Sino-LAC Ties:
Trade Relationships and Asymmetric Dependency*

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* Paper prepared for presentation at the International Conference on *Institutions, Reforms and Economic Development*, Peking University, Beijing, China, September 19-20, 2015.

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Abstract

Previous studies have emphasized the asymmetry in the Sino-LAC partnership, solely based on their trade exchanges. This paper extends the boundaries of understanding structural asymmetries in the Sino-LAC trade, by considering unequal opportunities in this partnership. The latter is accounted for by deriving two-way export potentials from the Sino-LAC partnership. The analysis is pitched within China's multiple trade interactions with global partners, to reflect a broader internationalized concept of potential in terms of exports. On average, the gravity of LAC's trade promise with China appears to lie in continuing to grow the level of exports in agriculture. In contrast, the model finds China to be exporting at predicted levels to LAC, and over-exporting in manufactures. These results lend support to the recent observation that China-LAC trade may have hit a plateau. The aggregate results, further, obscure opportunities for exports of manufactures from countries such as Argentina and Mexico to China (albeit marginal). Therefore, the export potentials observed for LAC to China, instead of China to LAC, not only imply untapped possibilities for the former relative to the latter connection, but also indicate their disparate opportunities for further integration; it is therefore misleading to draw inferences of asymmetry solely based on stylistic trends of exchanges, largely explained by the magnitude, concentration and structure of exports.

Key Words: China; Latin America; export potentials; asymmetric dependency; gravity model

JEL Classification: F14, F15, C23

1. Introduction

China's engagement with Latin America and the Caribbean (LAC) epitomizes well the growing integration between emerging economies. Commercial ties established to secure access to primary products, particularly oil, energy, metals and agricultural products (Jenkins et al., 2008; Iturre and Mendes, 2010), continue to explain the Chinese activities in the resource-rich nations of LAC. As Ellis (2009) points out, China leverages advantages in manufacturing to sell products to LAC. Reciprocally, LAC has capitalized on China's demand for unprocessed primary products, such as petroleum, copper and soy. For example, China exports electronic equipment and machinery to Brazil and imports raw materials and agricultural products (soybeans and iron ore) from Brazil. China-LAC trade relations are therefore considered highly complementary (He, 2007) and have an inter-industrial nature.

Despite the impressive results from this emerging trade partnership, interactions between China and LAC are considered to allude to the traditional view of specialization based

on comparative advantage, or rather known as developing along the lines of the classic center-periphery relations (Jenkins, 2012). Consequently, many argue that LAC will inadvertently "deindustrialize" or "reprimarize" following the current trade patterns with China. Consequently, most studies on the Sino-LAC ties focused either on the future of manufacturing in the region following direct trade with China, or through global competition in third markets (Moreira, 2006; Jenkins et al., 2008; Florido, 2009), and also the risks associated with specialization in natural resources. Following which, some analysts believe that LAC's relations with China may instead lead to a new geographical dependence (Ferchen, 2011). The actual equality of the relationship has been therefore questioned and concluded as being obviously asymmetric.

Though this paper builds on the narratives of dependency[1] when examining trade relationships in the Sino-LAC case, it by no means seek to contribute to the complementary versus dependent debate. Instead, it offers additional perspectives to the Sino-LAC interactions in the context of *asymmetric dependency* in international economic relations. While past studies highlight the issue of the Sino-LAC asymmetry in terms of hopes, leverage and trade relationships (based on trade patterns – trade volume, trade balance; trade structure/ composition), none have gone beyond those components to understand the imbalances that prevail in terms of *unequal opportunities*. This necessitates an empirical boundary question. This paper therefore derives and compares two-way export potentials, on aggregate, by sector and by principal LAC trading partners of China, to further qualify the imbalances in that partnership, and contribute to our understanding of asymmetries in the Sino-LAC trade[2]. This

[1] Dependency-type arguments are often levelled at what is argued to be asymmetrical or unbalanced nature of trade. It is acknowledged that this alone does not provide a comprehensive picture of dependency. Further, there is no unified dependency theory.

[2] The focus of asymmetric Sino-LAC relations in this paper is solely on trade *per se,* as it has expanded to command greater magnitude and importance relative to foreign direct investment and aid (Ferchen, 2011).

is to ensure that the conclusions reached from a seemingly simple story line of trade patterns do not obscure important details of imbalances.

The rest of the paper is organized as follows. Section 2 details the literature on the dimensions of trade-related asymmetric dependency. Section 3 qualifies the asymmetries observed in trade interactions between China and LAC. It also estimates and compares the export potentials that lie in the Sino-LAC relations, from both sides. Section 4 concludes with some inferences on the Sino-LAC trade ties and dependency.

2. Theoretical Exposition: Structural Aspects of Asymmetric Dependency

The hypothesis advanced in this paper is that imbalances may prevail in international economic relations leading to some form of asymmetric[3] dependency. Such assertion is probable under specific bilateral relationships and several contexts. The following discussion focuses on the structural aspects of understanding asymmetries in international trade relationships.

As an international economic actor, China's enormous market potential for exports and a source for imports is unquestionable. Dependency links are therefore redefined when one of the actors is a big partner; China's presence and weight in the global economy following its sheer size. Even beyond direct trade relationships, the growing weight of China in the global economy impacts the LAC's export performance through commodity prices. Larger nodes, like China, within the global multi-nodal system, therefore possess a key advantage as they becomes centers of attention. Not surprising is that no economy in the world is indifferent to the Chinese market, and that does not expect their economic interaction with China to increase (Womack, 2010). The basic point here is that the relationship of the larger to the smaller partner will be rather different from the relationship of the smaller to the larger partner.

[3] Asymmetry is defined by disparity. An asymmetric relationship is one in which the disparity is great enough so that is shapes the structure of the relationship (Womack, 2010).

Conditioned by strong national interests, China has become dependent on foreign resources and markets for its products; LAC offers China both. This sort of dependency within the international realm is hardly going to be symmetric (Hammer and Kilpatrick, 2006; Iturre and Mendes, 2010; Jenkins, 2012; Rubiolo, 2013). For these reasons also, there has been growing rapprochement between China and LAC, established through international trade, amongst other commercial and political ties. As Womack (2010) argues, asymmetric relationship has inherent structural tension of relative indifference and relative vulnerability. The eminent asymmetry of the Sino-LAC trade relations, largely growing out of the composition of commodity-for-manufacturing exchanges[4], has revitalized the debates on new dependencies following such patterns of international insertions. In this regard, one concept of dependence, based on dyadic relations, may be reflected by the structure of exports; its market concentration.

Caporaso (1978) also pointed out that structural asymmetries in trade also apply to *inequalities in opportunities* that follow from those bilateral exchanges. While disparities suggest that the smaller side cannot challenge the greater capacities of the larger side, the same cannot be said for opportunities from that connection. Opportunities present in a bilateral relationship may in fact be more important and more vivid to the smaller side, because they represent a larger percentage of the smaller economy's international outlook and of its total activities (Womack, 2010). In short, differences in capacities in an asymmetric relationship offer different stakes in that relationship.

In accounting for opportunities present in the bilateral relationship, we need to extend the arguments of basic external demand. Namely, the unequal exchanges between China and LAC buttress the importance of different comparative advantages (Ellis, 2009) in moving apart

[4] The theory of unequal exchange contends that whenever the core (China) and peripheral (LAC) countries meet in the proverbial global marketplace to exchange goods, the exchange results in net gains for the former. Proponents of this debate, Prebisch, Singer and Wallerstein, stress that the core countries will therefore dictate economic relations to the peripheral countries (Dargin, 2013).

their trade specialization patterns. Lederman et al. (2009) report that the induced increase in demand for commodities from China since mid-1990s has increased the revealed comparative advantage of LAC in natural resources. If the structure of trade contributes to the asymmetric connection between China and the LAC, then factor endowments (apart from size), also become fundamental in understanding the asymmetric relationship.

Combining the arguments above, size (scale) and factor endowments emerge as key drivers to understanding the asymmetric Sino-LAC trading relations. Therefore to offer a more nuanced understanding of the asymmetric relationship, a more detailed investigation into the drivers of trade and the potentials therein, are required to complement the discussion on unequal exchanges. This is taken up in the next section. The following section briefly sketches the dimensions of disparity between China and LAC in terms of the trade volume, trade balances and trade concentration and structure. The disparities outlined then set the background for verifying and contextualizing the hypothesized unequal opportunities in terms of export potentials from both sides.

3. Asymmetries in Sino-LAC Partnership

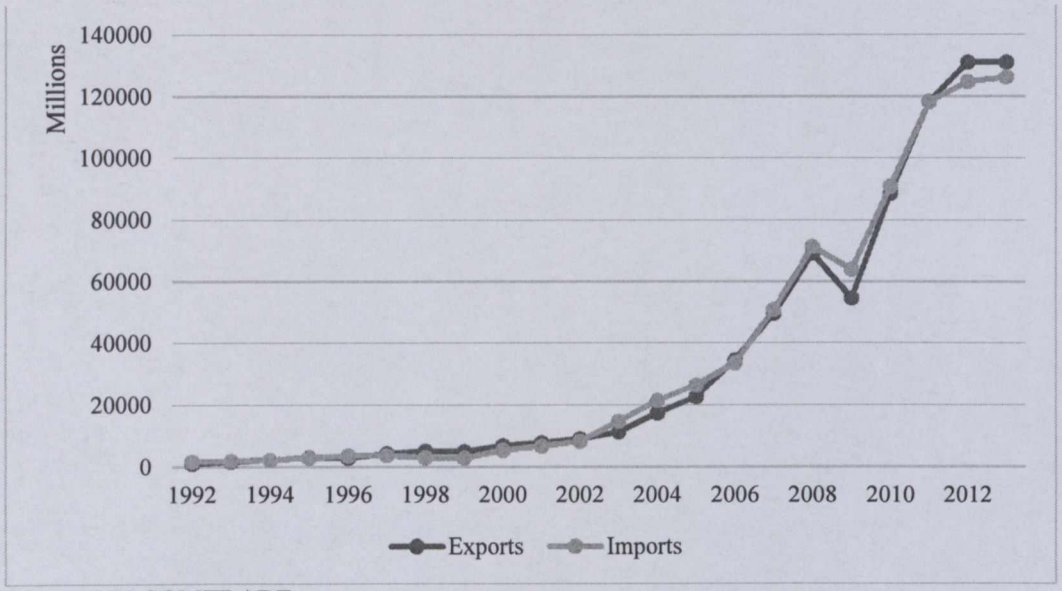
3.1 Disquieting Trends?

The rapid growth of China's trade with LAC dates from the end of the 1990s. Total trade reached USD257 billion in 2013[5], with an average annual growth rate of 29.9 per cent since 2000 (see Figure 1). In terms of bilateral trade, imports have generally lagged exports, producing an increasing trade surplus in favour of China. This pattern, however, hides considerable differences among countries in the region, with countries such as Brazil, Chile

[5] The target, agreed upon in January 2015, between the Community of Latin America and the Caribbean States (CELAC) and China, is to reach USD500 billion in 10-years (ECLAC, 2015).

and Venezuela showing sizeable and consistent surpluses in their trade with China (ECLAC, 2015).

Figure 1: China-LAC Trade, 1992-2013 (millions USD)



Source: UN COMTRADE.

It is important to bear in mind that because of the differences in size, China is much more economically significant for LAC than *vice versa*. LAC accounts for 5.9 per cent and 6.5 per cent of Chinese exports and imports globally. China, on the other hand, is the region's third largest export destination and second largest import source (ECLAC, 2015). The Chinese export- and import market shares of individual countries in the LAC region ranges from 0.25 – 27.41 per cent and 0.01 – 43.03 per cent based on 2013 data, respectively (Table 1). Brazil, followed by Mexico, Chile and Argentina are the dominant partners of China, constituting a combined share of 69 per cent of total trade with the LAC region. Brazil, Mexico and Argentina are also considered 'strategic'[6] partners of China.

[6] Worth mentioning here is that not all strategic objectives of China are met in LAC within the Southern cone. LAC is increasing protection in sectors where a large share of imports originates in China, as these goods are on average closer substitutes to domestic goods than goods imported from the rest of the world.

Table 1: Market Shares of China in LAC, 2000 and 2013 (per cent)

LAC	Export Share		`Import Share		Total Trade Share	
	2000	2013	2000	2013	2000	2013
Argentina	**8.84**	**6.68**	**17.68**	**4.82**	**12.66**	**5.77**
Bolivia	0.07	0.41	0.23	0.22	0.14	0.31
Brazil	**17.72**	**27.41**	**30.83**	**43.03**	**23.39**	**35.08**
Chile	**11.35**	**10.01**	**25.45**	**16.41**	**17.45**	**13.15**
Colombia	2.26	5.21	0.61	2.87	1.55	4.06
Costa Rica	0.94	0.71	0.20	3.77	0.62	2.21
Cuba	3.37	1.05	1.54	0.40	2.58	0.73
Dominican Rep.	1.09	0.80	0.02	0.23	0.63	0.52
Ecuador	1.08	2.27	1.52	0.61	1.27	1.46
El Salvador	0.91	0.40	0.01	0.01	0.52	0.21
Guatemala	2.01	1.13	0.09	0.14	1.18	0.64
Haiti	0.23	0.25	0.00	0.01	0.13	0.13
Honduras	0.90	0.61	0.00	0.19	0.51	0.40
Mexico	**19.34**	**22.12**	**9.28**	**8.11**	**14.99**	**15.25**
Nicaragua	0.62	0.40	0.01	0.07	0.36	0.24
Panama	18.69	8.39	0.02	0.03	10.62	4.29
Paraguay	1.25	1.04	0.06	0.05	0.73	0.55
Peru	2.09	4.73	10.65	6.66	5.79	5.68
Uruguay	3.52	1.77	0.00	1.95	2.00	1.86
Venezuela	3.72	4.63	1.80	10.40	2.89	7.46

Source: Calculated from UN COMTRADE

In terms of product composition, Table 2 shows that the exchange of manufactures for minerals and agriculture provide the foundation of the China-LAC partnership. As Gonzalez-Vicente (2011) puts it, "China represents a new kind of business partner for commodity exporting countries" (see also He, 2007). As a region, LAC is running a large and growing surplus with China in agriculture and minerals trade. More importantly, the region has witnessed a steady increase of agricultural exports of 28.1 per cent to China for the period 1992-2013. In this context, the prospects of agriculture exports from LAC to China warrant special attention. While China is known to be the 'factory of the world', LAC is already given the merit of being the 'farm of the world' (Lederman et al., 2009).

Table 2: Product Composition in Sino-LAC Exports, 2013 (in per cent)

LAC	China-LAC			China-LAC		
	Agriculture	Minerals	Manufacturing	Agriculture	Minerals	Manufacturing
Argentina	**0.40**	**0.17**	**99.43**	**80.26**	**13.31**	**6.44**
Bolivia	1.44	0.11	98.45	0.04	66.57	33.39
Brazil	**2.34**	**0.68**	**96.98**	**44.05**	**44.82**	**11.13**
Chile	**1.41**	**0.11**	**98.48**	**6.24**	**35.63**	**58.13**
Colombia	1.54	0.22	98.24	0.26	86.30	13.44
Costa Rica	4.82	0.27	94.91	6.47	0.03	93.50
Cuba	3.59	0.21	96.20	45.54	17.38	37.08
Dominican Rep.	4.69	0.49	94.82	0.14	33.79	66.07
Ecuador	0.98	0.17	98.85	28.50	58.38	13.12
El Salvador	1.24	0.27	98.49	0.38	0.00	99.62
Guatemala	1.37	0.81	97.82	93.61	0.00	6.39
Haiti	7.59	0.01	92.41	0.35	0.00	99.65
Honduras	1.22	0.12	98.66	0.40	86.76	12.84
Mexico	2.03	0.26	97.71	1.43	39.92	58.66
Nicaragua	0.60	0.04	99.35	7.90	0.00	92.10
Panama	0.46	24.63	74.91	26.76	0.00	73.24
Paraguay	0.37	0.01	99.62	2.42	0.00	97.58
Peru	0.86	0.19	98.95	15.13	66.81	18.06
Uruguay	1.29	0.05	98.67	84.20	0.07	15.73
Venezuela	1.25	0.31	98.44	0.01	94.50	5.50
Total	1.69	2.40	95.92	30.74	44.01	25.25

Notes: Agriculture (HS01-HS24); Minerals (HS25-HS27); Manufacturing (HS28-HS99).
Source: Calculated from UN COMTRADE

Finally, LAC's exports to China are concentrated in a very narrow range of products, whilst China's exports to LA are more diversified (see Table 3). Based on the bilateral market concentration index, LAC's exports to China are much more concentrated relative to China's exports to the LAC. On the contrary, Mexico's exports to China records the lowest level of market concentration[7] relative to the other LAC countries. On aggregate, LAC's exports to China have also become more concentrated with time. This again contributes to the asymmetric relationship as the relatively non-diversified export structure of LAC is not able to

[7] It should be noted that Mexico and some Central American countries export manufactured goods and hi-tech goods, such as integrated circuits and office equipment. The Sino-Mexican trade is therefore said to resemble trade between industrial countries.

compete for export market shares in China. However, it is noted that the agricultural trade relationship between China and both Argentina and Brazil (non-petroleum exporters) is relatively balanced. The argument for this is that both these countries are major sources of agricultural imports to China. For example, Brazil supplies 30 per cent and 16 per cent of China's total imports of soybeans and iron ore concentrates.

Table 3: China-LAC Partnership: Bilateral Export Market Concentration and Number of Products Exported

	Concentration Index						Number of Products					
	China-LAC Exports			LAC-China Exports			China-LAC Exports			LAC-China Exports		
Country	1995	2005	2012	1995	2005	2012	1995	2005	2012	1995	2005	2012
Argentina	**0.107**	**0.084**	**0.111**	**0.214**	**0.565**	**0.552**	**111**	**153**	**178**	**39**	**78**	**83**
Bolivia	0.092	0.180	0.131	0.815	0.657	0.416	52	53	123	2	9	20
Brazil	**0.117**	**0.150**	**0.069**	**0.452**	**0.335**	**0.443**	**122**	**171**	**199**	**88**	**153**	**163**
Chile	**0.145**	**0.113**	**0.086**	**0.406**	**0.518**	**0.562**	**103**	**159**	**186**	**19**	**43**	**72**
Colombia	0.129	0.096	0.074	0.731	0.638	0.654	62	157	182	12	22	41
Costa Rica	0.243	0.094	0.076	0.876	0.899	0.915	30	121	152	7	28	39
Cuba	0.188	0.146	0.072	0.996	0.542	0.545	83	132	150	2	7	33
Dominican Republic	0.361	0.104	0.071	0.430	0.498	0.398	31	121	156	3	15	39
Ecuador	0.107	0.077	0.071	0.592	0.349	0.644	62	143	167	2	15	37
El Salvador	0.426	0.168	0.106	0.984	0.694	0.485	28	99	136	2	15	16
Guatemala	0.296	0.154	0.105	0.994	0.689	0.602	46	133	157	1	9	18
Haiti	0.230	0.097	0.113	0.817	0.708	0.697	29	53	114	3	9	8
Honduras	0.287	0.136	0.127	0.010	0.409	0.441	36	103	142	2	18	17
Mexico	**0.194**	**0.116**	**0.149**	**0.538**	**0.200**	**0.263**	**84**	**172**	**192**	**20**	**112**	**167**
Nicaragua	0.572	0.353	0.295	0.498	0.900	0.873	22	78	120	3	7	10
Panama	0.210	0.186	0.266	0.450	0.331	0.330	76	136	164	16	11	30
Paraguay	0.147	0.185	0.117	0.980	0.635	0.381	57	84	144	2	13	14
Peru	0.171	0.079	0.068	0.628	0.409	0.402	88	144	176	12	29	61
Uruguay	0.120	0.103	0.080	0.785	0.439	0.546	61	122	164	7	27	44
Venezuela	0.094	0.087	0.127	0.297	0.339	0.642	71	145	179	10	29	32
Aggregate	0.110	0.086	0.077	0.261	0.239	0.281	171	208	218	132	205	229

Notes: 1. The bilateral concentration index for merchandise exports is based on the Herfindahl-Hirschman index.
2. The maximum number of products at the 3-digit SITC (Rev. 3) is 261. 3. Latest data available is 2012.
Source: UNCTADstat online database.

The discussion above based on unequal exchanges suggests that the benefits of the Sino-LAC partnership is clear for China, and less so for the LAC. However, the arguments fail to account for predictions on the opportunities, or paucity of alternatives for LAC, to draw additional inferences on the asymmetrical relationship. Further, asymmetry in the Sino-LAC partnership may not be specific to all the LAC trading partners, given the significant variations in their trading relations. Thus, in the next section, the export potentials in the Sino-LAC partnership are derived from both sides, and discussed separately for the agricultural and manufacturing sectors. The export potentials from the region are also considered for the principal trading partners of China, which are Brazil, Mexico, Chile and Argentina.

3.2 Disparate Opportunities?

3.2.1 Empirical Strategy

An augmented gravity model is employed to examine two-way export determinants of the Sino-LAC partnership, and derive their 'natural' levels of exports[8]. Using a panel data framework, the model specification follows Chengang et al. (2010) and Baltagi et al. (2003):

$$X_{ijt} = \beta_1 \ln GDPT_{ijt} + \beta_2 SIMGDP_{ijt} + \beta_3 \ln GD_{ij} + \beta_4 \ln FDST_{ijt} + \beta_5 SIMFDS_{ijt} + \beta_6 RLFAC_{ijt} + \beta_7 DUMContig_{ij} + \beta_8 DUMComlg_{ij} + \beta_9 DUMLand_{ij} + \zeta_t + \varepsilon_{ijt} \quad (1)$$

where X_{ijt} is country i's (reporter) exports to country j (partner) in year t. The other variables are as defined below.

$GDPT$ = total GDP of countries i and j

$SIMGDP$ = similarity in the levels of GDP in i and j

GD = geographical distance between i and j

[8] Past trade may have some predictive power (Eichengreen and Irwin, 1998).

FDST = total inward FDI stock of *i* and *j*

SIMFDS = similarity in inward FDI stocks in *i* and *j*

RLFAC = relative factor endowments in *i* and *j*

DUMContig = dummy variable set equal to 1 if *i* and *j* are contiguous, and 0 otherwise

DUMComlg = dummy variable set equal to 1 if *i* and *j* share a common official language, and 0 otherwise

DUMLand = dummy variable set equal to 1 if either *i* or *j* is a landlocked country, and 0 otherwise

In equation (1), β's represent the coefficient estimates, ζ_t refers to time effects and ε_{ijt} is a white-noise disturbance term. We follow the standard gravity model comprising gross domestic product (*GDP)* and geographical distance (*GD*) between countries, augmented with the stocks of inward foreign direct investment (*FDS*) and relative factor endowments (*RLFAC*). Theories direct the selection of the explanatory variables in equations (1).

The level of GDP of both reporter and partner countries positively affect trade and investment. In order to jointly capture economies of scale or the size effect, the total GDP of both partners, *GDPT*, is included in the model, instead of using the levels of GDP of both countries independently. Higher *GDPT* is posited to increase the trade and investment flows, given that a greater division of labour and specialization becomes feasible under a larger scale of operation. Baltagi *et al.* (2003) and Chengang *et al.* (2010) argue further that the level of GDP alone may not be sufficient to explain trade as the similarities of the two trading partners GDPs are of no less importance. Theoretically, similarity in the level of GDP (*SIMGDP*) or convergence in income levels (or tastes) is likely to increase trade either through the expansions in trade in manufactures or the increase in scope for product diversity.

Likewise, *GD* remains important for considerations of transport costs (Egger 2000), transaction costs (Bergstrand 1985; Edmonds et al. 2008) and timeliness in delivery (see also Rojid 2006). The expectations are for $\beta_3 < 0$ (Tinbergen 1962; Poyhonen 1963).

Chengang et al. (2010) argued that FDI contributes to intra-firm trade (IIT) through global production networks and the increase in product variety in the host economy. This in turn increases the volume of trade, mainly through IIT. However, if FDI and trade are substitutes, for example, if FDI is mainly channeled into domestic production of the host economy, then, it does not necessarily contribute to expansions in exports. As such, the relationship between *FDS* and international trade remains inconclusive. The distribution of *FDS* amongst trade partners is also considered important for international trade. If the size of *FDS* is similar between trade partners, one may expect similar volumes and varieties of bilateral exports from the partner countries. Following which, the import capabilities of both partner countries are also likely to be similar, leading to expansions in bilateral trade. Conversely, if the size of *FDS* is uneven between trade partners, the country with a smaller stock, offers less export capabilities and likewise smaller import capabilities, resulting in lower expansions in bilateral trade. Therefore, a positive relationship is envisaged between *SIMFDS* and exports.

Differences in factor endowments or factor intensity (derived from capital-labour ratio) matters for international trade and are closely linked to the trade structure (see Bergstrand 1990; Frankel et al. 1995; Baltagi et al. 2003; Debaere 2003; Ghosh and Yamarik 2004; Baxter and Kouparitsas 2006; Cieslik 2009). Traditional neoclassical trade theories suggest that comparative advantages due to differences in factor endowments explain basically inter-industry trade (IT). Alternatively, newer trade theories attribute similarities in factor endowments to trade expansions through IIT based on economies of scale and product differentiation. If the structure of trade is IT-based, differences in factor endowments will most

likely facilitate trade expansion vis-à-vis similarities in factor endowments. In this respect, the expected sign for β_6 will be positive (negative) if IT (IIT) dominates.

Finally, in the baseline estimation, border or contiguity effects (*DUMContig*), common language (*DUMComlg*) and landlocked effects (*DUMLand*) are included. Common language measures cultural distance. Trade partners with common language makes communication easy, and lowers transaction costs. Alternatively, land-locked economies proxy increasing transaction costs as they reflect difficulties in trading with and investing in remote countries.

The out-of-sample approach is adopted to calculate potential trade volumes from the estimation based on equation (1). The inherent assumption of the out-of-sample approach is that the projected trade patterns for the countries of interest, which are strongly linked to China, fit a model of how a normal country's geographic trade patterns are related to various characteristics. Following from the estimations of the gravity model, China's export potentials to LAC, and *vice versa*, are derived. Export potentials, the ratio of predicted exports (P, arrived at by the estimated value of the dependent variable) to actual/ observed trade (A), are derived by sector and key trading partners within the LAC. If the value of P/A exceeds one (under-trading), then there is potential for expansion of trade with the respective country. Conversely, if the predicted values fall short of the actual values, then the country is considered to be over-trading with its partner.

3.2.2 Data: Source and Description

The primary data on export (X) flows based on the Harmonized System (HS) nomenclature is derived from the UN COMTRADE database. The data on *GDP*, labor force (L) and gross fixed capital formation (GFCF) are sourced from the World Bank Development Indicators and Global Development Finance (online World DataBank). Data on stock of inward FDI are taken from the United Nations Conference on Trade and Development (online UNCTADSTAT).

Data for *GD* on the basis of the average distance between the capitals for country-pairs and the information for country-pair contiguity (*DUMContig*), country-pair common language (*DUMComlg*) and landlocked (*DUMLand*) countries are extracted from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) database. The definition and construction of the variables are detailed in Appendix Table 1.

To pitch the Sino-LAC analysis within the context of China's interactions with global markets, 86 countries (including 20 LAC countries), covering the regions of East and Southeast Asia, Middle East and Africa, are sampled (see Appendix Table 2 for the country listings). The empirical estimations based on equation (1) constitute a three-dimensional balanced panel of 3,784 observations (172 country-pair-product groups x 22 years). The data spans the period 1992[9]-2013 (annual). The broad product groups[10] in the cross-sectional dimension refer to agriculture (HS01-HS24) and manufacturing (HS25-HS97) sectors. The sample is then split into two groups to examine potentials in bilateral exports for agriculture and manufacturing separately. In this paper, minerals are combined with manufacturing for the following reasons: (i) Minerals cannot be examined as a separate sector given that there is no or negligible exports in this sector for many countries in the referenced sample; and (ii) Agriculture requires separate analysis given the improving outlook for this sector in the LAC, particularly among the dominant trading partners in the region. Therefore lumping together minerals with agriculture would distort the analysis on the potentials in the latter.

3.2.3 Results and Discussion

The Poisson Pseudo Maximum Likelihood (PPML) approach in estimating the gravity model is employed due to the zero values for exports. Santos and Tenreyro (2006) showed that in the

[9] The earliest year for which trade data are available for China is 1992.
[10] This level of aggregation would balance the issue of disaggregated versus aggregated analysis.

presence of heteroskedasticity and zero trade values, the PPML is a robust approach. Likewise, Burger et al. (2009) explained that the PPML provides a viable alternative to the standard log normal specification of the gravity trade model. The Durbin-Wu-Hausman test revealed that *GDPT* and *FDST* are endogenous. In this aspect, the estimations are also carried out using the Hausman and Taylor (HT, 1981) estimator, which uses the random-effects panel correcting for endogeneity. The HT estimation also allows for estimating coefficient on time invariant and time variant variables. (Appendices Tables 3 and 4 present the empirical results based on the PPML and HT estimators, respectively).

The discussion of the results are based on the PPML (which are also robust to the HT technique) estimates with time effects, as the latter makes any unusual variations in a single year not to unduly influence the estimates. As the focus of this paper is on the comparative export potentials in the Sino-LAC partnership, the following only briefly summarizes the results on export determinants of China and LAC with the reference sample of countries (see Appendix Table 3). From the results on China's exports to the rest of the world:

- Combined market size and similar demand structure are both positive and significant for exports;
- While combined FDI stock reduces exports, the distribution of the FDI is important for generating exports.
- Similarities in factor endowments drive exports;
- Distance reduces exports; and
- Contiguous neighbours and countries sharing similar linguistic orientation promote exports, while landlocked economies are negatively associated with exports.

Alternatively, the results on the exports of the rest of the world to China are similar to the above, with the following two exceptions:

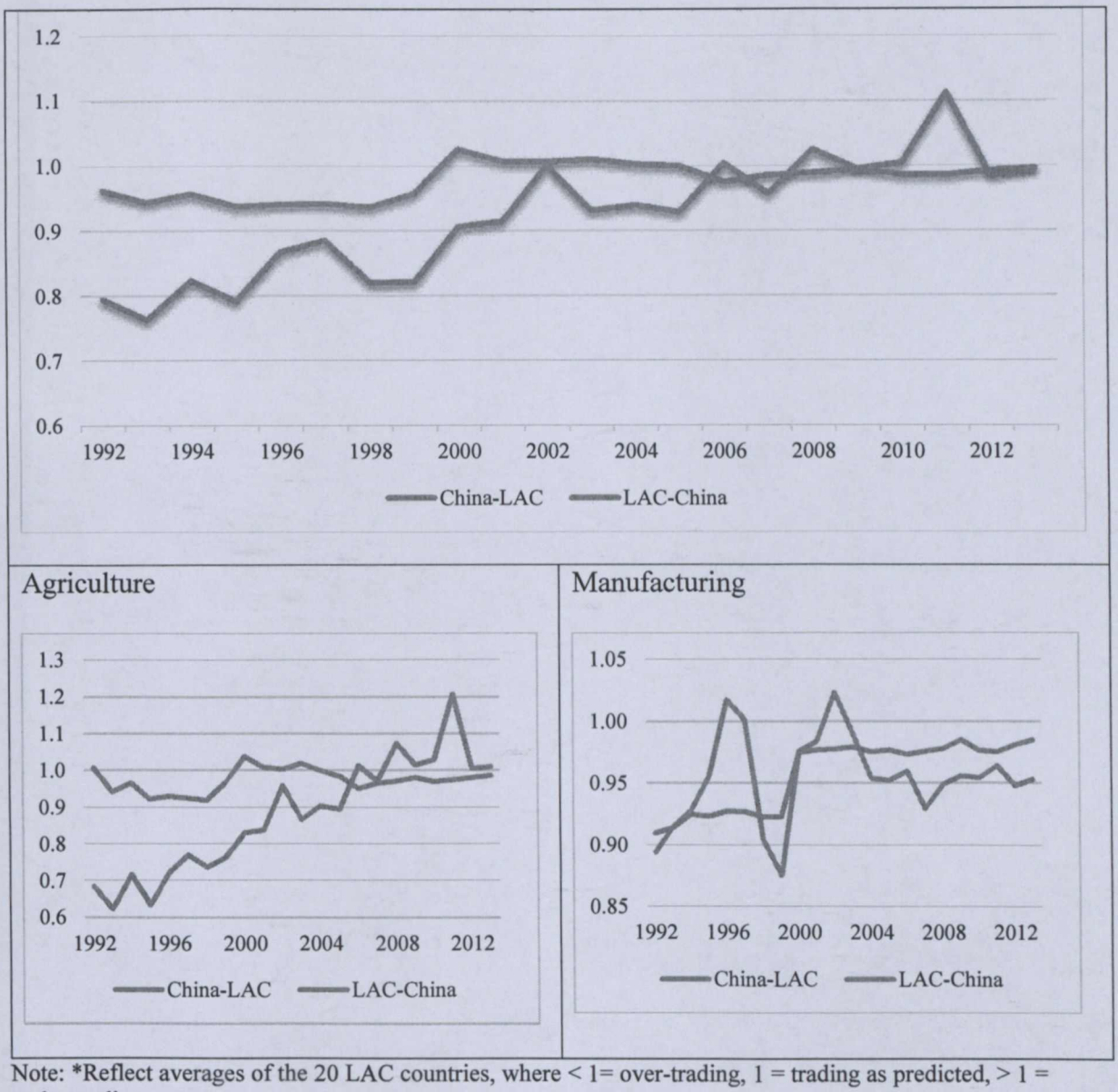
- Combined market size reduces exports but similar demand structures increase exports; and
- Similarities in factor endowments drive overall exports and exports of agriculture, but differences in factor endowments are important for exports of manufactures.

As the augmented gravity model is found to adequately explain bilateral export flows in the Sino-LAC partnership, the potentials for exports are derived from those estimations. Figure 2 presents the bilateral export potentials in the China-LAC partnership for total exports, exports of agriculture and exports of manufactures. The results are presented as a simple average of the predicted to actual export ratios for the 20 LAC countries of interest. The results are best understood as relative comparisons within and between sectors, rather than absolute measures of the appropriate level of trade.

The results show that, on average, since 2000, China has been exporting at predicted levels (near unitary values) to LAC. These trends indicate fewer export opportunities for China in integrating with LAC and affirm the recent observation that China-LAC trade may have hit the plateau (Latin America Advisor, 3 June 2015). Conversely, LAC has been, on average, under-exporting to China post-2008. The low volume of exports from LAC to China leave considerable room for growth. The trends in export potentials in agriculture mirror that for total exports. Interestingly, for agriculture exports from LAC to China, the gap between predicted and actual upward has narrowed substantially, with promising signs post-2008. The momentum of the region's agricultural exports to China is also expected to be maintained in the coming years based on ECLAC (2015).

Conversely for manufacturing, both sides are generally found to be over-exporting, suggesting that trade is already exhausted. This is expected particularly from the LAC side, as the region has been absorbing Chinese exports of machinery, electronics, textiles, apparel, medical products, cosmetics and light industrial products.

Figure 2: Bilateral Export Potentials*, 1992-2013



Note: *Reflect averages of the 20 LAC countries, where < 1= over-trading, 1 = trading as predicted, > 1 = under-trading.
Source: Export potentials are derived from the PPML estimates in Appendix Table 3.

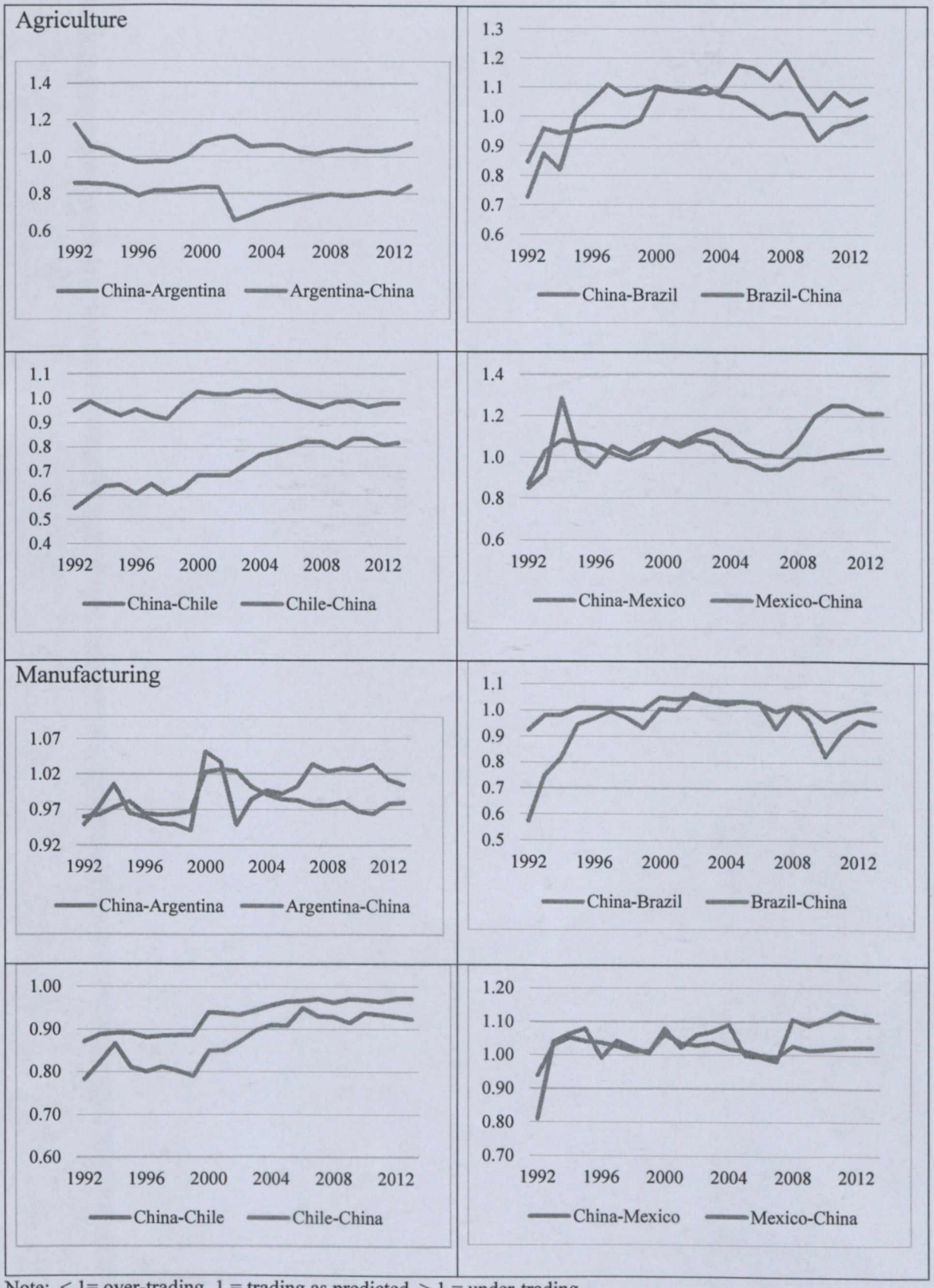
Figure 3 presents the export potentials between China and the four big trading partners of LAC, Brazil, Mexico, Chile and Argentina. In agriculture products, there is over-exporting from Argentina and Chile[11] to China, for the period of review. The exhausted potentials in agriculture exports from Chile to China most likely reflect the already well established trade links[12] relative to that of the other countries in the region with China. This contrasts to the under-exporting of agriculture products from Brazil and Mexico to China, particularly since 2004. The potentials of Brazil explain its current position as the second largest agricultural supplier to China (ECLAC, 2015) and China's first international provider of soy bean since 2006 (Hardy, 2013).

In terms of manufactures, some commodities producers still retain relevant manufacturing capabilities, such as Brazil and Argentina (Hardy, 2013). Notably, Brazil's exports of manufactures to China have made the most relative progress against predicted levels over the sampled period, while Argentina and Mexico have become marginal under-exporters since 2008. The potentials for Mexico's exports in manufactures are not surprising given that it is a more industrialized economy in the LAC and has joined international production networks in a number of sectors. In contrast, Chile shows no untapped potentials in exporting manufactures, as the country underwent a very purposeful transformation into a commodities producer (Hardy, 2013).

[11] In the first quarter of 2015, Chile's food exports to China grew at an overwhelming 48 per cent (Latin America Advisor, 3 June 2015).

[12] Chile is the first LAC country to sign a free trade agreement with China in 2005 (in force in 2006), which then saw tremendous growth in exports (mainly copper) from Chile to China (Ellis, 2009).

Figure 3: Bilateral Export Potentials, by Major LAC Partners, 1990-2013



Note: < 1= over-trading, 1 = trading as predicted, > 1 = under-trading.
Source: Export potentials are derived from the PPML estimates in Appendix Table 3.

4. Concluding Remarks

Asymmetries that follow from country size and factor endowments together support China's general expansion in world markets. It is therefore important to contextualize asymmetries in China's engagement with the LAC by moving beyond analyzing patterns in those exchanges. This paper posits that there are other components of trade dependence that one must identify with to explain the asymmetric reliance. More importantly, the economic opportunity from export potentials, derived from trade determinants, that include country size and factor endowments among others, may add to our understanding of the asymmetrical properties of this relationship.

Clearly, dependence must be accepted as a permanent feature of the Sino-LAC relations, as the pattern (structure) of interactions between both parties has been somewhat fixed, and is unlikely to change. However, the extent to which the Sino-LAC partnership resembles asymmetric dependency needs to be understood by factoring in the potentials that bilateral exports offer to both sides. Potentials or untapped opportunities for exports in agriculture products are found in the case of LAC's bilateral trade with China, while the latter is already considered to be overtrading in manufactures with the former. The questions that arise from these observations and findings are: Can gains from the exchange of commodities for manufactures continue to be derived from both sides? Could there be a turning point in the current economic interactions? Can asymmetric dependency be defined solely by the stilting relationship and exchanges? To answer the former two questions, we need to see results in the coming years. However, the answer for the third question is plausibly 'no.' The export potentials or scope for integration that present themselves in the LAC-Sino (specifically for agriculture) relative to the Sino-LAC interactions, provide indications that the current discussion on asymmetric dependency needs to be reframed to account for (unequal) opportunities.

Acknowledgement

This study is supported by the University of Malaya Research Grant (UMRG) programme, RP010B-13SBS.

Appendix Table 1: Definition and Measurement of Variables

Variable	Definition	Measurement
X	Real exports	The exports, expressed in current USD, are deflated by the consumer price index, with 2000 as the base year.
GDPT	Total real gross domestic product (GDP)	$GDPT_{ij} = GDP_i + GDP_j$
SIMGDP	Similarity in the levels of GDP or relative size of trade partners	$SIMGDP_{ij} = 1 - \frac{GDP_i^2}{(GDP_i + GDP_j)^2} - \frac{GDP_j^2}{(GDP_i + GDP_j)^2}$ where $0 \leq SIMGDP_{ij} \leq 0.5$ If $SIMGDP_{ij} = 0$ (absolute divergence in size) $SIMGDP_{ij} = 0.5$ (equal country size)
FDST	Total real inward foreign direct investment (FDI) stock	$FDST_{ij} = FDS_i + FDS_j$ The FDS, expressed in current USD, is deflated by the CPI index, with 2000 as the base year.
SIMFDS	Similarity in the inward FDI stock of trade partners	$SIMFDS_{ij} = 1 - \frac{FDS_i^2}{(FDS_i + FDS_j)^2} - \frac{FDS_j^2}{(FDS_i + FDS_j)^2}$
K/L	Capital-labour ratio	The GFCF, expressed in current USD, is deflated by the CPI index with 2000 as the base year. Using the data on GFCF, capital stock (K) is estimated using the standard perpetual inventory calculation method (Miller and Upadhyay, 2000): $K_0 = GFCF_0 / [\lambda gd + (1 - \lambda)gw + \delta]$ where the initial or base year is 1970. d = average growth rate of the GDP series for the related country for the period of review gw = estimated world growth rate for the period of review $\lambda = 0.25$, measure of mean reversion in growth rates $\delta = 0.05$, assumed rate of depreciation and *L* = total labour force
RLFAC	Similarity in K/L ratios or the distance between countries in terms of relative factor factor endowments	$RLFAC_{ij} = \lvert \ln(K_{jt}/L_{jt}) - \ln(K_{it}/L_{it}) \rvert$ If $RLFAC_{ij} = 0$ (same proportion of factor endowments) If $RLFAL_{ij} = 0$ (same proportion of factor endowments)
GD	Geographical distance	The average distance (in kilometres) between the capitals of *i* and *j*.

Appendix Table 2: Country Listings

Latin America (20 countries)
Argentina; Bolivia; Brazil; Chile; Colombia; Costa Rica; Cuba; Dominican Republic; Ecuador; El Salvador; Guatemala; Haiti; Honduras; Mexico; Nicaragua; Panama; Paraguay; Peru; Uruguay; Venezuela.
Africa (43 countries)
Algeria; Angola; Benin; Botswana; Burkina Faso; Cameroon; Cape Verde; Central African Republic; Chad; Comoros; Cote d'Ivoire; Djibouti; Egypt; Eritrea; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Libya; Madagascar; Malawi; Mali; Mauritania; Mauritius; Morocco; Mozambique; Namibia; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; South Africa; Swaziland; Togo; Tunisia; Uganda; Zambia; Zimbabwe.
Middle East (11 countries)
Bahrain; Iran; Iraq; Jordan; Kuwait; Lebanon; Oman; Qatar; Saudi Arabia; Syria; United Arab Emirates.
East & Southeast Asia (12 countries)
Brunei; Cambodia; Indonesia; Japan; Laos; Malaysia; Myanmar; Philippines; Singapore; South Korea; Thailand; Vietnam.

Appendix Table 3: PPML Estimation Results for Export Flows

	China-Partners*						Partners*-China					
	Total		Agriculture		Manufacturing		Total		Agriculture		Manufacturing	
ln*GDPT*	0.045***	0.099***	0.046*	0.114***	0.043**	0.087***	-0.001	0.171***	0.081	0.212***	-0.076**	0.136***
	(0.017)	(0.013)	(0.027)	(0.009)	(0.018)	(0.014)	(0.036)	(0.021)	(0.06)	(0.03)	(0.039)	(0.023)
SIMGDP	0.004***	0.003***	0.005***	0.003***	0.003***	0.002***	0.011***	0.008***	0.018***	0.015***	0.006***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.00)	(0.00)	(0.001)	(0.001)
ln*FDST*	-0.415***	0.029*	-0.515***	0.018	-0.327***	0.038**	-0.934***	0.043	-0.833***	0.047	-1.148***	0.044
	(0.078)	(0.017)	(0.102)	(0.026)	(0.078)	(0.019)	(0.128)	(0.028)	(0.19)	(0.05)	(0.166)	(0.030)
SIMFDS	0.006***	0.003***	0.007***	0.003***	0.005***	0.002***	0.012***	0.004***	0.009***	0.002	0.016***	0.006***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.00)	(0.00)	(0.002)	(0.001)
RLFAC	-0.017***	-0.022***	-0.020***	-0.026***	-0.014***	-0.018***	-0.023***	-0.040***	-0.071***	-0.083***	0.019***	-0.004
	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)	(0.003)	(0.006)	(0.006)	(0.01)	(0.01)	(0.006)	(0.006)
ln*GD*	-0.069***	-0.078***	-0.091***	-0.102***	-0.050***	-0.057***	-0.040***	-0.060***	0.014	-0.008	-0.081***	-0.101***
	(0.006)	(0.005)	(0.008)	(0.006)	(0.006)	(0.005)	(0.010)	(0.009)	(0.02)	(0.02)	(0.011)	(0.010)
DUMContig	0.092***	0.089***	0.127***	0.124***	0.065***	0.063***	0.269***	0.264***	0.561***	0.549***	0.035	0.034
	(0.014)	(0.014)	(0.021)	(0.020)	(0.012)	(0.011)	(0.026)	(0.024)	(0.04)	(0.04)	(0.027)	(0.025)
DUMComlg	0.111***	0.081***	0.142***	0.108***	0.084***	0.058***	0.287***	0.232***	0.467***	0.404***	0.151***	0.091***
	(0.016)	(0.015)	(0.021)	(0.023)	(0.084)	(0.014)	(0.030)	(0.031)	(0.05)	(0.05)	(0.028)	(0.032)
DUMLand	-0.201***	-0.206***	-0.301***	-0.308***	-0.127***	-0.131***	-0.164***	-0.177***	-0.250***	-0.263***	-0.104***	-0.121***
	(0.014)	(0.015)	(0.023)	(0.023)	(0.014)	(0.014)	(0.022)	(0.022)	(0.04)	(0.04)	(0.021)	(0.021)
Constant	13.586***	-0.023	16.408***	-0.045	11.162***	-0.004	28.670***	-2.818***	22.928***	-4.716***	37.179***	-1.378***
	(2.250)	(0.176)	(2.969)	(0.267)	(2.335)	(0.190)	(3.715)	(0.319)	(5.45)	(0.54)	(4.829)	(0.324)
Time dummy	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Observations	3783	3783	1892	1892	1891	1891	3718	3718	1826	1826	1892	1892
Adjusted R^2	0.379	0.366	0.463	0.448	0.469	0.451	0.327	0.309	0.348	0.329	0.410	0.377

Notes: * Refers to the referenced sample in Appendix Table 2. Standard errors in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Appendix Table 4: HT Estimation Results for Export Flows

	China-Partners*						Partners*-China					
	Total		Agriculture		Manufacturing		Total		Agriculture		Manufacturing	
ln*GDPT*	0.772**	1.914***	0.787	1.958***	0.900**	1.844***	1.351**	3.438***	1.761**	3.181***	1.060	3.659***
	(0.356)	(0.161)	(0.536)	(0.246)	(0.453)	(0.207)	(0.534)	(0.244)	(0.818)	(0.375)	(0.683)	(0.313)
SIMGDP	0.041***	0.034***	0.051***	0.042**	0.041***	0.034**	0.078***	0.065***	0.105***	0.882***	0.061***	0.050**
	(0.011)	(0.011)	(0.017)	(0.017)	(0.014)	(0.014)	(0.017)	(0.017)	(0.026)	(0.026)	(0.021)	(0.022)
ln*FDST*	0.940	0.153	0.359	-0.026	1.520	0.390	-3.816	-0.640**	-4.343	-0.253	-3.151	-0.973***
	(2.056)	(0.192)	(3.204)	(0.292)	(2.695)	(0.246)	(3.140)	(0.289)	(4.826)	(0.446)	(4.047)	(0.371)
SIMFDS	0.007	0.026**	0.020	0.034**	0.009	0.030**	0.038	0.032*	0.039	0.027	0.049	0.049**
	(0.021)	(0.011)	(0.032)	(0.017)	(0.027)	(0.014)	(0.032)	(0.017)	(0.050)	(0.026)	(0.041)	(0.022)
RLFAC	-0.279***	-0.354***	-0.136	-0.210*	-0.440***	-0.511***	0.263**	0.124	0.103	-0.026	0.369***	0.227
	(0.074)	(0.074)	(0.111)	(0.110)	(0.094)	(0.093)	(0.110)	(0.110)	(0.168)	(0.167)	(0.140)	(0.141)
ln*GD*	-1.694***	-1.604***	-1.844***	-1.771***	-1.467***	-1.395***	-1.240*	-1.133	-0.327	-0.318	-2.114**	-1.934**
	(0.462)	(0.449)	(0.535)	(0.513)	(0.481)	(0.456)	(0.726)	(0.703)	(0.995)	(0.957)	(0.834)	(0.797)
DUMContig	1.169	1.148	1.033	0.991	1.317	1.331	1.464	1.391	4.112	4.173	-0.995	-1.184
	(1.363)	(1.330)	(1.556)	(1.501)	(1.399)	(1.334)	(2.115)	(2.056)	(2.893)	(2.794)	(2.430)	(2.332)
DUMComlg	2.507**	2.479**	2.237	2.115	2.014	1.917	5.557**	5.014**	6.292*	5.597*	4.519	4.154
	(0.989)	(0.976)	(1.799)	(1.729)	(1.613)	(1.534)	(2.418)	(2.346)	(3.317)	(3.197)	(2.786)	(2.669)
DUMLand	-3.361***	-3.253***	-4.021***	-3.938***	-2.539***	-2.454***	-2.603***	-2.453***	-3.002***	-2.912**	-2.136**	-1.956**
	(0.578)	-0.563	(0.656)	(0.632)	(0.590)	(0.562)	(0.905)	(0.879)	(1.255)	(1.210)	(1.025)	(0.983)
Constant	-14.109	-26.256***	-0.657	-23.338***	-33.185	-30.443***	91.856	-56.806***	83.705	-69.031***	92.167	-45.266***
	(51.405)	(4.522)	(79.674)	(5.477)	(74.704)	(4.810)	(87.288)	(7.043)	(134.112)	(9.785)	(112.271)	(8.144)
Time dummy	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Observations	3783	3783	1892	1892	1891	1891	3718	3718	1826	1826	1892	1892
No. of groups	172	172	86	86	86	86	169	169	83	83	86	86
Wald test	2147.04	1936.66	894.08	795.04	1470.75	1355.43	1779.40	1579.76	770.90	682.91	1097.57	966.74

Notes: * Refers to the referenced sample in Appendix Table 2. Standard errors in parenthesis. *** significant at 1%, ** significant at 5% and * significant at 10%.

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