Investigating Trade Costs and Trade Flows of Melanesian Countries Using the Heterogeneous Trade Cost Effects Model

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1. Introduction

- An important research topic in international trade is the link between trade costs and trade flows (Arvis *et al.,* 2013; Novy, 2013; Chen and Novy, 2011; Jaks, Meissner and Novy, 2011; Anderson and Wincoop, 2004).
  - 'Trade cost elasticity' – if trade costs go down, by how much does trade go up?

- From a policy perspective, trade costs are of great importance since they are an important determinant of a country's ability to take part in regional and global production networks.
  - What are the effects of trade costs on trade flows and outcomes?
  - Are the effects quantitatively significant?
  - How do trade cost elasticities vary across trading partners?

1. Introduction

- Measuring trade costs has its challenges (Anderson and Wincoop, 2004; Harrigan, 1993; Hummels, 2001a, 2007; Jack, Meissner and Novy, 2008).

- Pacific Island Countries trade pattern and performance reveal that they have largely followed their comparative advantage in primary products (Chen, *et al,.* 2014).

- Higher trade costs disadvantage Landlocked Developing Countries and small Island Developing States (UNESCAP, 2015; WTO, 2015).

2. Literature Review – Evaluating the effects of Trade Costs

- International trade literature has traditionally focused on using the gravity model to identify particular factors, such as geographical distance, as sources of trade costs (Miroudot *et al.,* 2012; Chen and Novy, 2011; Jaks, Meissner and Novy, 2011; Anderson and Wincoop, 2004)

- Evaluating the effect of trade costs:
  - Rely on a standard gravity equation framework and insert trade cost proxies as regressors on the right hand side.
  - Outcome provides single coefficients to assess the trade effects of trade costs.
  - The effects are *homogeneous* across all country pairs in the sample.

2. Literature Review – Evaluating the effects of Trade Costs

- Chen and Novy (2021) propose a new approach based on the idea that trade costs may not affect all trade flows in the same way.
  - Challenging the view of *homogeneous trade cost* effects.
  - Trade costs might have a strong influence on trade between some countries but not between others.
  - Provide an alternative methodology to the traditional gravity equation that allows to estimate heterogeneous trade cost effects.

- This framework of flexible trade cost effects can be applied to other trade cost-related variables popular in the international trade literature. For example, heterogeneous effects for regional trade agreements (RTAs) and WTO membership.

3. Research Questions

This research aims to investigate the following questions:

- Heterogeneous trade costs effect on trade outcomes among Melanesian Countries?

- What are the policy implications of trade costs in Melanesian countries?

4. Theoretical Framework and Methodology

- The theoretical framework of flexible trade cost effects extends from the translog gravity equation that predicts variable trade cost elasticities (Novy, 2013).

- In this framework, thin bilateral trade relationship (characterized by small bilateral import share) are more sensitive to trade cost changes than thick trade relationship (characterized by large bilateral import shares).

- Chen and Novy (2021) introduces heterogeneous trade cost effects by taking guidance from a translog gravity equation that predicts variable trade cost elasticities (Novy, 2013).

4. Theoretical Framework and Methodology

- The research methodology is guided by a recent paper by Chen and Novy (2021) that provides innovative methodology to estimate heterogeneous trade costs.

- The key variable of interest is the bilateral import shares. Dependent variable is the bilateral import share per good of the exporting country. *Empirically demonstrate in a systematic and comprehensive way that trade cost effects are heterogeneous across country pairs, and also within country pairs by direction of trade.*

- Two methodological approaches have been utilized in the literature (1) modification of the standard gravity specification similar from the literature (flexible gravity model) and (2) estimating the translog gravity equation using regression

4. Theoretical Framework and Methodology

- Santos, Silva and Tenreyro (2006) highlight two issues with using OLS estimates of the log linearized gravity model:
  - The logarithm functional form automatically drops observations for which the reported trade value is zero
  - OLS gives inconsistent parameter estimates if the disturbance term in standard gravity model is heteroskedastic

- To deal with the above issues - heteroskedasticity and to include zero import shares in the sample, empirical technique used by Chen and Novy (2021) is the Poisson Pseudo Maximum Likelihood (PPML) estimator.

4. Theoretical Framework and Methodology

- The PPML regression model is defined in general terms by the discrete distribution:

$$\Pr\left(X_{ij} = k \middle| \widehat{X_{ij}}\right) = \left(e^{-\widehat{X_{ij}}} \left(e^{\widehat{X_{ij}}}\right)^k / k!, k = 0,1,2, \dots \dots \dots n \right. \quad (1)$$

- The expected value and variance are the modeled exports:

$$E\left[X_{ij}\right] = \widehat{X_{ij}}; Var\left[X_{ij}\right] = \widehat{X_{ij}} \quad (2)$$

- The log likelihood associated with the distribution is

$$Log\ L = \sum_{ij} Log \Pr\left(X_{ij} \middle| \widehat{X_{ij}} = \sum_{ij} \{-\widehat{X_{ij}} + X_{ij} * Log\widehat{X_{ij}} - Log\ X_{ij}!\} \right. \quad (3)$$

4. Theoretical Framework and Methodology

- Flexible Gravity Model (Chen and Novy, 2021):

The translog gravity equation:

$$\frac{{}^{x_{ij}}/_{y_i}}{n_i} = -\theta ln(t_{ij}) + D_i + \theta \ln(T_j) \quad (4)$$

$$D_i = \frac{{}^{y_i}/_{y^w}}{n_i} + \theta \sum \frac{y_s}{y^w} \ln(\frac{t_{is}}{T_s})$$

$$\ln(T_j) = \sum \frac{n_s}{N} \ln(t_{sj})$$

The variable elasticity is as follows:

$$n_{ij} = -\frac{\theta}{\frac{({}^{x_{ij}}/_{y_i})}{n_i}} \quad (5)$$

4. Theoretical Framework and Methodology

- Standard gravity model specification is modified by letting the independent variables vary across predicted import shares.

- Two steps to achieve this: Step One - regressing import shares per good on geography-related variable (distance) to generate predicted shares.

$$\left(\frac{x_{ij,t}/y_{j,t}}{n_{i,t}}\right) = \exp\left(\delta K_{ij} + D_{i,t} + D_{j,t}\right) + v_{i,j,t}$$

The time varying pair variables not included as they are not geography related and therefore more likely endogenous. The predicted shares is denoted by $\left(\frac{\widehat{x_{ij,t}/y_{jt}}}{n_{i,t}}\right)$

4. Theoretical Framework and Methodology

- Step Two - the independent variable is interacted with the logarithmic predicted import shares with parameter as the key coefficient of interest.

- This flexible gravity equation predicts variable trade cost elasticities, both across and within country pairs.

4. Theoretical Framework and Methodology

The heterogeneous trade cost effects is estimated as follows:

$$\left(\frac{x_{ij,t}/y_{j,t}}{n_{i,t}}\right) = \exp(\beta_1 RTA_{ij,t} + \beta_2 RTA_{ij,t} \times \ln\left(\frac{\widehat{x_{ij,t}/y_{jt}}}{n_{i,t}}\right) + \beta_3 WTO\ membership_{ij,t} +$$

$$\beta_4 WTO\ membership_{ij,t} \times \ln\left(\frac{\widehat{x_{ij,t}/y_{jt}}}{n_{i,t}}\right) + D_{i,t} + D_{j,t} + D_{ij}\,\epsilon_{ij,t} \qquad (6)$$

The most recent innovative contribution in understanding trade cost effects on trade flow is the heterogeneous bilateral trade elasticities calculated from Equation (6).

5. Potential Data Sources

- Pacific Island countries Statistical agencies.
- International Monetary Fund Database: Direction of Trade Statistics.
  - Direction of Trade Statistics (DOTS) presents the value of merchandise exports and imports disaggregated according to a country's primary trading partner.
  - DOTS cover all IMF members some non-member countries and major areas
- ESCAP World Bank Trade Cost Database will supplement trade cost data gathering.
- UNCTAD database.
- The Observatory of Economic Complexity.

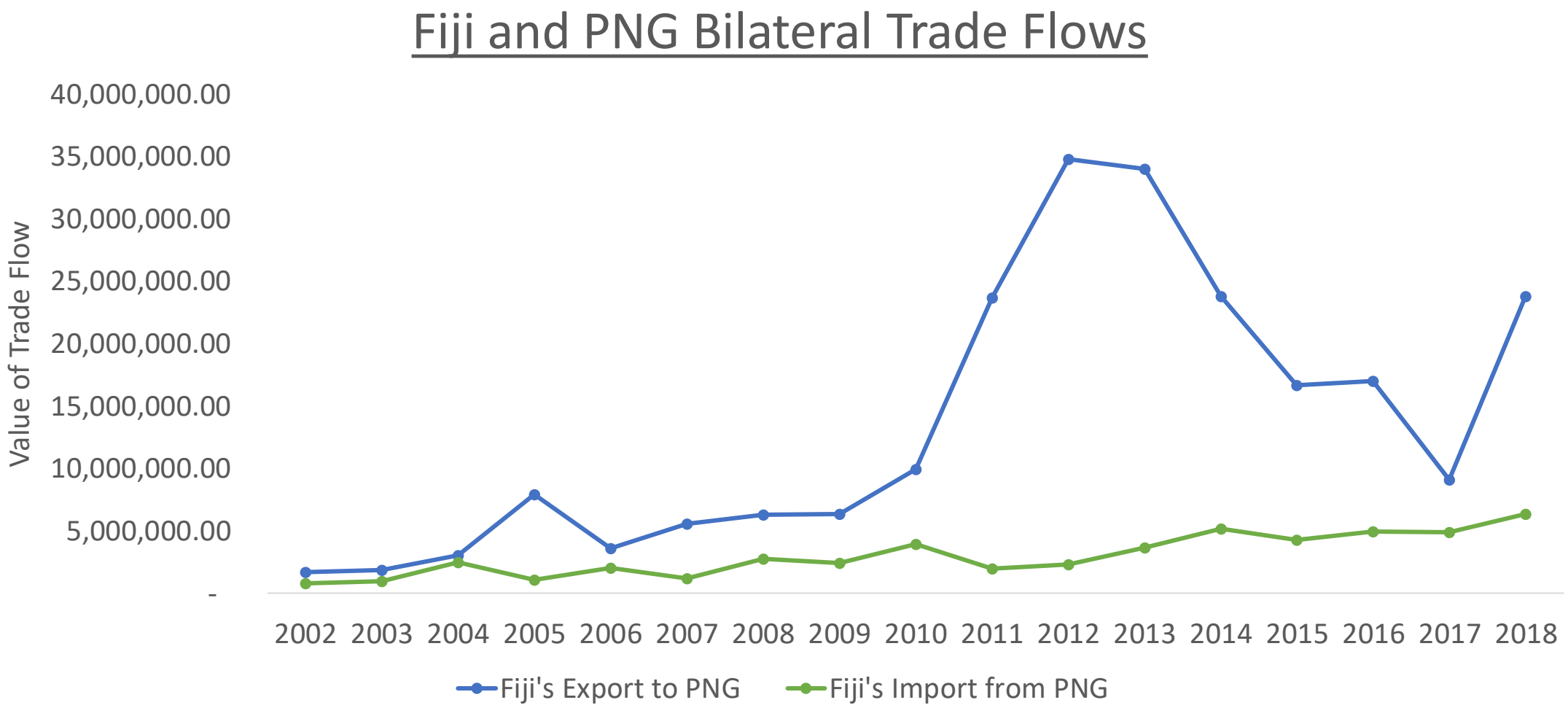
6. Discussion

- Chen and Novy (2021) found that coefficients on the RTA and WTO interaction terms are negative. The trade effects of RTAs and the WTO are thus heterogeneous and smaller for country pairs with larger import shares.

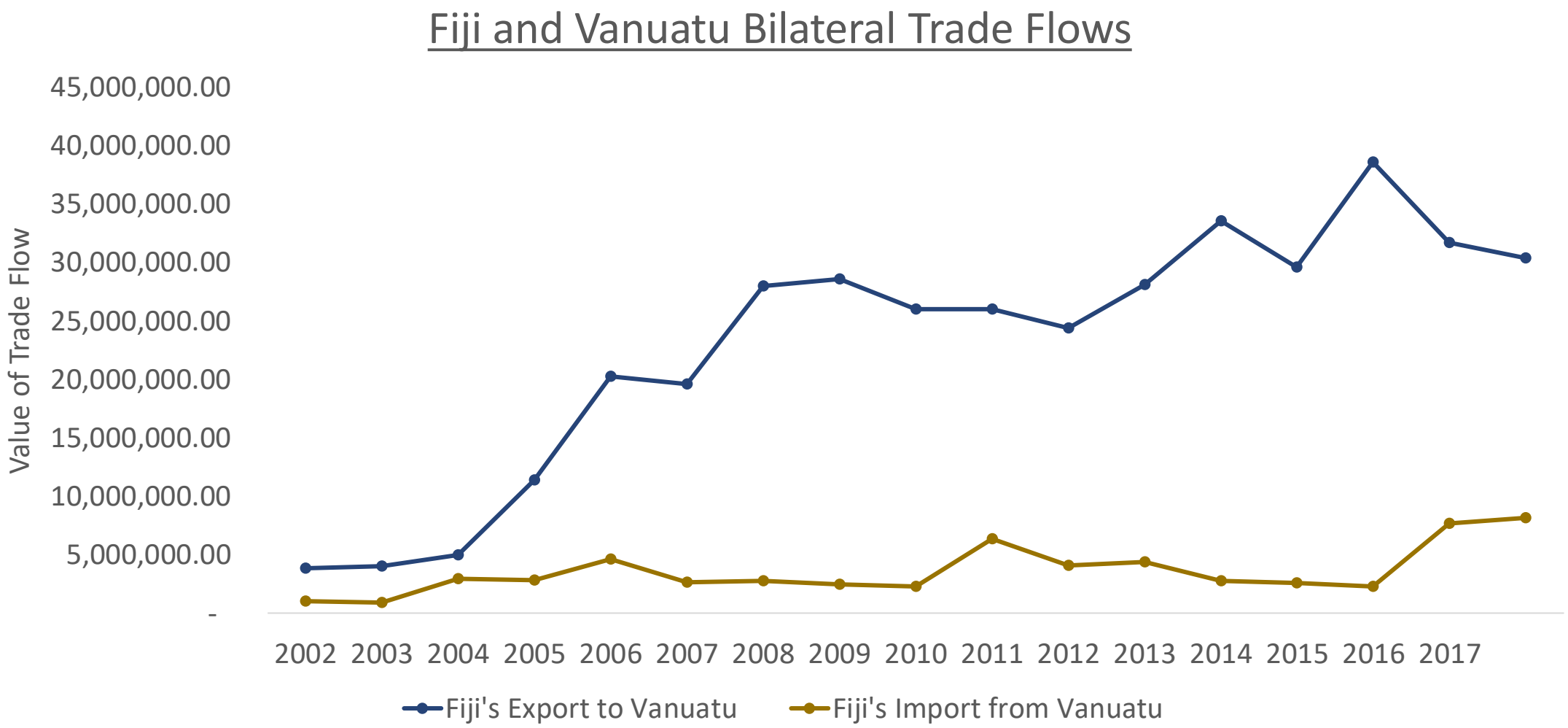
- One potential implication is that the gains from trade liberalization could be mismeasured if research assume a constant trade elasticity (Arkolakis *et al*., 2012; Melitz and Redding, 2015; Bas *et al*., 2017 as cited in Chen and Novy, 2021).

- Aligning the above with possible similar results for Melanesian countries provides a stronger platform for regional integration.

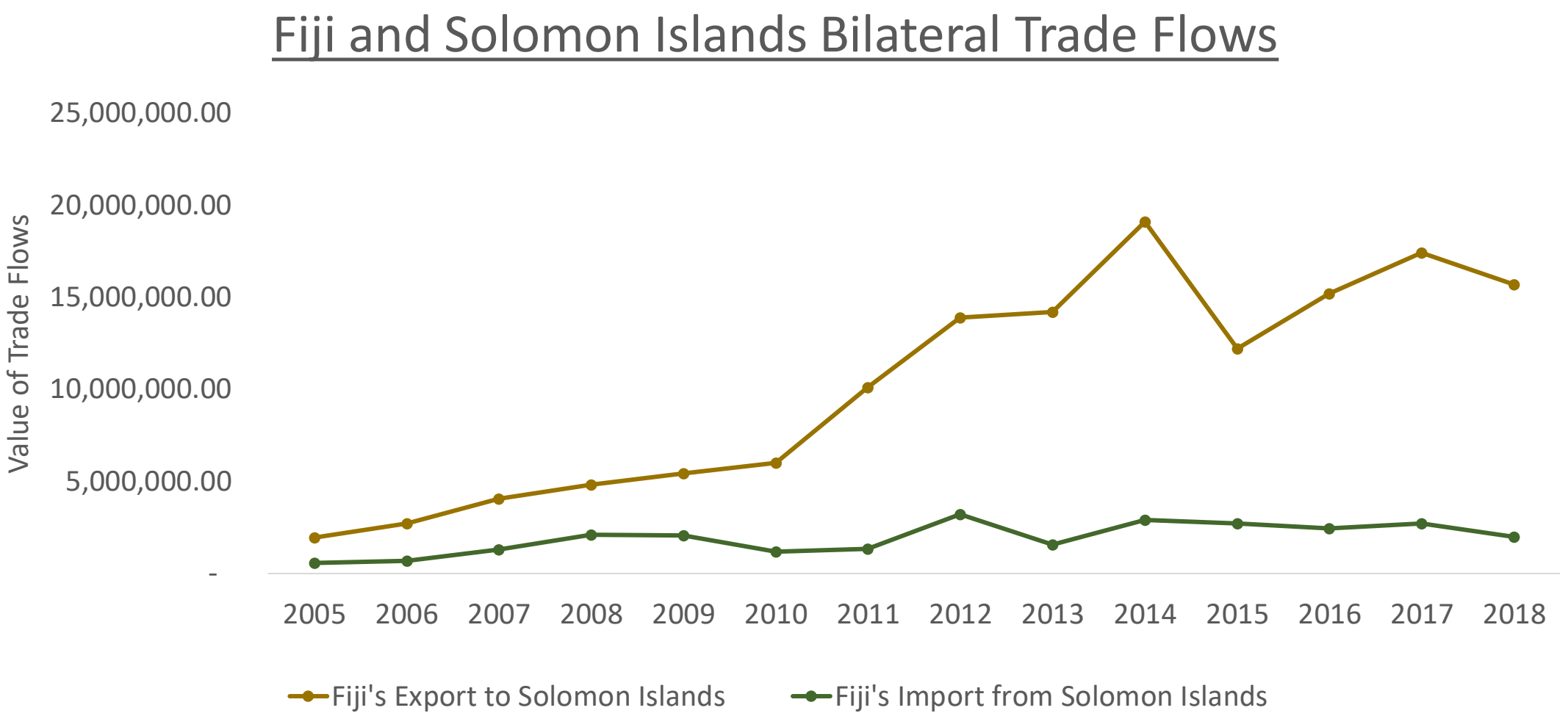
6. Discussion



6. Discussion



6. Discussion



7. Conclusion and Policy Implications

- Heterogeneous trade cost elasticity is the latest innovation in understanding trade costs effects.

- Pacific Island Countries are disadvantaged by the higher trade costs.

- Heterogeneous trade cost findings will provide and equip PICs with better strategical approach in mitigating trade costs where possible.

7. Conclusion and Policy Implications

- First research to study heterogeneous trade costs in Pacific Islands Countries - able to identity and evaluate thin and thick bilateral trade relationship.

- The understanding of heterogeneous trade costs will provide input into policy making towards reducing trade costs.

- The findings from this study will also be useful in understanding the heterogeneous effects of regional trade agreements (PACER Plus, EU trade agreements) and WTO membership (since joining).

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