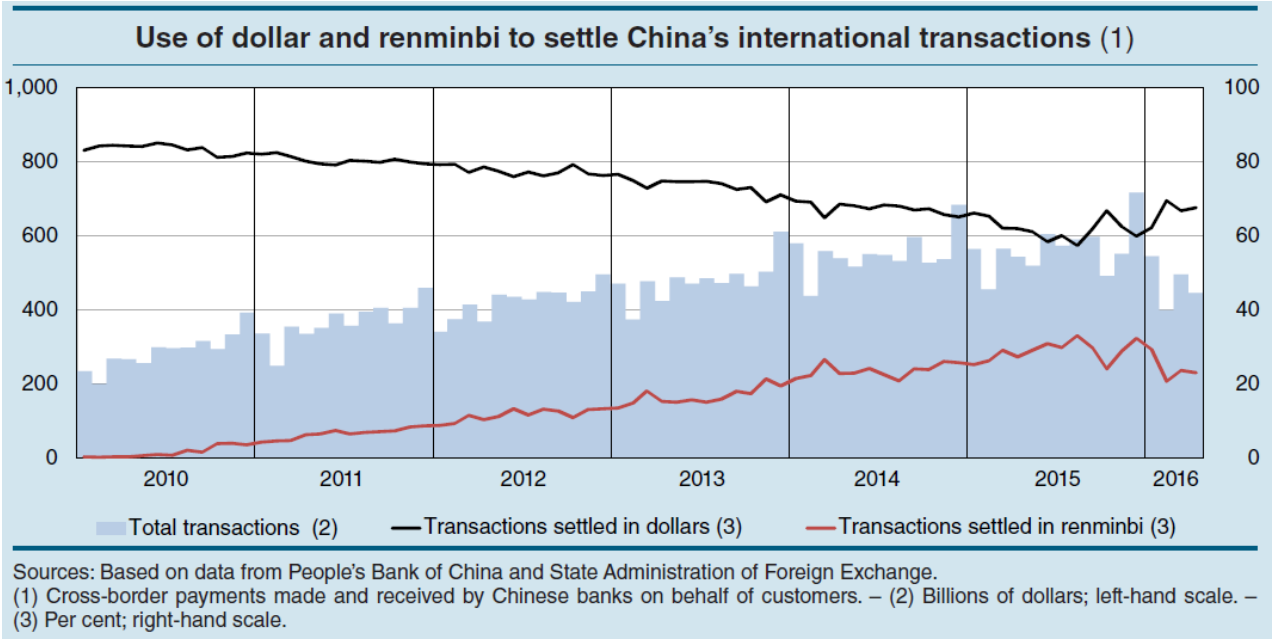
- Does the RMB affect currency movements in Asia-Pacific?
- Has the effect changed over time?

Motivation: Changing exchange rate regimes

- The USD has long been the key reference currency for many AP currencies (dollar -denominated assets and liabilities; trade invoicing).
- Since the AFC, ER arrangements within the region have been changing: from hard peg to crawl-like arrangements, from managed arrangement to free floating ones. China' ER regime too has been reformed gradually in the last decade (from a hard peg to the dollar into a more flexible crawl-like arrangement)
- Since 2009 China has been promoting the international use of its currency. In 2010 the offshore RMB market was launched in Hong Kong leading to the formation of a quasi-«free-floating» offshore exchange rate (CNH)

Motivation: Increasing cross-border use of RMB

- The cross-border use of the RMB has been increasing mainly at the expense of the USD.



Sources: Based on data from People's Bank of China and State Administration of Foreign Exchange.
(1) Cross-border payments made and received by Chinese banks on behalf of customers. – (2) Billions of dollars; left-hand scale. – (3) Per cent; right-hand scale.

- The Asia-Pacific region today accounts for about 80% of cross-border RMB settlements; 31% of payments in Asia-Pacific with China and Hong Kong are now made in RMB, up from 7% in April 2012 (SWIFT).

- Given the pivotal role of China in regional integration, there might be an incentive to stabilize regional partner's local currency against the RMB.

Assessing the influence of the RMB

- Increasing body of literature looking at the role of the RMB in the regional exchange rate configuration.
- Focus on determining the weight of the RMB in currency baskets

$$\Delta \log\left(\frac{E_i}{CHF}\right) = \alpha_i + \beta_1 \Delta \log\left(\frac{USD}{CHF}\right) + \beta_2 \Delta \log\left(\frac{EUR}{CHF}\right) + \beta_3 \Delta \log\left(\frac{JPY}{CHF}\right) + \beta_4 \Delta \log\left(\frac{GBP}{CHF}\right) + \beta_4 \Delta \log\left(\frac{RMB}{CHF}\right) + \epsilon_{it}$$

- Henning (2012); Subramanian and Kessler (2013); Eichengreen and Lombardi (2015) => find evidence of RMB block in Asia

Multicollinearity problems

- Identification challenge: given the central role of the USD dollar in the international monetary system and the weight of USD in RMB ER basket: serious problem of **multicollinearity**

$$\Delta \log\left(\frac{E_i}{CHF}\right) = \alpha_i + \beta_1 \Delta \log\left(\frac{USD}{CHF}\right) + \beta_2 \Delta \log\left(\frac{EUR}{CHF}\right) + \beta_3 \Delta \log\left(\frac{JPY}{CHF}\right) + \beta_4 \Delta \log\left(\frac{GBP}{CHF}\right) + \beta_4 \Delta \log\left(\frac{RMB}{CHF}\right) + \epsilon_{it}$$

- Proposed solutions: ortogonalize endogenous factors with respect to the USD factor (exogenous) [Fratzcher and Mehel (2011, 2013) and Kawai and Pontines (2014/15)] or take the USD as numeraire (Shu et al, 2014).

- Also need to control for other regional or global factors affecting ER movements

Related literature: findings

- Increasing role of RMB in explaining ER movements in Asia
- Effect larger after GFC
- However, magnitude very different across studies

Proposed strategy

- Merge Fratzcher and Mehl (2013), Verdelhan (2015), Shu et al. (2014)
- Take the US dollar as *numeraire*
- Include a global dollar index, to control for USD movements against major currencies (Verdelhan, 2015)
- Include regional dollar index, to control for USD movements against regional currencies (increasing integration)
- Include other global variables (commodity prices, sovereign spreads, risk aversion)
- Panel and country-by-country regressions
- Robustness checks

Specification

$$\Delta \log\left(\frac{E_{it}}{USD_t}\right) = \alpha_i + \beta_{GD}\Delta \log(GD_t) + \beta_{REG}\Delta \log(REG_{it}) + \beta_{RMB}\Delta \log\left(\frac{RMB_t}{USD_t}\right) + \boldsymbol{\gamma' X} + \delta_1 \Delta REPO_t + \epsilon_{it}$$

The dependent variable is the two-day (non-overlapping) return for the nominal (spot) exchange rate expressed in units of the *i-th* national currency per USD

i= Australia, Hong Kong, India, Indonesia, South Korea, Malaysia, New Zeland, Philippines, Singapore, Thailand, Taiwan

$$GD_t = \sum_c e_{ct} * w_c^{US} \;\; ; \;\; \sum_c w_c^{US} = 1$$

Trade-weighted US$ NEER w.r.t. *c*= Canadian $; Euro; JPY; Swedish Krona; Swiss Franc; UK Pound.

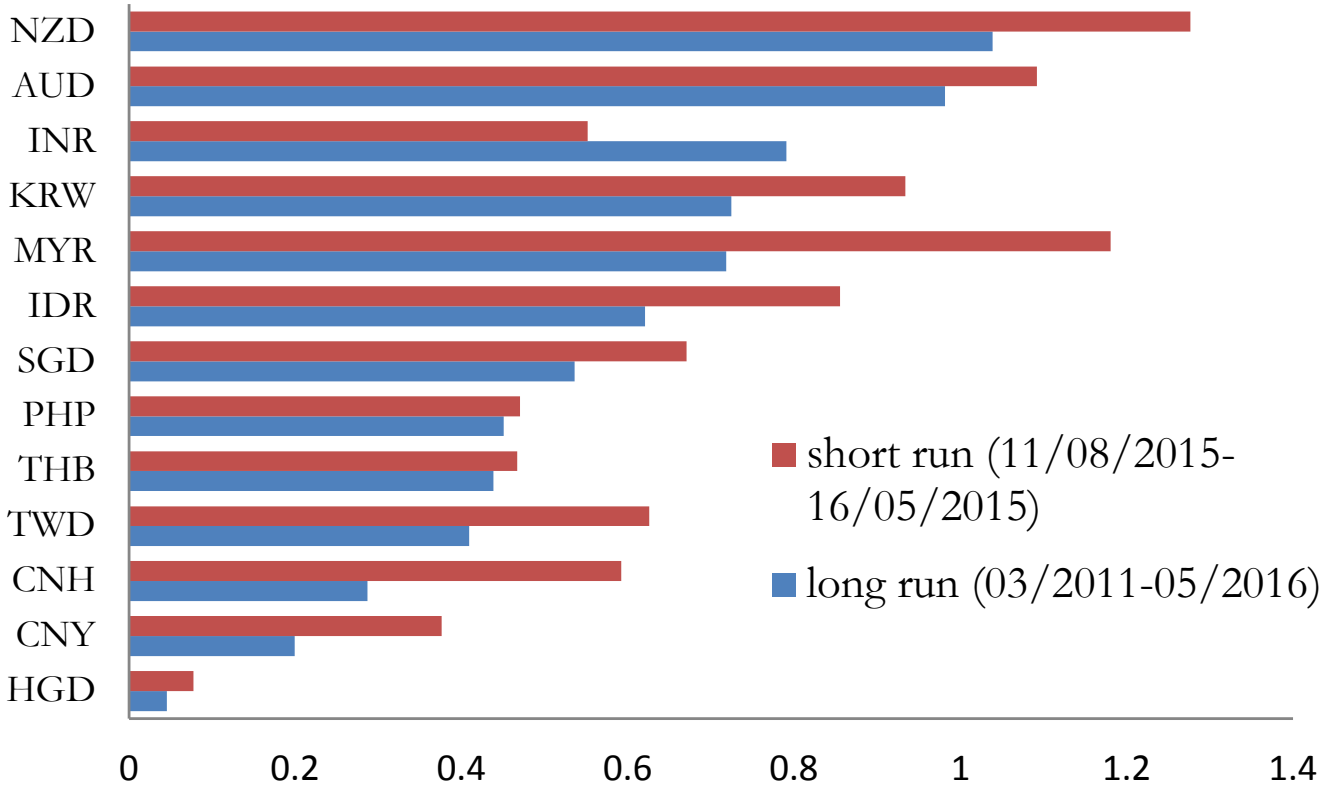
$$Reg_{it} = \sum_{s \neq i} e_{st} * w_s^i \;\; ; \; i \in AP; s \in AP \; ; \; \sum_{s \neq i} w_s^i = 1$$

Trade-weighted US$ NEER w.r.t. AP currencies excluding currency *i* itself

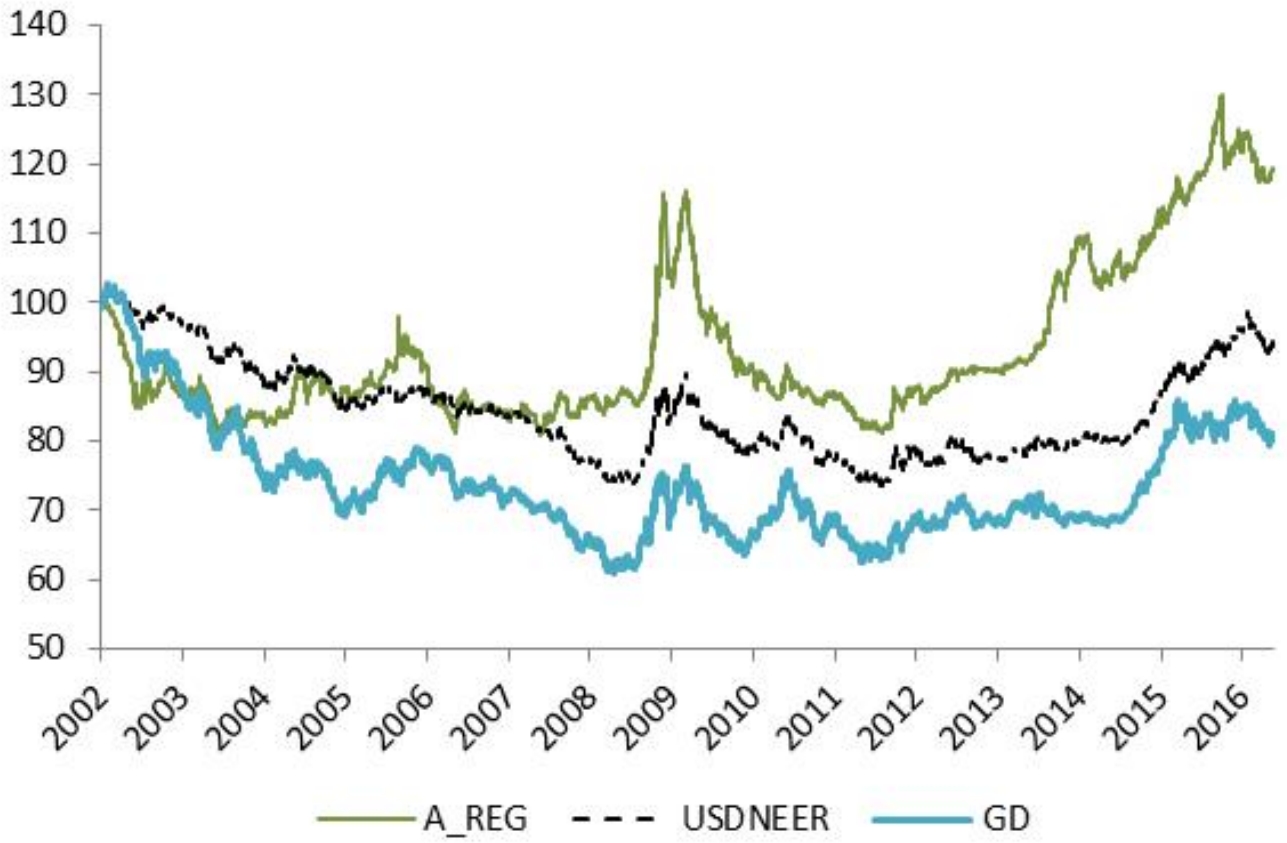
X=[GSCI,VIX,SOVX].

Exchange rate volatility vis-à-vis the USD in AP has increased

Average standard deviation of daily exchange rate changes against the USD (%)



The regional dollar index and the global dollar index show distinct trends



Source: Thomson Reuters Datastream and author's calculations.

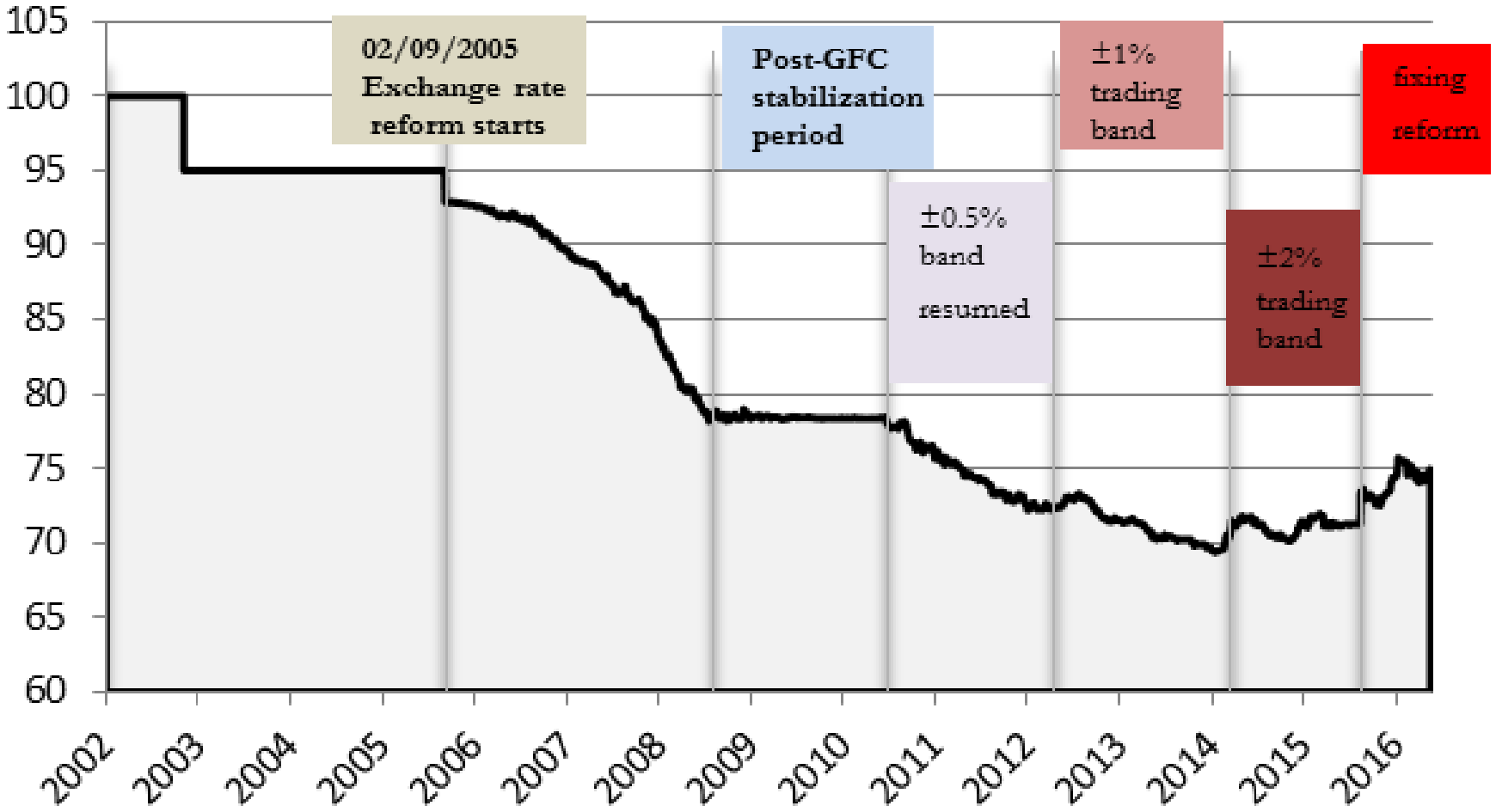
Note: An increase indicates a dollar effective appreciation against the group of currencies considered. A_REG is the average of country-specific REG_{it} computed in (3); GD is the USD index against 6 major currencies; USDNEER is the daily USD effective exchange rate index.

Basic panel regressions comparing different estimators

	OLS	FE	PCSE	FE_ORTH
	(1)	(2)	(3)	(4)
GD	0.27***	0.27***	0.27***	0.27**
REG	0.20***	0.20***	0.20***	0.20***
RMB	0.17***	0.17***	0.17***	0.17**
SOVX	0.01***	0.01***	0.01***	0.01***
GSCI	-0.02***	-0.02***	-0.02***	-0.02*
VIX	0.01***	0.01***	0.01***	0.01**
REPO	0	0	0	0
N	20614	20614	20614	20614
r2	0.23	0.23	0.23	0.23

*Note: *p<0.05; ** p<0.01; *** p<0.001. FE= fixed effect, with robust standard errors; PCSE= panel-corrected standard error model. ORTH = orthogonalized variables. Variable ordering for orthogonalization: GD, VIX, SOVX, GSCI, REG, RMB, REPO.*

RMB/USD daily exchange rate (Jan. 2002=100)



Specification matters in assessing RMB influence

$\widehat{\beta}_{RMB}$ from alternative specifications and on different sub-periods			
Period	EUR and YEN	GD	GD and REG
All sample	0.23***	0.24***	0.17***
Pre-sept.2005	0.0	-0.01	-0.01
Post-Sep.2005	0.34***	0.35***	0.25***
Early-reform period	0.27***	0.30***	0.23***
Post-GFC stabilization period	-0.32	-0.04	-0.15
0.5%-band period	0.31***	0.33***	0.25***
1%-band period	0.36***	0.36***	0.28**
2%-band period	0.14*	0.18**	0.05
Post- fixing reform period	0.38***	0.39***	0.28***

$$\Delta \log\left(\frac{E_{it}}{USD_t}\right) = \alpha_i + \beta_{GD}\Delta \log(GD_t) + \beta_{REG}\Delta \log(REG_{it}) + \beta_{RMB}\Delta \log\left(\frac{RMB_t}{USD_t}\right) + \gamma' Z + \varepsilon_{it}$$

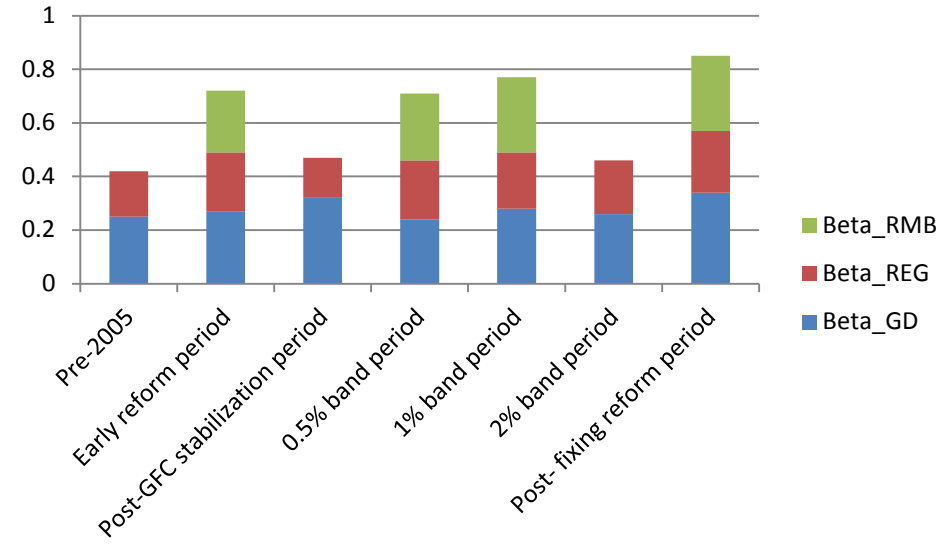
Excluding AUD, NZD and HGD

Table 6. Fixed-effect panel regressions with global, regional and RMB factor; excl. AUD, NZD and HGD

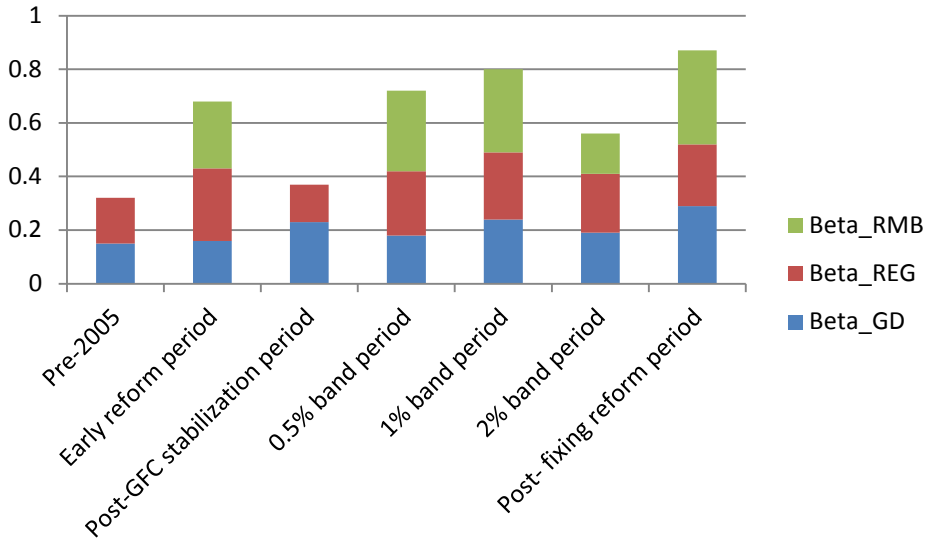
	All sample	Pre-reform	Early reform	Post-GFC stabilization	0.5% band	1% band	2% band	Post-fixing reform
GD	0.19***	0.15***	0.16***	0.23***	0.18***	0.24***	0.19***	0.29***
REG	0.21***	0.17***	0.27***	0.14***	0.24***	0.25***	0.22***	0.23***
RMB	0.22***	-0.02	0.25***	0.25	0.30***	0.31**	0.15*	0.35***
SOVX	0.01***	0.00*	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
GSCI	-0.01***	0.01	0.01	0	-0.03***	-0.02	-0.01	0
VIX	0.01***	0	0	0.01***	0.00**	0	0.00**	0.01***
REPO	0	-0.12	-0.01	0.08	-0.03	0.06**	0	0.12
N	14992	3824	3040	1960	1896	2000	1464	800
r2	0.21	0.15	0.15	0.25	0.36	0.2	0.21	0.41

Summary of panel regression results

Estimated betas from FE panel regressions including all countries



Estimated betas from FE panel regressions excluding AUD, NWD and HGD



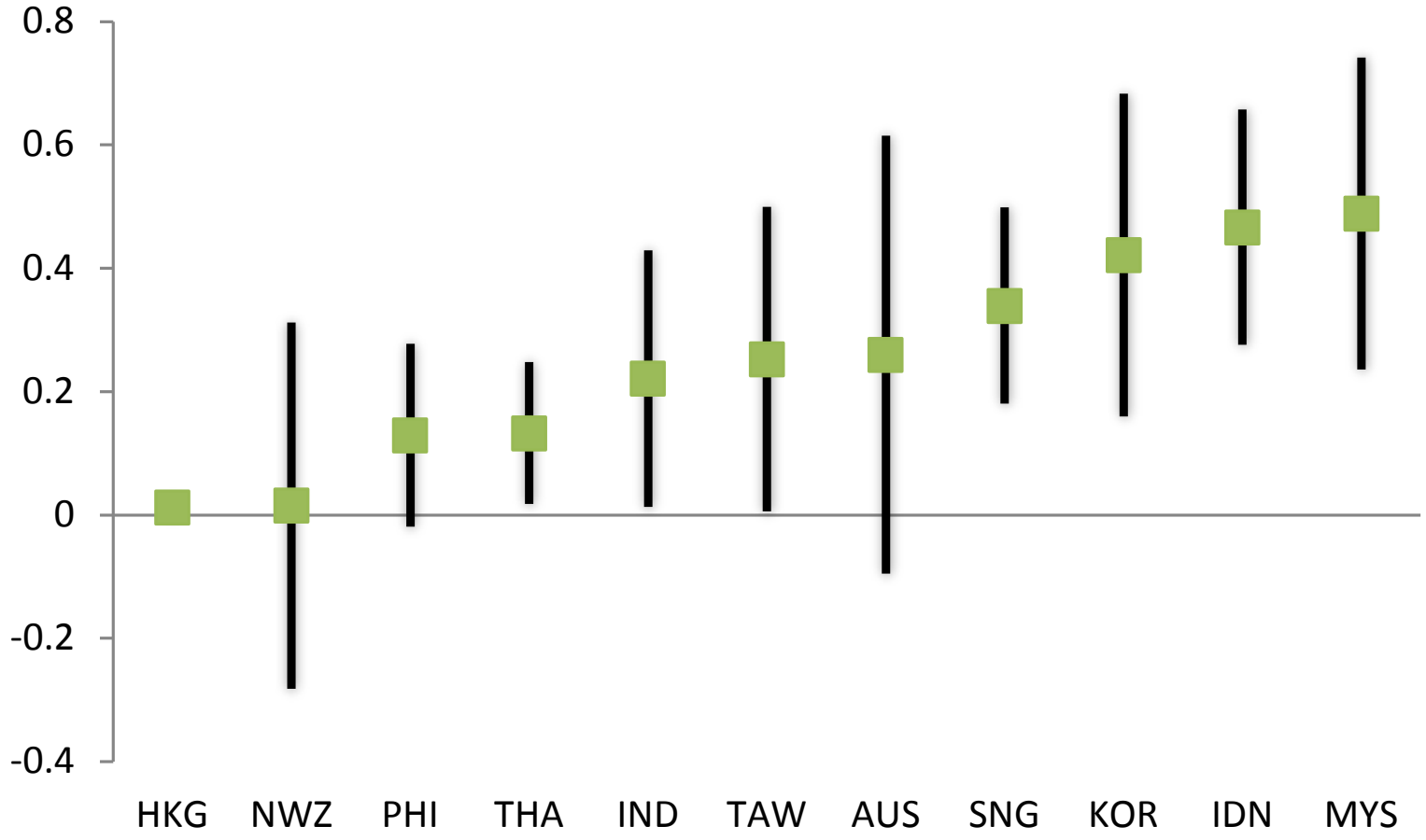
The RMB influence changes depending on global trends of USD

Table 7. Fixed effects panel regressions based on USD phases of appreciation/depreciation			
Variable	**USD depreciation**	**USD appreciation**	**USD stability**
GD	0.24***	0.31***	0.26***
REG	0.25***	0.17***	0.21***
RMB	0.27***	0.09	0.30***
SOVX	0.01***	0.00***	0.01***
GSCI	0.0	-0.03***	-0.02***
VIX	0.01***	0.01***	0.01***
REPO	-0.02	0.01	0.01
N	4323	4070	6930
r2	0.20	0.25	0.28

*Note: * p<0.05; ** p<0.01; *** p<0.001. Robust standard error. The depreciation period includes: 10/03/2006-18/04/2008; 10/03/2009-25/11/2009; 09/06/2010-29/04/2011. The appreciation period includes: 19/04/2008-09/03/2009; 26/11/2009-08/06/2010; 01/07/2014-16/03/2015. The stability period includes: 05/09/2005-09/03/2006; 30/03/2011-30/06/2014; 17/03/2015-16/05/2016.*

The RMB influence differs across crountry

$\widehat{\beta}_{RMB}$ from rolling-window regressions
(period Feb. '14 - May '16)



CNY and CNH exert the same influence

Table 9. Fixed-effect panel regressions onshore (CNY) vs offshore (CNH) RMB				
	Onshore RMB (CNY)	Offshore RMB (CNH)	Onshore RMB Excluding AUD, NWD and HGD (CNY)	Offshore RMB Excluding AUS, NWZ and HKG (CNH)
GD	0.26**	0.26**	0.19*	0.20*
REG	0.20**	0.22***	0.23**	0.24**
CNY	0.27***		0.32***	
CNH		0.27***		0.32**
SOVX	0.01***	0.01***	0.01**	0.01**
GSCI	-0.03*	-0.03*	-0.02	-0.02
VIX	0.01*	0.01*	0.00*	0.00*
REPO	0.02	0.02	0.02	0.02
N	7480	7491	5440	5448
r2	0.28	0.27	0.29	0.28

Reverse causality appear mild

Table 10. OLS regressions for RMB/USD exchange rate

$$\Delta \log\left(\frac{RMB}{USD_t}\right) = \alpha_i + \beta_{GD}\Delta \log(GD_t) + \beta_{REG}\Delta \log(REG_{RMBt}) + \gamma_1 \Delta \log(GSCI_t) + \gamma_2 \Delta SOVX_t + \gamma_3 \Delta VIX_t + \delta_1 \Delta REPO_t + \epsilon_{it}$$

	Full sample period 05/09/2005-16/03/2016	Post GFC-stabilization period 21/06/2010-16/05/2016
GD	0.02*	0.01
REG	0.04***	0.10***
SOVX	0.0	0.0
GSCI	-0.01**	-0.02**
VIX	0.0	0.0
REPO	0.01	0.01
N	1396	770
r2	0.05	0.09

Average RMB influence confirmed at lower frequencies

Table 11. Fixed-effect panel regressions on monthly data			
Variable	I	II	III
GD	0.35**	0.29**	0.23**
REG	0.21***	0.21***	0.17
RMB	0.22**	0.28**	0.37**
SOVX	0.01**	0.01*	0.02**
GSCI	0	0.02	0.03
VIX	0.01*	0.01	0.0
REPO	-0.01	0.03	0.13
N	1419	1032	568
r2	0.41	0.41	0.41

The first regression is based on the full sample, starting from September 2005; the second regression excludes the AUD, the NZD and HGD; the third is based on observations from June 2010 to May 2016 (excluding AUD, NZD and HGD).

Concluding remarks

- Overall the RMB factor shows a growing influence on Asian currencies: since 2005 the RMB influence has turned significant and positive, indicating that Asian currencies tend to co-move with the RMB.
- The degree of correlation with the RMB varies considerably across currencies. Correlation is zero throughout the period for the Australian and New Zealand dollars. While, the Indonesian rupiah, the Korean Won, the Malaysian ringgit, the Singaporean dollar and the Taiwanese dollar show a very strong correlation with the RMB
- Correlations are asymmetric, depending on US dollar appreciation/depreciation phases: When the US$ tends to appreciate globally, AP exchange rates tend to follow the global depreciation trend against the US dollar more closely; in these instances the RMB plays little or no role. It seems that AP currencies move as if driven by the aim of stabilizing the effective exchange rate, avoiding excessive appreciation against the USD

Thank you

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