University of New South Wales

School of Economics

Honours Thesis

Have Australia's Free Trade Agreements increased the New goods margin?

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1 Declaration

I declare that this thesis is my own work and that, to the best of my knowledge, it contains no materials which has been written by another person or persons, except where acknowledgements has been made. This thesis has not been submitted for the award of any degree of diploma at the University of New South Wales Sydney, or at any other institute of higher education.

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Atharva Karandikar

5th November 2018

2 Acknowledgements

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3 Abstract

This thesis examines whether Australia's free trade agreements (FTAs) increase exports and imports of goods that were previously not traded or traded in very small amounts. I refer to this product category as the "new goods margin". I use the methodology developed by Kehoe and Ruhl (2013) to define the new goods margin as the set of goods that initially account for 10 per cent of trade prior to the FTAs. In Part I of this thesis, I find that in comparison to a group of comparable non-FTA partners, trade with FTA partners is associated with an increase in the new goods margin for imports but not exports. In Part II, I employ the synthetic control methodology (SCM) to estimate the causal effect of Australia's FTAs on the new goods margin. The SCM estimates the counterfactual situation of Australia's new goods margin for exports and imports in the absence of an FTA with its FTA partner. The advantage of the SCM over difference-in-difference method is that it avoids the endogeneity bias associated with FTAs. Using the SCM approach, I find that Australia's FTAs increase the new goods margin for imports, on average, by 85 per cent over ten years but have no effect on exports.

4 Introduction

Over the last 15 years, both major political parties have pursued a policy of signing FTAs. FTAs lower tariff and non-tariff barriers between participating partners, to the exclusion of third-parties. The Federal government argues that FTAs will increase bilateral trade as increased market access allows existing firms in both nations to increase exports and encourages new firms to begin exporting. They also argue that FTAs give Australian exporters a competitive advantage over exporters from third-parties. These arguments are supported by economic modelling commissioned by the Federal government to evaluate recent FTAs. The Centre for International Economics (CIE) estimates that the North Asian FTAs will increase exports to the North-Asian economies by an additional 10 per cent by 2030, while merchandise imports will increase by an additional 8.3 per cent (CIE, 2015).[1]

The Productivity Commission (PC) notes that ex-ante estimates may overstate the potential benefits of FTAs (PC, 2010). The Commission argues that feasibility studies that use Computable general equilibrium (CGE) models rely on unrealistic assumptions. The CGE models typically assume that tariffs will be reduced to zero, with no carve-out or phase-in periods, and the application of rules of origin (RoO) have no impact on trade costs for exporters and importers.[2]

To date, only one ex-post evaluation of Australia's FTAs has been conducted. A review of the Australia-United States FTA (AUSFTA) finds that bilateral trade between Australia and the United States has not increased since the ratification of the agreement in 2005 (Armstrong, 2015). In contrast to Armstrong (2015), this thesis evaluates Australia's FTAs through a different angle. I examine whether Australia's FTAs increase exports and imports of goods that were previously not traded or traded in small volumes. I refer to this product category as the "new goods margin".[3] I use the methodology developed by Kehoe and Ruhl (2013) to define the new goods margin as the set of goods that initially account for 10 per cent of trade prior to the FTAs.

The following facts motivate my choice to study the impact of FTAs on Australia's new goods margin. First, Australia's composition of trade is unique amongst developed nations. In the last 20 years, Australia's export base has further narrowed. In 1996, 50 per cent of exports were concentrated in the mining and agriculture industries. By 2016, the export share of these two industries had increased to 75 per cent. The products exported in these two industries are homogeneous such as coal, iron ore, liquefied gas and wheat. Second, Australia's import base has widened over the same period, with new products

[1] North Asian FTAs refer to the Korea-Australia FTA (KAFTA), Japan-Australia Economic Partnership Agreement (JAEPA) and the China-Australia FTA (ChAFTA). The estimates reported by the CEI are aggregate results for the three FTAs.

[2] Ro0 is the criteria used to determine the national source of a product.

[3] The terms: "new goods margin", "extensive margin" and "least-traded goods" are used interchangeably. The "new goods margin" or the "extensive margin" refers to the concept. "Least-traded goods" refer to the measurement of the concept.

imported from emerging markets. Australia's main imports are in sectors that have more differentiated goods such as transportation, machines and chemical products.

Within this context, analysing the new goods margin for exports and imports indicates whether Australia's FTAs provide new trade opportunities. Prior to an FTA, exports and imports of least-traded products are likely to be restricted due to relatively high tariff and non-tariff barriers. A permanent reduction in trade barriers induces new firms in both countries to export, leading to an increase in the new goods margin (Ruhl, 2008). Also, exporters in both countries who initially trade in small amounts gain from an FTA because a reduction in trade barriers reduces the marginal cost of reaching additional customers (Arkolakis, 2010). As such, the new goods margin increases.

In this thesis, I use two methods, relative analysis (Part I) and synthetic controls (Part II), to show that Australia's FTAs increase the new goods margin for imports but not exports. In Part I of this thesis, I compare the change in the new goods margin between FTA countries relative to a comparable group of non-FTA countries. To do so, I consider the FTAs Australia ratified between 2003 and 2010. For each agreement, I examine a pre- and post-FTA period of seven years. Next, I construct a group of comparable countries that did not sign FTAs with Australia. The group is constructed in such a way that its trade share with Australia and its geographical distribution is similar to those of the FTA countries. Following the construction of the comparison group, I trace the share of total trade accounted for by least-traded goods between FTA and non-FTA countries. I find that seven years after the FTAs were signed, the share of least-traded imports from FTA countries grew, on average, to account for 32 per cent of total imports, compared to 20 per cent from non-FTA countries. By contrast, least-traded exports to non-FTA countries grew faster than compared with FTA countries. The share of least-traded exports to non-FTA countries ended up accounting for 22 per cent of total exports, compared to 20 per cent for FTA countries. This result is contrary to all previous studies on the topic of trade liberalisation (Kim and Ruhl, 2013; Choe and Diaz, 2018; Choe et al., 2018). In all previous studies, the authors find that the share of least-traded exports increases rapidly following trade liberalisation. Overall, my analysis in Part I shows that FTAs are associated with an increase in least-traded imports but not least-traded exports.

In Part II, I employ the SCM to quantify the causal effect of Australia's FTAs on the new goods margin. To the best of my knowledge, the SCM has not been applied in trade literature regarding FTAs. This is the main contribution of my thesis to the literature. The SCM estimates the counterfactual situation of Australia's new goods margin for exports and imports in the absence of an FTA with its FTA partner. It does so by constructing a weighted combination of comparison units from a sample of countries that did not sign an FTA with Australia's FTA partner. The effect of the FTA is the difference between the actual value of least-traded goods and the counterfactual estimate. The advantage of the SCM over difference-in-difference method is that it avoids the endogeneity bias associated

with FTAs.

Due to data limitations, my empirical focus is on the FTAs that Australia signed between Singapore, Thailand and the United States. I find that three FTAs do not affect Australia's least-traded exports to the three FTA partners. On the import side, I find that FTAs with Singapore and Thailand increase least-traded imports, on average, by 103 and 128 per cent over ten years. In relation to the FTA with the United States, I find that least-traded imports increase, on average, by 26 per cent over ten years but this estimate is statistically insignificant. Overall, I conclude that Australia's FTAs increase least-traded imports, on average, by 85 per cent over ten years but do not affect least-traded exports.

5 Related Literature

5.1 New Goods Margin

Trade between two countries can grow in two ways, countries can trade more of existing goods or begin trading goods that haven't been previously traded. The former term is referred to as the intensive margin and the latter term is called the new goods margin. In the literature, there is considerable debate about which margin of trade is more important for trade growth. Hummels and Klenow (2005) analyse shipment data for 126 exporting countries to 59 importing countries in 5,000 product categories. The authors find that the extensive margin accounts for 60 per cent of the increase in exports. Similary, Evenett and Venables (2002) finds that two-thirds of the increase in exports of developing countries is accounted for by the extensive margin. By contrast, there is a large body of work which finds the intensive margin to be the dominant factor for trade growth. Amiti and Freund (2010) finds that the intensive margin plays a more important role in the growth of China's exports between 1992 and 2005. In addition, Besedes and Prusa (2011) finds that most new export relationships are short-lived as new firms exit soon after entering the market.

Kehoe and Ruhl (2013) develop a new methodology to study the role of the new goods margin for trade growth. They define the new goods margin as the set of goods that initially account for 10 per cent of trade. The authors analyse the change in the share of new goods margin for the United states with a variety of partner countries. They find that the new goods margin for exports and imports increases only when trade liberalisation occurs, such as NAFTA, or when the partner country undergoes deep structural change, such as Korea and Chile in 1970s and 1980s. Also, the authors find that the new goods margin remains unchanged over the business cycle. They argue that trade liberalisation increases the extensive margin because it is permanent reduction in trade costs, inducing new firms to enter the export market.

The methodology developed by Kehoe and Ruhl (2013) has been in a variety of scenarios. Cho and Diaz (2018) analyse the role of the new goods margin for Baltic countries between 1995 - 2008. During this period, the Baltic nations such as Estonia, Latvia and Lithuania liberalised their economies and joined the European Union. The authors find that by 2008, the new goods margin accounts for 50 per cent and 22 per cent of Baltic exports and imports to their main trading partners. Additionally, Cho et al. (2018) study the role of the new goods margin between Korea's FTA partners. They find that eight years after an FTA, least-traded exports and imports account for, on average, 37 per cent of total exports and imports. They also construct a reference group of comparable countries that did not sign an FTA with Korea. The authors find that growth in share of least-traded goods increased to only 23 per cent of total exports and 17 per cent of total imports with non-FTA countries. Part I of thesis builds upon the work of Kehoe and Ruhl (2013) and Cho et al. (2018) to analyse the effect of Australia's FTAs on the new goods margin. As

stated in the introduction, the analysis of this topic is motivated by Australia's unique composition of trade.

5.2 Identification of the causal effect

Early ex-post evaluations of FTAs on bilateral trade were based on traditional gravity equations. A typical specification estimated by OLS was:

$$\ln X_{ijt} = \beta_0 + \beta_1 \text{FTA}_{ijt} + \beta^{'} \text{Z} + \epsilon_{ijt} \tag{1}$$

where X_{ijt} denotes bilateral trade between partners i and j at time t. FTA_{ijt} is a dummy variable capturing the presence of an FTA between i and j at time t. Z captures all factors relating to determinants of FTAs such as GDP, distance, common language, common coloniser and common legal system. Studies which applied this econometric framework found inconsistent estimates ranging from positive and statistically significant to negative and statistically significant (Aikten, 1973; Frankel, 1997).

Baier and Bergstrand (2007) pointed that the fragility of the estimates was due to endogeneity bias. They argued that countries endogenous select into FTAs due to unobservable factors that are potentially correlated with the level of trade. For example, non-tariff barriers such as domestic regulations which are negative correlated with trade, may induce countries to ratify FTAs. Baier and Bergstrand (2007) recommend to use fixed effects to eliminate the endogeneity bias by using the following specification,

$$\ln X_{ijt} = \beta_0 + \beta_1 \text{FTA}_{ijt} + \gamma_{ij} + \delta_{it} + \theta_{it} + \epsilon_{ijt}, \tag{2}$$

where γ_{ij} is a country-pair fixed effect to capture all time-invariant unobservable bilateral factors such as distance and common legal system. δ_{it} and θ_{it} are exporter-time and importer-time fixed effects to capture time-varying exporter and importer GDP as well as time-varying country-specific unobservables in i and j influencing trade, such as comparative advantage and multilateral resistances (Anderson and Van Wincoop, 2003). Baier and Bergstrand (2007) find that an FTA increases bilateral trade, on average, by 100 per cent after 10 years.

Other studies attempt to account for the FTA endogeneity bias by using instrumental variables in cross-sectional data (Baier and Bergstrand, 2004; Mage, 2003; Trefler, 1993). Magee (2003) employs a wide range of instruments for an FTA such an index for democracy, GDP similarities, trade surplus and similarity in capital-labour ratios. Magee (2003) finds that the estimates are very sensitive to model specification. The baseline 2SLS estimate indicates that FTAs increase bilateral traded by 800 per cent. However, when country and time-fixed effects were added into the model, the estimate was only 11 per cent. Baier and Bergstrand (2007) advice that the usefulness of instrumental variables is limited because they are likely correlated with trade flows, causing endogeneity bias.

When analysing the effect of FTAs on new goods exports or imports, the above Equation 2 cannot be used because it based on total bilateral trade. As such, the following specification is adopted,

$$\ln X_{cjt} = \beta_0 + \beta_1 \text{FTA}_{jt} + \beta_3 \text{Z}_{jt} + \gamma_j + \delta_t + \lambda_c^s + \epsilon_{jt}, \tag{3}$$

where X_{jt} denotes least-traded exports or imports to or from partner j at time t for product c. Z_{jt} controls for country-specific covariates in j at t, θ_t is a time fixed effect, δ_j is a time-invariant country-fixed effect and λ_c^s captures sector-specific shocks for product c in sector s. Choe et al. (2018) note that Equation 8 is a generalised difference-in-difference model. In their study, they estimate the causal effect of Chile's FTAs with United States and Korea on least-traded imports. The control group is Chile's border countries such as Argentina, Bolivia and Peru. The choice of border countries ensures unobservable factors such as time-invariant trade costs, culture, institutional factor are controlled. They also show that parallel trends assumption holds, with least-traded imports for control countries increasing at pre-FTA trends. In their preliminary results, they find that FTAs with Korea and the United States increases least-traded imports by \$126,000 and \$442,000.[4]

However, in most applications the parallel trends assumption does not hold due to time-varying country-specific unobservables. These factors bias the estimate of the FTA dummy variable. If time-vary fixed effects were included in Equation 3, the FTA variable would disappear. As such, this motivates my application of the SCM.

[4]In their study, they do not log the dependent variable.

Part I
Relative Analysis

6 Introduction

In this thesis Part, I compare the change in the new goods margin between Australia's FTA partners relative to a comparable group of countries that did not sign an FTA with Australia (see Figure 1).

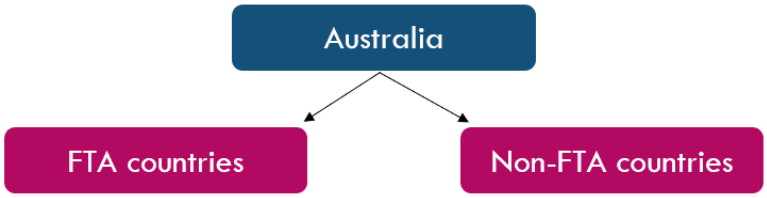


Figure 1: Relative Analysis

I analyse whether Australia's new goods margin for exports and imports has increased with FTA countries relative to non-FTA countries. Following this analysis, I investigate whether tariff reductions help explain the changes in the extensive margin.

7 Data and Methodology

7.1 Data

To analyse Australia's export and imports with its FTA and non-FTA partners, I extract annual, bilateral merchandise trade data from the World Bank Integrated Trade Solution (WITS) database.[5] The data I extract is disaggregated at the 6-digit-level according to the 1996 Harmonised System (HS) product classification. All data in the database is reported in current U.S dollar values.[6] To examine the distribution of trade at the industry-level, I assign each product to one of 16 traded industries according to the International Standard Industrial Classification (ISIC) Revision 3. A small number of products, including confidential items of trade, were dropped as no industry codes could be assigned. By consequence, my analysis includes a total of 4924 products. In table 1, I present the industry distribution of all products.

[5]Merchandise trade data can be downloaded at https://wits.worldbank.org/WITS.

[6]The database converts the value of Australia's trade into U.S dollars by using an average annual exchange rate, created by weighting the monthly exchange rate with the monthly volume of trade.

Table 1: Industry Distribution of all Products

ISIC Code	Industry Name	Number of Goods	ISIC Code	Industry Name	Number of Goods
A-B	Agriculture	305	24	Chemicals	862
C	Mining	108	25	Rubber, plastic (R/P)	116
15-16	Food	413	26	Non-metallic minerals	158
17-18	Textiles	770	27-28	Metals	594
19	Leather	67	29	Machinery	517
20	Wood	64	30-33	Electric equipment	454
21-22	Paper	151	34-35	Transport equipment	136
23	Petroleum	20	36-37	Manufacturing nec	189

7.2 FTA Partners

Currently, Australia has entered into ten FTAs. I consider the FTAs Australia ratified between 2003 and 2010. The countries include Singapore, Thailand, the United States, Chile and three members of the Association of South East Asian Nations (ASEAN): Philippines, Malaysia and Vietnam.[7] After 2010, Australia has signed FTAs with Japan in 2013, Korea in 2015 and China in 2016. I drop these countries from my sample because the post-FTA period is too short to assess the impact of the FTAs on bilateral trade.[8]

To investigate the impact of FTAs on trade patterns, I examine a pre- and post-FTA period of seven years for each FTA partner. Ideally, a before and after period of ten or more years is preferred, as tariff and non-tariff barriers are progressively reduced over an extended period (Baier and Bergstrand, 2007). However, a before and after period of ten or more years will reduce my sample size to only three FTA countries. As such, my analysis for each FTA partner covers a total of 15 years.

7.3 Defining the New Goods margin

I follow the methodology proposed by Kehoe and Ruhl (2013) to construct the new goods margin. First, I order all goods in ascending order based on their average trade value over the first three years of the pre-FTA period. By taking a three-year average, I minimise the effect of the base year in determining the order. For example, without averaging, a good that is traded in all years except for the base year may be classified as "not traded". Next, I sort goods into ten bins, with the first bin containing the first 10 per cent of trade. I construct the next bin by taking the next 10 per cent of trade. The process continues until all ten bins are formed. To ensure that each bin exactly accounts for 10 per cent

[7] I leave out the remaining members of ASEAN - Brunei, Myanmar, Cambodia and Laos - because of their limited importance in Australia's trade. I do not consider Indonesia because it joined the FTA in 2012. As such, the post-FTA period is too short to assess the impact of the FTA on bilateral trade.

[8] Australia ratified a bilateral FTA with Malaysia in 2013. The Malaysia-Australia FTA builds upon the ASEAN-Australia-New Zealand FTA, which started in 2010. As such, I view the Malaysia-Australia FTA as an amendment to the ASEAN-Australia-New Zealand FTA, which further reduces trade barriers between the two countries. Amendments to original FTAs are common. For example, Australia and Singapore have amended their bilateral FTA three times since its implementation in 2003.

of trade, I follow Kehoe and Ruhl's (2013) recommendation to split some products across different bins.[9]

I classify goods in the first bin as least-traded goods (new goods margin), as the first bin contains goods that are not traded or traded in very low volumes. This methodology developed by Kehoe and Ruhl (2013) is superior to other methods, such as using a fixed cutoff value, because the first bin reflects the relative importance of the new goods margin in each trading relationship.[10]

8 Trade Patterns of the New Goods Margin

8.1 FTA Partners

I compute a time-plot of the share of total exports and imports accounted for by least-traded goods for each FTA partner (see Figures 2 and 3). On the import side, I find that the share of least-traded goods from a majority of partners begins to increase prior to the ratification of the FTAs. In particular, imports from Chile and Singapore experience rapid growth in their share of least-traded goods. Also, imports from the Philippines, Vietnam and Thailand experience moderate growth in their share of least-traded imports during the pre-FTA period. After signing FTAs with these three countries, the growth in the share of least-traded imports intensifies. On the export side, there is significantly less cross-country variation in the share of least-traded exports. Across all countries, the share of least-traded exports increases, on average, at a slower rate than least-traded imports in the pre- and post-FTA period. In the final year of the post-FTA period, least-traded exports to 6 out of 7 partners account for only 15 to 25 per cent of total exports. By contrast, least-traded imports from 5 out of 7 partners account for more than 25 per cent of total imports. Overall, my calculations suggest that trade with FTA countries, on average, is associated with an increase in the new goods margin. However, it appears that the new goods margin increases more for imports than exports. To investigate whether this hypothesis is correct, in the next subsection, I construct a comparison group of thirteen countries that did not sign an FTA with Australia between 1996 and 2017. By constructing a comparison group, I can compare the change in the share of the new goods margin for exports and imports between FTA and non-FTA countries.

[9] To see how products are split across different bins, consider two goods, x_1 and x_2. The good, x_1, is just below the 10 per cent bin and the good, x_2, is just above the 10 per cent bin. To split x_2 by trade value, I use the formula, (0.1 - total trade share until x_1)/(total trade share until x_2 - total trade share until x_1)*trade value of x_2. To split x_2 by product number I use the formula, (product number of x_1) + (0.1 - total trade share until x_1)/(total trade share until x_2 - total trade share until x_1).

[10] Other studies such as Hummels and Klenow (2005) classify the extensive margin as goods that have zero trade value in a given year. Kehoe and Ruhl (2013) note that interpreting zero-valued observations in trade data is difficult, as small-value shipments tend to go unreported and different countries require exports and imports to be reported only above a specific shipment value. Evenett and Venables (2002) classify the extensive margin as goods that have a trade value of less than $50,000 in a given year. Cho et al. (2018) note that a $50,000 cutoff value is arbitrary due to its invariance across different trading relationships. For example, using a $50,000 cutoff value for Australia's trade with small nations would mean that very few products would be classified as intensively traded.

Figure 2: Time Series of Australia's LT Exports (per cent of Total Exports)

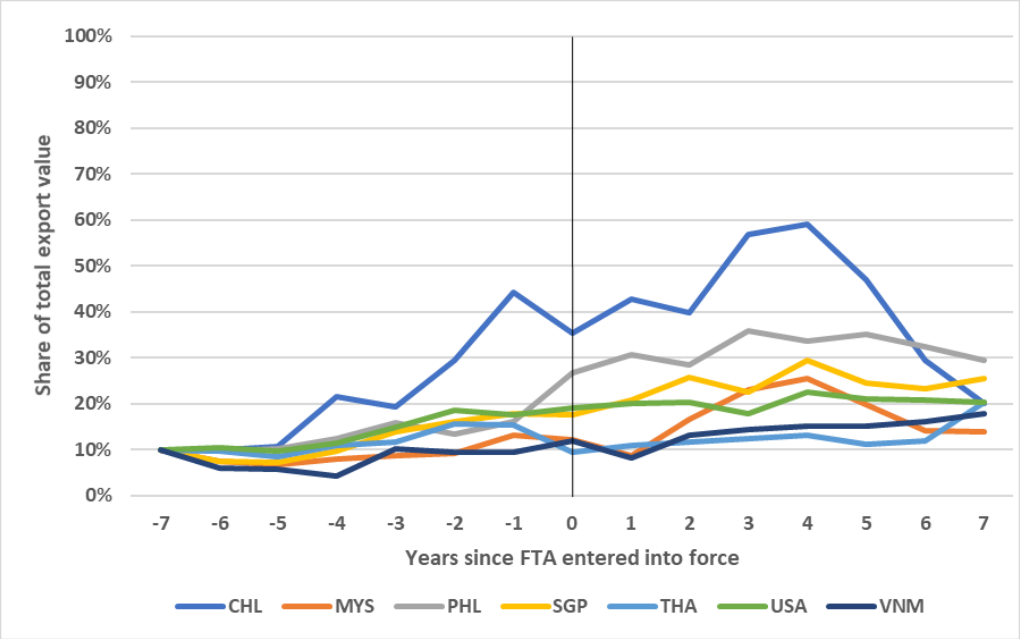
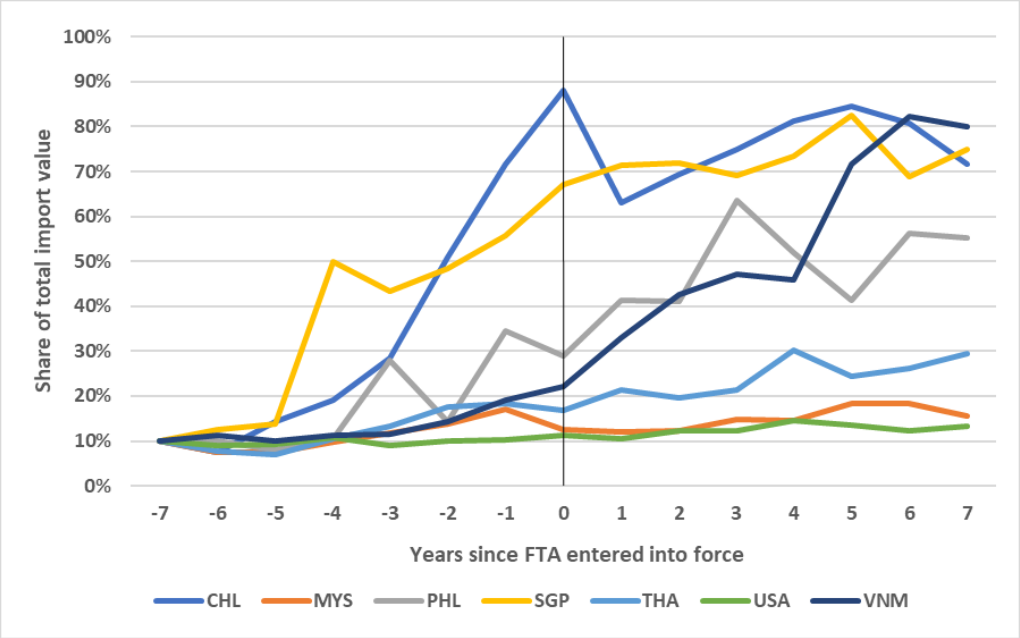


Figure 3: Time Series of Australia's LT Imports (per cent of Total Imports)



8.2 Constructing a Comparison group

To construct the comparison group, I employ the methodology developed by Cho et al. (2018). In their study, Cho et al. (2018) choose a group of non-FTA countries that collectively account to a similar share of Korea's total trade between the FTA group before the

ratification of the first FTA.[11] They also aim to ensure that the geographical distribution of FTA and non-FTA countries is comparable.[12] In Table 2, I present the countries in each group with their corresponding shares of total trade (STT) and their distance from Australia (DFA).[13] The share of total trade of the two groups is very similar, with a difference of only 0.01 percentage points. The distance from Australia for countries in both groups varies on average by 1,600 km, which is economically insignificant given Australia's size and geographical position. Since the FTAs were not ratified in a single year, for each non-FTA country, I analyse a period of 15 years to correspond with a similar FTA counterpart. I match FTA and non-FTA countries based on two factors: their distance from Australia and their composition of trade with Australia. For example, for Peru, we consider the years 2002 - 2016, which is the same as Chile. For Saudi Arabia and the UAE, we consider the same years as Singapore because in all three countries trade with Australia is dominated by petroleum (crude and refined), meat (excluding beef) and equipment parts for ships and telecommunications.

Table 2: FTA and Non-FTA countries

FTA countries					Non-FTA countries			
Country	Year of FTA	Period Analysed	STT (%) (average 1990 - 2002)	DFA (kms)	Country	Period Analysed	STT (%) (average 1990 - 2002)	DFA (kms)
SGP	2003	1996-2010	3.91	4,381	HKG	1996-2010	2.41	5,716
THA	2005	1998-2012	1.81	5,798	SAU	1996-2010	1.05	11,005
USA	2005	1998-2012	14.89	15,201	UAE	1996-2010	0.76	10,176
CHL	2009	2002-2016	0.12	12,748	TWN	1998-2012	3.77	5,624
MYS	2010	2003-2017	2.44	4,751	EU	1998-2012	14.15	14,976
PHL	2010	2003-2017	0.79	4,442	DEU	1998-2012	3.67	14,482
VNM	2010	2003-2017	0.64	5,179	ESP	1998-2012	0.56	15,771
					FRA	1998-2012	1.72	15,176
					GBR	1998-2012	4.85	15,223
					ITA	1998-2012	2.26	14,398
					NLD	1998-2012	1.09	14,810
					PER	2002-2016	0.04	15,092
					IND	2003-2017	1.19	7,822
					PNG	2003-2017	1.23	2,373
Total STT			24.60				24.61	
Average DFA				7,500				9,098

In addition, I compute a similarity index to ensure that products traded between FTA and non-FTA countries are similar over the sample period. The similarity index was developed by Finger and Kreinin (1979) to measure the similarity of *export* patterns of two countries

[11] I consider the average share of Australia's trade between each FTA and non-FTA country between 1990 and 2002. The dataset on Australia's trading partners was downloaded from the Department of Foreign Affairs and Trade (DFAT) website. The dataset covers Australia's trade from 1990 to present.

[12] The difference in mean distance is also statistically insignificant. A two-tail, t-test gives a p-value of 0.50, which is greater than the five per cent significance level.

[13] As I have matched the United States with Australia's top six European Union (E.U) trading partners, I consider the share of total trade and distance from Australia to the six E.U trading partners as a single, average number.

in reference to a third country. Formally, the index is defined by the formula:

$$S(ab,c) = 100\left(\sum_i \text{Minimum}\left[X_i(ac), X_i(bc)\right]\right). \tag{4}$$

The index measures the similarity of exports (X_i) of 'a' and 'b' to 'c'. I modify Finger and Kreinin's (1979) index to measure the similarity of Australia's exports and imports between FTA and non-FTA countries. First, I define 'a' to be either FTA or non-FTA countries, 'b' as the world and 'c' as Australia. By modifying the index, I compare Australia's trade between FTA and non-FTA countries in reference to Australia's trade with the world. I choose the world as the reference because it minimises the bias of either FTA and non-FTA countries having a similar trading pattern to a particular country or regional group. If the product distribution of Australia's trade between either FTA or non-FTA countries is identical with Australia's trade with the world, the index will take on a value of 100. If the distribution is dissimilar, the index will take on a value of 0. To give a simple example, if Australia's *exports* to FTA and non-FTA countries and the world are composed of two products of differing values, the export similarity index can be calculated as shown below:

Product	**FTA**	$X_i(ac)$	**non-FTA**	$X_i(ac)$	**World**	$X_i(bc)$
1	\$120	0.40	\$280	0.56	\$1000	0.33
2	\$180	0.60	\$220	0.44	\$2000	0.67
Total	\$300	1.00	\$500	1.00	\$3000	1.0

For FTA countries:

$$S(ab,c) = 100[\min(0.4, 0.33) + \min(0.6, 0.67)] = 93. \tag{5}$$

For non-FTA countries:

$$S(ab,c) = 100[\min(0.56, 0.33) + \min(0.44, 0.67)] = 77. \tag{6}$$

The example above shows that the index is not influenced by the relative size of total exports in each group. However, the index is sensitive to aggregation bias (Kellman and Schroder, 1983). In my study, the aggregation bias is not of concern because I calculate the index at the 6-digit product level. Figures 4 and 5 show the export and import similarity index for both FTA and non-FTA countries. I find that the distribution of trade between FTA and non-FTA countries is relatively similar and stable over time. Exports between the two groups are more similar than imports however the FTA import similarity index appears to converge to the non-FTA import similarity index. Overall, I am confident that my group of non-FTA countries are a reasonable comparison group.

Figure 4: Export Similarity Index

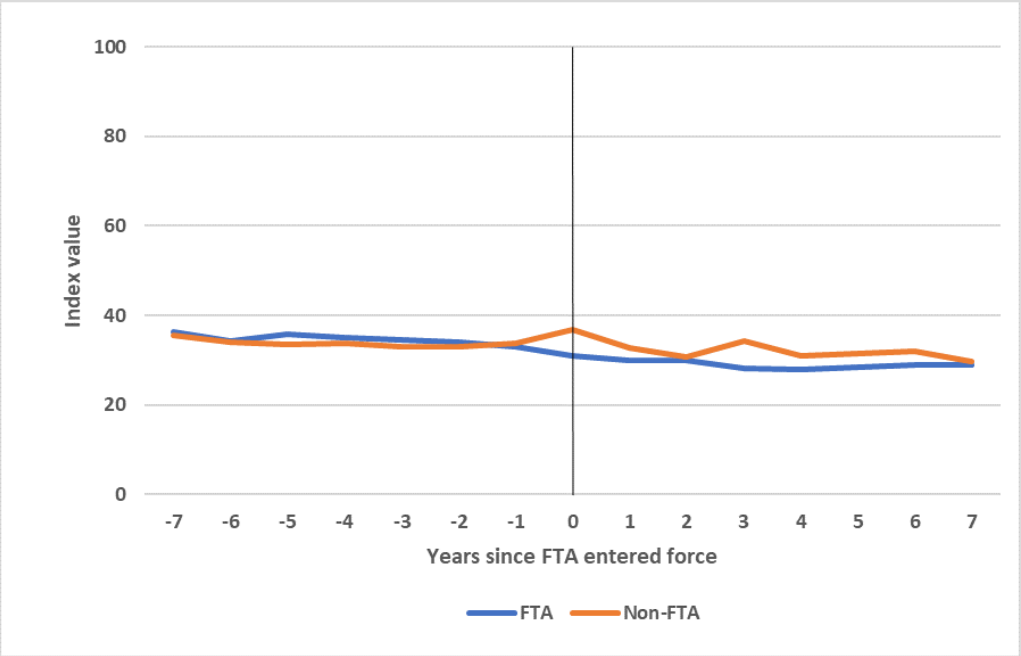
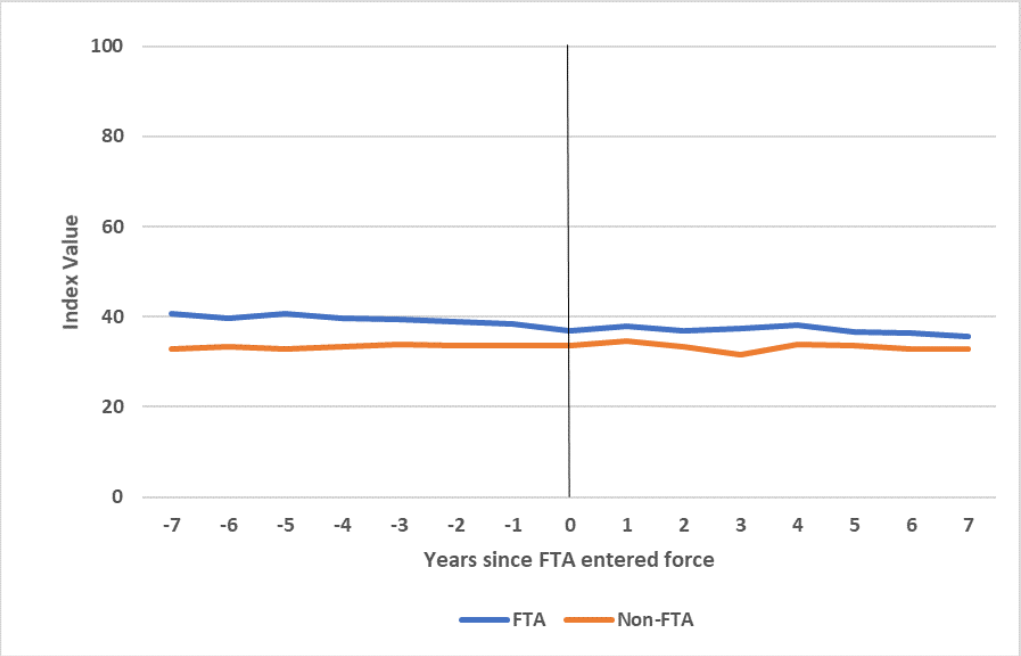


Figure 5: Import Similarity Index



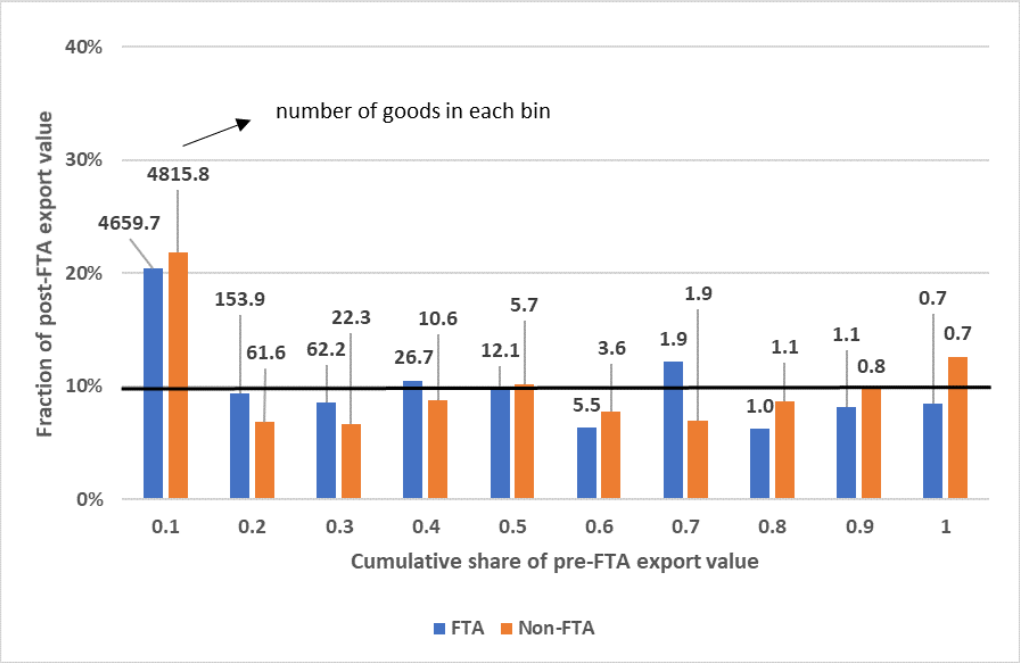
8.3 FTA vs. Non-FTA countries

To determine whether the new goods margin increases between FTA and non-FTA countries, I break down Australia's exports and imports according to Kehoe and Ruhl's (2013) methodology.[14] The 10 bars in Figures 6 and 7 correspond to the ten bins that each

[14]Unless otherwise noted, the averages I report in this section, and all following sections are weighted averages for FTA and non-FTA countries. The weights correspond to each country's share of total trade between 1996 and 2017 as shown in Table 7 (see Appendix - Section 17.1). Trends for specific FTA and

account for 10 per cent of trade in the base year (seven years before the ratification of each FTA). The numbers on top of each bar denote the average number of goods in each bin. The distribution of trade is heavily skewed, with least-traded exports and imports accounting for at least 94 per cent and 90 per cent of all products. The values on the vertical axis denote the average fraction of total trade accounted by each of the ten bins in the final year (seven years after the ratification of each FTA). If trade growth is driven entirely by the intensive margin, each bin will still account for 10 per cent of trade in the final year. By contrast, if the growth in trade is driven entirely by the new goods margin, the first bin would account for more than 10 per cent of trade, and the trade shares of the other nine bins would decline.

Figure 6: Composition of Australia's Exports



non-FTA countries are presented in the Appendix (Section 17.1).

Figure 7: Composition of Australia's Imports

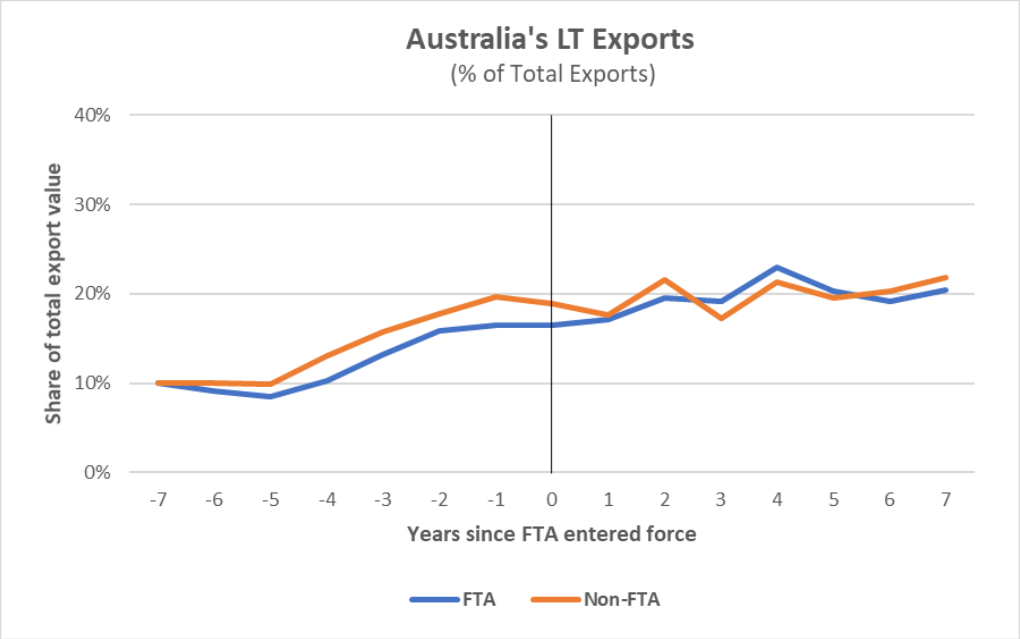
As shown in Figure 6, least-traded exports experience a slightly larger expansion with non-FTA countries than with FTA countries. The share of least-traded exports to FTA countries grew to account for 20 per cent of total exports, compared to 22 per cent for non-FTA countries. This result is contrary to all previous studies on the topic, such as Kehoe and Ruhl (2013) for the case of NAFTA partners, Choe et al. (2018) for Korea's trade with its FTA partners and Choe and Diaz (2018) for the case of Baltic countries and EU membership.[15] In these studies, the authors find that the share of least-traded exports increases rapidly following trade liberalisation. Kehoe and Ruhl (2013) argue that trade liberalisation is the key factor which increases the trade share of the new goods margin. This argument proposed by Kehoe and Ruhl (2013) holds on the import side, where least-traded imports from FTA partners went on to account for 32 per cent of total imports, compared to 20 per cent from non-FTA partners (see Figure 7).

To determine whether the new goods margin increased as a result of the FTAs, I compute a time-plot of the share of total exports and imports accounted for by least-traded goods (see Figure 8 and 9). If the increase in the share of least-traded goods in FTA countries coincides with the ratification of an FTA, it provides evidence that FTAs increase the new goods margin (Kehoe and Ruhl, 2013). For imports, the share of least-traded goods from FTA and non-FTA countries diverges after the implementation of the FTAs. The share of least-traded imports increases by 8.0 percentage points from FTA countries compared to a decline of 0.64 percentage points from non-FTA countries. On the export side, I find that the evolution of the share of least-traded exports to both FTA and non-FTA countries is very similar over the sample period. Following the implementation of the FTAs, the share

[15] NAFTA refers to the North American Free Trade Agreement which includes the United States, Canada and Mexico.

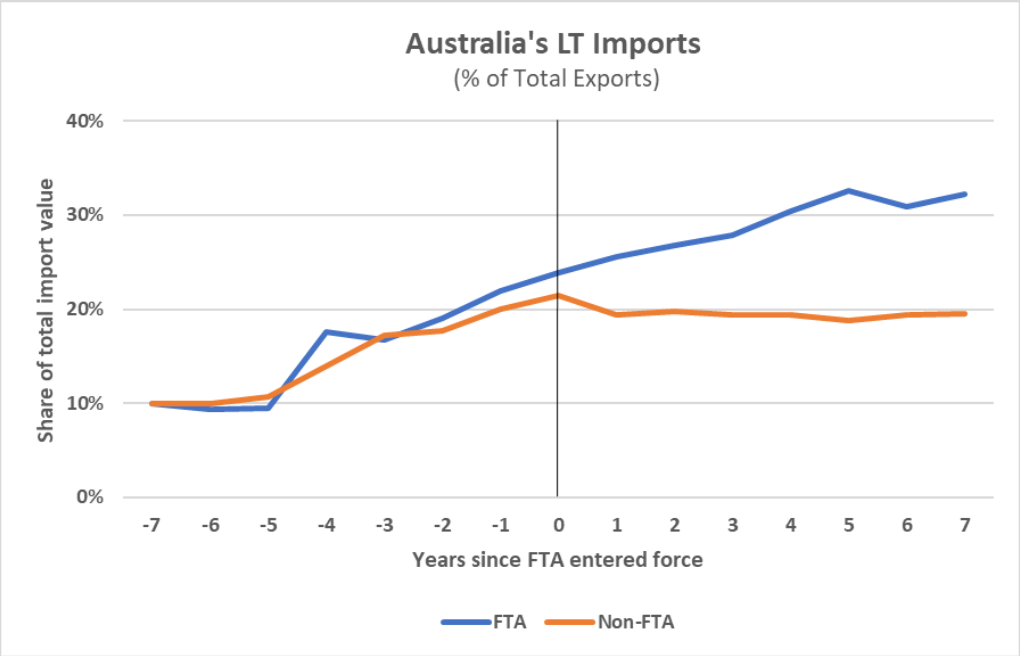
of least-traded exports to both FTA and non-FTA countries increases by 3.0 percentage points. Consequently, this result complements my analysis in Section 7.1, by showing that in comparison to non-FTA countries, trade with FTA countries is associated with an increase in the new goods margin for imports but not exports.[16]

Figure 8: Time Series of Least-traded Exports



[16]I also, analyse the change in the new goods margin in further detail. The results are presented in the appendix. First, I investigate whether a small number of goods drives the increase in the new goods margin across FTA and non-FTA countries. Second, I examine whether least-traded goods in the pre-FTA period become heavily-traded in the post-FTA period. Third, I analyse whether heavily-traded goods in the pre-FTA period continue to dominate trade in the post-FTA period.

Figure 9: Time Series of Least-traded Imports



9 New Goods Margin and Tariffs

The Productivity Commission notes that Australia's FTAs have resulted in substantial bilateral tariff reductions (PC, 2010). In each of Australia's FTAs to date, over 95 per cent of exports and imports are eligible to enter duty-free or at preferential rates within five years of the FTAs' implementation. Given the disproportionate growth in the share of least-traded imports from Australia's FTA partners, an obvious question is whether least-traded imports were subject to higher tariffs before the FTA and thus benefited from a larger tariff reduction.

To conduct this analysis, I extract tariff data at the 6-digit product level from the UNCTAD Trade Analysis Information System (TRAINS) database. The database contains three types of *ad valorem* tariffs; Most Favoured Nation (MFN), Bound Tariff (BT) and Effectively Applied (EA). I collect data on EA tariffs for two reasons. First, EA tariffs are the lowest available tariffs and include zero tariff rates. MFN tariffs are the lowest tariff rates available for products traded between non-FTA partners. As such, the tariff rates will be recorded as an EA tariff. Second, under FTAs, a vast majority of tariffs are reduced below the MFN tariff rate. By consequence, the new tariff rates will be recorded as an EA tariff.[17]

[17]It must be noted that when using EA tariffs, two implicit assumptions are made. First, I assume that Australia and its FTA partners do not apply MFN tariffs on products that fail to comply with Ro0. Second, I assume that all firms in Australia and its FTA partners will comply with Ro0 to gain preferential access. The Productivity Commission finds anecdotal evidence of exporters and importers forgoing preferential access because compliance costs exceed the benefits of lower tariffs. These two assumptions are necessary because data does not exist on which products fail to comply with Ro0 and which firm forgo preferential access.

EA tariffs for exports and imports are collected separately for each FTA and non-FTA country. Each country reports their tariff schedules using a different product classification system for different years. I use a concordance table provided in the WITS database to convert the product classification system in each tariff schedule to the 1996 HS product classification system. Also, for many products, EA tariff rates are not always reported in all years. To rectify this problem, I use data from the closest available year to replace the missing values. For a very few products, EA tariff rates are missing for all years. In this case, I use the sub-industry average tariff rate to replace the missing values. Next, I merge tariff data with merchandise trade data used in Sections 6 - 7.

I focus on comparing tariffs applied on top least-traded (TLT) goods and intensive goods in the first year of the pre-FTA period and the final year of the post-FTA period. TLT goods are made of least-traded goods that account for the top 67 per cent of new goods traded in the post-FTA period. The rationale for focusing on TLT goods is that tariffs applied to all least-traded goods may not be accurate as most least-traded goods remain non-traded after an FTA (Cho et al., 2018).[18] As presented in Table 3, I find that in the pre-FTA period, TLT goods were subject to higher tariffs than intensive goods in both FTA and non-FTA countries. By the final year of the post-FTA period, tariffs on TLT goods and intensive goods were significantly reduced between FTA countries than compared to non-FTA countries. However, across FTA and non-FTA countries, tariffs were reduced by a greater magnitude for TLT goods than intensive goods. As such, I expect the share of least-traded goods to increase in both FTA and non-FTA countries. In Section 8.3, I documented that the share of least-traded exports and imports increases in both FTA and non-FTA countries.

Table 3: Tariff Rates on Australia's TLT goods and Intensive goods

	TLT goods			Intensive margin		
Trade Flow	Pre-FTA (%)	Post-FTA (%)	Δ	Pre-FTA (%)	Post-FTA (%)	Δ
Exports to:						
FTA countries	11.53	2.52	9.01	8.12	1.50	6.62
non-FTA countries	7.71	4.83	2.88	5.25	3.20	2.05
Imports from:						
FTA countries	5.66	0.11	5.55	4.52	0.06	4.46
non-FTA countries	7.88	3.33	4.55	5.10	3.43	1.67

Notes: For the Pre-FTA columns, the average tariff rates are weighted by the pre-FTA trade value of each country in the FTA or non-FTA group. For the Post-FTA columns, the average tariff rates are weighted by the post-FTA trade value of each country in the FTA or non-FTA group.

For TLT exports, I find that tariffs were reduced by 9.0 percentage points by FTA countries, and by only 2.9 percentage points by non-FTA countries. For TLT imports, tariffs applied to FTA and non-FTA countries were reduced by relatively similar magnitudes.

[18] I also compare tariffs applied on all least-traded goods and intensive goods. The results are presented in the appendix (see Section 17.3). The results are similar to Table 3.

However, when compared to tariff reductions for intensive imports, tariffs on TLT imports were reduced by a greater magnitude for non-FTA countries than FTA countries. Specifically, tariffs on TLT imports from non-FTA countries were reduced by an additional 2.88 percentage points than compared to intensive imports, while tariffs on TLT imports from FTA countries were reduced only by an additional 1.09 percentage points. On the export side, tariffs on TLT exports to FTA countries were reduced by an additional 2.39 percentage points than compared to intensive exports, while tariffs on TLT exports to non-FTA countries were reduced only by an additional 0.83 percentage points. As a result, if tariffs are a key factor driving the increase in the new goods margin, I expect the share of least-traded exports to FTA countries to be higher than compared to non-FTA countries. Also, I expect the share of least-traded imports from FTA partners to be similar or lower than compared to non-FTA partners.

However, in Section 8.2, I documented that the share of least-traded exports to FTA countries was 2.0 percentage points lower than compared to non-FTA countries. On the import side, the share of least-traded imports from FTA countries was 12.0 percentage points higher than compared to non-FTA countries. These inconsistencies suggest that tariff reductions may not play a significant role in explaining changes in the extensive margin across FTA and non-FTA countries.[19]

10 Discussion and Concluding Remarks

In this thesis Part, I find that in comparison to non-FTA countries, trade with FTA countries is associated with an increase in least-traded imports but not least-traded exports. A possible explanation for this result may be due to Australia's lack of export diversity. As stated in the introduction, Australia's export base has drastically narrowed. In 2016, over 75 per cent of Australia's exports are concentrated in two sectors, agriculture and mining. Most products in agriculture and mining sectors were already intensively traded. By consequence, the growth in Australia's least-traded exports is likely constrained. Therefore, an FTA is unlikely to increase least-traded exports.

Additionally, I find that tariff reductions do not explain the change in the new goods margin in both FTA and non-FTA countries. This finding suggests that other factors such as product-specific trade elasticities and reductions in non-tariff barriers may explain why the share of least-traded imports from FTA countries increases disproportionately compared to the share of least-traded exports to FTA countries. This conclusion is consistent with Debaere and Mostashari (2010) who find that tariff reductions explain only 5 per cent of the increase in the extensive margin for U.S imports between 1989 and 1999.[20] As such, fu-

[19] I also computed the change in average tariff rates by industry for least-traded exports and imports for both FTA and non-FTA countries. I find that there is a weak relationship between the reduction in tariffs and the change in industry share in both FTA and non-FTA countries. In most cases, industries which experienced the greatest tariff reductions did not increase their share of least-traded exports and imports. The results are presented in the Appendix.

[20] Also, I estimate the effect of tariffs on the new goods margin using a gravity equation similar to

ture research could uncover which specific factors drive the change in the extensive margin.

The implications of my findings, though useful, suffer from four key limitations. First, in most of the calculations, I implicitly assume that all FTAs are the same. In reality, each FTA that Australia has signed is different. For example, the Australia-United States FTA (AUSFTA) was more focused on intellectual property and copyright issues while the Thailand-Australia FTA (TAFTA) was more focused on reducing bilateral trade barriers for merchandise goods. Second, the results are sensitive to the years considered and the comparison countries chosen. I have attempted to mitigate this problem by selecting a group of non-FTA countries that are similar to the FTA countries. However, the problem of selection bias persists. Country pairs endogenous select to enter FTAs, which may overstate the change in the extensive margin relative to non-FTA countries (Baier and Bergstrand, 2007). Third, as my analysis compares two points in time, valuable information between the first year of the pre-FTA period and the final year of the post-FTA period is ignored. Besedes and Prusa (2011) argue that a point-to-point comparison of trade data ignores information on firm entry and exit during the intervening years. Fourth, a point-to-point comparison of the extensive margin cannot separate the effect of an FTA from time-varying factors such as changes in GDP, GDP per capita and the exchange rate.

Overall, the four limitations are a motivation for using the synthetic control method (SCM) to identify the causal effect of Australia's FTAs on the extensive margin. The advantages of using the SCM is that it avoids selection bias on observable and unobservable characteristics and controls for time-varying factors.

Cheong et al. (2018). However, I use a Poisson pseudo-maximum likelihood estimator (PPML) to account for heteroskedasticity in the error term and zero-valued observations. Also, for comparison purposes, I estimate the gravity equation using log, probit and Gaussian PML specifications. To account for tariff endogeneity, I use panel techniques recommended by Baier and Bergstrand (2007). I find that the coefficient estimate on tariff is quite unstable across different specifications and in some cases even positive. As such, the results are not reported in this thesis.

Part II

Identifying the Causal Effect - The Synthetic Control Method

11 Introduction

To estimate the causal effect of Australia's FTAs on least-traded exports and imports, I apply the SCM developed by Abadie and Gardeazabal (2003) and extended in Abadie et al. (2010). The SCM constructs a weighted combination of comparison units from a sample of countries that did not sign an FTA with Australia's FTA partner. The synthetic control is chosen to best approximate the most relevant characteristics of the treated unit. The rationale for using a weighted combination of comparisons units is that a single untreated unit typically does a poor job of approximating the most relevant characteristics of the treated unit. After an FTA is implemented, the SCM can be used to estimate the counterfactual situation of Australia's least-traded exports and imports in the absence of an FTA with its FTA partner. To give an example of an application of the SCM, consider the following example where Australia ratified an FTA with Singapore in 2003.

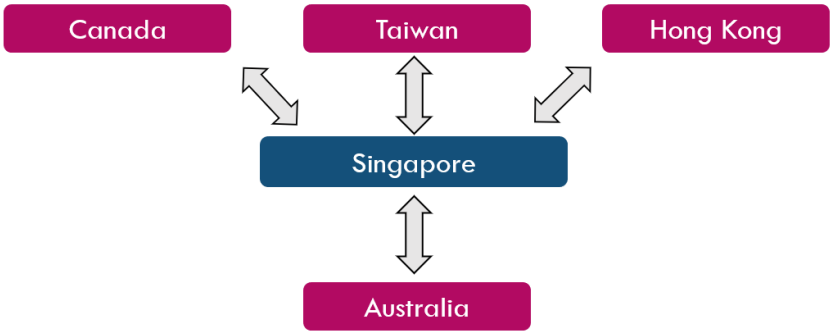


Figure 10: Example - Application of the SCM

The sample of potential control countries that have not implemented an FTA with Singapore include, Canada, Taiwan and Hong Kong.[21] The SCM will choose a weighted combination from these three countries to approximate the most relevant characteristics of Australia. By constructing a synthetic control, I can estimate the treatment effect of the Singapore-Australia FTA on Australia's least-traded exports and imports with Singapore.

[21] My sample of potential control countries for each FTA partner is more than 20. The three countries were chosen to give an example of how the SCM is applied.

12 Methodology - The Synthetic Control Approach

12.1 Theoretical set-up

To implement the SCM, the dataset must be a balanced panel. I assume that we observe a panel of least-traded exports or imports for $J+1$ countries over T periods with a common trading partner. Only one country, Australia ($i = 1$), implements an FTA with the common trading partner at time $T_0 < T$, while the remaining J potential control countries have no FTA with the common trading partner for all T periods. These potential control countries constitute the "donor pool". The treatment effect of the FTA for Australia's least-traded exports and imports at time $t > T_0$ can be defined as

$$\tau_{1t} = X_{1t}^I - X_{1t}^N = X_{1t} - X_{1t}^N, \tag{7}$$

where X_{1t}^I and X_{1t}^N denotes the potential outcome that would be observed with and without the FTA.[22] My aim is to estimate the vector $(\tau_{1T_0+1}, ..., \tau_{1T})$. The average treatment effect (ATE) is the mean of the vector $(\tau_{1T_0+1}, ..., \tau_{1T})$.

For any period $t > T_0$, estimating the treatment effect using Equation 7 is impossible because the counterfactual, X_{1t}^N, is never observed. Nevertheless, Abadie et al. (2010) assume that the potential outcomes for all units that do not receive treatment, X_{it}^N, can be represented by the following factor model (Abadie et al., 2010):

$$X_{it}^N = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \epsilon_{it}, \tag{8}$$

where δ_t is a time-specific constant; θ_t is a vector of time-specific parameters, Z_i is a vector of observed country-specific covariates that are not affected by the treatment. The covariates can be either time-invariant or time-varying and may also be pre- or post-FTA. Also, λ_t is a vector of unobserved common factors; μ_i is a vector of country-specific unobservables, and ϵ_{it} are zero-mean transitory shocks at the country level. In contrast to the difference-in-difference specification, the factor model allows λ_t to vary with time rather than be constant in time. As such, time-varying confounders do not pose a threat to identification.

To construct the synthetic control, I first define W as a (J X 1) vector of weights equal to $(w_2, ..., w_{J+1})'$, such that $w_j \geq 0$ for $j = 2, ..., J+1$ and $\sum w_j = 1$. Each value of W represents a potential synthetic control for Australia. For a given W, the outcome of a synthetic control at time t can be represented as follows

$$\sum_{j=2}^{J+1} w_j X_{jt} = \delta_t + \theta_t \sum_{j=2}^{J+1} w_j Z_j + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \epsilon_{jt}. \tag{9}$$

Abadie et al. (2010) assume that there exists an optimal vector, w^*, equal to $(w_2^*, ..., w_{J+1}^*)$

[22] I assume that FTAs do not have an affect the outcome before the implementation of the FTA (Abadie et al., 2010). Hence, $X_{1t}^I = X_{1t}^N$ at time $t < T_0$. However, in practice, exports and imports of least-traded goods can increase prior to the ratification of an FTA due to anticipation effects.

such that

$$\sum_{j=2}^{J+1} w_j^* X_{jt} = X_{1t} \quad \forall t \in \{1, ..., T_0\} \tag{10}$$

and

$$\sum_{j=2}^{J+1} w_j^* Z_j = Z_1. \tag{11}$$

Therefore,

$$\hat{\tau}_{1t} = X_{1t} - \sum_{j=2}^{J+1} w_j^* X_{jt} \tag{12}$$

is an unbiased estimator of τ_{1t} $\forall t \in \{T_0 + 1, ..., T\}$. Conditions 11 and 12 will hold exactly only if $(X_{11}, ...X_{1T_0}, Z_1^{'})$ belongs to the convex hull of $\{(X_{21}, ..., X_{2T_0}, Z_2^{'}), ..., (X_{J+11}, ..., X_{J+1T_0}, Z_{J+1}^{'})\}$. In certain cases, a synthetic control cannot be constructed because $(X_{11}, ...X_{1T_0}, Z_1^{'})$ falls far from the convex hull of $\{(X_{21}, ..., X_{2T_0}, Z_2^{'}), ..., (X_{J+11}, ..., X_{J+1T_0}, Z_{J+1}^{'})\}$. By consequence, it is imperative to choose countries in the donor pool that have similar characteristics to Australia.

In practice, it is very rare to find a set of weights such that Conditions 11 and 12 will be satisfied in the dataset. Hence, the synthetic control weights, w^*, are estimated such that Conditions 11 and 12 hold approximately.[23] To estimate w^*, let Y_1 be a (k X 1) vector of pre-FTA characteristics of Australia equal to $(Z_1^{'}, X_{11}, ..., X_{1T_0})^{'}$. Also, let Y_0 be a (k X J) matrix which contains the same pre-FTA characteristics for the untreated trading partners, such that column j of X_0 is equal to $(Z_j^{'}, X_{j1}, ..., X_{jT_0})^{'}$. The vector w^* is chosen to minimise the following pseudo-distance

$$||Y_1 - Y_0 w||v = \sqrt{(Y_1 - Y_0 w)' V (Y_1 - Y_0 w)}, \tag{13}$$

where V is a (k x k) symmetric and positive semidefinite matrix.[24] I assume that V is diagonal, with the main diagonal equal to $(v_1, ..., v_k)$. The choice of V is critical because w^* depends on the choice of V. Hence, V should assign larger weights to pre-FTA covariates that have higher predictive power on Australia's new goods margin. Hence, I choose V such that the mean squared prediction error (MSPE) of the outcome variable,

[23] An alternative method of constructing weights is to use an elastic net specification developed by Doudchenko and Imbens (2016). The elastic net specification places does not restrict on w_j. In contrast to the synthetic control method developed by Adabie et al. (2010), the elastic net method performs better in settings with a larger number of potential control countries. The elastic net method was not applied in this study because the specification is a new concept and the code is not freely available.

[24] To reduce interpolation bias, Abadie and L'Hour (2018) include a penalty term on the LHS of Equation 13 to penalise pairwise discrepancies between the pre-treatment characteristics of the treated unit and the synthetic control. The penalty term is a new, theoretical concept and has not yet been applied into the computation of synthetic controls.

$$\sum_{t=1}^{T_0} \left(X_{1t} - \sum_{t=1}^{J} w_j^* X_{jt} \right)^2, \tag{14}$$

is minimised in the pre-FTA period.[25]

12.2 Addressing the endogeneity of FTAs

As noted in the literature review, country pairs endogenously select into FTAs due to observable and unobservable determinants. Since the synthetic control constructs a counterfactual outcome using a combination of countries in the donor pool that have similar pre-intervention outcome trajectories as the treated unit, it replicates the observed and unobserved heterogeneity. Formally, a synthetic control will provide an unbiased estimate of X_{1t}^N if

$$\sum_{j=2}^{J+1} w_j^* Z_j = Z_1 \tag{15}$$

and

$$\sum_{j=2}^{J+1} w_j^* \mu_j = \mu_1. \tag{16}$$

However, this method is unfeasible since $\mu_1, ..., \mu_{J+1}$ is not observed. Abadie et al. (2010) show that the factor model in Equation 8 implies that a synthetic control can fit Z_1 and a long set of pre-intervention outcomes, $Y_{11}, .., Y_{1T_0}$, only as long as it fits Z_1 and u_1. As a result, the authors state that Equations 15 and 16 hold approximately. The intuition of this result is that the synthetic control and the treated unit can only have the same trajectory in pre-FTA period if the observed and unobserved factors are alike and the effect of these factors on the outcome variable is the same. Overall, if we find that treated unit and the synthetic control unit have a similar trajectory prior to the pre-FTA, a discrepancy in the outcome variable after an FTA can be interpreted as produced by the FTA.

12.3 Constructing a Synthetic Version of Australia

Due to data limitations, my empirical focus is on the FTAs that Australia has signed with Singapore, Thailand and the United States.[26] I employ the SCM to estimate the ATE of

[25] An alternative procedure to choose V is to use cross-validation (Abadie et al., 2015). The rationale for using cross-validation is that the SCM operates in-sample, making it difficult to assess the validity of the synthetic control. To mitigate this problem, the pre-treatment period is divided into an initial training period and a subsequent validation period. V is selected by minimising the out-of-sample prediction error in the validation period. To apply cross-validation, the number of pre-FTA periods must be sizeable. In Abadie et al. (2015), the number of pre-intervention periods was 30 years. In my study, the pre-FTA period is between 11 and 13 years. As such, the cross-validation technique was not applied.

[26] The SCM could not be applied to the Chile-Australia FTA (ACLFTA) and the ASEAN-Australia-New Zealand FTA (AANZFTA) due to data limitations. The ACLFTA and AANZFTA were ratified in 2009 and 2010. This fact limits our ability to construct an adequate set of potential control countries because

each FTA on Australia's least-traded exports and imports with the FTA partner. For each FTA partner, I construct two country-level panel datasets, one for least-traded exports to the FTA partner and the other for least-traded imports from the FTA partner. The sample period is between 1992 - 2015. I use the year 1992 as a starting date because it avoids the results being affected by the 1990 - 1991 recession that occurred in Australia and other Western economies such as the United States. The sample period ends in 2015, giving 13 years of post-FTA data for Singapore-Australia FTA (SAFTA) and 11 years of post-FTA data for Thailand-Australia (TAFTA) and the Australia-United States FTA (AUSFTA).

Recall that the synthetic Australia is constructed as a weighted average of potential control countries in the donor pool. The synthetic Australia is meant to best reproduce Australia's new goods margin with the FTA partner in the absence of an FTA. As such, the donor pool should be different for each FTA application. Hence, for each FTA country, I construct a new donor pool by choosing its top-30 non-FTA trading based on total trade in the pre-FTA period.[27]

The outcome variable, $\ln X_{it}$, is the log of country i's least-traded exports or imports with the FTA partner at time t. To construct a panel dataset, I extract annual, bilateral merchandise trade data at the 6-digit product level from the WITS database. I construct the new goods margin for Australia and each country in the donor pool by using the methodology developed by Kehoe and Ruhl (2013).[28] For the pre-FTA characteristics in X_1 and X_0; I rely on a standard set of covariates typically used in a gravity model to estimate exports and imports between country pairs. The covariates include:

1. Log of GDP of country i.
2. Log of GDP per capita of country i.
3. Log of distance between country i and Australia's FTA partner.
4. Dummy for common language, equal to 1 if country i shares a common language with Australia's FTA partner.
5. Dummy for common legal system, equal to 1 if country i shares a common legal system with Australia's FTA partner.
6. Dummy for common coloniser, equal to 1 if country i shares a common colonial history with Australia's FTA partner.
7. Nominal exchange rate expressed as units of U.S dollars (USD) per one unit of domestic currency i.
8. Two lagged terms of the outcome variable.

data is readily available only until 2015. A post-FTA period to 2015 is too short.

[27] The list of countries in the donor pool is listed in the Appendix.

[28] See Section 6 for more information.

I collect data on covariates (1)-(6) from the CEPII Gravity database.[29] Data on GDP and GDP per capita is reported in current U.S dollars. Distance between country i and the FTA country is calculated using the simple distance in kilometres between the two most populated cities in each country. I extract data on nominal exchange rate from the United States Department of Agriculture website.[30] In the dataset, the nominal exchange rates are expressed as units of domestic currency i per one unit of USD. As the value of the new goods margin is recorded in U.S dollars, I express the exchange rates as units of USD per one unit of domestic currency i. I include two lagged terms of the outcome variable, one lag in the middle of the pre-FTA period and the second lag one year before the FTA. The lagged terms help mitigate the problem of omitting important predictor effects (Athley and Imbens, 2006). However, one cannot include lags for the entire pre-FTA period because it eliminates the effect of the included covariates. If the included covariates help predict the outcome, omitting them can bias the outcome of synthetic control in the post-FTA period. Also, I experiment with a comprehensive set of additional covariates. However, their inclusion did not change my results.

One valid concern in using the log of GDP and the log of GDP per capita as predictors is that an FTA may increase Australia's GDP and GDP per capita. Recall that the predictors, Z_i, must not be affected by the FTA. Nevertheless, this assumption is likely to hold. For example, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTTP) is expected to increase GDP by 0.6 per cent by 2030 (PIIE, 2018). When this figure is spread over 12 years, it amounts to only a 0.05 per cent increase in national income per year. Given that the CPTTP is the largest FTA that Australia has ever ratified, the increase in nominal GDP is very minimal. As such, GDP and GDP per capita can be used as predictors of least-traded exports and imports.

12.4 Limitations

One limitation of the SCM is the potential for interpolation biases. The use of a synthetic control relies upon an assumption that the treated and control units follow the same linear, factor model over time. If the control countries used to construct the synthetic control do not have a linear model generating their outcome of interest, for example, a non-linear relationship with any of the covariates, then the resulting synthetic control may cause biases when estimating the treatment effect. By consequence, Abadie et al. (2015) suggest restricting the donor pool to countries which share similar characteristics to the treated unit. The second drawback of the SCM is the risk of overfitting. Overfitting can occur when the synthetic control is generated by matching the idiosyncratic variations of untreated units to the characteristics of the treated unit (Abadie et al., 2015). By consequence, the estimate of the treatment effect is biased. As such, it is essential to restrict the donor pool to countries which share similar characteristics to the treated unit and to drop countries that have suffered large idiosyncratic shocks to the outcome of interest. For example,

[29]The CEPII gravity database can be downloaded at http://www.cepii.fr/CEPII/en/.

[30]Data on nominal exchange rates can be downloaded at https://www.ers.usda.gov/data-products/agricultural-exchange-rate-data-set/.

when I apply the SCM to SAFTA, I drop Austria, Denmark, Israel, Portugal, Turkey and Russia from donor pool because they do not share similar characteristics to Australia's trade with Singapore. Also, another key argument for restricting the donor size is that the bias of the synthetic control estimator can increase if the number of countries in the donor pool increases (Abadie et al., 2010). [31]

13 The Effect of FTAs on the New goods margin

13.1 Results

The top half of Figures 11, 12 and 13 plot the trends in log exports or imports for Australia and it's synthetic counterpart.[32] The bottom half of each Figure reports the difference in log exports or imports between Australia and its synthetic counterpart. In each figure, the difference in log exports or log imports is close to zero in the pre-FTA period. This suggests that the synthetic Australia provides a reasonable approximation to Australia's least-traded exports and imports to each FTA partner in the absence of an FTA.

The estimate of the causal effect of an FTA on Australia's new goods margin is given by the difference in log exports or imports between Australia and its synthetic counterpart in the post-FTA period. On the import side, I estimate that SAFTA and TAFTA increase least-traded imports from Singapore and Thailand by an average of 103 and 128 per cent over ten years. In relation to AUSFTA, I find that least-traded imports increase, on average, by only 25 per cent over ten years. An explanation for this relatively low estimate is that tariffs and non-tariff barriers between Australia and the U.S were low prior to the FTA. Also, as stated in Section 11, the AUSFTA was more focused on intellectual property and copyright issues than compared to SAFTA and TAFTA.

An additional benefit of the SCM is the ability to analyse the short-run and long-run dynamics of FTAs on least-traded imports. In relation to SAFTA and TAFTA, least-traded imports from Singapore and Thailand increase in the first two years of the post-FTA period by 65 and 75 per cent relative to synthetic Australia. Also, there is evidence of anticipation effects since Australia and synthetic Australia begin to diverge one year prior to both FTAs. This result suggests that permanent changes in policy induce firms to immediately begin exporting new products to Australia (Kim and Ruhl, 2013). However, this hypothesis does not apply to AUSFTA. Least-traded imports from the United States begin to increase three years after the FTA. In the long run, I find that there is no additional increase in least-traded imports from all three FTA partners. This result is against expectations because some tariff and non-tariff barriers are phased out over an extended period. As such, I would expect least-traded imports to increase over the long-run.

[31] Additionally, the bias of the synthetic control estimator can go to zero as the number of pre-FTA periods increases (Abadie et al., 2010). For each application of the SCM in my study, the number of pre-FTA periods is between 10 - 12 years. As such, the bias of the synthetic control estimator is likely low.

[32] The synthetic control weights and predictor means are presented in the Appendix. See Section 17.4.

On the export side, I find that all three FTAs have a negative effect on least-traded exports to Australia's FTA partners. These estimates are unusual because a negative estimate of an FTA on trade flows has rarely been documented in the literature. However, I will explain in the next section that these negative estimates are due to a lack of out-of-sample fit that appears by chance. As such, I conclude that FTAs have no impact on Australia's least-traded exports to FTA partners.

Figure 11: SAFTA - Australia vs. Synthetic Australia

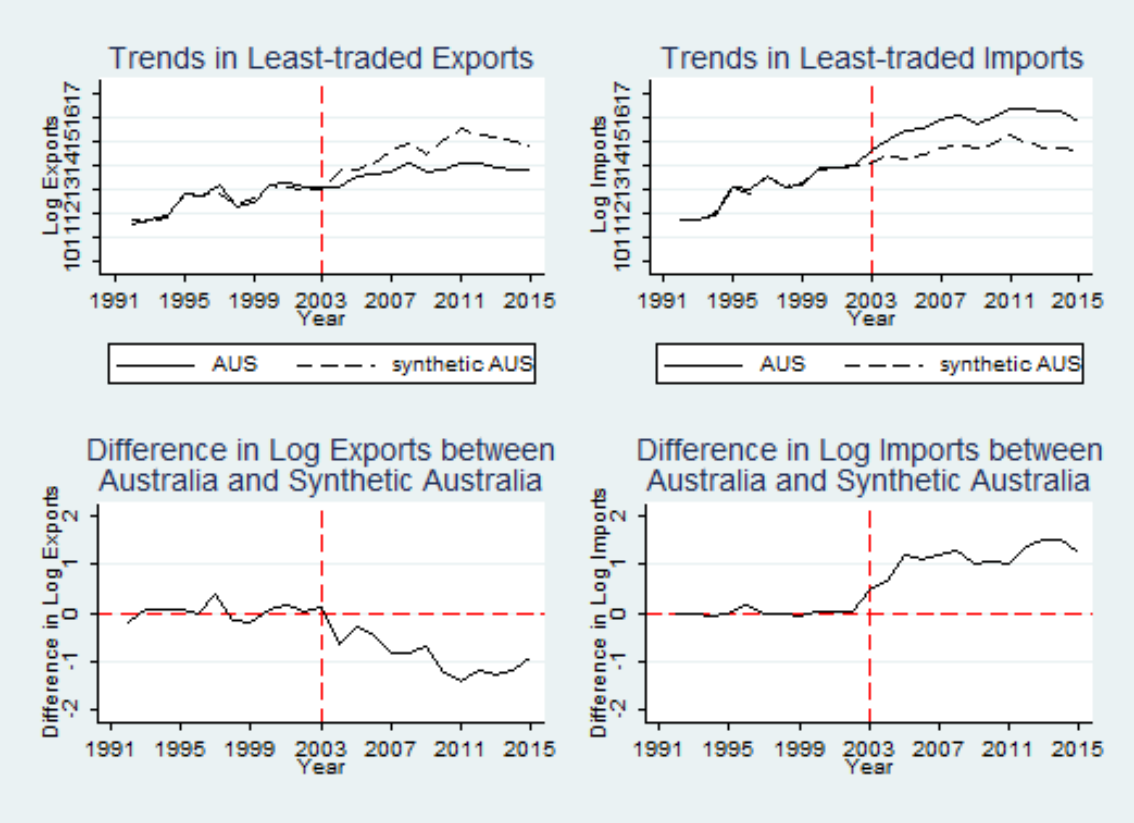


Figure 12: TAFTA - Australia vs. Synthetic Australia

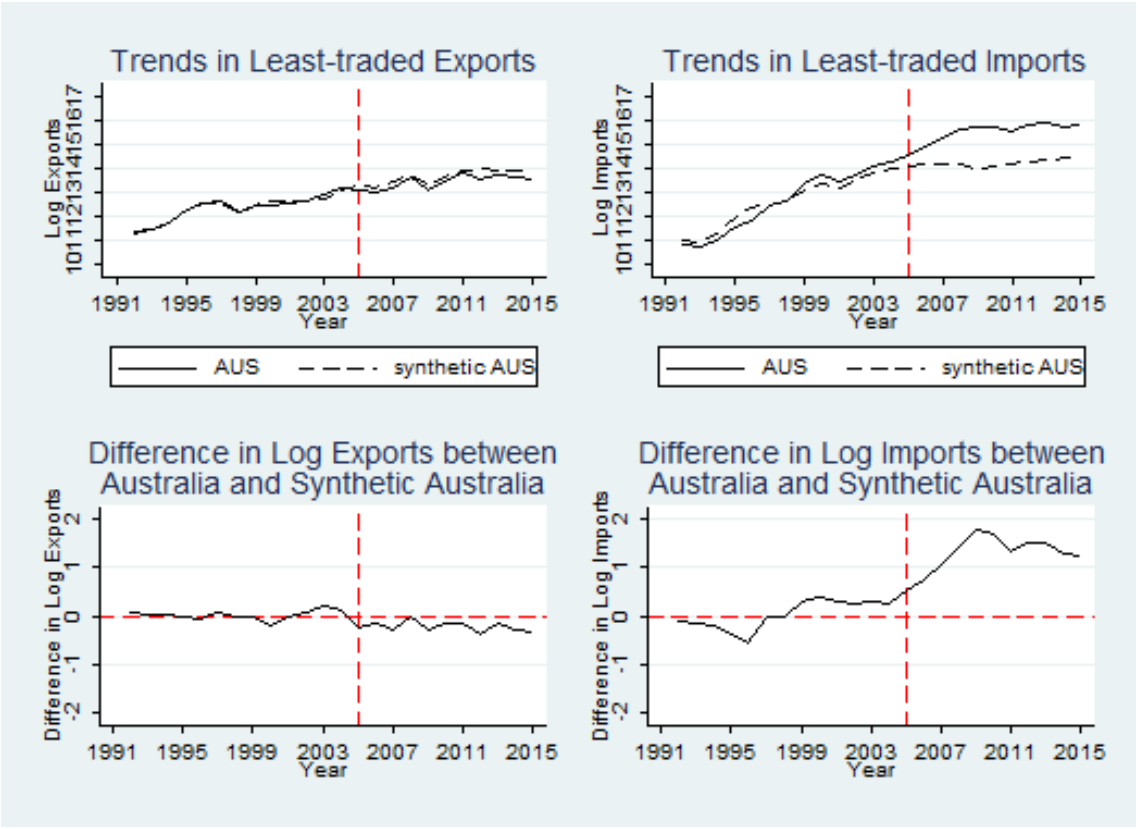
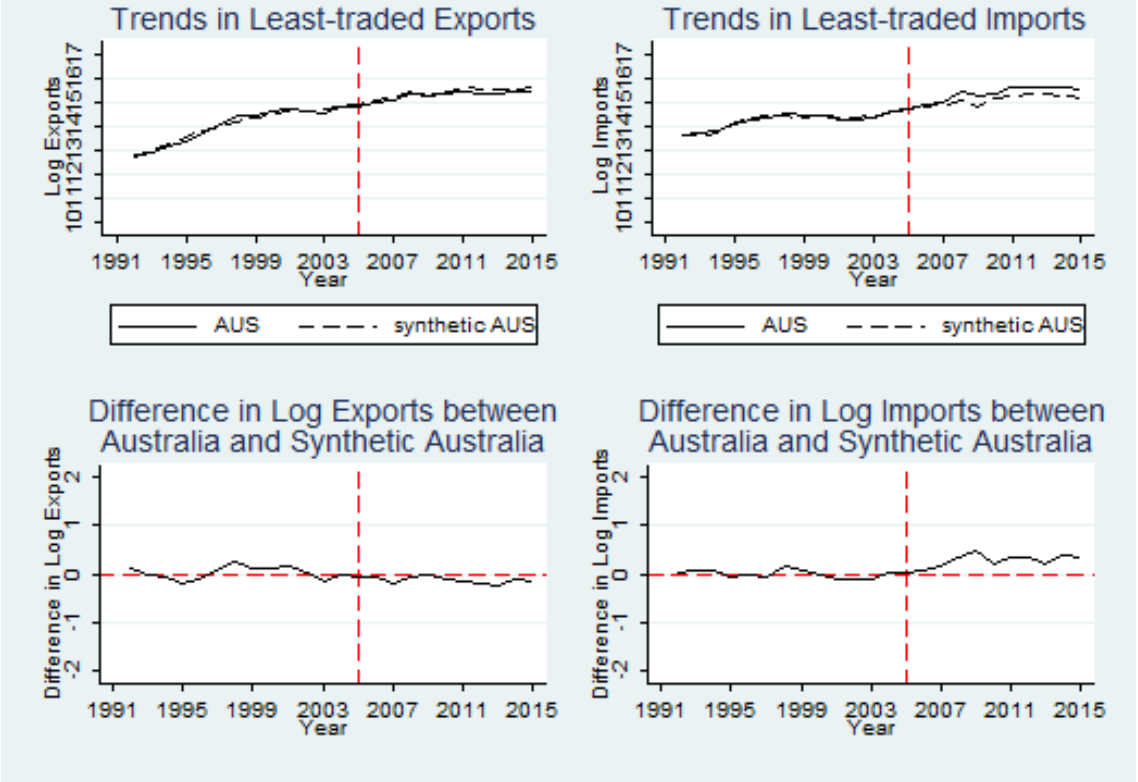


Figure 13: AUSFTA - Australia vs. Synthetic Australia



13.2 Inference

To evaluate the statistical significance of my results, I cannot rely on standard large-sample inferential techniques due to the small number of units in the control group. Abadie et al. (2010) suggest that placebo experiments be implemented to make inference, where the intervention is artificially assigned to the untreated trading partners. Following their advice, I sequentially apply the synthetic control algorithm to every possible control country in the donor pool. This process creates a distribution of placebo estimates against which the estimate of the treatment effect for Australia, (τ_{1t}), can be compared.[33] The estimate of τ_{1t} is statistically significant if the magnitude is large relative to the distribution of placebo estimates.[34] If the magnitude of τ_{1t} lies within the distribution of placebo estimates, it is likely that the treatment effect is due to a lack of out-of-sample fit that appears by chance. When applying this inferential technique, a p-value can be constructed. The p-value represents the probability of obtaining an estimate at least as large as the one obtained for Australia when the intervention is assigned to an untreated trading partner at random.

Figures 14, 15 and 16 display the results of the placebo tests for least-traded exports and imports in respect to all three FTAs. The grey lines represent the estimated difference in log exports or imports for each country in the donor pool and its respective synthetic version. The red line denotes the difference for Australia. The estimate of τ_{1t} is the magnitude of the red line from zero in the post-FTA period. Similarly, an estimate of the treatment effect for a placebo unit is the magnitude of a grey line from zero in the post-FTA period. Some placebo units with very poor fit in the pre-FTA period were removed. The removal of these units is justified because they do not provide information to measure the relative rarity of estimating a large treatment effect for a trading partner that was well fitted prior to an FTA (Abadie et al., 2015).

As presented in Figures 14 and 15, the placebo tests show that the treatment effect on Australia's least-traded imports is large relative to the placebos. As such, I conclude that the effect of SAFTA and TAFTA on Australia's least-traded imports from Singapore and Thailand is statistically significant. In regards to AUSFTA, the treatment effect on Australia's least-traded imports is situated in mid-range of the placebo distribution. As such, the effect of AUSFTA on Australia's least-traded imports from the U.S is statistically insignificant.

On the export side, in Figures 14, 15 and 16, the magnitude of the treatment effect for Australia lies within the distribution of placebo estimates. As such, the effect of the FTAs on Australia's least-traded exports to Singapore, Thailand and the U.S is statistically insignificant.

[33] This inferential technique does not produce confidence intervals or posterior distribution.

[34] Note, I am not comparing the difference between the true and the placebo effects. I analysing whether a very few placebo estimates lie above the treatment effect.

Figure 14: SAFTA - Difference in Log Exports (A) or Imports (B) for Australia and Placebos relative to Synthetic

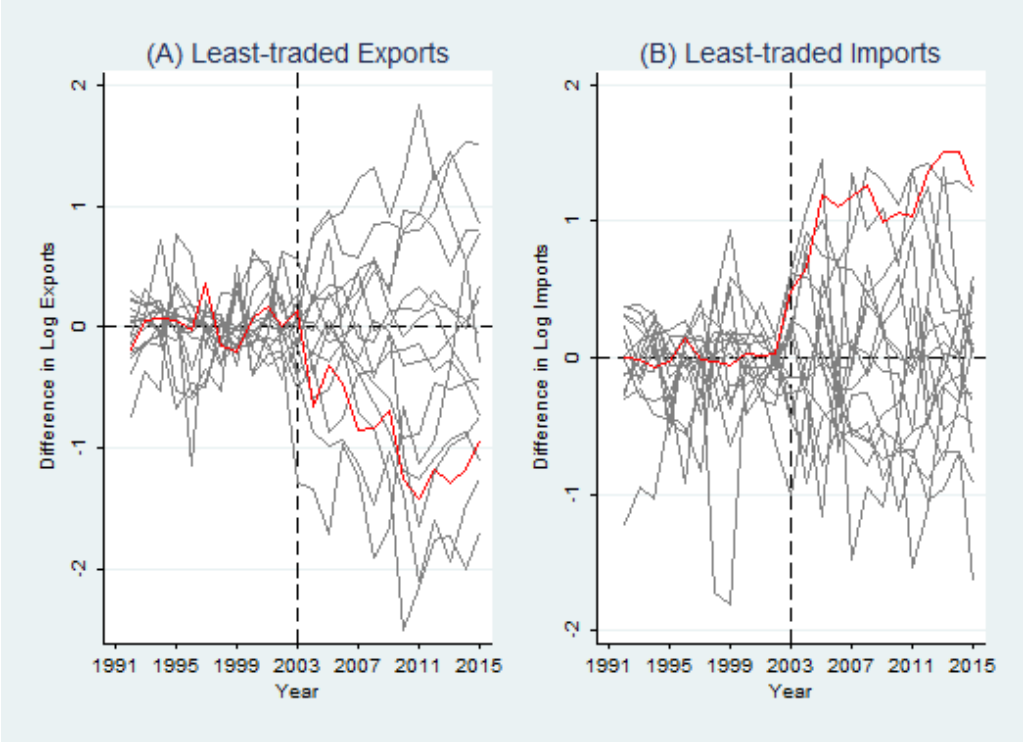


Figure 15: TAFTA - Difference in Log Exports (A) or Imports (B) for Australia and Placebos relative to Synthetic

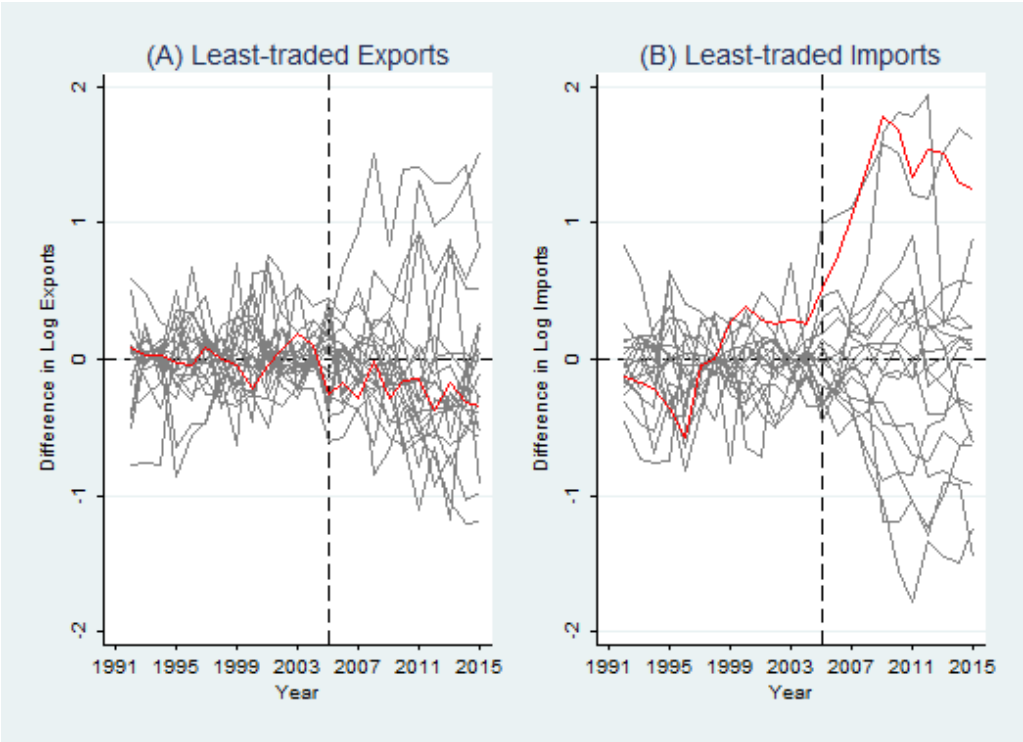
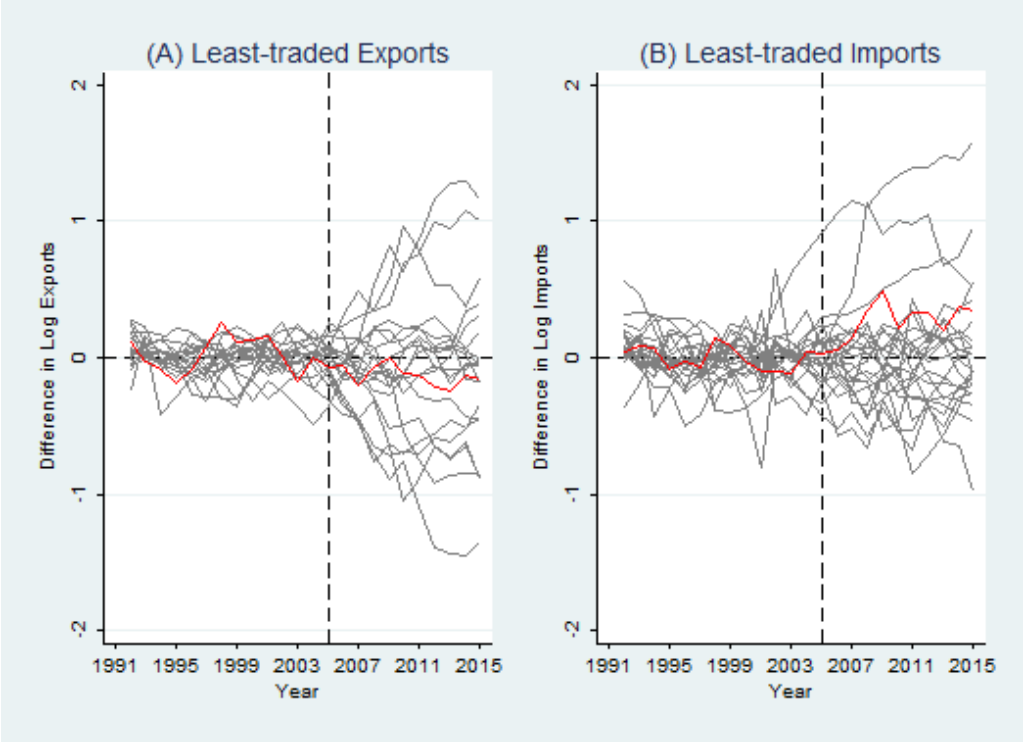


Figure 16: AUSFTA - Difference in Log Exports (A) or Imports (B) for Australia and Placebos relative to Synthetic



Another way to conduct inferential analysis is to construct a distribution of ratios between the post-FTA RMSPE and the pre-FTA RMSPE for Australia and each country in the donor pool (Abadie et al., 2015). The pre-FTA RMSPE is defined as

$$\left(\frac{1}{T_0}\sum_{t=1}^{T_0}\left(X_{1t}-\sum_{t=1}^{J}w_j^*X_{jt}\right)^2\right)^{\frac{1}{2}}, \tag{17}$$

and the Post-FTA RMSPE defined as

$$\left(\frac{1}{T-T_0}\sum_{t=T_0+1}^{T}\left(X_{1t}-\sum_{t=1}^{J}w_j^*X_{jt}\right)^2\right)^{\frac{1}{2}}. \tag{18}$$

The estimate of τ_{it} for Australia is statistically significant only if the ratio is large relative to the ratios of the countries in the donor pool. The advantage of this method is that it discounts a large post-FTA RMSPE if the synthetic control does not closely reproduce the outcome in the pre-FTA period. As such, placebo units with very poor fit in the pre-FTA do not need to be dropped. Figures 17, 18 and 19 report the ratios between the post-FTA RMSPE and the pre-FTA RMSPE for Australia and all the countries in the donor pool.

As shown in Figures 17 and 18, Australia stands out as the country with the highest RMSPE ratio for least-traded imports. In relation to SAFTA, Australia's post-FTA RMSPE gap is about 22 times larger than the pre-FTA gap. If one were to pick a country at random from the sample, the chances of obtaining a ratio as high as this one would be

$1/18 \approx 0.055$. Similarly, in relation to TAFTA, the p-value would be $1/24 \approx 0.04$. As such, these results confirm that SAFTA and TAFTA has a statistically significant effect on Australia's least-traded imports from Singapore and Thailand. Regarding AUSFTA, Figure 19 shows that the effect of the FTA on least-traded imports from the U.S is statistically insignificant.

On the export side, in Figures 17, 18 and 19, the ratio for Australia is within the distribution of placebo ratios. As such, the effect of the FTAs on Australia's least-traded exports to Singapore, Thailand and the U.S is statistically insignificant.

Figure 17: SAFTA - Ratio of Post-FTA RMSPE to Pre-FTA RMSPE for Australia and 18 control countries

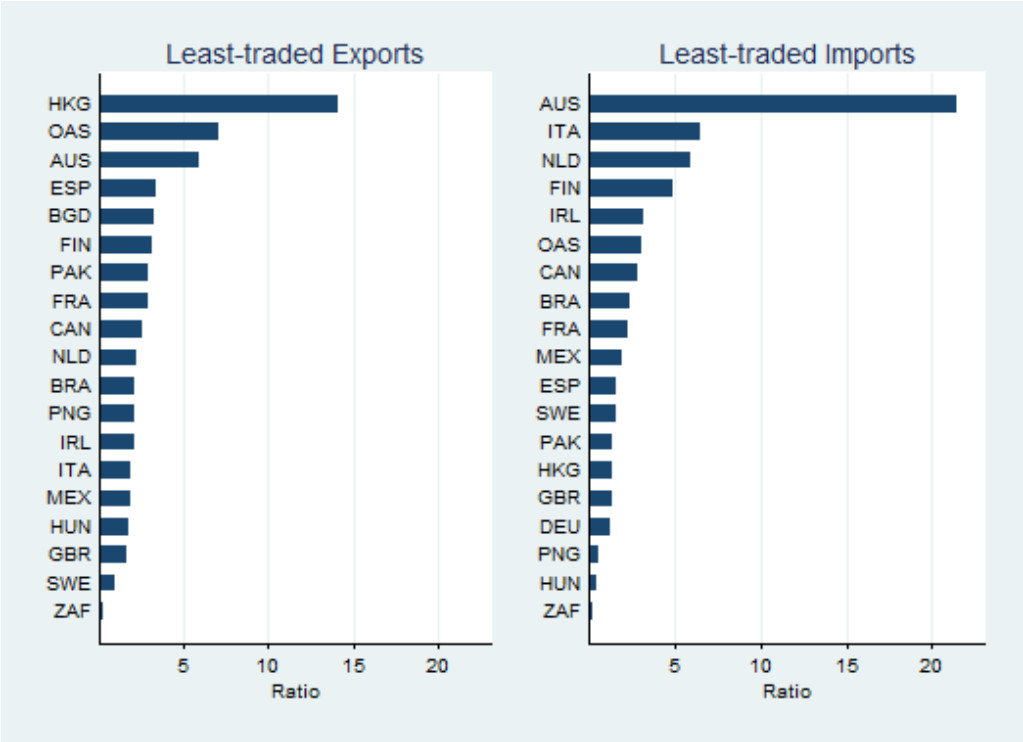


Figure 18: TAFTA - Ratio of Post-FTA RMSPE to Pre-FTA RMSPE for Australia and 24 control countries

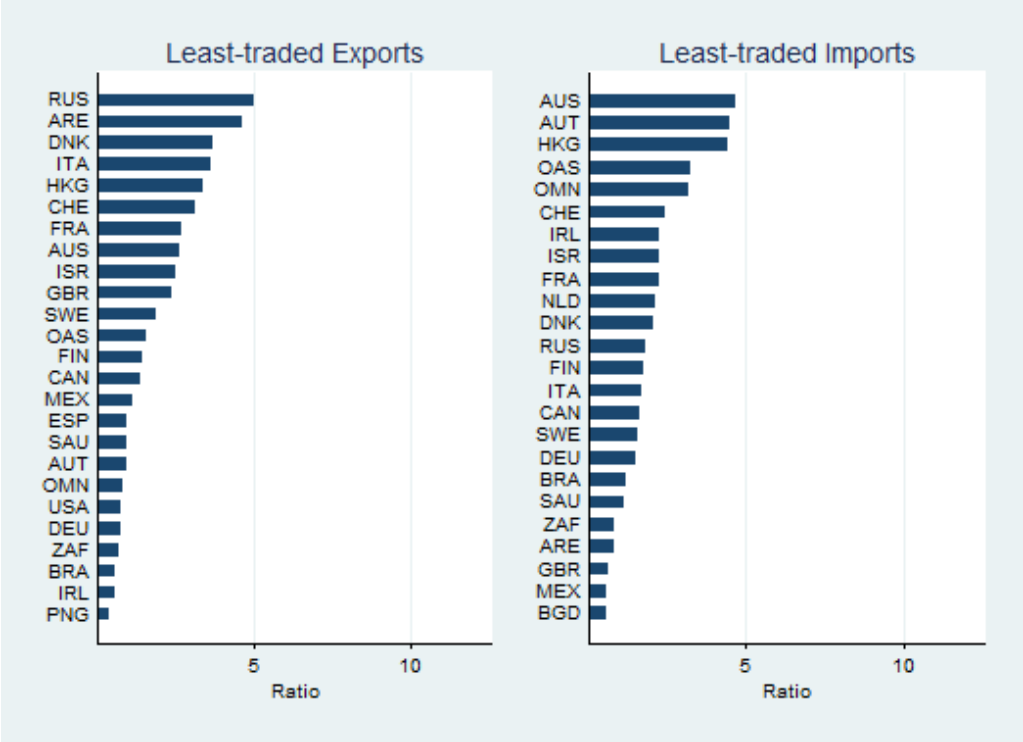
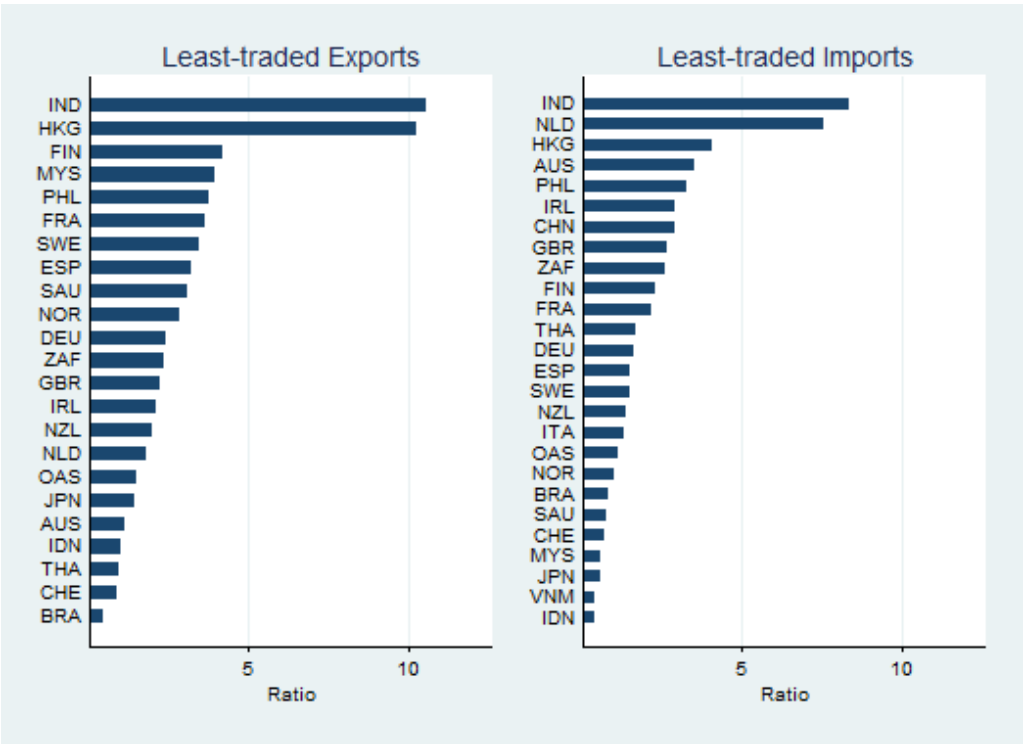


Figure 19: AUSFTA - Ratio of Post-FTA RMSPE to Pre-FTA RMSPE for Australia and 22 control countries



14 Discussion and Concluding Remarks

To summarise Sections 13.1 and 13.2, I find that SAFTA and TAFTA has an economically and statistically significant effect on Australia's least-traded imports from Singapore and Thailand. In relation to AUSFTA, I document that the FTA has a small, positive effect on least-traded imports from the U.S. However, I show that this estimate is statistically insignificant. Overall, I conclude that FTAs, on average, increase least-traded imports to Australia by 85 per cent over 10 years.[35]

On the export side, I find that FTAs have no impact on Australia's least-traded exports to FTA partners. This result is line with findings in Part I of this thesis. In Section 7, I documented that Australia's least-traded exports with FTA countries do not increase in comparison to non-FTA countries.

In this section, I will discuss two key issues related to my results. First, I analyse whether FTAs mainly benefit existing exports and therefore have no effect on least-traded exports. Second, I will analyse the possibility that least-traded imports may have increased due to trade diversion.

14.1 Effect of FTAs on the intensive exports and imports

In 2010, the Productivity Commission conducted an extensive review of Australia's FTAs. During public consultation, the Commission received little evidence to suggest that FTAs provide substantial commercial benefits to Australian businesses (PC, 2010). However, the Commission found that benefits of FTAs mainly accrued to existing exporters. To test this finding, I employ the SCM to estimate the effect of Australia's FTAs on intensive exports. The donor pool for each FTA is the same as in Section 13. I find that the FTAs do not affect the intensive margin for exports.[36] A possible explanation of this result is that tariffs and non-tariff barriers for intensive exports in the pre-FTA period are already relatively low. Overall, there is no evidence to suggest that Australia's FTAs mainly benefit existing exports and therefore have no effect on least-traded exports.

14.2 Trade diversion

Least-traded imports from Singapore and Thailand may have increased due to trade diversion. Trade diversion occurs when goods imported from lower-cost suppliers are replaced by goods from higher-cost suppliers in FTA countries. This diversion of trade occurs because goods from FTA countries are less expensive due to tariff and non-tariff reductions than goods from more-efficient countries. As such, the potential gains from an increase in imports due to trade diversion are lower than compared to a situation where imports increase due to trade creation.

[35] Average of 128, 103, 24 = 85

[36] See Appendix - Section 17.5 for results.

The extent to which trade diversion occurs from Australia's FTAs with Singapore and Thailand is unknown. The occurrence of trade diversion is likely dependent on the difference between Australia's preferential and MFN tariff rates. Lloyd (2005) argues that the scope of trade diversion in Australia is limited due to Australia's low MFN tariffs and it's large network of FTA partners. However, the Productivity Commission finds that Australia's MFN tariffs on some product categories are significantly higher relative to the global average (PC, 2010). As such, if tariffs were reduced on those product categories for Singapore and Thailand, it is likely that the increase in least-traded imports from these products was due to trade diversion. Future research could investigate the extent to which the increase in least-traded imports is due to trade creation and trade diversion.

15 Policy Implications

15.1 FTAs vs Unilateral trade reform

Before the ratification of SAFTA, Australia had ratified only one FTA. The single FTA was the Closer Economic Relations agreement with New Zealand, which was implemented in 1983. During the years 1970 - 2003, the Federal government pursued a policy of trade liberalisation on a non-discriminatory basis, including the implementation of multilateral trade agreements. During this period, tariffs on imported good were unilaterally reduced by 30 percentage points, and quotas on textiles, clothing and footwear were phased out. The Productivity Commission argues that the unilateral trade reforms entailed 'substantial economic benefits' to Australia. These reforms increased import variety for consumers resulting in substantial welfare gains, increased the productivity of domestic industries due to greater import competition and reduced administrative costs associated with managing the tariff system (PC, 2010).

Since 2003, Australia has embarked on signing FTAs with a variety of countries. The key purpose of signing FTAs was to increase market access for Australian exporters in FTA countries in return for preferential access to the Australian economy. In Part I and II of this thesis, I show that Australia's FTAs increase imports of least-traded goods but do not increase Australia's least-traded exports. Additionally, I have documented that FTAs do not increase the trade of intensive exports. By consequence, I can conclude that Australia's FTAs have mainly increased least-traded imports.[37] However, the increase in welfare and productivity from least-traded imports from FTA countries is likely to be lower than compared to an increase in imports from unilateral trade reform.

First, the increase in least-traded imports may be due to trade diversion. As stated in the previous section, due to reduced tariff and non-tariff barriers from an FTA, goods previously imported from a low-cost supplier in a non-FTA country may be now imported from a less efficient supplier in an FTA country. Second, FTAs entail large negotiation and compliance costs for the government. For example, in the 2006 - 2007 Federal budget, $17 million was spent on FTA negotiations with China and Japan (PC, 2010). Also, Customs spends $1 million per annum to administer Australia's FTAs (PC, 2010).[38] Third, the Productivity Commission finds that some importers forgo preferential access due to significant compliance costs in relation to RoO (PC, 2010).

Overall, in relation to merchandise trade, it may be prudent for the Federal government to unilaterally reduce tariff and non-tariff barriers instead of signing further FTAs.

[37] I also ran the SCM for intensive imports. I find that the FTAs have no effect on intensive imports except for intensive imports from Thailand. See Section 17.5 for results.

[38] The administrative costs of Australia's FTAs for DFAT are confidential.

15.2 Australia's lack of export diversity

As stated in Part I of this thesis, Australia's export base has drastically narrowed in the last 20 years. Low-income countries such as Nepal, Kenya and Tanzania have a greater export diversity than Australia. In Part I of this thesis, I discuss that Australia's lack of export diversity may limit the growth of least-traded products since most products in the mining and agriculture industries were already intensively traded. In general, the lack of export diversity has serious policy implications. First, a diversified export base limits the effects of price variations and shocks in specific product markets (Giovanni and Levchenko, 2006). Second, greater export diversity is associated with an increase in average productivity. Feenstra and Kee (2008) develop a variant of Meltiz's (2003) monopolistic competition model to show that, for a sample of 44 countries between 1980 - 2000, the total increase in export variety is associated with a 3.3 per cent increase in average productivity. As such, the Federal government should consider enacting policies which increase Australia's export variety.

16 Conclusion

The purpose of this thesis was to answer the question posed in the title: Have Australia's FTAs increased the new goods margin? Specifically, I analyse whether Australia's FTAs increase exports and imports of products that were previously not traded or traded in very small amounts. I use the methodology developed by Kehoe and Ruhl (2013) to define the extensive margin as the set of goods that initially account for 10 per cent of trade prior to the FTAs.

My answer to the question is that Australia's FTAs increase the new goods margin for imports but not exports. I employ two methods, relative analysis and synthetic controls, to show this result. In the first method, I consider the FTAs Australia ratified between 2003 and 2010. I compare the change in Australia's new goods margin with FTA countries to a comparable group of countries that did not FTAs with Australia. I find that least-traded imports from FTA countries grew disproportionately relative to non-FTA countries. I find that seven years after the FTAs were signed, the share of least-traded imports from FTA countries grew to account for 32 per cent of total imports, compared to 20 per cent from non-FTA countries. By contrast, I find that share of least-traded exports to FTA countries grew to account for only 20 per cent of total exports, compared to 22 per cent from non-FTA countries. These findings show that FTAs are associated with an increase in least-traded imports but not least-traded exports.

In the second method, I employ the synthetic control methodology to identify the causal effect of Australia's FTAs on the new goods margin. Due to data limitations, my empirical focus is on the FTAs that Australia signed between Singapore, Thailand and the United States. I find that FTAs do not affect Australia's least-traded exports to the three FTA partners. On the import side, I find that SAFTA and TAFTA increase least-traded imports from Singapore and Thailand, on average, by 103 and 128 per cent over ten years. In relation to AUSFTA, least-traded imports increase from the United States, on average, by 26 per cent over ten years but this estimate is statistically insignificant. Overall, I conclude that Australia's FTAs increase least-traded imports on average, by 85 per cent over ten years but have no effect on least-traded exports.

I attempt to explain why Australia's FTAs increase least-traded imports but not least-traded exports. In Part I, I examine whether least-traded imports benefited from larger tariff reductions than least-traded exports. However, I find that tariffs reductions were greater for least-traded exports than least-traded imports. Second, I discuss whether Australia's lack of export diversity may constrain the growth of least-traded products. As stated in the introduction, Australia's export base has become more concentrated in agriculture and mining industries. I argue that since most products in the agriculture and mining industries were already intensively traded, FTAs are unlikely to increase Australia's least-traded exports. Third, I investigate whether FTAs have more of an impact on intensive exports and therefore have no effect on least-traded exports. The intensive

margin considers goods that countries trade before an FTA. Using the SCM, I find no evidence to suggest that FTAs increase intensive exports. Overall, I cannot find definitive evidence of why Australia's FTAs increase least-traded imports than least-traded exports. Future research could examine additional factors, such as the effects of non-tariff barriers on least-traded exports and imports.

17 Appendix

17.1 FTA and non-FTA countries

Figure 20: Total Trade shares of FTA vs. non-FTA countries (per cent)

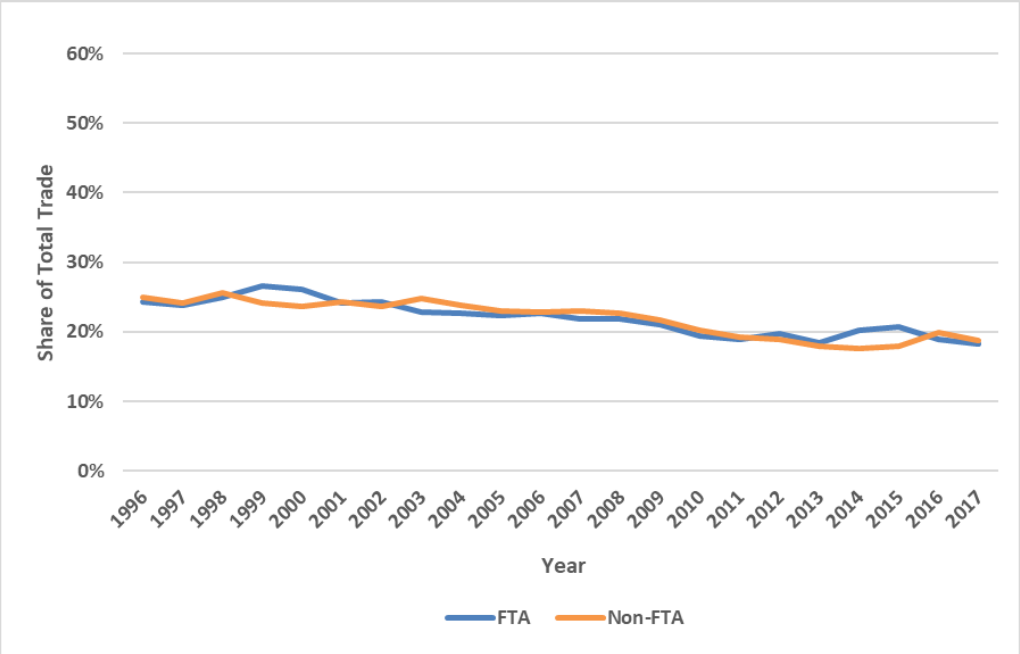


Table 4: Trade Weights

FTA countries			Non-FTA countries		
Country	STT (%) (average 1996 - 2017)	Weight (%)	Country	STT (%) (average 1996 - 2017)	Weight (%)
CHL	3.70	0.91	DEU	3.00	14.22
MYS	2.83	13.37	ESP	0.69	3.27
PHL	0.55	2.59	FRA	1.44	6.83
SGP	3.70	17.50	GBR	3.40	16.13
THA	2.99	14.16	HKG	1.72	8.16
USA	9.62	45.50	IND	2.72	12.90
VNM	1.26	5.97	ITA	1.61	7.63
			NLD	0.98	4.63
			PER	0.05	0.24
			PNG	1.06	5.04
			SAU	0.69	3.28
			TWN	2.72	12.88
			UAE	1.01	4.79
Total	21.14	1.00		21.10	1.00

Table 5: Share of LT Exports (FTA and non-FTA countries)

Country	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7
CHL	0.10	0.10	0.11	0.22	0.19	0.30	0.44	0.35	0.43	0.40	0.57	0.59	0.47	0.30	0.20
MYS	0.10	0.07	0.07	0.08	0.09	0.09	0.13	0.12	0.09	0.17	0.23	0.25	0.20	0.14	0.14
PHL	0.10	0.10	0.10	0.12	0.16	0.13	0.16	0.27	0.31	0.28	0.36	0.34	0.35	0.32	0.29
SGP	0.10	0.08	0.07	0.10	0.14	0.16	0.18	0.18	0.21	0.26	0.23	0.29	0.24	0.23	0.25
THA	0.10	0.10	0.09	0.11	0.12	0.16	0.15	0.10	0.11	0.12	0.12	0.13	0.11	0.12	0.20
USA	0.10	0.10	0.10	0.11	0.15	0.19	0.18	0.19	0.20	0.20	0.18	0.23	0.21	0.21	0.20
VNM	0.10	0.06	0.06	0.04	0.10	0.09	0.09	0.12	0.08	0.13	0.14	0.15	0.15	0.16	0.18
DEU	0.10	0.12	0.12	0.14	0.16	0.27	0.34	0.31	0.31	0.38	0.31	0.45	0.46	0.40	0.51
ESP	0.10	0.09	0.09	0.15	0.17	0.20	0.20	0.15	0.15	0.16	0.16	0.40	0.16	0.23	0.24
FRA	0.10	0.13	0.13	0.14	0.34	0.35	0.32	0.22	0.21	0.28	0.19	0.35	0.22	0.24	0.22
GBR	0.10	0.13	0.15	0.14	0.15	0.13	0.20	0.21	0.15	0.16	0.11	0.10	0.11	0.11	0.11
HKG	0.10	0.07	0.08	0.13	0.15	0.15	0.16	0.19	0.18	0.18	0.15	0.16	0.19	0.21	0.19
IND	0.10	0.08	0.06	0.07	0.09	0.11	0.07	0.13	0.11	0.18	0.14	0.13	0.12	0.16	0.13
ITA	0.10	0.10	0.14	0.25	0.25	0.26	0.27	0.29	0.29	0.41	0.31	0.39	0.30	0.25	0.26
NLD	0.10	0.07	0.04	0.13	0.15	0.15	0.11	0.07	0.11	0.16	0.11	0.20	0.12	0.10	0.14
PER	0.10	0.05	0.08	0.19	0.52	0.42	0.50	0.44	0.77	0.60	0.56	0.52	0.70	0.86	0.81
PNG	0.10	0.08	0.06	0.08	0.11	0.14	0.13	0.14	0.14	0.13	0.15	0.14	0.18	0.16	0.20
SAU	0.10	0.11	0.06	0.06	0.05	0.04	0.08	0.06	0.05	0.06	0.07	0.09	0.10	0.12	0.12
TWN	0.10	0.09	0.08	0.10	0.11	0.14	0.13	0.10	0.08	0.08	0.08	0.09	0.08	0.07	0.09
UAE	0.10	0.07	0.09	0.21	0.16	0.15	0.27	0.22	0.25	0.28	0.24	0.12	0.16	0.42	0.39

Table 6: Share of LT Imports (FTA and non-FTA countries)

Country	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7
CHL	0.10	0.07	0.14	0.19	0.28	0.51	0.72	0.88	0.63	0.69	0.75	0.81	0.85	0.81	0.72
MYS	0.10	0.07	0.08	0.10	0.12	0.14	0.17	0.13	0.12	0.12	0.15	0.15	0.18	0.18	0.16
PHL	0.10	0.10	0.08	0.10	0.28	0.14	0.34	0.29	0.41	0.41	0.64	0.52	0.41	0.56	0.55
SGP	0.10	0.13	0.14	0.50	0.43	0.48	0.56	0.67	0.71	0.72	0.69	0.73	0.82	0.69	0.75
THA	0.10	0.08	0.07	0.11	0.13	0.18	0.18	0.17	0.21	0.20	0.21	0.30	0.24	0.26	0.29
USA	0.10	0.09	0.09	0.11	0.09	0.10	0.10	0.11	0.10	0.12	0.12	0.14	0.14	0.12	0.13
VNM	0.10	0.11	0.10	0.11	0.12	0.14	0.19	0.22	0.33	0.43	0.47	0.46	0.72	0.82	0.80
DEU	0.10	0.10	0.10	0.11	0.15	0.15	0.16	0.16	0.17	0.16	0.19	0.20	0.21	0.21	0.22
ESP	0.10	0.09	0.11	0.14	0.15	0.20	0.25	0.35	0.30	0.22	0.29	0.23	0.31	0.32	0.46
FRA	0.10	0.08	0.09	0.13	0.28	0.35	0.42	0.43	0.27	0.30	0.29	0.17	0.17	0.17	0.17
GBR	0.10	0.09	0.08	0.10	0.11	0.12	0.12	0.18	0.11	0.09	0.08	0.12	0.12	0.19	0.15
HKG	0.10	0.10	0.09	0.12	0.15	0.15	0.20	0.30	0.21	0.20	0.20	0.25	0.27	0.26	0.27
IND	0.10	0.09	0.10	0.15	0.17	0.20	0.26	0.23	0.25	0.29	0.28	0.27	0.16	0.19	0.19
ITA	0.10	0.10	0.09	0.12	0.14	0.14	0.13	0.13	0.16	0.16	0.16	0.15	0.18	0.17	0.15
NLD	0.10	0.09	0.10	0.16	0.17	0.19	0.22	0.25	0.24	0.27	0.27	0.27	0.25	0.25	0.31
PER	0.10	0.09	0.21	0.29	0.29	0.17	0.29	0.19	0.21	0.36	0.54	0.55	0.58	0.54	0.33
PNG	0.10	0.17	0.22	0.38	0.42	0.21	0.14	0.14	0.22	0.18	0.17	0.19	0.13	0.15	0.07
SAU	0.10	0.05	0.13	0.18	0.37	0.41	0.48	0.32	0.26	0.13	0.27	0.30	0.27	0.17	0.15
TWN	0.10	0.10	0.10	0.12	0.13	0.13	0.15	0.17	0.18	0.16	0.17	0.18	0.20	0.16	0.18
UAE	0.10	0.14	0.17	0.15	0.15	0.12	0.20	0.12	0.17	0.42	0.17	0.11	0.14	0.13	0.16

17.2 New Goods Margin Dynamics

In this section, I analyse the change in the new goods margin in further detail. First, I investigate whether a small number of goods drives the increase in the new goods margin across FTA and non-FTA countries. Second, I examine whether least-traded goods in the pre-FTA period become heavily-traded in the post-FTA period. I also examine whether heavily-traded goods in the pre-FTA period continue to dominate trade in the post-FTA period.

To address these two three, I focus on two sets of goods: top least-traded (TLT) goods and top-traded (TT) goods (Cho et al., 2018).[39] TLT goods are comprised of least-traded goods that account for the top 67 per cent of new goods traded in the post-FTA period. Top-traded (TT) goods are made up of goods that account for the top 67 per cent of all trade in the post-FTA period.

17.2.1 Top Least-Traded Goods

As presented in Table 7, only a small number of products drives growth in the new goods margin across FTA and non-FTA countries. In FTA countries, TLT goods account for 1.5 per cent and 3.0 per cent of least-traded exports and imports in the post-FTA period. The share of TLT goods is lower in non-FTA countries, 0.8 per cent and 2.4 per cent of least-traded exports and imports. Although these figures seems very low, they are at least two times greater than the number of products in the corresponding top-traded basket.

Table 7: Top Least-Traded Goods

	Least-Traded (LT) goods		Top LT (TLT) goods		Top-Traded (TT) goods	
Trade Flow	Number	% of all goods	Number	% of LTG	Number	% of LTG
Exports to:						
FTA countries	4658.7	94.6	72.0	1.5	20.8	0.4
non-FTA countries	4815.8	97.8	39.1	0.8	12.4	0.3
Imports from:						
FTA countries	4474.2	90.9	127.9	3.0	60.3	1.2
non-FTA countries	4428.2	89.9	103.4	2.4	69.4	1.4

17.2.2 Transitions from Least-traded to Top-Traded Goods

The trade of least-traded products may initially be restricted because the presence of tariff and non-tariff barriers increase the marginal cost of trade for exporters and importers (Arkolakis, 2010). FTAs enable least-traded goods that were previously subject to trade restrictions to become heavily-traded. To assess if transition occurs, I define the transition

[39]The terms: "heavily-traded" and "top-traded" are equivalent.

rate as the per cent of TT goods that were initially least-traded (Cho et al., 2018). As presented in Table [], I find that 16 per cent of top-exported goods were initially least-traded, accounting for 8 per cent of top-traded export volume. For imports, the transition rate is higher, with least-traded goods accounting for 27 per cent of top-imported goods and 26 per cent of top-traded import volume. Looking at the individual countries, I find that the transition rate for exports is above 10 per cent for all countries except for Chile. On the import side, the transition rate varies significantly across countries. The transition rate is above 40 per cent for four out of the seven FTA countries but below 10 per cent for the remaining three countries.

By contrast, for non-FTA countries, I find that a smaller fraction of top-traded exports and imports were initially least-traded. For exports, eight out of the thirteen non-FTA countries show no transition. The transition rate is higher for imports than exports, however the rate varies considerably across countries.

Overall, the calculations displayed in Table 8 indicate that trade with FTA countries in comparison to non-FTA countries is associated with a greater fraction of least-traded goods gaining importance in overall trade. Within FTA countries, a greater percentage of TT imports were least-traded than compared to TT exports. This result provides additional evidence to support my hypothesis that Australia's FTAs may have a greater effect on the new goods margin for imports than exports.

Table 8: Transitions from Least-Traded to Top-Traded

Countries	Exports		Imports	
	Pct of Post-FTA TT Goods that were LTG	Share of Post-FTA TT Exports	Pct of Post-FTA TT Goods that were LTG	Share of Post-FTA TT Imports
FTA countries (average)	**16.2**	**8.1**	**26.5**	**25.4**
CHL	0.0	0.0	48.9	72.2
MYS	10.8	3.3	9.2	2.1
PHL	22.0	28.0	44.9	44.2
SGP	35.5	19.8	94.4	99.4
THA	14.6	10.6	0.0	0.0
USA	11.3	3.5	6.0	3.7
VNM	13.0	5.7	73.8	70.2
non-FTA countries (average)	**5.5**	**8.1**	**12.4**	**9.4**
DEU	18.9	39.2	8.8	13.4
ESP	0.0	0.0	55.3	44.9
FRA	0.0	0.0	12.8	6.6
GBR	0.0	0.0	7.1	6.3
HKG	9.6	10.7	21.5	13.4
IND	0.0	0.0	15.2	9.5
ITA	0.0	0.0	9.9	4.4
NLD	0.0	0.0	23.4	23.0
PER	64.7	75.3	28.3	13.3
PNG	11.2	5.2	0.0	0.0
SAU	0.0	0.0	0.0	0.0
TWN	0.0	0.0	13.2	6.4
UAE	28.0	24.6	0.0	0.0

17.2.3 Persistence of Top-Traded Goods

In Table 7, I documented that the TT basket becomes smaller across FTA and non-FTA countries. Table 9 complements this finding by showing that for FTA and non-FTA countries, the least-traded goods that become heavily-traded are part of a smaller set of TT goods. This result suggests that some least-traded goods that became heavily-traded in FTA and non-FTA countries may have displaced goods that were initially in the TT basket. In the next subsection, I investigate whether heavily-traded goods in the pre-FTA period continue to dominate trade in the post-FTA period.

FTAs are expected to increase the variety of exports and imports between members due to a reduction in trade costs (Arkolaskis et al., 2010). The increase in the variety of traded products will decrease the concentration of trade in pre-FTA top-traded goods. I define the persistence rate as the per cent of TT goods in the first year of the pre-FTA period that remain in the TT basket at the end of the post-FTA period. As presented in Table [], I find that the persistence rate of initially TT exports and imports between FTA countries is consistently lower in terms of frequency and trade volume than compared to non-FTA countries. For FTA countries, 47 per cent and 52 per cent of the most heavily-traded exports and imports remained heavily-traded following an FTA, compared to 71 per cent and 62 per cent for exports and imports between non-FTA countries. In the case of imports from FTA countries, I find significant cross-country variation in the persistence of top-traded goods. For example, Thailand and Chile have a persistence rate of over 70 per cent while Chile and Vietnam have a persistence rate of less than 5 per cent, signalling a significant turnover in TT goods. On the export side, country-variation in the persistence rate is low except for Chile. The persistence rate for Chile is 100 per cent because exports to Chile remain concentrated in heavily-traded mining products. For non-FTA countries, the persistence rate varies considerably across countries for both exports and imports.

Table 9: Persistence of Top-Traded

Countries	Exports		Imports	
	Pct of Post-FTA TT Goods that were Pre-FTA TT	Share of Post-FTA TT Exports	Pct of Post-FTA TT Goods that were Pre-FTA TT	Share of Post-FTA TT Imports
FTA countries (average)	**47.2**	**61.1**	**51.7**	**62.0**
CHL	100.0	100.0	16.3	10.7
MYS	46.2	62.6	83.2	96.8
PHL	34.0	26.4	24.5	37.1
SGP	53.3	76.6	0.0	0.0
THA	41.6	38.4	48.5	68.1
USA	48.1	66.3	71.9	82.4
VNM	35.2	35.7	3.7	14.2
non-FTA countries (average)	**71.4**	**79.0**	**62.3**	**65.6**
DEU	31.2	37.4	61.5	71.0
ESP	53.7	68.4	44.7	55.1
FRA	100.0	100.0	59.1	79.5
GBR	100.0	100.0	70.0	75.7
HKG	67.5	76.6	29.8	54.6
IND	93.2	99.1	55.2	36.5
ITA	68.6	84.8	71.2	73.0
NLD	36.8	57.5	50.3	49.3
PER	0.0	0.0	43.4	61.1
PNG	50.1	65.2	100.0	100.0
SAU	35.0	69.9	64.7	67.3
TWN	100.0	100.0	57.5	53.2
UAE	25.4	39.3	100.0	100.0

Overall, for FTA countries, the transition rate for least-traded goods is higher and the persistence rate of initially TT goods is lower than compared to non-FTA countries. This result suggests that in comparison to non-FTA countries, least-traded goods that become heavily-traded in FTA countries are more likely to have displaced goods that were heavily-traded in the pre-FTA period.

17.3 New Goods Margin and Tariff Rates

Table 10: Tariff Rates on Australia's Exports and Imports

Trade Flow	Extensive margin			Intensive margin		
	Pre-FTA (%)	Post-FTA (%)	Δ	Pre-FTA (%)	Post-FTA (%)	Δ
Exports to:						
FTA countries	12.59	2.45	10.14	8.12	1.50	6.62
non-FTA countries	8.86	5.17	3.69	5.25	3.20	2.05
Imports from:						
FTA countries	5.18	0.18	5.00	4.52	0.06	4.46
non-FTA countries	5.26	2.48	2.78	5.10	3.43	1.67

Notes: For the pre-FTA columns, the average tariff rates are weighted by the pre-FTA trade value of each country in the FTA or non-FTA group. For the post-FTA columns, the average tariff rates are weighted by the post-FTA trade value of each country in the FTA or non-FTA group.

Table 11: Tariff Rates on Australia's Least-traded Exports

Industries	FTA countries			non-FTA countries		
	Pre-FTA (%)	Post-FTA (%)	Δ in share	Pre-FTA (%)	Post-FTA (%)	Δ in share
Agriculture	13.41	3.94	9.47	11.70	6.82	4.88
Mining	4.57	0.42	4.15	3.21	0.95	2.26
Food	18.08	5.48	12.61	23.68	16.64	7.05
Textiles	21.60	3.95	17.65	11.12	8.20	2.93
Leather	17.35	4.32	13.03	8.62	6.00	2.62
Wood	13.25	2.41	10.85	8.38	3.94	4.43
Paper	10.84	1.87	8.96	7.39	1.86	5.53
Petroleum	5.82	0.86	4.95	3.90	1.02	2.89
Chemicals	7.44	0.63	6.81	6.29	3.48	2.82
R/P	16.41	3.17	13.23	7.78	4.56	3.22
Non-metallic minerals	19.06	2.65	16.41	6.95	3.68	3.27
Metals	8.54	1.73	6.81	6.52	2.66	3.85
Machinery	8.24	1.31	6.93	5.37	2.35	3.02
Electric equip.	9.79	1.31	8.48	5.75	2.37	3.39
Transport equip.	12.35	4.04	8.31	8.09	4.94	3.10
Manuf. Nec	14.02	3.25	10.77	7.13	3.64	3.49

Notes: For the Pre-FTA columns, the average tariff rates are weighted by the pre-FTA trade value of each country in the FTA or non-FTA group. For the Post-FTA columns, the average tariff rates are weighted by the post-FTA trade value of each country in the FTA or non-FTA group.

Table 12: Tariff Rates on Australia's Least-traded Imports

Industries	FTA countries			non-FTA countries		
	Pre-FTA (%)	Post-FTA (%)	Δ in share	Pre-FTA (%)	Post-FTA (%)	Δ in share
Agriculture	0.43	0.00	0.43	0.30	0.21	0.09
Mining	0.54	0.00	0.54	0.47	0.15	0.32
Food	4.40	0.01	4.39	6.10	1.72	4.35
Textiles	16.30	1.01	15.29	16.70	5.11	11.59
Leather	8.42	0.16	8.26	7.78	3.69	4.06
Wood	3.23	0.04	3.19	3.32	3.32	0.00
Paper	2.88	0.01	2.87	3.38	3.200	0.18
Petroleum	0.05	0.00	0.05	0.05	0.00	0.05
Chemicals	1.99	0.00	1.99	1.59	1.27	0.32
R/P	6.03	0.08	5.95	5.99	4.18	1.81
Non-metallic minerals	3.98	0.00	3.98	3.80	3.06	0.74
Metals	3.76	0.02	3.74	3.65	3.12	0.53
Machinery	3.30	0.01	3.28	3.19	2.42	0.78
Electric equip.	2.44	0.00	2.44	2.38	1.23	1.15
Transport equip.	4.87	0.00	4.87	5.48	2.77	2.70
Manuf. Nec	3.39	0.02	3.37	3.09	2.41	0.68

Notes: For the Pre-FTA columns, the average tariff rates are weighted by the pre-FTA trade value of each country in the FTA or non-FTA group. For the Post-FTA columns, the average tariff rates are weighted by the post-FTA trade value of each country in the FTA or non-FTA group.

17.4 Synthetic Controls - Extensive Margin

17.4.1 SAFTA

Table 13: SAFTA - Synthetic control weights

Country	Export weight	Import weight
BGD	0	0.070
BRA	.001	0
CAN	0	0
DEU	.066	0.089
ESP	0	0
FIN	0	0
FRA	0	0
GBR	.04	0.318
HKG	0	0.366
HUN	0	0.055
IRL	0	0
ITA	0	0
MEX	0	0.102
NLD	.342	0
TWN	.512	0
PAK	0	0
PNG	0	0
SWE	0	0
ZAF	.039	0

Table 14: Predictor Means before SAFTA

	Australia	Synthetic Australia
Least-traded Exports		
Common language	1	0.59
Common legal system	1	0.08
Common coloniser	1	0.08
Distance (log)	8.68	8.63
GDP (log)	12.83	12.85
GDP per capita (log)	9.91	9.73
Nominal Exchange rate	0.67	0.60
New Good exports (1997) (log)	13.14	12.79
New Good exports (2002) (log)	13.04	12.03
RMSPE		0.15
Least-traded Imports		
Common language	1	0.68
Common legal system	1	0.75
Common coloniser	1	0.75
Distance (log)	8.68	8.70
GDP (log)	12.83	12.83
GDP per capita (log)	9.91	9.53
Nominal Exchange rate	0.67	0.67
New Good exports (1997) (log)	13.51	13.52
New Good exports (2002) (log)	13.99	13.97
RMSPE		0.05

17.4.2 TAFTA

Table 15: TAFTA - Synthetic control weights

Country	Export weight	Import weight
ARE	.042	0
AUT	0	0
BGD	0	0
BRA	.006	0
CAN	0	0
CHE	.267	0
DEU	0	0
DNK	0	0
ESP	0	0
FIN	0	0
FRA	0	0
GBR	0	0
HKG	0	0
IRL	0	0.282
ISR	0	0
ITA	0	0
MEX	0	0.198
NLD	0	0
TWN	.314	0
OMN	0	0
PNG	0	0
RUS	0	0
SAU	0	0
SWE	0	0
USA	.148	0.52
ZAF	.223	0

Table 16: Predictor Means before TAFTA

	Australia	Synthetic Australia
Least-traded Exports		
Common language	-	-
Common legal system	1	0.413
Common coloniser	-	-
Distance (log)	8.88	8.75
GDP (log)	12.88	12.89
GDP per capita (log)	9.96	9.66
Nominal Exchange rate	0.67	0.65
New Good exports (1997) (log)	12.14	12.14
New Good exports (2002) (log)	13.16	13.05
RMSPE		0.09
Least-traded Imports		
Common language	-	-
Common legal system	1	0.80
Common coloniser	-	-
Distance (log)	8.88	9.47
GDP (log)	12.88	14.16
GDP per capita (log)	9.96	9.96
Nominal Exchange rate	0.67	0.87
New Good exports (1997) (log)	12.63	12.64
New Good exports (2002) (log)	14.22	13.97
RMSPE		0.29

Note: The missing values for common language and common language are because the Thai language is not spoken outside the country and the country was never colonised.

17.4.3 AUSFTA

Table 17: AUSFTA - Synthetic control weights

Country	Export weight	Import weight
BRA	.014	0
CHE	0	0
CHN	0	0
DEU	0	0
ESP	0	0
FIN	0	0
FRA	0	0
GBR	0	0
HKG	0	0.393
IDN	.562	0
IND	0	0
IRL	0	0
ITA	0	0
JPN	0	0.240
MYS	0	0
NLD	0	0
NOR	0	0
NZL	0	0
TWN	0	0
PHL	0	0
SAU	.055	0
SWE	0	0
THA	0	0
VNM	0	0
ZAF	.367	0.367

Table 18: Predictor Means before AUSFTA

	Australia	Synthetic Australia
Least-traded Exports		
Common language	1	0.367
Common legal system	1	0.08
Common coloniser	1	0.08
Distance (log)	9.60	9.57
GDP (log)	12.88	11.99
GDP per capita (log)	9.96	7.39
Nominal Exchange rate	0.67	0.67
New Good exports (1997) (log)	14.47	14.21
New Good exports (2002) (log)	14.81	14.81
RMSPE		0.13
Least-traded Imports		
Common language	1	0.76
Common legal system	1	0.76
Common coloniser	1	0.76
Distance (log)	9.60	9.44
GDP (log)	12.88	12.72
GDP per capita (log)	9.96	9.45
Nominal Exchange rate	0.67	0.14
New Good exports (1997) (log)	14.57	14.21
New Good exports (2002) (log)	14.58	14.54
RMSPE		0.13

17.5 Synthetic Controls - Intensive Margin

17.5.1 SAFTA

Figure 21: SAFTA - Australia vs. Synthetic Australia

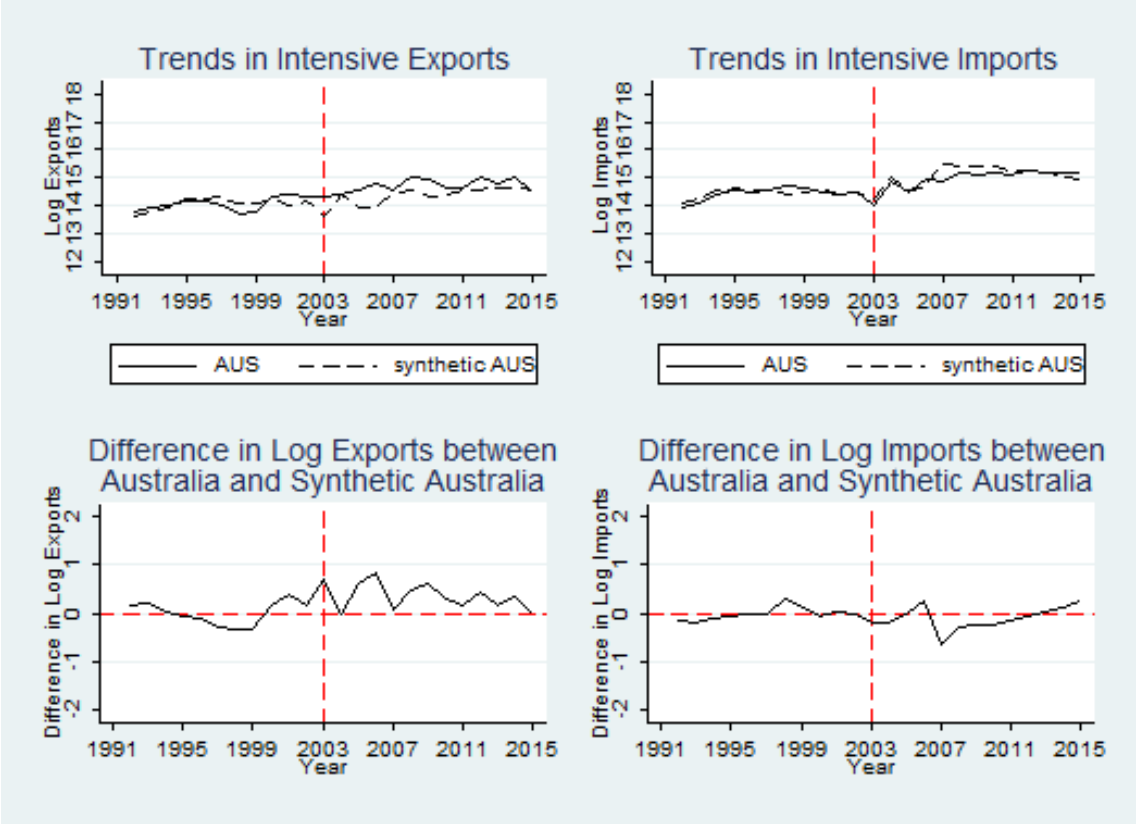


Figure 22: SAFTA - Ratio of Post-FTA RMSPE to Pre-FTA RMSPE for Australia and control countries

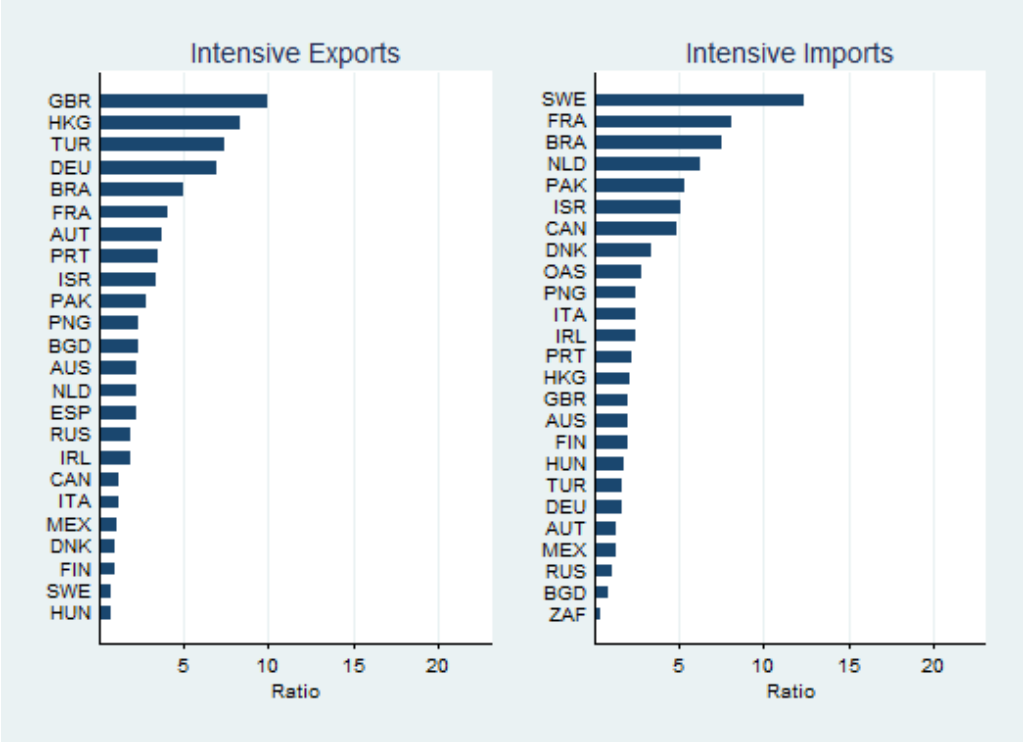


Table 19: SAFTA - Synthetic control weights

Country	Export weight	Import weight
BGD	.007	0
BRA	0	0
CAN	.136	.178
DEU	0	0
ESP	0	0
FIN	0	0
FRA	0	0
GBR	.21	.325
HKG	.335	.401
HUN	0	.068
IRL	.169	0
ITA	0	0
MEX	0	0
NLD	0	0
TWN	.134	.026
PAK	0	.003
PNG	0	0
SWE	0	0
ZAF	.009	0

Table 20: Predictor Means before SAFTA

	Australia	Synthetic Australia
Intensive Exports		
Common language	1	0.99
Common legal system	1	0.87
Common coloniser	1	0.87
Distance (log)	8.68	8.68
GDP (log)	12.83	12.55
GDP per capita (log)	9.91	9.91
Nominal Exchange rate	0.67	0.66
New Good exports (1997) (log)	14.03	14.32
New Good exports (2002) (log)	14.32	14.15
RMSPE		0.23
Intensive Imports		
Common language	1	0.93
Common legal system	1	0.91
Common coloniser	1	0.91
Distance (log)	8.68	8.73
GDP (log)	12.83	12.84
GDP per capita (log)	9.91	9.92
Nominal Exchange rate	0.67	0.69
New Good exports (1997) (log)	14.54	13.52
New Good exports (2002) (log)	14.48	14.49
RMSPE		0.13

17.5.2 TAFTA

Figure 23: TAFTA - Australia vs. Synthetic Australia

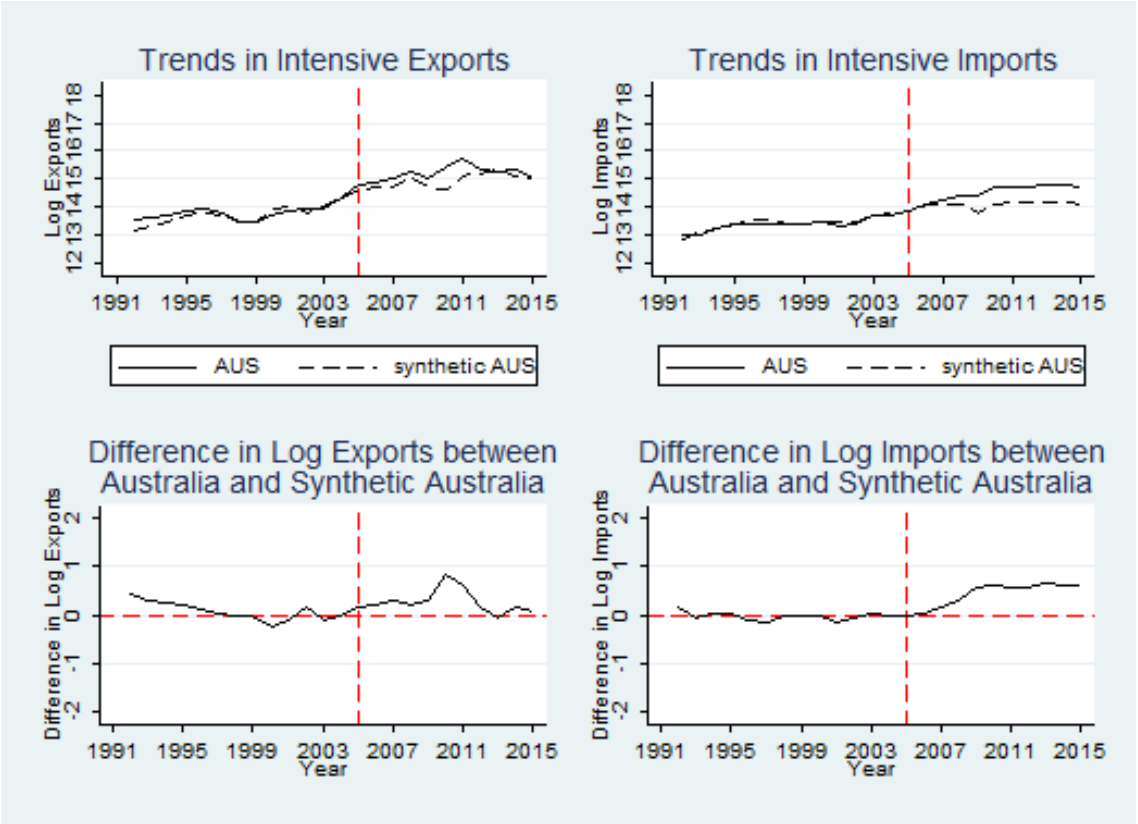


Figure 24: TAFTA - Ratio of Post-FTA RMSPE to Pre-FTA RMSPE for Australia and control countries

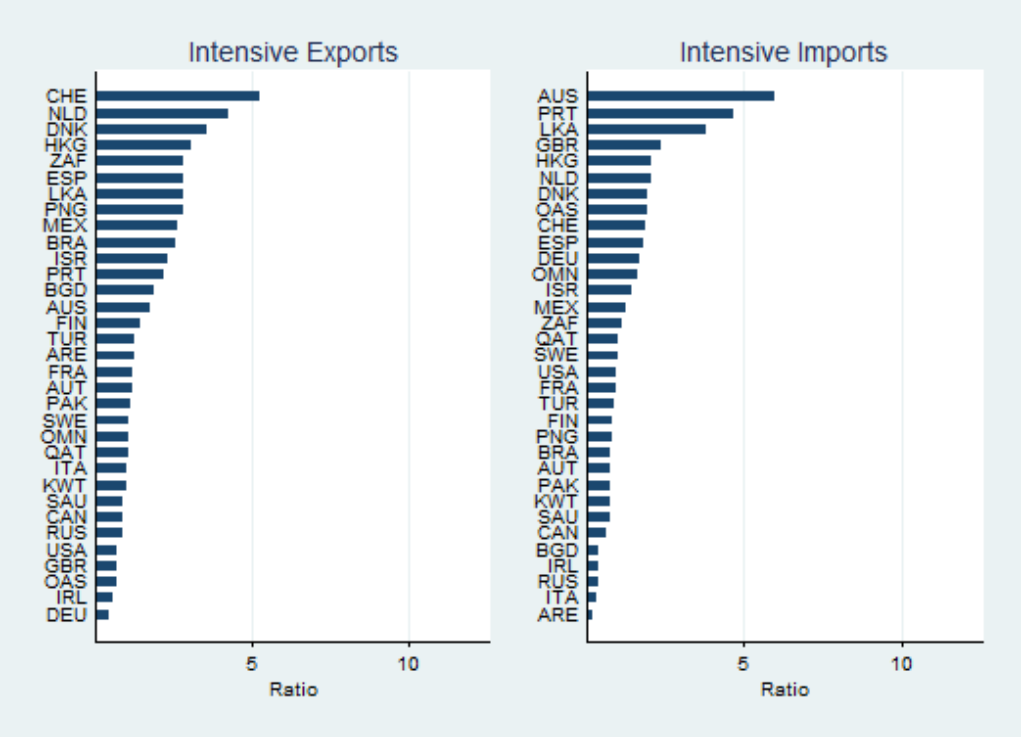


Table 21: TAFTA - Synthetic control weights

Country	Export weight	Import weight
ARE	.422	0.03
AUT	0	0
BGD	.025	0.09
BRA	0	0
CAN	.009	0.019
CHE	0	0
DEU	0	0
DNK	0	0
ESP	0	0
FIN	0	0
FRA	0	0
GBR	.134	0.199
HKG	.01	0.105
IRL	.037	0.019
ISR	.012	0.445
ITA	0	0
LKA	.005	0.001
MEX	0	0
NLD	0	0
TWN	0	0
OMN	0	0
PAK	.007	0.001
PNG	.026	0.001
RUS	0	0
SAU	.037	0
SWE	0	0
USA	.259	0.168
ZAF	.018	0.004

Table 22: Predictor Means before TAFTA

	Australia	Synthetic Australia
Intensive Exports		
Common language	-	-
Common legal system	1	1
Common coloniser	-	-
Distance (log)	8.88	8.88
GDP (log)	12.88	12.90
GDP per capita (log)	9.96	9.67
Nominal Exchange rate	0.67	0.65
New Good exports (1997) (log)	13.45	13.46
New Good exports (2002) (log)	14.30	14.31
RMSPE		0.21
Intensive Imports		
Common language	-	-
Common legal system	1	1
Common coloniser	-	-
Distance (log)	8.88	8.88
GDP (log)	12.88	12.89
GDP per capita (log)	9.96	9.97
Nominal Exchange rate	0.67	0.67
New Good exports (1997) (log)	12.63	13.40
New Good exports (2002) (log)	14.22	13.75
RMSPE		0.08

Note: The missing values for common language and common language are because the Thai language is not spoken outside the country and the country was never colonised.

17.5.3 AUSFTA

Figure 25: AUSFTA - Australia vs. Synthetic Australia

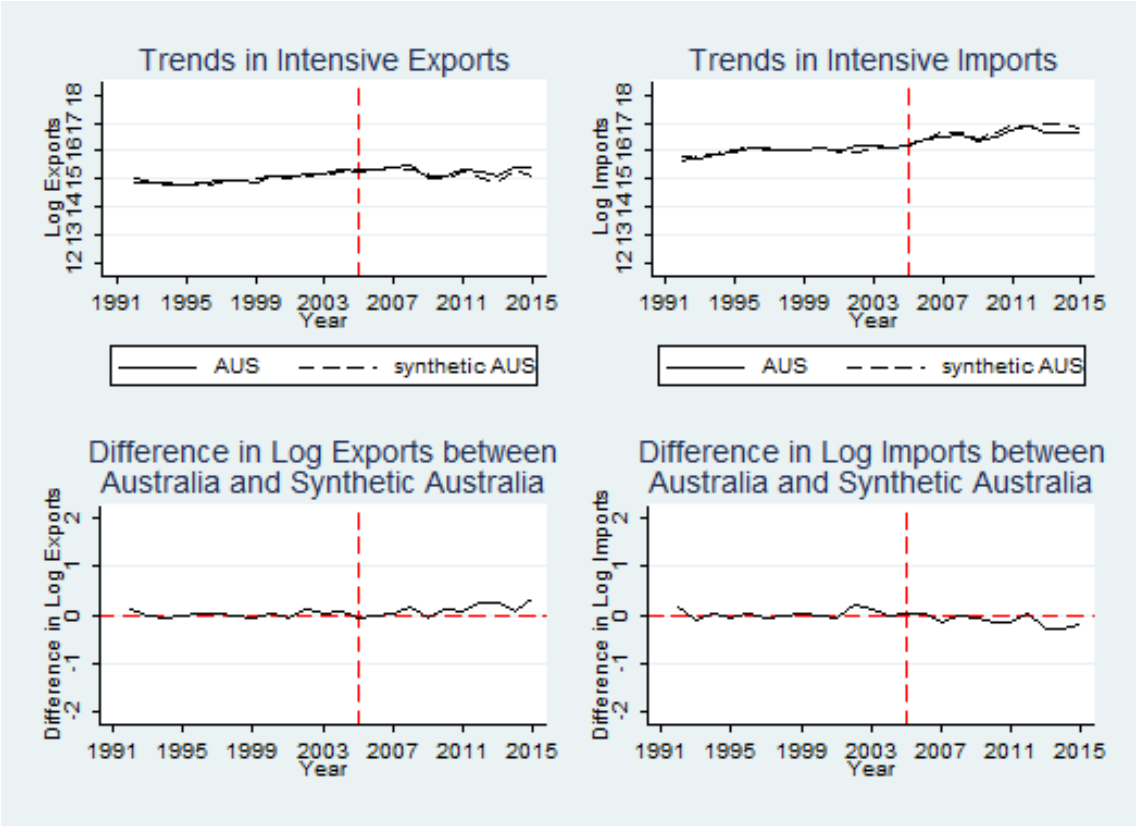


Figure 26: AUSFTA - Ratio of Post-FTA RMSPE to Pre-FTA RMSPE for Australia and control countries

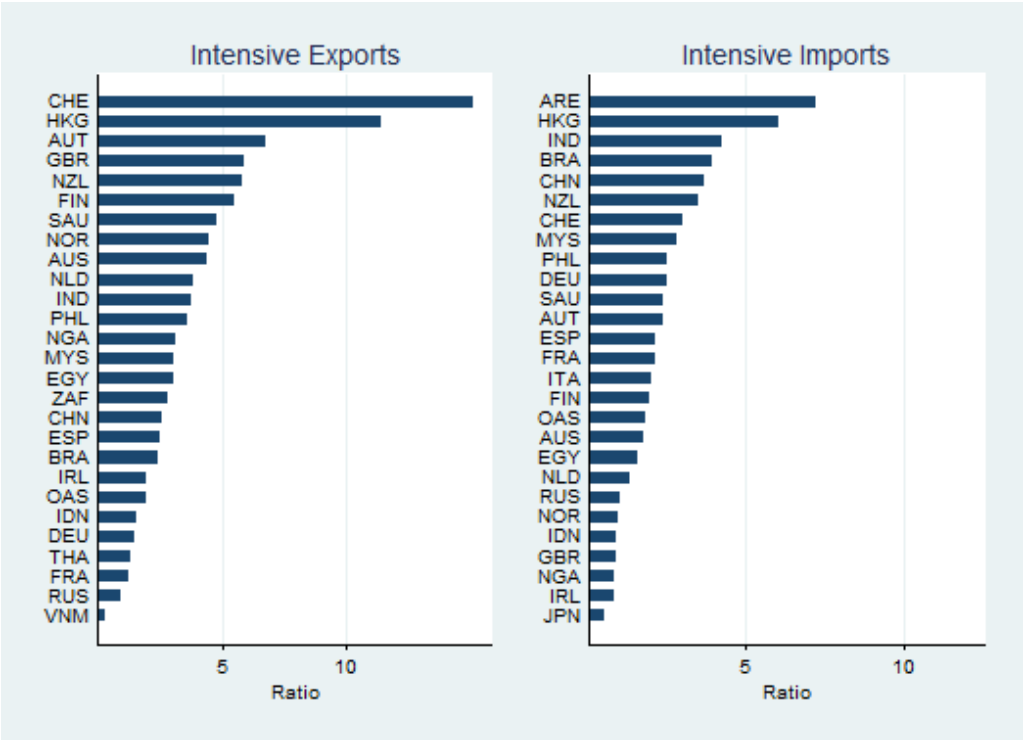


Table 23: AUSFTA - Synthetic control weights

Country	Export weight	Import weight
ARE	.131	0
AUT	0	0
BRA	0	0
CHE	0	0
CHN	0	0
DEU	0	0
EGY	0	0
ESP	0	0
FIN	0	0
FRA	0	0
GBR	.263	0
HKG	.125	0.473
IDN	0	0
IND	0	0.25
IRL	0	0
ITA	0	0
JPN	0	0.206
MYS	0	0
NGA	0	0
NLD	0	0
NOR	0	0
NZL	.301	0
OAS	0	0
PHL	0	0
RUS	0	0
SAU	0	0
SWE	0	0
THA	0	0
VNM	0	0
ZAF	.179	0.07

Table 24: Predictor Means before AUSFTA

	Australia	Synthetic Australia
Intensive Exports		
Common language	1	0.87
Common legal system	1	1
Common coloniser	1	1
Distance (log)	9.60	9.29
GDP (log)	12.88	12.14
GDP per capita (log)	9.96	9.64
Nominal Exchange rate	0.67	0.68
New Good exports (1997) (log)	14.96	14.96
New Good exports (2002) (log)	15.34	15.29
RMSPE		0.06
Intensive Imports		
Common language	1	0.79
Common legal system	1	0.79
Common coloniser	1	0.79
Distance (log)	9.60	9.41
GDP (log)	12.88	12.87
GDP per capita (log)	9.96	9.00
Nominal Exchange rate	0.67	0.08
New Good exports (1997) (log)	16.02	16.02
New Good exports (2002) (log)	16.10	16.13
RMSPE		0.09

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