RECIPROCITY IN BILATERAL TRADE FLOWS: AN EMPIRICAL ANALYSIS FOR TRADE BETWEEN AUSTRALIA AND LATIN AMERICAN COUNTRIES

German H. GONZALEZ[1]
Alexis S. ESPOSTO[2]
Valentina N. VIEGO[3]

ABSTRACT
Bilateral trade is not a spontaneous phenomenon. While individual agents are the ones who initiate and conduct trade transactions, it is nations that define the conditions under which trade occurs. Recent statistical studies relating to bilateral trade indicate that those conditions have long term consequences. We study the existence of reciprocity in terms of trade flows between Australia and Latin American economies using the pair wise Granger causality test. The results indicate that reciprocity can be considered as a market penetration strategy, or specific case of countertrade. This strategy is practised by both Australia and Latin America.
Keywords: reciprocity, bilateral trade, Granger causality, Australia, Latin America
JEL classification: F15, F14, F13

1. Introduction

Neither the existence of different patterns of specialization nor the presence of scale economies from the enlargement of the market size guarantees the existence of bilateral trade. Bilateral trade is not a spontaneous phenomenon. While individual agents are the ones who initiate and conduct the trade transactions, governments define the conditions under which trade arrangements are conducted. Historical evidence suggests that in periods of poor economic performance the emergence of decisions that promote protectionist trade policies abound. Nations, irrespective of their size, income, productivity structure and performance, are affected by cyclical economic downturns and this situation is a strong incentive for protectionism. Even if that kind of policies is not

[1] Germán H. González. Instituto de Investigaciones Económicas y Sociales del Sur, CONICET-UNS, 12 de octubre 1198, 3rd. floor, B8000CTX Bahía Blanca, Argentina. (2706) Email: ghgonza@uns.edu.ar
[2](Corresponding author) Swinburne University of Technology, Australia. Email: aesposto@swin.edu.au
[3] Departamento de Economía, Universidad Nacional del Sur, Argentina. Email: vviego@criba.edu.ar
Acknowledgements: First drafts were presented at the Seminar *Grupo de Estudios en Economía y Empresa*, organised by Departamento de Economía at Universidad EAFIT in Medellin, Colombia, and the XIV *Jornadas de la Asociación Argentina de Historia de las Relaciones Internacionales* (Argentinean Association of History of International Relations) and the IV *Jornadas de la Asociación Latinoamericana de Historia de las Relaciones Internacionales* (Latin American Association of History of International Relations) in Buenos Aires, Argentina. Very helpful comments were provided by the seminar participants. The authors would like to thank the organisers of the events. For constructive comments, we would also like to express our gratitude to Alvaro Hurtado, Theodore Breton and John Jairo García. All remaining errors are our own. We thank Yamila Perez for assistance in data processing.

put into practice, bilateral trade does not emerge as resulting from "natural" forces. Given this, it is important to identify which drivers give raise to bilateral trade.

Our paper has as main objectives to gather evidence that relates to the increase in bilateral trade as a result of trade reciprocity. Reciprocity is a concept commonly related to international relations and policy. However, these have not to date been fully incorporated into discussions that reflect patterns of trade, particularly in the area of bilateral trade. Particularly, we take as study case the trade between Australia and Latin America. For many years the countries of Latin America were almost undiscovered territory to Australian industry and consumers. In recent years, however, major Latin American economies have changed the Australian perception (Commonwealth of Australia 2011, p. 43). As a result of this, two-way trade between Australia and Latin America now stands at almost $8 billion, a 48 percent increase in just over 4 years and growth does not appear to be abating with both Australian and Latin American businesses, as well as governments continuing on a sustained path of trade growth and foreign direct investment between these two distant economic regions (DFAT 2011, p. 122).

In this paper, we conduct a bilateral sectoral trade analysis between Australia and ten Latin American economies. The results reveal the existence of reciprocity that can be explained as a statistical relationship of precedence (Granger causality) from import to exports. This might be interpreted as a strategy of trade market penetration or a particular case of countertrade, where one economy imports in order to motivate openness to its partner and to export its own products.

This paper is divided into 6 sections. The second section discusses the theoretical motivation. Section three offers a literature review, with particular attention to the evolution of trade between Australia and 10 selected Latin American countries. Section four and five present issues related to data and methodology employed in the analysis conducted, and the model's results, respectively. The final section presents the conclusions and discusses future research directions.

2. Theoretical motivation

Trade relations can be explained in different ways. The most common theoretical approaches are via factor endowments, increasing returns to scale and preferential trade agreements. The land that could not cover the theory has become fertile ground for empirical options among which the gravity model has taken a leading role. These models emerged in the 1960s (Tinbergen 1962; Pöyhönen 1963; Linnemann 1966) and are still widely used now (Salvatore 2010). These models take into consideration three different interrelated factors. The first considers factors related to the relative potential supply of exporters, the second is concerned with relative potential demand for importers, while the third deals with matters related to trade operations, including transaction costs emerging from the distance between two nations and the existence of other potential trade barriers such as language, time zones, ways of doing business, and other related matters. Since the 1980s gravity models have gained much importance and popularity as a method for analysing trade issues. A particular advantage of gravity models is that the formulation is at the same time compatible with the Heckscher-Ohlin model and theories related to imperfect competition in international trade (Anderson 1979; Bergstrand 1985; Deardorff 1998). The gravity model deficiencies centre mainly empirical, that is the variables employed and methods related to the model estimation.

Recently, there has been a surge of research which highlights the importance of analysing datasets aiming at describing the basic properties of the data generating process. Harris et al. (2012) in particular point out the importance that the properties of the data are reflected in the model specifications and estimation methods used in the analysis (p. 783). Earlier research has shown evidence of hysteresis in bilateral trade (Eichengreen and Irwin 1998). Research conducted by Harris et al. (op. cit.) has demonstrated that bilateral trade tends to be persistent and reciprocal. Both articles emphasize the possibility of endogeneity and the presence of specification errors[4]. A number of other studies have shown the presence of trade persistence (Bun and Klaassen 2002; de Nardis and Vicarelli 2003). Nevertheless, the treatment of reciprocity as a statistical characteristic or feature in terms of trade flows has not been tackled in the literature. Hence, our work aims at making a contribution to this discussion.

Harris et al (2012) define two cases of reciprocity in international trade at the aggregate level. First, zero- reciprocity; "that is whether in any given year country i (j) exports to or imports from country j (i) is dependent on whether country j (i) exports to or imports from country i (j)" (p. 784). Second, volume reciprocity; "… that is whether in any given year country i´s exports to country j is small/large is dependent on whether country j´s exports to country i is small/large" (p. 786)[5]. These concepts have shown to contain a certain level of association with other research findings in the literature.

An example of that is the concept of countertrade, originating in microeconomic literature: "A seller provides a buyer with goods or services and promises in return to purchase goods or services from the buyer" (Banks 1983: 160). Among the relevant empirical assessments of these practices are Hennart (1990), Caves and Marin (1992) and Marin and Schnitzer (2003). More frequently, reciprocity is used to make reference to "balance of concessions", that means the principle by which one country agrees to reduce the levels of protection in exchange for reciprocal concession from trading partner (Bagwell and Staiger 1999; Freund 2004; Furusawa y Kamihigashi 2012). Reciprocity, in different senses, implies a conscious or strategic action carried out by at least one of its agents involved in bilateral trade arrangements.

At the aggregate level, this implies a specific direct government action, or at least the creation of incentives which would lead agents to behave in a coherent way, in order to achieve countertrade practices. Statistically, this should translate into a precedence relationship from import to exports. Simply stated, there may well be a relationship which stimulates increased exports by a nation, when it first starts to import, thus enticing the

[4] Bebczuk (2008) has found that total imports and exports are significantly correlated in the short term and argues the possible existence of causality occurring both ways. While the author presents an aggregate approximation, his results might have connections in terms of bilateral trade. A priori, there seems to be no argument to discard these statistical relationships (i.e. correlation and causality).

[5] These authors find that if economy i does not export to economy j, the probability that economy j will not export to economy i, is 0.743 (0.665 if it is defined in import terms). This implies that if economy j has not imported from i, it is highly probable that it will not export to i, or in other words, i will not import from j. The other relevant result is that the relative magnitudes of country i´s exports to country j are related to the relative magnitudes of country j´s exports to country i with an average probability of 0,722.

exporting nation to engage in wider trade relations, thus opening up its markets to imports.

It is also feasible to suppose a causal relationship emanating from exports to imports. This might be interpreted as export-led growth models. In this situation exports expand the volume of the product as a result of a multiplier effect. At the same time, for less developed countries the revenues generated as a result of the increase in exports allow capital imports which have the effect of improving and increasing productivity levels. Given these theoretical premises, the expansion of trade produces externalities that arise out of trade openness and as a result improves income levels, thus allowing for imports to rise. Whilst these models are able to explain the long-run effects of exporter' behaviour, still remains unexplained initial buyer behaviour. Moreover, imports of i from j and exports from j to i are both sides of the same coin. To say that causality goes from exports coming from i and going to j, towards imports from i going to j, is the same as saying that the causality is present from imports generating from j to i, towards exports from j to i.

In our empirical exercise we propose to test the existence of reciprocity as a phenomenon in which the importing economy performs the first movement. To conduct this analysis we use import and export data by economic sector between Australia and 10 Latin American economies, having Australia as our point of reference.

3. The evolution of trade Between Australia And Latin America

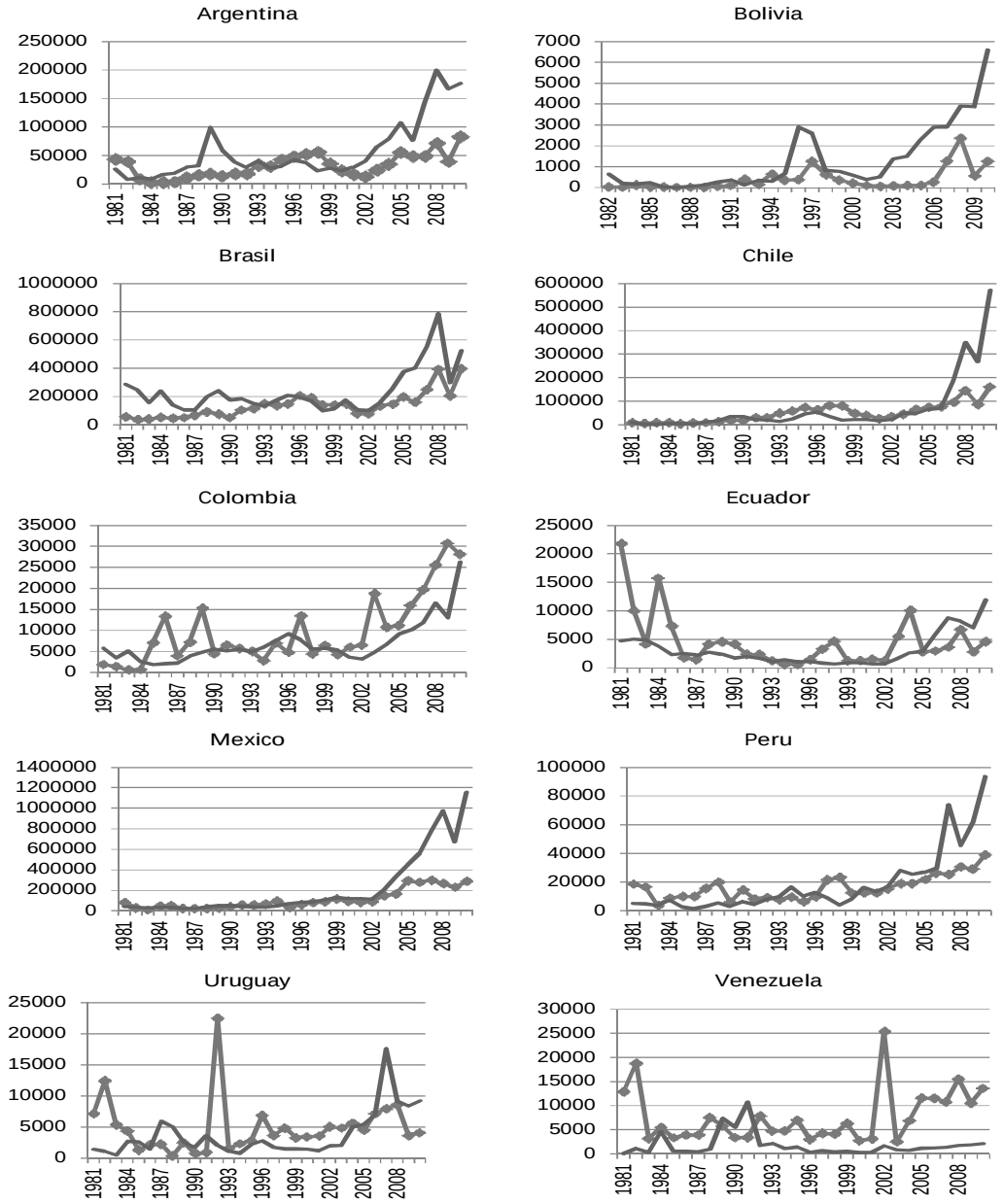
Trade between Australia and the majority of Latin American countries had been set against a background in which these economies were regarded as complete strangers even though they form part of the same hemisphere. According to Kenyon and vand der Eng (2011), their trade and political relations had been "marginal" between the early part of the last century to around the middle of the 1980s. However over the last twenty-five or so years, the situation has changed considerably. The importance of expanding Australia´s economic relations with South America has been highlighted by several reports since 2000 (e.g. DFAT 2000, 2001, 2010). These have argued that South America has considerable market expansion potential. In the past this potential has not been taken advantage of the Australian business for a number of reasons. South America, and in particular countries like Argentina, Brazil and Chile, have for decades been regarded as Australia´s competitors in international markets. While there is some truth in this view, particularly as it relates to the primary sector, the rise of the global knowledge economy and intensified international investment flows has changed this situation considerably.

In addition, in recent years, Australian companies have become more inclined to invest in South America, but engagement has still to reach its full potential. For example, in terms of merchandise and service trade with Australia, Chile was the highest ranked nation in 2008 (DFAT 2008), but by 2011 it had been overtaken by Brazil and Mexico (DFAT 2011). Similarly, in terms of foreign direct investment (FDI), Australian firms generally do not take advantage of all the opportunities offered by the region (Van Ruth 2008, p. 11).

An additional problem has been the relative lack of success of Australian and South American trade negotiations. Negotiations between Australia and the MERCOSUR in the early 2000s were not able to reach a successful conclusion (DFAT 2008). However, Australia and Chile have recently successfully negotiated a free trade agreement and, since the early 1990s, Australia has been actively involved in the Asia-Pacific Economic

Cooperation treaty with Chile, Peru and Mexico. Furthermore, those economies have now joined the Trans-Pacific Strategic Economic Partnership Agreement between 2005 and 2012, while Australia began negotiations in 2008. Currently, Australia is negotiating a free trade agreement with Colombia.

Figure 1. Two-way trade between Australia and 10 Latin American countries, 1981-2010
(1000 AU D$. Constant import and export prices, 1989-90=100)



Source: United Nation Commodity Trade Statistics Database (comtrade.un.org)
Australian imports ◆ Australian exports

Much of the discussion of Australian trade has centred on the massive expansion of trade resulting from the so called "Asian Century". While this massive expansion of trade has been extremely beneficial, other parts of the world are now becoming far more prominent. Although this growth has not shown the massive acceleration of trade as seen in the Asian region, trade growth has over the last 10 or so years began to be noticeable. Two-way trade with the Latin American region has begun to grow steadily particularly over the last 10 years. Figure 1 show the flows of trade between Australia and the selected Latin American countries.

The overall trade balance has favoured the larger Latin American economies, where Australia experienced stronger trade volumes and relatively large trade deficits over the period with Mexico, Brazil, Chile and Argentina. These deficits began to show prominence shortly after 2000 where by 2010 Australia achieved trade deficits of over $800 million with Mexico and Chile, and over $200 million with Argentina and Brazil and much smaller ones with smaller economies such as Peru, Uruguay, Bolivia and Ecuador. On the other hand, Australia experienced small trade surpluses with Colombia and Venezuela.

The driver for these deficits could be found in trade related to a variety of commodities. In terms of food and live animal trade, the balance of trade favoured countries like Brazil and Mexico, where the largest increases were seen after 2004. Australia's trade of crude materials such as hides and fur skins experienced relatively high deficits with Brazil and Chile, and experienced a slow trend decline in exports to Mexico over the thirty year period. Australia's exports of mineral fuels, lubricants and related materials experienced surpluses with Brazil, Chile, Mexico and Argentina, while trade with the remaining 6 Latin American nations was of low significance.

Australia's imports of animal and vegetable oils from the region impacted strongly on its trade deficits, particularly with Argentina, Peru and Mexico. In terms of trade in chemical and related products, two way trade was significant, with exports flowing strongly to all countries in the region, and relatively strong levels of imports coming from Mexico, Argentina, Brazil and Chile. These trends could also be seen in two way trading in manufactured goods, machinery and transport equipment and other miscellaneous manufactured articles. In these three areas, the trade surpluses favoured, as in other sectors, the larger Latin American nations. While these trade volumes are not as large as Australia's trade with the Asian region, the impact of the growth over the last decade is quite significant and requires further investigation.

The important question to ask is what is driving these Australian trade deficits with Latin America? Is it a conscious policy of openness in order to access more Latin American markets or is there a different phenomenon taking place? A possible explanation is that over the last twenty five or so years, there has been a clear process of trade liberalization, as well as an Australian realization of the commercial opportunities that abound in Latin America. In terms of the general gravitational equation model, it can be argued that there has been a reduction in "distance" between the two regions and an increase in the "mass" or size of these 10 Latin American economies.

4. Data and empirical specification

The data utilized for the analysis of trade flows were obtained from the United Nation Commodity Trade Statistics Database (comtrade.un.org). Australia was classified as the reporter source, while the 10 Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay y Venezuela), reported as partner countries. The time period used for our analysis was 1981-2010. In order to maintain consistency, trade flows are defined from Australia's point of view.

The data reported utilized for imports and exports by sector were classified under the SITC revision 2. Eight commodities groups were considered: food, live animals and beverages and tobacco (SITC 0 and 1), crude materials, inedible, except fuels (SITC 2), mineral fuels, lubricants and related materials (SITC 3), animal and vegetable oils, fats and waxes (SITC 4), chemicals and related products n.e.s. (SITC 5), manufactured goods classified chiefly by material (SITC 6), machinery and transport equipment (SITC 7), and others manufactured products (SITC 8 and 9).All commodity values were converted from US dollars to AU dollars using exchange rates supplied by the Australian Bureau of Statistics (www.abs.gov.au: Series A2716726J). To obtain real flows over time, we deflated the nominal flows by the import price and export price indexes by SITC obtained from the Australian Bureau of Statistics (International Trade Indexes, Cat. No. 6457.0 and Export Price Index, Cat No. 6405.0, various issues). For the conversions we used the annual averages of the original index numbers published quarterly.

In section 2 of our analysis we proposed a relationship of statistical precedence between import and export flows. This relationship may be interpreted as a strategic policy/method of promoting exports where one of the parties involved makes the first move by allowing the target market´s product to enter its own market. In order to verify this hypothesis we used the pair wise Granger causality test which consists in evaluating the extent to which the value of a current variable can be explained by previous values of the same and of other relevant variables. This methodology has been applied by Bhatt (2013) to study causal relationship between exports, FDI and GDP. Similarly, Konya (2004) applied the same methodology to investigate export-led growth and growth-driven export by testing for Granger causality between the real exports and real GDP for twenty-five OECD countries.Hence, we say that "X_{ijr} is caused in the Granger direction by $M_{ij\bullet}$" (with r as a given commodity and ● represents all of the commodities under consideration) if the lagged variables of $M_{ij\bullet}$ are statistically significant. Formally we can express the empirical relationship as:

$$C_{ij}i = \sum_{i}(d_{ij}i - 1/N)/\delta_{ij}i)\tau((1)) + \sum_{i}(\Sigma_{i}h\equiv(d_{ij}h - 1/N)/(ih)\tau((2)) + \sum_{i}((\Sigma_{i}f\equiv[[d_{ij}fi - 1/N]$$
$$\gamma_{ij}fj]]\gamma/\delta_{ij}ii)\tau((3)) + \sum_{i}(\Sigma_{i}h\equiv(\Sigma_{i}f\equiv[[d_{ij}fh - 1/N]\gamma_{ij}fj]]\gamma/\delta_{ij}ih)\tau((4))$$
$$+\underbrace{\frac{\Sigma_s\left[l_{st} - {}^{1}/_{N}\right]\theta_{sj}}{\delta_{it}}}_{(5)} + \underbrace{\sum_{h}\frac{\Sigma_s\left[l_{sh} - {}^{1}/_{N}\right]\theta_{sj}}{\delta_{ih}}}_{(6)}$$

(1)

where *r* corresponds to the economy sector, *l* represents the number of lags considered, *t* is the subindex of temporal placement and *u* is the random error term. Operationally, to prove G-causality we need to use the null hypothesis stating that all the parameters β are

equal to zero. The inclusion of the lagged variables for the dependent variable is due to the possibility of the persistence of trade as already discussed in the review of the literature. Finally, the inverse specification proposed by Granger (1969), in our case corresponds to the country *j´*s initiative for reciprocal trade.

It is important to highlight that the proposition "$M_{ij\bullet}$ *G-cause* X_{ijr}" does not necessarily imply that X_{ijr} is caused by $M_{ij\bullet}$. G-causality captures precedence and informational content, but does not indicate causality in the more traditional use of the term. Its formulation does not allow to consider it as unequivocal proof of theoretical causality. Although its main use is in exploratory approximations, probing G-causality absence would invalidate a deeper study of the phenomenon. Therefore, the results of this stage of analysis is of great importance.

A central element in test specification is the number of lags to be employed. Generally it is recommended to include the largest possible number of lags in order to obtain valuable information. In our case, the lags should capture the time it takes for country *i* in transforming its imports from *j* to exports towards *j*. While this strategy may take several periods due to the challenge of overcoming institutional barriers of various kinds, the inclusion of an excessive number of lags in an econometrical model might create a micronumerosity problem. As a result, the test has been specified to 5 lags (i.e. 5 years), which corresponds to a reasonable time range for exports to react to importing practices.

A prerequisite in the evaluation of G-causality is that series are required to be cointegrated. For testing this, we utilised the Engle-Granger (E-G) criterion in order to evaluate the presence of unitary root in the residuals (i.e. no cointegration). The E-G p-value corresponds to the z-statistic of the normalised autocorrelation coefficient.

5. Results

We covered a total of 1,280 possible G-causal relationships of Australian imports and exports with Latin America according to the SITC classification described above. This number arises as a result of combinations of 8 groups of commodities for each of the 10 pairs of trading nations under consideration, and two possible G-causality relationships for each of the pairs of trading nations. Our results verify 93 cases of statistical significance in which at least one of the trading partners (i.e. Australia or one of the Latin American economies) has allowed imports from the other country and this has generated export flows from the first partner to the second. This represents only 7.3 percent of the number of examined relationships but 64% of the total bilateral trade between Australia and the selected Latin American countries in 2010[6]. Table 1 points out that, except for Mexico and Venezuela, reciprocal trade represented more than 60% of bilateral trade. Considering the origin of reciprocal trade, Australia initiated the first trading action in 42 cases and Latin American economies in 51 cases. Table 2 synthesizes this information. The country abbreviations in the cells indicate where the causal relationship originates. For example, COL situated in the third cell of the first row shows mineral fuels imports into Colombia, which as a result G-causes food exports to Australia. The number in brackets next to AUS indicates the quantity of causal relationships initiated by Australia for that particular combination of commodities. For example, in the last cell of the first

[6] The percentage was computing as where s indicates the SITC items.

row, AUS appears three times which indicates that it was food imports that allowed exports of other manufactured products to flow to three other Latin American economies.

Table 1. Reciprocal trade between Australia and 10 Latin American countries, 2010
(1000 AUD$. Constant import and export prices, 1989-90=100)

	Bilateral trade	Reciprocal trade	Reciprocal/Bilateral trade (%)
Argentina	259.564,22	186.806,38	71,97
Bolivia	7.825,45	7.163,41	91,54
Brazil	922.608,74	863.571,28	93,60
Chile	732.444,84	678.985,83	92,70
Colombia	54.323,88	46.243,34	85,13
Ecuador	16.566,01	14.687,37	88,66
Mexico	1.444.612,88	393.120,27	27,21
Peru	132.396,80	93.375,83	70,53
Uruguay	13.311,66	10.224,52	76,81
Venezuela	15.780,10	7.945,75	50,35
Total	3.599.434,60	1.021.700,67	63,96

Sources: our estimations. See section IV for more information.

Figure 2 shows two pairs of columns. The ones in the upper row correspond to the importance (%) of each of the exported commodities as a result of considering the number of cases of reciprocity where the reference region made the first move. On the other hand, the ones in the lower row correspond to the importance of each of the imported commodities. Both rankings together give an idea of the preferences of each region in terms of the goods offered and imports received at the time of the opening of its economy.

We must take into consideration that the cases presented are those statistically significant, so they can be considered successful attempts at market penetration.

From the analysis shown in Table 2 and Figure 2, in the Appendix, we can highlight the following distinctions in relation to bilateral trade between the two regions. (i) Australia has utilized a strategy of promoting exports of manufactures and machinery and transport equipment (3 SITC items represent the 55% of the cases), while Latin America has successfully placed mineral fuels, chemicals products and miscellaneous manufactures[7] (3 SITC items, 57%); (ii) Australia has shown preference to import crude materials, chemicals and miscellaneous manufactures (3 SITC items, 50%). Latin America, on the other hand, has preferred to import machinery and transport equipment, miscellaneous manufactured products, and chemicals (3 SITC items, 63%); (iii) the results shows a high degree of coincidence between Australian promoting attempts and Latin American preferential imports, and the same applies in the reverse direction; (iv) 70% of all statistical significant cases, regardless of who moved first, involve Australian exports of products classified as manufactured goods and machinery (SITC 6 to 9); Latin America

[7] Details about SITC 8 Miscellaneous manufactured articles: 81 Prefabricated buildings and fixtures n.e.s.; 82 Furniture and parts thereof; 83 Travel goods and handbags; 84 Articles of apparel and clothing; 85 Footwear; 87 Professional, scientific and controlling instruments and apparatus, n.e.s.; 88 Photographic and optical goods; 89 Miscellaneous manufactured articles, n.e.s.; SITC 9 Commodities and transactions, n.e.s.; 97 Gold, non-monetary.

instead shows a lesser concentrated export basket where manufacturing and machinery (SICT 6 and 7) only are present in 15% of the cases.

Table 2. Reciprocal trade between Australia and 10 Latin American countries: Pairwise Granger causality test

Imports (AUS)	Exports (AUS)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1				VE	MX	VE	AU (2) CO MX	AU (3) CL
SITC 2	AU	BO			AU (2) CL, MX	AU (3) MX		AU (2) BR
SITC 3	AU	AU EC PE VE	AU CO	CO MX	CO	CO PE	EC	AU CO EC
SITC 4		AU	AU AR	AU PE		AU MX	AU EC MX	
SITC 5	AU	EC		AU	AU BR EC	AU	AU (2) BR EC	AU, BR EC, MX PE, UR
SITC 6	AU	BR					MX	AU MX
SITC 7	AU	AU			EC	AU UR	AU	AU UR
SITC 8+9	AU		BR	AU (2)	AU BR		AU. BR MX. PE, VE	AU MX

Sources: our estimations. Reference: Australian exports and imports by groups of commodities. SITC 0+1. Food & live animals, Beverages & Tobacco. SITC 2. Crude materials, inedible, except fuels. SITC 3. Mineral fuels, lubricants & related materials. SITC 4. Animal & vegetable oils, fats and waxes. SITC 5. Chemicals & related products n.e.s. SITC 6. Manufactured goods classified chiefly by material. SITC 7. Machinery & transport equipment. SITC 8+9. Other manufactured products

In the Appendix we present tables in terms of two way trade between Australia and its corresponding Latin American trading partner, where we specify the G-causality direction and statistics for each verified relationship. Below, we show a summary of our findings:

(a) Australia-Argentina

The results show 5 cases of intersectoral G-causality, 4 are as a result of Australian strategies for trade and 1 case for Argentina – the last one has a p-value equal to10%, then it has poor statistical significance. If we take the quantity of G-causal relationships coming from the same nation in terms of export effort, we could conclude that Australia has pursued a stronger export orientation. While its basket of export goods is oriented towards value added goods, we can assume that Australian import preferences are principally food and live animals, oils and machinery and transport equipment. Argentina promoted exports of animals and vegetable oils and importing products classified as mineral fuels, lubricants and related materials.

(b) Australia-Bolivia

Bilateral trade between Australia and Bolivia showed a total of 5 cases of reciprocity. Bolivia made successful attempts at placing crude materials (except fuels) while importing products classified in the same group. Australia, for its part, placed food products and “other manufactured products” and imported food products, machinery and other manufactured products.

(c) Australia-Brazil

We verify 15 cases of reciprocal trade with the following distribution: 7 promoted by Australia and 8 by Brazil. Brazil has offered a diversified basket of commodities to Australia, although most of its efforts were concentrated in chemicals and related products, and miscellaneous manufactures (3 cases for each one). Of interest is Australia's push for preferential import such as crude materials, chemicals, machinery and transport. This strategy has been conducted in order to place a diversified basket of commodities, although the main interest for Australia has been to export manufactured goods and miscellaneous manufactures.

(d) Australia-Chile

We established 13 reciprocal trade relationships, of which 10 corresponded to Australian initiatives. Australia made successful attempts at placing goods classified as food and live animals, beverages and tobaccos, also manufactured goods, machinery and transport equipment and miscellaneous manufactures. Chile has offered a diversified basket but Australia showed more interest in chemical and related products. On the other hand, Chilean trade seems to be concentrated in areas of comparative advantage (i.e. food and live animals, and crude materials, except fuels).

(e) Australia-Colombia

A total of 11 cases were account for reciprocal trade. Most of these were promoted by Colombia (6 as opposed to 5 for Australia). The strategy of trade promoted by Colombia is centered on placing mineral fuels. In order to this, Colombia imports a diversified set of commodities from Australia. Australia has placed crude materials (except fuels) and machinery and transport equipment importing animal and vegetable oils and machinery and transport equipment.

(f) Australia-Ecuador

We establish 12 cases of reciprocal trade, dominated by trade initiatives started by Ecuador (9 cases). Ecuador made successful attempts at placing mineral fuels and chemicals importing crude materials and manufactured goods from Australia. This country has imported food and crude materials from Ecuador.

(g) Australia-Mexico

We observe 12 cases of reciprocal trade, which are essentially driven by Mexico (11 cases). In its totality, Mexico's strategy towards Australia can be seen in placing foods, as well as manufactured goods. In response, it has imported a basket of oils and manufactured goods from Australia.

(h) Australia-Peru

We identify 11 cases of reciprocal trade between Australia and Peru. Five of these are driven by Peru, while 6 are from Australia. Although there does not seem to a clear pattern in respect to Peru's drive, it made successful attempts at placing mineral fuels. In return, Australia has preferred export oils and manufactured goods and imported a diversified basket of goods from Peru.

(i) Australia-Uruguay

The results show 5 cases of reciprocal trade between Australia and Uruguay. Both Australia and Uruguay made attempts at placing chemicals and machinery and transport equipment. While the first one preferred to import food and crude materials, the other preferred manufactured goods.

(j) Australia-Venezuela

Our analysis finds 5 statistically significant cases of reciprocal trade, of which 4 are initiatives by Venezuela. This country promoted exports of food, mineral fuels and miscellaneous manufactured goods importing crude materials, oils, manufactured goods and machinery.

The evidence obtained from our study points to clear signs that Australia is attempting to conduct a more intense policy of penetration of the Chilean, Brazilian and Peruvian markets. Between 2000 and 2006, Australia's balance of trade with these economies grew quite rapidly. Nevertheless, taking into consideration the G-causal relationship shown, it is possible to suggest that the gap in trade flows might begin to close. And it is more probable in bilateral trade with Chile and Brazil considering the high proportion of reciprocal trade in 2010 (see again Table 1). In fact, the negative Australian trade balance with Brazil was significantly reduced after 2007.

In contrast to the picture above, Mexico, Ecuador, Brazil and Colombia appeared to have made more effort to penetrate the Australian market. While the balance of Mexico took a path clearly in its favour until 2008, Colombia is one of the two economies that have shown a negative trade balance with Australia. Ecuador and Australia have experienced a stable behaviour where the trade balance has been close to zero.

6. Final considerations

Recent statistical studies indicate that bilateral trade flows show persistence and reciprocity. Clearly, those conditions tend to have long term consequences. We interpreted reciprocity as a strategy of trade market penetration or a particular case of countertrade, where one economy imports in order to motivate the openness of the partner´s economy and to place in that country its own products. After a discussion about the conceptualization, we described the evolution of the bilateral trade between Australia and Latin America and presented the strategy to study the reciprocal trade between those regions.

The objective of this empirical study has not been to define the patterns of trade between them. It is possible, however, to suggest that Australia has utilized a basket of goods for exports that is far more diversified than its Latin American counterparts. Furthermore, Australia has been more active in trying to promote exports of manufactured goods than the Latin American economies involved in this study. The trade deficits found with these economies over the last few years, could be assumed as result of a policy designed by Australia to penetrate the region. It is important to note, however, that reciprocity trade has not occurred in only one direction, because a number of these Latin American economies have also shown a proactive policy of market penetration.

We have shown that reciprocal trade accounts for much of bilateral trade, reaching 90% in some cases. The evidence we have provided allows us hypothesize that reciprocity is a significant marketing strategy. However, the empirical approach used prevents us from generalizing this phenomenon. Thus, we propose two research areas in the near future. The first, the empirical one, is introducing reciprocity in gravity models as a source of bilateral trade. The second, with theoretical motivation, is to incorporate the phenomenon within the theoretical models that explain that. If the first presents difficulties, in the second one the difficulties are even greater because initially it is necessary to study the origin of reciprocity. That is, is reciprocal trade a result of an identified governmental

strategy or a result of an economic environment that enhances the potential individual winnings of this type of countertrade? The latter requires a simultaneous advance in the two proposed research areas.

Reference

Anderson, J. (1979), A Theoretical Foundation for the Gravity Equation. *American Economic Review* 69, 106–16.

Bagwell, K. and R. Staiger (1999). An Economic Theory of GATT. *American Economic Review* 89(1), 215-248.

Banks, G. (1983), The Economics and Politics of Countertrade. *The World Economy* 6 (2), 159-182.

Bebczuk, R. (2008), Correlación entre importaciones y exportaciones: ¿Un nuevo enigma? *Ensayos Económicos* 52, 39-56.

Bergstrand, J. (1985), The Gravity Equation in International Trade, Some Microeconomic Foundations and Empirical Evidence. *Review of Economics and Statistics* 67: 474–81.

Bahtt, P. (2013), China's Exports and Foreign Direct Investment. *Applied Econometrics and International Development* 13 (2): 183-196.

Bun, M. and F. Klaassen (2002), The Importance of dynamics in Panel Gravity Models of Trade, *UvA Econometrics Discussion Paper* 2002/18.

Caves, R. and D. Marin (1992), Countertrade Transactions: Theory and Evidence. *Economic Journal* 102(414), 1171-83.

De Nardis, S. and C. Vicarelli (2003), Currency Unions and Trade: The special Case of EMU. *Weltwirtschaftliches Archiv/Review of World Economics* 139: 625-649.

Deardorff, A. (1998), Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World? in J. Frankel (ed.) *The Regionalization of the World Economy*, University of Chicago Press, Chicago.

DFAT, Department of Foreign Affairs and International Trade (2000), *Doing Business in Latin America: An Introductory Guide*, DFAIT, Canberra.

_____(2001), *Investing in Latin American Growth: Unlocking Opportunities in Brazil, Mexico, Argentina and Chile*, DFAIT, Canberra.

_____(2008), *Composition of Trade Australia*, DFAIT, Canberra.

_____(2009), *Trade in Services Australia*, DFAIT, Camberra.

_____(2010), *Australia's trade with the Americas*, DFAIT, Camberra.

_____(2011), *Trade in Primary and Manufactured products Australia*, DFAIT, Canberra.

Esposto, A. and F. Tohmé (2009), *Drifting apart: The divergent development paths of Argentina and Australia*, VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG., Saarbrücken

Eichengreen, B. and D. Irwin (1998), The Role of History in Bilateral Trade Flows, in J. Frankel (ed.). *The Regionalization of the World Economy*, University of Chicago Press, Chicago, 33–57.

Freund, C. (2003), Reciprocity in Free Trade Agreements. *Working Papers Central Bank of Chile* 279.

Furusawa, T. and T. Kamihigashi (2012), Threats or Promises? A Built-In Mechanism of Gradual Reciprocal Trade Liberalization, *The Japanese Economic Review* 63(2), 259-279.

Granger, C. (1969), Investigating causal relation by econometric and cross-sectional method. *Econometrica* 37: 424–438.

Harris, M., Kónya, L. and L. Mátyás (2012), Some Stylized Facts about International Trade Flows. *Review of International Economics* 20(4), 781–792.

Hennart, J. (1990), Some Empirical Dimensions of Countertrade. *Journal of International Business Studies* 21(2), 243-270.

Joint Standing Committee on Foreign Affairs, Defence and Trade (2000). *Australia's Trade and Investment Relationship with South America*, available online: http://www.aph.gov.au/house/committee/jfadt/samer/samindex.htm, accessed 15 August 2011.

Kenyon, D and P. van der Eng (2012), *From strangers to partners in the hemisphere: New Prospects in Australia's Economic Relations with Latin America*, Centre for Economic Policy Research, Australian National University, Canberra. Available online: http://cbe.anu.edu.au/research/papers/ceprdpapers/dp650.pdf,accessed 28 October 2011.

Konya, L. (2004), Export-Led Growth, Growth-Driven Export, Both or None? Granger Causality Analysis on OECD Countries. *Applied Econometrics and International Development* 4 (1), 73-94.

Linnemann, H. (1966), *An Econometric Study of International Trade flows*, North-Holland, Amsterdam

Marin, D. and M. Schnitzer (2003) Creating Creditworthiness through Reciprocal Trade. *Review of International Economics* 11(1), 159-174.

OECD, Organisation for Economic Co-operation and Development (2012). *Latin American Economic Outlook 2012: Transforming the State for Development*, OECD.

Pöyhönen, P. (1963), A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches Archiv* 90,: 93–99.

Salvatore, D. (2010), *International Economics*, 9th edition, John Wiley & Son Inc., United States of America,.

Tinbergen, J. (1962), *Shaping the World Economy: Suggestions for an International Economic Policy*, Twentieth Century Fund, New York.

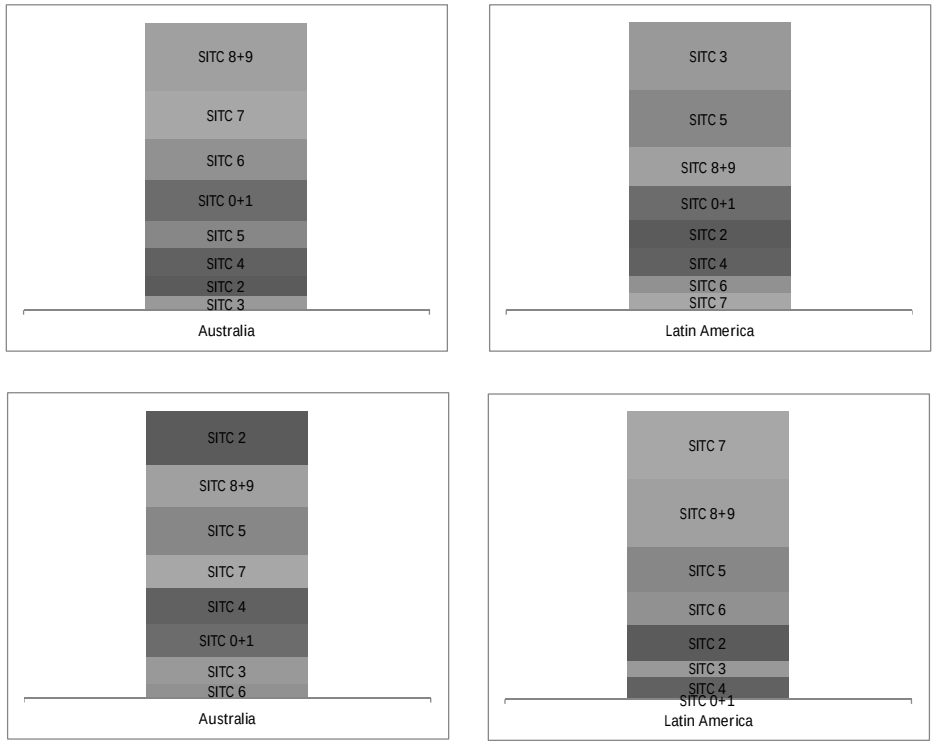
Van Ruth, F. (2008), *The internationalisation of Australian firms: how networks help bridge the psychic distance between a firm and a market*, PhD thesis, Department of Management and Marketing, The University of Melbourne.

WEF, World Economic Forum (2009), *The Global Competitiveness Report 2009-10*, World Economic Forum, Geneva.

Appendix on line at the journal Website: http://www.usc.es/economet/aeid.htm

Appendix

Figure 2. Exports promotion by reciprocal trade (upper row) and preferential imports (lower row) by region



Sources: our estimations.

Table A1. Reciprocal trade between Australia and Argentina: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1							E-G p=0.0437 M → X 2.67257 (0.0673)	E-G p=0.0000 M → X 3.27125 (0.0365)
SITC 4			E-G p=0.0000 X → M 2.30771 (0.0999)			E-G p=0.0055 M → X 2.57071 (0.0751)		
SITC 7								E-G p=0.0000 M → X 5.97717 (0.0037)

Sources: Our estimations. Reference: Australian exports and imports by groups of commodities. SITC 0+1 Food & live animals, Beverages & Tobacco. SITC 2 Crude materials, inedible, except fuels. SITC 3 Mineral fuels, lubricants & related materials. SITC 4 Animal & vegetable oils, fats and waxes. SITC 5 Chemicals & related products n.e.s. SITC 6 Manufactured goods classified chiefly by material SITC 7 Machinery & transport equipment. SITC 8+9 other manufactured products

Table A2. Reciprocal trade between Australia and Bolivia: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1								E-G p=0.0563 M → X 2.72679 (0.0636)
SITC 2		E-G p=0.0000 X → M 7.051 (0.0017)						
SITC 7	E-G p=0.0000 M → X 4.23555 (0.0148)							
SITC 8+9	E-G p=0.0000 M → X 14.0757 (0.0000)							E-G p=0.0000 M → X 6.05571 (0.0035)

Sources: our estimations. References: See table A1.

Table A3. Reciprocal trade between Australia and Brazil: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 2	E-G p=0.0029 M → X 2.58756 (0.0737)					E-G p=0.0491 M → X 4.00208 (0.0183)		E-G p=0.0000 M → X 3.91145 (0.0199) E-G p=0.0001 X → M 3.38611 (0.0326)
SITC 5					E-G p=0.0077 X → M 3.25056 (0.0372)		E-G p=0.0002 M → X 7.60246 (0.0012) E-G p=0.0000 X → M 3.94527 (0.0193)	E-G p=0.0480 M → X 4.02925 (0.0178) E-G p=0.0054 X → M 3.17675 (0.0401)
SITC 6		E-G p=0.0637 X → M 2.39726 (0.0906)						
SITC 7						E-G p=0.0000 M → X 9.76198 (0.0004)		

SITC 8+9			E-G p=0.0521 X → M 3.07568 (0.0444)	E-G p=0.0033 M → X 3.53293 (0.0283)	E-G p=0.0818 X → M 2.38525 (0.0918)		E-G p=0.0189 X → M 3.36706 (0.0332)	

Sources: our estimations. References: See table A1.

Table A4. Reciprocal trade between Australia and Chile: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1								E-G p=0.0440 X → M 4.87907 (0.0086)
SITC 2					E-G p=0.0018 M → X 5.28159 (0.0062) E-G p=0.0001 X → M 3.38403 (0.0327)			E-G p=0.0000 M → X 13.3414 (0.0000)
SITC 3		E-G p=0.0066 M → X 8.94563 (0.0005)						E-G p=0.0358 M → X 2.88246 (0.0541)
SITC 5	E-G p=0.0003 M → X 2.95438 (0.0502)				E-G p=0.0000 M → X 2.74517 (0.0624) E-G p=0.0203 X → M 2.95983 (0.0499)		E-G p=0.0988 M → X 2.70385 (0.0651)	E-G p=0.0671 M → X 4.25801 (0.0145)
SITC 6	E-G p=0.0001 M → X 3.31354 (0.0350)							
SITC 8+9							E-G p=0.0002 M → X 2.88554 (0.0543)	

Sources: our estimations. Reference: See table A1.

Table A5. Reciprocal trade between Australia and Colombia: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1							E-G p=0.0219 X → M 3.04405 (0.0458)	
SITC 3	E-G p=0.0032 M → X 3.46165 (0.0303)		E-G p=0.0005 X → M 13.1481 (0.0000)	E-G p=0.0006 X → M 2.63780 (0.0699)	E-G p=0.0003 X → M 4.56406 (0.0112)	E-G p=0.0000 X → M 3.93901 (0.00194)		E-G p=0.0003 X → M 226.05 (0.0000)
SITC 4		E-G p=0.0015 M → X 4.86034 (0.0087)					E-G p=0.0001 M → X 3.32074 (0.0348)	
SITC 7		E-G p=0.0031 M → X 4.42790 (0.0125)					E-G p=0.0276 M → X 3.35838 (0.0335)	

Sources: our estimations. References: See table A1.

Table A6. Reciprocal trade between Australia and Ecuador: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1								E-G p=0.0026 M → X 8.86663 (0.0006)
SITC 2						E-G p=0.0087 M → X 5.64079 (0.0047)		
SITC 3		E-G p=0.0008 X → M 11.4423 (0.0002)					E-G p=0.0002 X → M 43.3560 (0.0000)	E-G p=0.0003 X → M 5.28573 (0.0062)
SITC 4			E-G p=0.0003 M → X 11.9548 (0.0001)				E-G p=0.0001 X → M 41.8523 (0.0000)	
SITC 5		E-G p=0.0046 X → M 9.64314 (0.0004)			E-G p=0.0003 X → M 5.86782 (0.0040)		E-G p=0.0025 X → M 15.9999 (0.0000)	E-G p=0.0000 X → M 4.700085 (0.0100)
SITC 7					E-G p=0.0000 X → M			

					4.00098 (0.0183)			

Sources: our estimations. Reference: See table 1.

Table A7. Reciprocal trade between Australia and Mexico: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1					E-G p=0.0139 X → M 3.824914 (0.0215)		E-G p=0.0318 X → M 2.79676 (0.0591)	
SITC 2					E-G p=0.0007 X → M 72.7851 (0.0000)	E-G p=0.0280 X → M 2.53315 (0.0781)		
SITC 3				E-G p=0.0001 X → M 5.31047 (0.0061)				
SITC 4						E-G p=0.0002 X → M 8.74468 (0.0006)	E-G p=0.0048 X → M 2.91301 (0.0524)	
SITC 6							E-G p=0.0039 X → M 4.98252 (0.0079)	E-G p=0.0142 X → M 20.1645 (0.0000)
SITC 8+9					E-G p=0.0005 M → X 7.07270 (0.0017)		E-G p=0.0000 X → M 5.88064 (0.0039)	E-G p=0.0218 X → M 3.22585 (0.0382)

Sources: our estimations. References: See table A1.

Table A8. Reciprocal trade between Australia and Peru: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 2						E-G p=0.0067 M → X 3.01606 (0.0471)		
SITC 3		E-G p=0.0001 X → M 10.4124 (0.0003)				E-G p=0.0006 X → M 5.46735 (0.0054)		
SITC 4				E-G p=0.0375 M → X 3.37156 (0.0331) E-G p=0.0377				

				X → M 2.3317 (0.0973)				
SITC 5				E-G p=0.0368 M → X 3.18744 (0.0397)		E-G p=0.0195 M → X 5.68213 (0.0046)		E-G p=0.0393 X → M 3.47231 (0.0300)
SITC 6								E-G p=0.0051 M → X 4.81352 (0.0091)
SITC 8+9				E-G p=0.0069 M → X 3.79888 (0.0220)			E-G p=0.0032 X → M 3.47289 (0.0300)	

Sources: our estimations. References: See table A1.

Table A9. Reciprocal trade between Australia and Uruguay: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1							E-G p=0.0003 M → X 5.65361 (0.0047)	
SITC 2					E-G p=0.0727 M → X 4.14612 (0.0161)			
SITC 5								E-G p=0.0001 X → M 3.35672 (0.0336)
SITC 7						E-G p=0.0003 X → M 10.7685 (0.0002)		E-G p=0.0000 X → M 4.57981 (0.0110)

Sources: our estimations. References: See table A1.

Table A10. Reciprocal trade between Australia and Venezuela: Pair wise Granger causality test

Imports (M)	Exports (X)							
	SITC 0+1	SITC 2	SITC 3	SITC 4	SITC 5	SITC 6	SITC 7	SITC 8+9
SITC 0+1				E-G p=0.0010 X → M 7.719 (0.0011)		E-G p=0.0007 X → M 4.43523 (0.0125)		
SITC 3		E-G p=0.0002 X → M 9.73623 (0.0004)	E-G p=0.0003 M → X 6.39997 (0.0027)					
SITC 8+9							E-G p=0.0025 X → M	

							3.64903 (0.0253)	

Sources: our estimations. Reference: See table 1.