People’s international movement and real exchange rate volatility

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Real exchange rate volatility

- The post-Bretton woods episode witnessed a sharp rise in real exchange rate volatility, namely, the fluctuation of price differential across countries.

- Deviation from the Purchasing Power Parity (PPP)

- Still, why RER volatility differs across country-pairs?

Why people movement matters for RER?

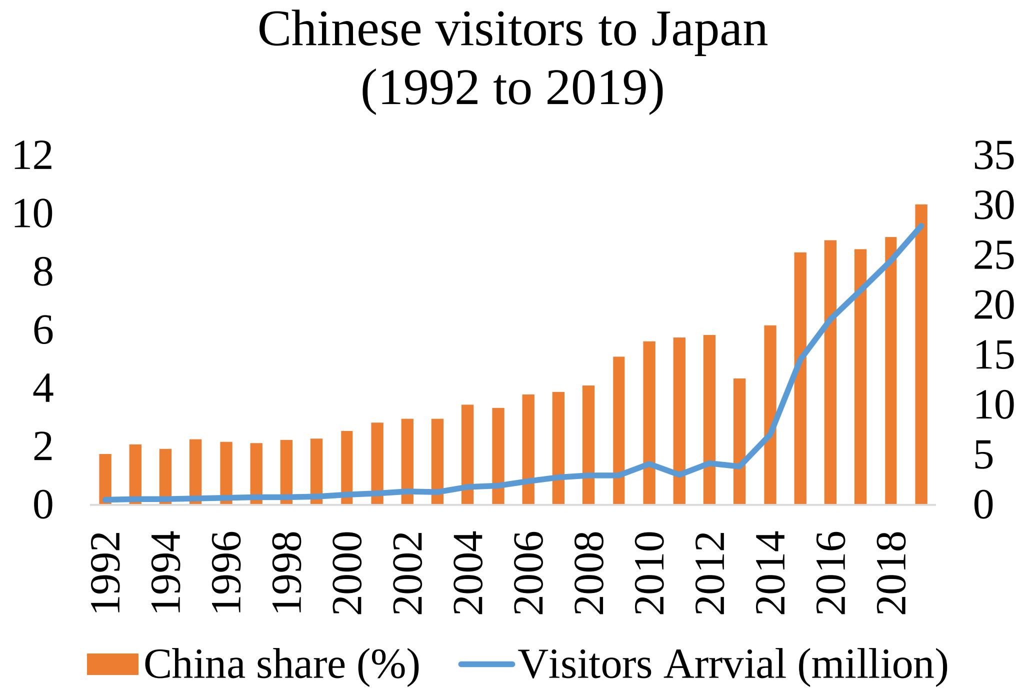
- RER volatility is a crucial phenomenon as regards international goods flow, so capital control and FX intervention are the policy instruments restricting nominal exchange rate volatility

- In terms of real factors, past studies focus on the international trade barriers or producer behavior to explain why international prices differ across countries
  - Transportation cost: Parsley and Wei (1996)
  - Border effect: Engel (1996)
  - Price to market: Knetter (1989, 1993)

- However, product pricing also depends on how consumers perceive the goods and usually incurs consumer's search cost, thereby causing variable markup related to the buyer's characteristics (Alessandria, 2009).

China-Japan bilateral travel

There has been a surge in the number Chinese visitors to Japan after 2013, while Japanese visitors to China have been relatively stable after 2001



Data Source: Japan National Tourist Organization.

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Example: China-Japan rice cookers

Source: https://kknews.cc/zh-hk/digital/pabx68.html

Why people movement matters for RER?

- What determines a consumer’s understanding (or search cost) of the products sold in the foreign countries?

- In this paper, we argue that consumer’s understanding of the internationally traded goods is associated with **the country’s people connections** with the counterparty country.

- The more people communicating across countries, the easier for them to share similar perception on the goods. As such, the real exchange rate volatility will be smaller.

A Simple Model

- Consider a two-country model, D and F.

- Normalize the global population as 1.
  - Domestic population $(0,\alpha)$
  - Foreign population $(\alpha,1)$ - α is an exogenous parameter.

- Following Alessandria (2009), consumer needs to pay search cost θ for obtaining goods, and thus the producer's markup is a decreasing function of the search cost.

- Thus, the price set by producers are as follows (this is a more general form taken from Burstein and Gopinath (2017)):
  - $P_{DD} = MC_D + \int_0^{\alpha} \mu(\theta_i)\, dG(i)$
  - $P_{DF} = MC_D + \int_{\alpha}^{1} \mu(\theta_i^*)\, G(i^*)$

A Simple Model

- Assume the consumer's search cost differs for domestically and foreign produced goods.
  - For domestic goods, the consumer search cost is $\theta_i = \theta$;
  - For foreign goods, the consumer's search cost is $\theta^* = \eta\theta$.
    - $\eta = 1$ if the consumer has been to the foreign country
    - $\eta > 1$ if the consumer has never been to the foreign country

- If there is a proportion ψ of the people having been to the foreign country, the average search cost is

$$\overline{\theta^*} = \big((1-\eta)\psi + \eta\big)\theta \equiv \Upsilon(\psi)\theta$$

A Simple Model

- For simplicity, assume the share of domestic and foreign goods is fixed as β, then the real exchange rate can be written as

$$R = \frac{P_D}{P_F} = \frac{(MC^D + \mu(\theta))^{\beta}(MC^F + \mu(\theta\Upsilon(\psi)))^{1-\beta}}{(MC^D + \mu(\theta\Upsilon(\psi)))^{\beta}(MC^F + \mu(\theta))^{1-\beta}}$$

- To investigate the effect of international people communication ψ on real exchange rate volatility, consider a shock around the no-search-cost equilibrium. After some algebra, we can show that

$$\frac{\partial Var(\hat{R})}{\partial \psi} = 2\left(\frac{1-\beta}{\overline{P_F}} - \frac{\beta}{\overline{P_D}}\right)^2 \mu'(\bar{\theta})^2(\Upsilon(\psi) - 1)\Upsilon'(\psi)Var(\hat{\theta}) < 0$$

- Thus, a higher ψ leads to lower $Var(\hat{R})$

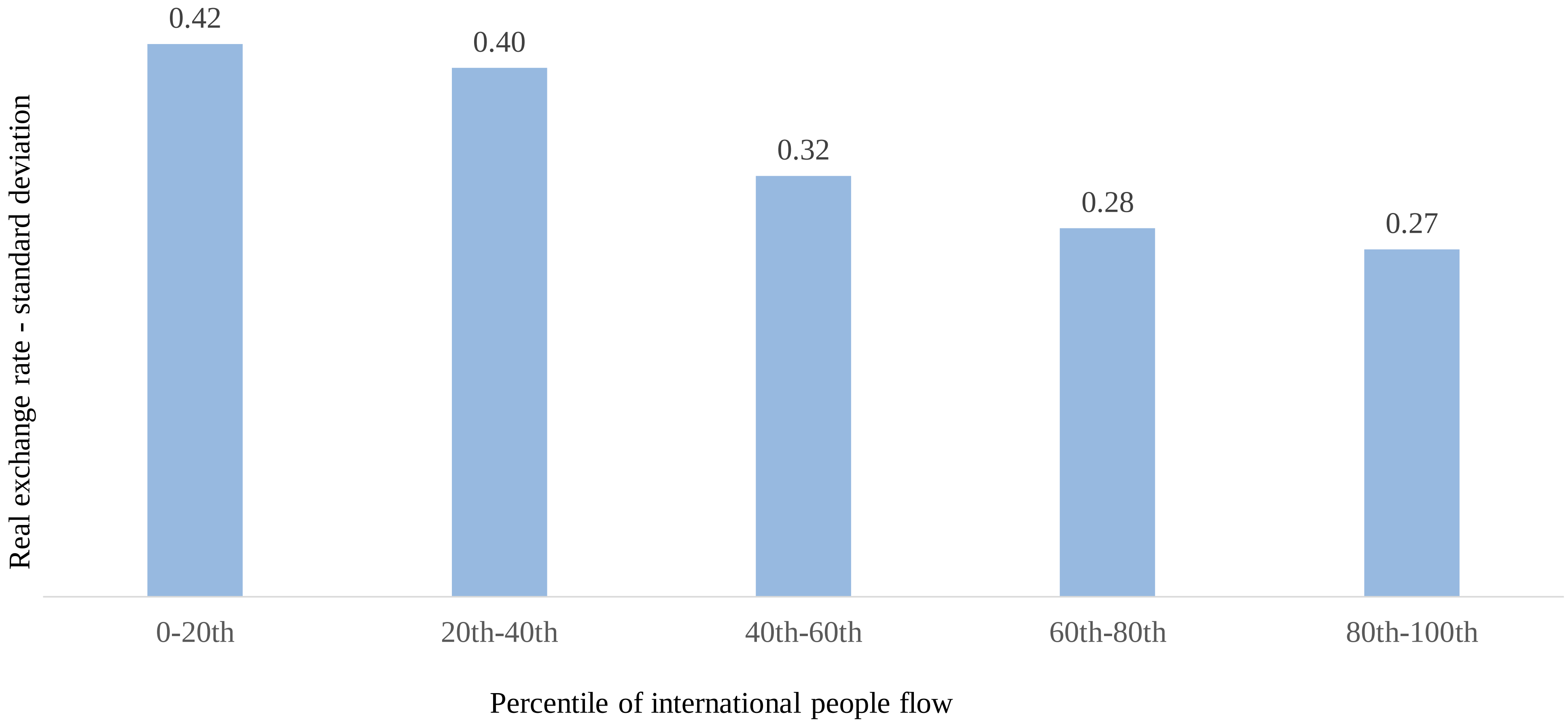
Data source

- Product-level database
  - EIU city-level product database covers the information for 313 products from 64 cities using 43 currencies from 1991 to 2014.
  - We categorize the products into tradable goods and non-tradable goods.
  - For tradable goods, we further classify it into homogenous goods/heterogeneous goods.
- Product-level bilateral exchange rate.
  - New York is chosen as the base city for the calculation of real exchange rate.
  - We consider three periods for calculating the standard deviation of the RER: 1991-1998, 1999-2006, 2007-2014
- International flight passengers
  - ICAO database from 1991 to 2013
- Bilateral tariff
  - We use the same methodology as in Hayakawa et al. (2020) to extract tariff data from the World Integrated Trade Solution (WITS)
- Exchange Rate Regime
  - The exchange rate regime data from Shambaugh (2004)

Descriptive analysis

Variables	Number of sample	Mean	Standard deviation	Minimum	Maximum
Log distance (miles)	297547	8.41	0.57	6.26	9.18
Log number of international travelers	297547	11.74	0.90	10.01	14.52
Real exchange rate volatility – Full sample	297547	0.292	0.205	0.000	5.474
Real exchange rate volatility - Tradable goods	219465	0.294	0.187	0.000	5.474
Real exchange rate volatility - Non-tradable goods	78082	0.287	0. 248	0.000	3.885
Real exchange rate volatility - Homogenous goods (Tradable goods)	134440	0.293	0. 178	0.000	2.417
Real exchange rate volatility – Heterogeneous goods (Tradable goods)	76693	0.306	0.205	0.002	5.474

Preliminary result: the relationship between people's international flow and RER volatility



Source: ICAO database, EIU city database, author's calculation.

Empirical specification

- Similar to Parsley and Wei (1996), we specify the model as
$$y_{ijpt} = std(q_{ijpt}) = \alpha + \beta X_{ijt} + \gamma Z_{ijt} + \epsilon_{it}$$
- Variables:
  - y_{ijpt} is the standard deviation of the bilateral real exchange rate for product p between city i and j at year t
  - X_{ijt} is the logarithm of the people movement between city i and j
  - Z_{ijt} is the control variables including the fixed effects

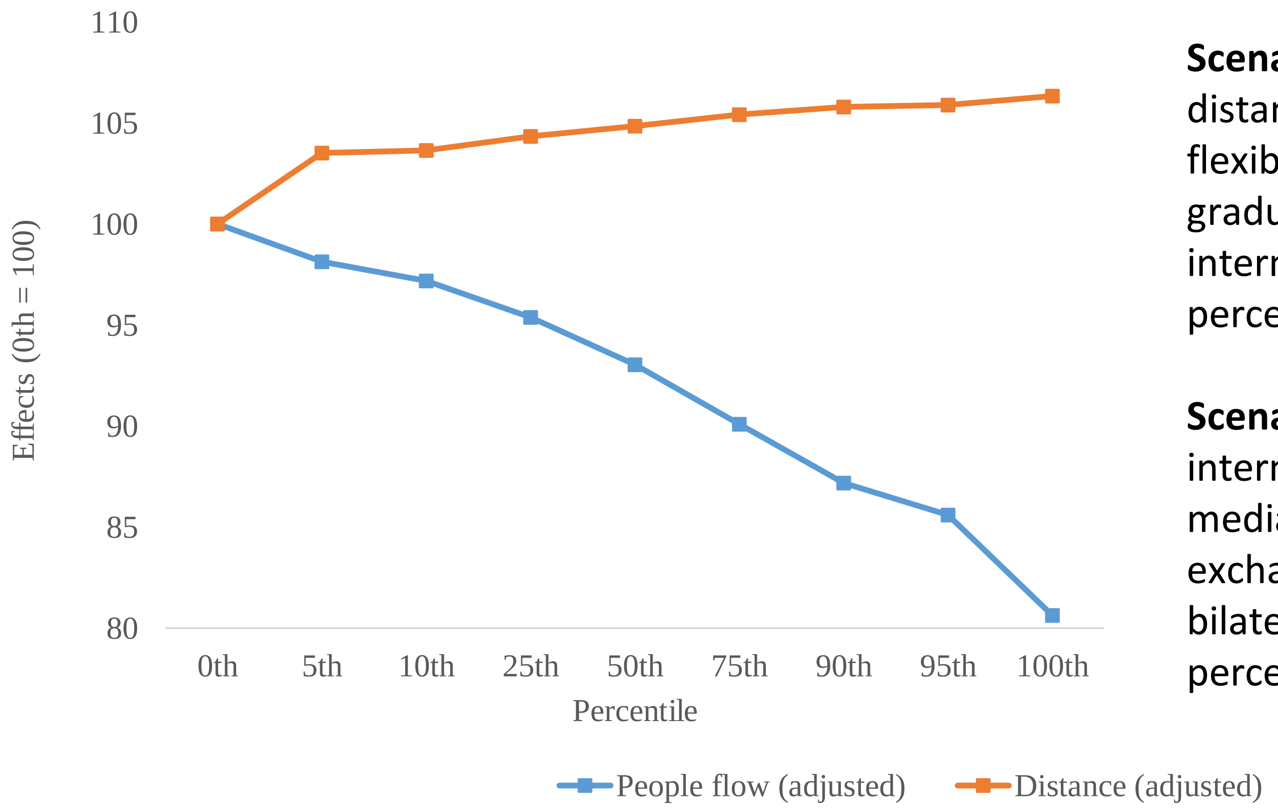
- Control variables include city-to-city distance, bilateral tariffs (TBD), and bilateral exchange rate regime (TBD).

- We consider the following fixed effects:
  - Time effect
  - Time effect * product effect
  - Time effect * product effect + city pair effect

Baseline results

Variables	Real exchange rate volatility	Real exchange rate volatility	Real exchange rate volatility	Real exchange rate volatility	Real exchange rate volatility	Real exchange rate volatility – Tradable goods
	（1）	（2）	（3）	（4）	（5）	（6）
Log number of travelers	-0.00944*** (0.000425)	-0.0105*** (0.000359)	-0.0105*** (0.000339)	-0.00241*** (0.000821)	-0.00936*** (0.000387)	-0.00872*** (0.000461)
Log Distance					0.00693*** (0.000547)	0.00390*** (0.000676)
Exchange rate regime					0.00111** (0.000447)	0.00253*** (0.000532)
Tariff						-0.451 (0.600)
Year FE	No	Yes	No	No	No	No
Product-year FE	No	No	Yes	Yes	Yes	Yes
City-pair FE	No	No	No	Yes	No	No
Observations	297,547	297,547	297,547	297,547	297,547	174,949
R-squared	0.002	0.255	0.338	0.505	0.339	0.343

Comparing people movement effect with the distance effect



Scenario 1： We assume the bilateral distance taking its median level under flexible exchange rate regime. Then, we gradually move the degree of international people flow from the 10th percentile to the 90th percentile.

Scenario 2： we also set the number of international travelers as its sampling median level and assume flexible exchange rate regime, and moves the bilateral distance from 10th to 90th percentile

Tradable versus Non-tradable goods

Variables	Real exchange rate volatility	Real exchange rate volatility
	Tradable goods	Non-tradable goods
Log number of travelers	-0.00872*** (0.000461)	-0.0127*** (0.000919)
Log Distance	0.00390*** (0.000676)	0.0159*** (0.00126)
Exchange rate regime	0.00253*** (0.000532)	-0.00123 (0.00110)
Tariffs	-0.00451 (0.00600)	
Product-year FE	Yes	Yes
Observations	174,949	78,082
R-squared	0.343	0.352

Robustness checks

- Alternative baseline city choice: Frankfurt
- Collapsing period by four years instead of eight years
- Using the initial people movement instead of the average people movement

Mechanism discussion

- To investigate the effect, we construct the following empirical specification,

- $y_{ijpt} = std(q_{ijpt}) = \alpha + \beta X_{ijt} + \theta X_{ijt}\Gamma + \gamma Z_{ijt} + \epsilon_{it}$

- where the newly added controlling variable Γ indicates whether the sampling good is a heterogeneous goods, equating to 1 if yes and 0 otherwise.

Heterogeneous goods versus homogeneous goods

	Real exchange rate volatility	Real exchange rate volatility	Real exchange rate volatility	Real exchange rate volatility
	（1）	（2）	（3）	（4）
Log number of travelers	-0.00730***	-0.00657***	-0.00672***	-0.00806***
	(0.000467)	(0.000479)	(0.000480)	(0.000541)
Heterogeneous goods dummy	0.0817***	0.0813***	0.0810***	0.0388**
	(0.0150)	(0.0150)	(0.0150)	(0.0193)
Log number of travelers	-0.00339*** (0.000776)	-0.00340*** (0.000775)	-0.00339*** (0.000775)	-0.00143* (0.000851)
Log Distance		0.00413***	0.00377***	0.00337***
		(0.000615)	(0.000619)	(0.000693)
Exchange rate regime			0.00197***	0.00264***
			(0.000365)	(0.000405)
Tariffs				0.01085*
				(0.00608)
Product-year dummy	Yes	Yes	Yes	Yes
Observations	211,133	211,133	211,133	170,613
R-squared	0.329	0.330	0.330	0.346

Conclusion

- International movement matters for understanding exchange rate volatility as it increases people's perception of foreign goods.

- Our empirical analysis shows that people's interaction generates stronger effect on exchange rate volatility than bilateral distance.

- The international people movement effect is more profound in the heterogeneous goods than the homogeneous goods, indicating the room for searching goods plays an important role for the key mechanism to hold.