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Is The Answer in The East? Trade Agreements with East Asia as an Opportunity for Latin American Exports: The Case of Chile*

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Abstract: Trade Agreements (TAs) are instruments crafted and implemented by policymakers with the aim of enhancing trade between countries or regions/economic blocs. In this study, a gravity model was utilized to estimate the effects within a panel of 165 countries, examining Chilean exports across total, agricultural, and manufacturing sectors. The findings largely align with theoretical expectations: the presence of FTAs tends to bolster Chile's exports to partner nations, with a more pronounced effect observed for FTAs. Notably, FTAs with South Korea, China, and Japan have facilitated trade growth exceeding the average increase, both across total exports and within the manufacturing sector. Additionally, the FTA with South Korea has shown significant growth in agricultural exports compared to exports to other countries.

Keywords: Empirical Studies of Trade; Trade Policy; International Economic Order and Integration

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¿Está la respuesta en Oriente? Los acuerdos comerciales con el Este de Asia como oportunidad para las exportaciones latinoamericanas: el caso de Chile

Resumen: Los acuerdos comerciales (AT) son instrumentos elaborados e implementados por los formuladores de políticas con el objetivo de mejorar el comercio entre países o regiones/bloques económicos. En este estudio, se utilizó un modelo gravitacional para estimar los efectos dentro de un panel de 165 países, examinando las exportaciones chilenas en los sectores total, agrícola y manufacturero. Los hallazgos se alinean en gran medida con las expectativas teóricas: la presencia de TLC tiende a impulsar las exportaciones de Chile a los países socios, observándose un efecto más pronunciado para los TLC. En particular, los TLC con Corea del Sur, China y Japón han facilitado un crecimiento del comercio superior al aumento promedio, tanto en las exportaciones totales como dentro del sector manufacturero. Además, el TLC con Corea del Sur ha mostrado un crecimiento significativo en las exportaciones agrícolas en comparación con las exportaciones a otros países.

Palabras clave: estudios empíricos del comercio; política comercial; orden económico internacional e integración

A resposta está no Oriente? Os acordos comerciais com o Leste da Ásia como oportunidade para as exportações latino-americanas: o caso do Chile

Resumo: Os acordos comerciais (AC) são instrumentos elaborados e implementados pelos formuladores de políticas com o objetivo de melhorar o comércio entre países ou regiões/blocos econômicos. Neste estudo, foi utilizado um modelo gravitacional para estimar os efeitos dentro de um painel de 165 países, examinando as exportações chilenas nos setores total, agrícola e manufatureiro. As descobertas alinham-se em grande medida com as expectativas teóricas: a presença de TLC tende a impulsionar as exportações do Chile para os países parceiros, observando-se um efeito mais pronunciado para os TLCs. Em particular, os TLCs com a Coreia do Sul, China e Japão facilitaram um crescimento do comércio superior ao aumento médio, tanto nas exportações totais quanto dentro do setor manufatureiro. Além disso, o TLC com a Coreia do Sul mostrou um crescimento significativo nas exportações agrícolas em comparação com as exportações para outros países.

Palavras-chave: estudos empíricos do comércio; política comercial; ordem econômica internacional e integração

Introduction

Trade Agreements (TAS) stands as crucial tools for enhancing trade flows among nations or regions. These agreements, often referred to as "agreements between two or more countries that establish, through tariff reduction schedules, the conditions under which such tariff reductions can be applied, and which commonly include additional agreements concerning trade facilitation between the parties" (Van de Heetkamp and Tusveld, 2011) play a pivotal role in shaping global commerce. Consequently, it's reasonable to expect that Tas, such as Free Trade Agreements (FTAS), would foster increased trade flows among signatory nations.

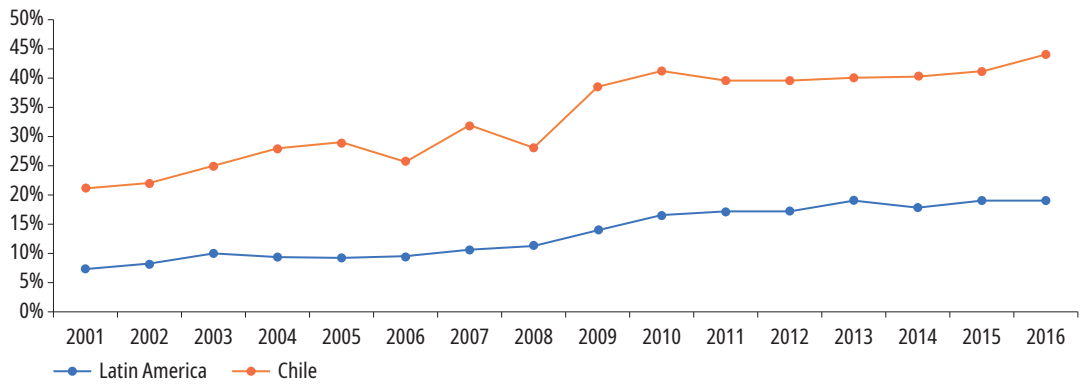
In recent years, the employment of TAS has surged as a trade integration strategy in Latin American economies. Chile, for instance, currently boasts 26 active Tas spanning 65 markets globally (Ministry of Foreign Affairs of Chile, 2018). Notably, among the plethora of TAS to which Chile is a party, there are three inked with East Asia countries: the FTAS with South Korea and China in 2004 and 2006, respectively, and the Chile-Japan Economic Cooperation Agreement (ECA) in 2007 (SICE OAS, 2018). Chile stands out as a prime example of integration within Latin America, particularly with East Asia. An in-depth study of the Chilean case is imperative as it could offer invaluable insights and empirical evidence on the advantages of forging ties with this region for other Latin American countries.

Moreover, given East Asia's robust economic performance and its dynamism nature in establishing trade relations (Kawai and Wignaraja, 2010), is plausible that these specific TAS have yielded more substantial benefits for Chilean exports compared to others to which Chile is a party. This suggests that these agreements may hold significant potential for bolstering trade and economic growth within the region. Indications supporting this notion are discerned from the significant role that China, Japan and South Korea have assumed as destinations for Chilean exports (refer to *Figure* 1).

Figure 1 also illustrates the pattern of East Asia's emergence as a primary destination for Latin American exports, considering the export destination of Colombia, Brazil, Argentina, Peru, Ecuador, Venezuela, Mexico and Uruguay under the umbrella of "Latin America". While the growth of East Asia as an export destination appears to be a regional trend, it's evident that East Asia's significance as an export destination is disproportionately higher for Chile compared to the rest of the region. It's worth noting that within Latin America, only five TAS with East Asian countries exist, which are the focus of this study: Mexico-Japan (2005), Peru-China (2010), Peru-South Korea (2011), Peru-Japan (2012), and Colombia-South Korea (2016), all signed within the period covered by this study (2001-2016).

Given all that has been proposed above, the question arises: Has the entry into force of trade

Figure 1. East Asia as an Export Destination for Chilean and Latin American Exports worldwide.



Source: ITC Trade Map (2018). Calculations conducted by the authors.

agreements with East Asia had any significant and differentiated impact on the trend of Chile's export flows between 2001 and 2016? This question is addressed by estimating a gravity model for the period 2001 – 2016 using a rich panel of country-wide variables, while controlling for macroeconomic key variables, as well as cultural and geographical factors. This paper is structured as follows: Section 2 presents a review of existing theoretical and empirical literature. Section 3 outlines the empirical methodology employed. Finally, section 5 presents the results obtained by the gravity model, and Section 6 provides the conclusion.

Literature Review

Economic theory has long been dedicated to understanding trade dynamics among nations and the factors shaping them. Since its inception as a science, David Ricardo, in Principles of Political Economy established the theory of comparative advantage, which correctly implies the propensity to trade between two nations results from their interactions and specializations. Ricardo posited that: i) Specialization is a fundamental for the growth, as it enhances productivity, leading to efficient production; and ii) Given the productive gains from specialization, nations will find it advantageous to exchange goods in which they specialize for others, making trade mutually beneficial.

In recent decades, global economies have shifted from protectionist systems to trade specialization and openness, fostering an environment conducive to trade and productivity. Trade Agreements (TAs) have played a crucial role in facilitating this transition, opening national markets, fostering price and quality competition, and promoting innovations.

Modern theorists argue that promoting free trade relations, signing TAs, between nations is beneficial, as it prevents welfare and efficiency losses associated with protectionist policies (Krugman and Obstfeld, 1997). Numerous empirical studies corroborate a positive relationship between reciprocal TAs and increased trade between participating nations (Cipollina, Salvatici, and Luca, 2007). However, the impact of TAs, on trade size varies widely, ranging from 15% to 100% growth (DeRosa, 2007). Some studies suggest that the effects of TAs are not uniform, with mixed results regarding their impact on trade size (Kepaptsoglou, Karlaftis, and Tsamboulas, 2010).

In Latin America, agreements like the Latin America Free Trade Agreement (LAFTA or CAN), have shown minimal effects on trade generation and diversification (Kepaptsoglou, Karlaftis, and Tsamboulas, 2010). For Chile, the trade agreement with the United States since August 2003 has had positive impacts on specific sectors, but its overall effect on Chile's exports to the United State is not universal (Jean, 2012). Conversely, the Chile-Canada FTA has significantly boosted trade between the two nations (FAIT Canada, 2013).

Finally, in a study on the effects that entry into force of the Trans-Pacific Partnership Agreement (TPP) could have on various economies in termes of the growth of their trade volumes, was found through gravity model estimations that increases in both the Chilean gross domestic product and that of its trading partners have a positive and significant impact on bilateral trade flow growth. Similarly, the border and language dummy variables also indicate a positive effect. On the other hand, the increase in distance has a negative and significant effect. Finally, the dummy variables that measure the impact that the presence of the TPP and the Trans-Pacific Strategic Economic Partnership Agreement (P4), an economic partnership agreement initiated by Chile, Brunei, New Zealand and Singapore in 2005, which years later would be expanded and renamed TPP, show that the estimates were not significant in both cases (Raffo, *et al*, 2018).

Despite the existence of this empirical evidence, there exists a lack of studies that analyze in depth and individually the effect that the current FTAs between Chile and Japan, South Korea and China have had on Chile's exports and evaluate the existence of a differentiated effect. This work aims to fill that gap in the literature and provide evidence impact on bilateral trade flows growth used by other Latin American countries to promote the signing of trade agreements with East Asia.

Empirical Strategy

The assessment of trade agreements' effectiveness in promoting exports, as well as the impacts of various determinants of international trade, is typically conducted using augmented gravity models. The foundational gravity model (Tinbergen, 1962; Tinbergen 1966) posits significant relationships between countries' distance and the volume of trade between them. Building upon this, an extensive empirical and theoretical body of work has emerged, aiming to address trade policy questions through different iterations of the Tinbergen gravity model. This framework, consistent with orthodox theory, suggests that distance serves as a proxy for trade costs, implying that greater distances correlate with lower trade volumes. Moreover, novel approaches to measuring distance between countries have been proposed, incorporating not only geographical factor, but also cultural, economic and historical factors considerations into the costs associated with distance (Mejía and Hassan, 2017).

To validate these hypotheses, a gravity model will be employed, utilizing the following model specification:

$$exports_{ijt} = \beta_0 + \beta_1 \ln(GDP_{it-1}) + \beta_2 \ln(GDP_{jt-1}) + \beta_3 \ln(Distance_{ij}) + \beta_4 FTADummy_{ijt} + \beta_5 OADummy_{ijt} + \beta_6 BRDDummy_{ij} + \beta_7 LANDummy_{ij} + \beta_8 CHNDummy_{ijt} + \beta_9 JPNDummy_{ijt} + \beta_{10} KORDummy_{ijt} + \varepsilon_t \quad (1)$$

where:

- i represents Chile, j refers to its trading partners, and t represents time in years.
- Exports $_{ijt}$ refers to Chilean exports to each of its partners in period t.
- GDPi$_{t-1}$ and GDPj$_{t-1}$ refer to the gross domestic products of Chile and its trading partners during period t.
- Distance $_{ii}$ represents the geographical distance between Chile and its partners.
- FTAdummy$_{it}$ and OADummy$_{ij}$ controls for the existence of FTAs and other types of comercial agreements.
- BRDDummy$_{ij}$ and LANDummy$_{ij}$, are dummies controlling for language and borders, respectively.
- CHNDummyij, JPNDummyij, and KORDummyij, are interaction variables that isolate the effect of a commercial agreement between Chile and China, Japan and Korea.

The gravity model should not be estimated in its log-linearized form, which involves taking the natural logarithm of variables on both sides of the equation. This method fails when the independent variable equals 0 and can introduce biases when linearizing the model for Ordinary Least Squares (OLS) estimation. This is because it diminishes the scale of differences in the observations of the endogenous variable, potentially rendering the estimator inconsistent. Another common issue in OLS estimation of the gravity equation is the assumption of homoscedasticity in the error term, which is often due to non-random differences between countries affecting their trade relations (Burguer *et al.*, 2009). Consequently, heteroscedasticity in the error term can lead to an inefficient estimator (Santos and Teneyro, 2006).

To address these challenges, alternative techniques for estimating the gravity model are necessary. One such technique, increasingly employed, is the Poisson Pseudo-Maximum Verosmilitude (PPML) estimator (Kepastoglu *et al.*, 2010). In this method, all explanatory variables are exponentiated. While Poisson models traditionally focused on count variables, the Poisson estimator can also be applied to continuous variables with values greater than 0, which aligns a case with the nature of trade flows, particularly exports in the context of this paper.

1 The specification and formalization of the model to be estimated, as well as the econometric validation of its consistency and efficiency, can be found in "The Log of Gravity" by Santos Silva and Silvana Teneyro (2006); in "To Log or Not Log?" by Boriss Silivestrovs and Dieter Schumacher; and in "Gravity Model Estimation: Fixed Effects vs. Random Intercept Poisson Pseudo Maximum Likelihood" by Sören Prehn, Bernhard Brümmer and Thomas Glauben.

The gravity model is estimated using a panel data comprising annual net exports from Chile to each of its trading partners from 2001 to 2017. Specifically, this includes countries to which Chile exported during the period. Additionally, data on relevant variables of interest and control are incorporated. Estimation is conducted at the aggregate level, covering total exports from Chile to each partner, with separate estimations for agricultural and manufacturing exports. This disaggregation is facilitated by the system's harmonized classification.

Data series for endogenous variables, such as export trade balances at the aggregate level, and for agricultural and manufacturing sectors, were sourced from ITC Trade Map (2018). For the agricultural sector, data on Chile's exports to each partner were aggregated for the first 24 chapters of the harmonized system. For manufacturing sector, Chile's exports were aggregated for 100 manufactured products explicitly classified under manufacturing. It's worth noting that the study focuses on a representative portion of manufactured products due to technical constraints preventing a detailed examination of all items. Gross domestic product data for each country were sourced from the World Bank's "World Development Indicators" database (2018). Information for creating dummy variables controlling for Free Trade Agreements and interaction variables with China, Japan, and South Korea was obtained from the SICE OAS portal. Data for the border dummy variable were sourced from the website of the Ministry of Foreign Affairs of Chile (2018), while information for the language dummy variable (Spanish) was obtained from the website of the Association of Spanish Language Academies. Dummies isolating the effects of FTAs between Chile and East Asian countries were derived from the TLC Dummy variable.

Results

The Hausman test suggests that the model estimations for total exports and agricultural exports should utilize fixed effects to control for unobserved time-invariant heterogeneity across countries. Conversely, estimations for manufacturing exports should employ random effects to account for both observed and unobserved time-invariant heterogeneity across countries. To capture a comprehensive understanding of the potential effects of FTAs on Chilean exports at aggregate, agricultural, and manufacturing levels, and recognizing that fixed effects estimations eliminate effects that remain constant over time (such as border variables, language, and geographical distance), each estimation was conducted using both fixed and random effects.

For each of the three variables under examination, two types of estimations were conducted: the first type included only dummy variables indicating the presence of FTAs and other agreements, along with controls; the second type incorporated variables isolating the impact of commercial agreements with China, Japan, and South Korea.

In examining the variables of interest, an assessment of the estimates excluding those isolating relations with Japan, China, and South Korea reveals that FTAs exhibit a positive impact on total exports and agricultural exports, consistent with prior findings (Chumacero, 2004; Fuenzalida, 2016). However, for manufacturing exports, the estimation suggests a negative relationship with the FTA variable (see Table 1), aligning with qualitative analyses of Chilean exports behavior. These analyses highlight the potential effect of trade integration policies, noting that "the value added of the export basket remains low and sophistication low" (Dingemans, 2016), characteristics prevalent in manufacturing exports.

Conversely, other types of trade agreements, such as Economic Cooperation Agreements, Partial Scope Agreements, Economic Integration Agreements, and Trade Protocols, demonstrate a similar pattern: a significant positive impact on total and agricultural exports, but a negative one on manufacturing exports. The unexpected negative impact of TAs on manufacturing exports could theoretically be supported by the idea that short-range economies of scale, which are not well- developed, may be displaced by long-range economies of scale upon entering competition (Krugman, 1979). This theoretical framework is relevant to this specific

Table 1. Results

Variables	Total Exports				Agricultural Exports				Manufacturing Exports			
	EF	EA	EF	EA	EF	EA	EF	EA	EF	EA	EF	EA
LnPIBi	0.918***	0.198***	0.257***	0.257***	0.881***	0.881***	0.867***	0.868***	0.445***	0.448***	0.678***	0.681***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnPIBj	0.001***	1.001***	0.917***	0.917***	1.487***	1.487***	1.511***	1.511***	1.660***	1.657***	1.420***	1.417***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnDISij		-0.891***		-0.779***		-1.710***		-1.691**		-3.058***		-3.430***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
FTADummy	0.634***	0.634***	0.455***	0.455***	0.106***	0.106***	0.095***	0.095***	-0.419***	-0.419***	0.609***	-0.609***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)
OA Dummy	0.414***	0.414***	0.386***	0.386***	0.037***	0.037***	0.067***	0.067***	-0.130***	-0.129***	-0.106***	-0.105***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
BRDDummy		2.895***		2.638***		2,054		2,01		7.297***		7.351***
		(0.915)		(0.924)		(1.415)		(1.446)		(1.433)		(1.301)
LANDummy		0.796***		1.002***		-1,243		-1.341*		-0.738		-0.231
		(0.445)		(0.448)		(0.772)		(0.794)		(0.725)		(0.657)
Corea Dummy			0.600***	0.600***			0.818***	0.818***			4.248***	4.244***
			(0.000)	(0.000)			(0.002)	(0.000)			(0.123)	(0.000)
Japón Dummy			0.044***	0.044***			-0.050***	-0.050***			1.021***	1.020***
			(0.000)	(0.000)			(0.000)	(0.000)			(0.020)	(0.028)
China Dummy			0.367***	0.367***			-0.134***	-0.133***			3.032***	3.034***
			(0.000)	(0.000)			(0.000)	(0.001)			(0.028)	(0.000)
Constant		4.897***		4.044***		-0,158		-0.302		11.530**		13.96***
		(1.901)		(1.835)		(6.596)		(6.884)		(4.509)		(4.19)
Const - LnAlpha		0.666***		0.692***		1.401***		1.437***		1.507***		1.315***
		(0.090)		(0.089)		(0.086)		(0.086)		(0.097)		(0.097)
Observations	2509	2510	2509	2510	2408	2469	2408	2469	2019	2080	2019	2080
Number of ID	168	169	168	169	161	166	161	166	135	140	135	140
Prob-Chi Hasumann	(0.000)		(0.000)		(0.000)		(0.000)		(0.076)		(0.336)	

Note: Standard errors in parentheses - *** p<0.01, ** p<0.05, * p<0.1

case, considering that the manufacturing sector is not Chile's primary comparative advantage, given its focused of mineral exports.

Turning to the analysis of variables isolating the effect of trade agreements between Chile and China, Japan, and Korea, it becomes evident that, for total exports, the impact of all trade agreements signed by Chile. This finding corroborates previous research indicating that CAs do indeed stimulate trade among their members (Baier and Bergstrand, 2007; Cipollina and Salvatici, 2010). As for agricultural exports, the results are mixed: the Chile-Korea FTA stands out with an above-average effect on exports, whereas the Chile-China FTA and the Chile-Japan EPA exhibit below-average effects. Lastly, the estimated effects of the CAs with East Asia on manufacturing exports indicate a greater impact than the average effect observed for the three export destination countries under scrutiny.

Conclusions

East Asia stands as the primary destination for Chilean exports globally, absorbing 44% of Chilean exports in 2016. Moreover, there has been a consistent growth in Chilean exports to the region since the early 20th century. Chile's trade policy is oriented towards promoting Trade Agreements (TAs) not only with East Asia countries but also with nations and economic blocs worldwide, exemplified by the signing of agreements with South Korea (2004), China (2006), and Japan (2007).

The objective of this study was to empirically assess whether the FTAs signed by Chile with China, Japan, and South Korea have had a distinctive impact on Chilean exports. for this purpose, such quantification was carried out on total, agricultural and manufacturing exports, based on the use of a gravity model. The findings suggest that, contrary to the average effect, the impact of these FTAs is greater, except for the Chile-Japan Economic Cooperation Agreement (ECA) and the Chile-China FTA in the case of agricultural exports. In essence, the results indicate that Chile's FTAs with East Asian countries have exerted an above-average influence on the growth of Chile's export balances with each respective party. Consistent with prior studies, it is noted that when trade balances are generally low, such as in the case of manufacturing exports considered here, the Poisson Pseudo Maximum Likelihood (PPML) estimator tends to overestimate the effect of the variables in question (Gomez, 2013; Dueñas and Fagiolo, 2011).

Given the structural disparities among economies in the region, the findings of this study may not readily generalizable to other countries. Thus, it would be inappropriate to extrapolate the effects in this study for Chile to other nations in Southeast Asia. However, establish that the effect of the entry into force of trade agreements with Southeast Asian countries would have an effect that can be extrapolated in the direction or magnitude of that estimated in this study for the case of Chile. However, further research could explore the significance of East Asia as a platform for trade expansion not only for Chile but also for Colombia, Mexico, and Peru - countries in the region that have also engaged in CA signings with South Korea, China and Japan. Additionally, subsequent studies could investigate the influence of CAs with East Asia on the diversification of the Chilean export products.

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