BANGKO SENTRAL NG PILIPINAS
MONETARY POLICY SUB-SECTOR I DEPARTMENT OF ECONOMIC STATISTICS

How do Exchange Rates Affect the Big One?

An Empirical Analysis of the Effect of Exchange Rates on RCEP Exports using the Gravity Model

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Outline

1. Introduction and Motivation
2. Theoretical Framework
3. Empirical Framework
4. Results and Discussion
5. Conclusion

Exchange rate policies can be considered a substitute for trade policy (Pomfret & Pontines, 2013).

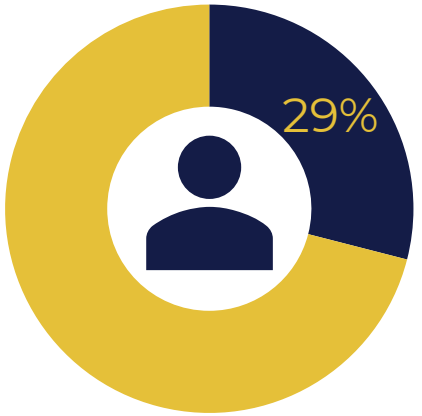
- Changes in the exchange rate are identical to changes in trade transaction costs and risks that can affect the volume of exports for a country.

The overall goal of this study is to contribute to the literature that delves on the relationship between exchange rates and trade.

- To determine the impact and significance of **exchange rate misalignments**, **exchange rate volatility**, **real effective exchange rates** and a **floating exchange rate regime** on exports;

- To analyze the monetary and exchange rate instruments that affect bilateral exports using the **augmented gravity model approach** of Anderson and Van Wincoop (2003) by utilizing **annual bilateral trade** and **exchange rate data** from **15 countries comprising the RCEP region** from **1996 to 2017**

The Regional Comprehensive Economic Partnership (RCEP) is currently the largest trading bloc in the world.



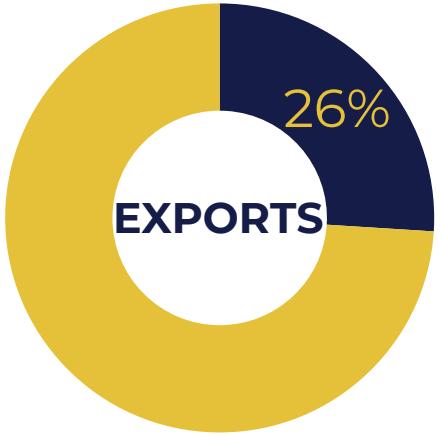


Image obtained from: https://www.dw.com/en/rcep-asia-readies-worlds-largest-trade-deal/a-60267980

Increases in Real Effective Exchange Rates (REER) generally reduce exports competitiveness (Benkovskid & Wörz, 2013).

- REER measures the real value of a country's currency against a basket of trading partners. (Darvas, 2012)
- Increases (decrease) in REER yields a currency appreciation (depreciation).
- REER were observed to significantly reduce real gross exports. (Tan et al., 2019).
- Currency depreciation significantly increase exports. (Pomfret & Pontines, 2013).

Exchange rate misalignment has an effect on trade but should be analyzed in line with other monetary variables (Nasir & Jackson, 2019).

- Misalignment measures the difference between the observed exchange rate and estimated equilibrium exchange rate.

- A higher (lower) level of misalignment yields an undervaluation (overvaluation) of the domestic currency (Rodrik, 2008).

- Currency overvaluation were found to significantly reduce exports (Nicita, 2013).

Exchange rate volatility can either be trade creating or trade reducing (Bahmani-Oskooee & Hegerty, 2009).

- Volatility measures the level of fluctuations a country's exchange rate undergo over a period of time.

- Mixed theories on the effects of volatility on trade:
  - Trade reducing – risks and additional costs from fluctuations
  - Trade creating – increase in production and sales to achieve specific levels of income

- Recommended to interact with other monetary policy variables to better demonstrate its effect on trade (Clark et al., 2004).

Mixed results from empirical studies regarding volatility and trade may possibly be an empirical issue (Clark et al., 2004)

- Exchange rate volatility significantly reduce exports (Hayakawa & Kimura, 2008).

- There is no significant long-run relationship between volatility and world exports (Hondroyiannis et al., 2008).

- Volatility significantly reduce exports in the short-run but significantly increase exports in the long-run (Senadza & Diaba, 2018).

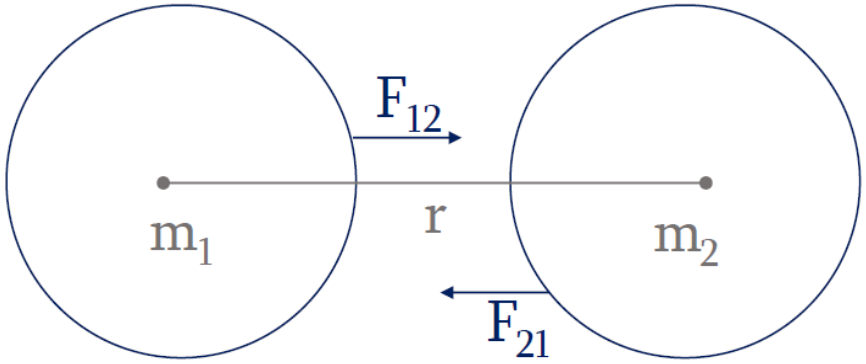
Previous literature mostly focus on the effect of fixed exchange rate regimes on trade.

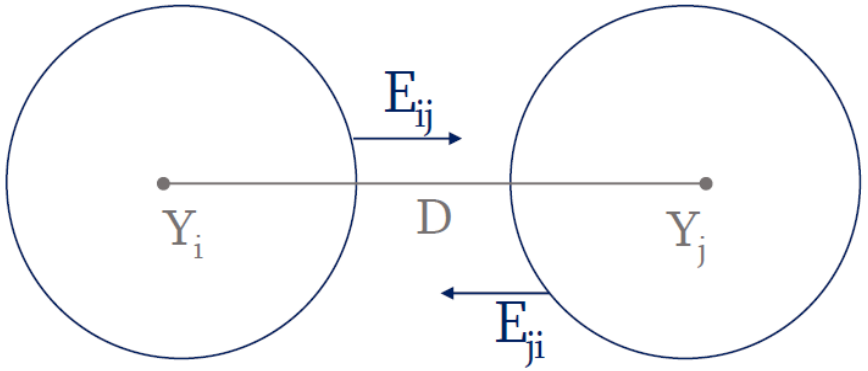
- Floating exchange rate regimes
  - The monetary authority attempts to influence the exchange rate without having a specific exchange rate path; or
  - The exchange rate is completely market-determined (IMF, 2006)

- Direct peg exchange rate regimes are expected to generate currency stability and foster bilateral trade with other fixed currencies (Klein & Shambaugh, 2004).

- Direct pegs significantly increase bilateral trade (Wong & Chong, 2016).

The Gravity model describes the amount of interaction between two spatially-distinct points.





$$F = gm_1m_2r^{-2}$$

Newton's law of universal gravitation (1686)

$$E_{ij} = a_0 Y_i^{a_1} Y_j^{a_2} D_{ij}^{a_3}$$

Trade flow equation (Tinbergen et al., 1962)

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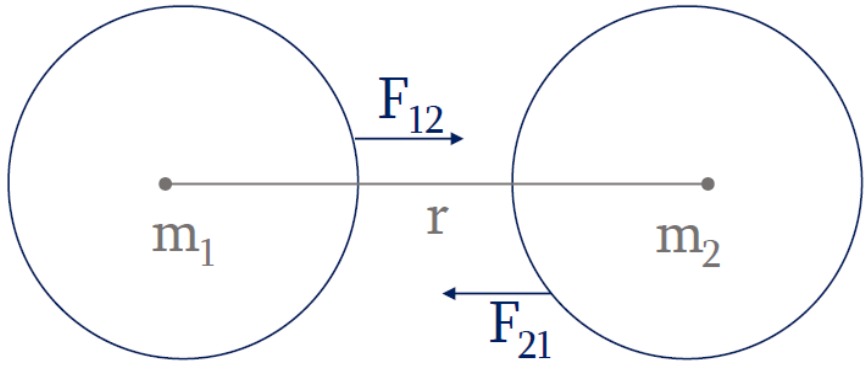

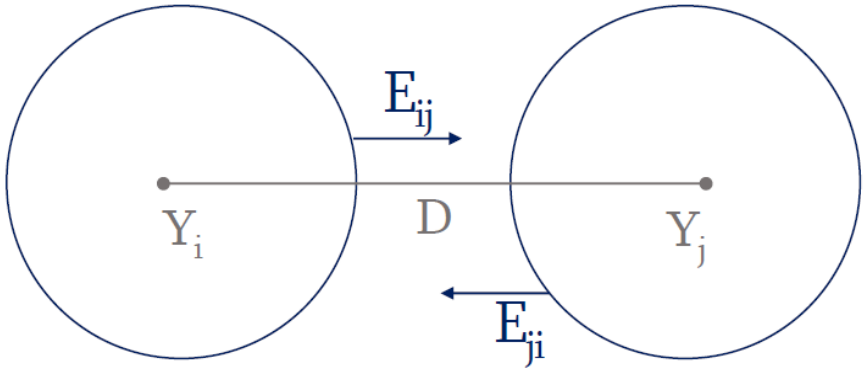

$$\log X_{ij} = a_o + \beta_1 \log GDP_i + \beta_2 \log GDP_j + \beta_3 \log \tau_{ij} + \varepsilon_{ij}$$

$$\log \tau_{ij} = \log(distance_{ij}) + contig_{ij} + comlang\_off_{ij} + comcol_{ij}$$

Properties of the PPML estimator suggests policy impacts should be based on PPML results rather than OLS (Shepherd, 2016)

- Regarded as the “workhorse gravity estimator” (Yotov et al., 2016; Gauto, 2012; Silverstovs & Schumacher, 2008)
- The estimator is consistent with fixed effects estimation (multilateral resistance variables).
- The estimator accommodates missing/zero value observations.
- Coefficients of the estimator can still be interpreted as simple elasticities.

Both OLS and PPML estimates will be reported for robustness

- OLS Panel Exporter-time & Importer-time fixed effects regression

$$\ln (Exports)_{ij,t} = a_o + \beta_1 \ln(GDP_{i,t} * GDP_{j,t}) + \beta_2 \ln (dist)_{ij} + \beta_3 contig_{ij} +$$

$$\beta_4 comlang\_off_{ij} + \beta_5 comcol_{ij} + \beta_6 \ln (REER)_{ij,t} + \beta_7 Misalign_{ij,t} +$$

$$\beta_8 Float_{ij,t} * \ln (Volatility)_{ij,t} + \beta_9 cty_{ij,t} + \varepsilon_{ij,t}$$

- PPML Panel Exporter-time & Importer-time fixed effects regression

$$\left(\frac{Exports}{1{,}000{,}000}\right)_{ij,t} = \exp [\, \beta_1 \ln\left(GDP_{i,t} * GDP_{j,t}\right) + \beta_2 \ln(dist)_{ij} + \beta_3 contig_{ij} +$$

$$\beta_4 comlang_{off_{ij}} + \beta_5 comcol_{ij} + \beta_6 \ln(REER)_{ij,t} + \beta_7 Misalig$$

$$\beta_8 Float_{ij,t} * \ln(Volatility)_{ij,t} + \beta_9 cty_{ij,t}] + \varepsilon_{ij,t}$$

Augmented Model estimates are in line with gravity model and exchange rate theory.

Method	[1] OLS	[2] PPML
Dependent Variable	ln of Exports	Exports^{m}
ln of Nominal GDP product	**1.192*** **	**0.840*** **
	(0.0512)	(0.0388)
ln of Distance	**-0.564*** **	**-0.501*** **
	(0.148)	(0.0704)
Contiguity (dummy)	**0.989*** **	0.0786
	(0.333)	(0.122)
Common Official Language (dummy)	-0.213	0.0478
	(0.223)	(0.135)
Common Colony (dummy)	**1.148*** **	0.293
	(0.438)	(0.211)
ln of REER Ratio	-0.239	**-0.606** **
	(0.446)	(0.302)
Exchange Rate Misalignment	**-0.196*** **	-0.0302
	(0.0582)	(0.0401)
Float peg (dummy) * ln of Exchange Rate Volatility	**-0.0909*** **	**-0.0585** **
	(0.0312)	(0.0242)

Method	[1] OLS	[2] PPML	[3] OLS	[4] PPML	[5] OLS	[6] PPML	[7] OLS	[8] PPML
Dependent Variable	ln of Exports	$Exports^m$	ln of Exports	$Exports^m$	ln of Exports	$Exports^m$	ln of Exports	$Exports^m$
ln of Nominal GDP product	**1.153*** **	**0.796*** **	**1.094*** **	**0.797*** **	**1.112*** **	**0.758*** **	**1.189*** **	**0.834*** **
	(0.0488)	(0.0358)	(0.0445)	(0.0324)	(0.0640)	(0.0388)	(0.0513)	(0.0395)
ln of Distance	**-0.541*** **	**-0.499*** **	**-0.542*** **	**-0.488*** **	**-0.564*** **	**-0.501*** **	**-0.563*** **	**-0.494*** **
	(0.149)	(0.0703)	(0.148)	(0.0704)	(0.148)	(0.0704)	(0.148)	(0.0698)
Contiguity (dummy)	**1.110*** **	0.0967	**1.110*** **	0.131	**0.989*** **	0.0786	**0.988*** **	0.109
	(0.346)	(0.122)	(0.347)	(0.125)	(0.333)	(0.122)	(0.333)	(0.124)
Common Official Language (dummy)	-0.243	0.0472	-0.243	0.0860	-0.213	0.0478	-0.214	0.0806
	(0.233)	(0.136)	(0.233)	(0.129)	(0.223)	(0.135)	(0.222)	(0.128)
Common Colony (dummy)	**1.107** **	0.260	**1.106** **	0.232	**1.148*** **	0.293	**1.149*** **	0.270
	(0.445)	(0.213)	(0.446)	(0.204)	(0.438)	(0.211)	(0.438)	(0.203)
ln of REER Ratio	-0.212	-0.387	**-2.120*** **	**-1.264*** **	**4.164*** **	**1.493*** **	-0.325	**-0.564***
	(0.529)	(0.290)	(0.590)	(0.480)	(0.648)	(0.434)	(0.460)	(0.337)
Exchange Rate Misalignment	**-0.201*** **	-0.0384	**-0.390*** **	**-0.110***	**-0.165*** **	-0.0444	**-0.203*** **	-0.0368
	(0.0559)	(0.0457)	(0.0913)	(0.0639)	(0.0400)	(0.0277)	(0.0588)	(0.0405)
Float peg (dummy) * ln of Exchange Rate Volatility	**-0.0866*** **	**-0.0583** **	**-0.0866*** **	**-0.0544** **	**-0.0909*** **	**-0.0585** **	**-0.0910*** **	**-0.0548** **
	(0.0330)	(0.0245)	(0.0330)	(0.0239)	(0.0312)	(0.0242)	(0.0312)	(0.0237)
FTA (dummy)			-0.0160	-0.165			0.0211	-0.146
			(0.131)	(0.104)			(0.130)	(0.100)
AFC (dummy)					0.372	0.0741	-0.209	-0.0878
					(0.424)	(0.541)	(0.483)	(0.421)
Constant Term	-36.99***	-30.89***	-32.24***	-30.10***	-35.29***	-29.04***	-38.46***	-32.57***
	(2.952)	(2.248)	(2.645)	(1.920)	(3.649)	(2.363)	(3.096)	(2.360)
Observations	3,096	3,096	3,096	3,096	3,563	3,563	3,563	3,563
R-squared	0.906	0.952	0.906	0.957	0.905	0.952	0.905	0.956
Country pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Exchange rate variables such as REER, float peg, and volatility significantly affect exports in the region.

- Provides strong evidence on the importance of including monetary policy variables in the gravity model.
- Potential of the RCEP to re-energize trade in the region post-COVID.
- Importance of currency stabilizing mechanisms present in floating peg exchange rate regimes.

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