The Trade Between Us: Barriers and Predictors for Exports of Cultural Goods from Chile

El Comercio Entre Nosotros: Barreras y Predictores de las Exportaciones de Bienes Culturales desde Chile

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Abstract

For many Global South countries, domestic demand for cultural goods cannot sustain the livelihoods of cultural workers. Expanding exports is therefore essential, yet access to Global North markets remains constrained by persistent trade barriers. This article examines the determinants of cultural goods imports from the Global South, with a focus on Chile as a representative case.

Using a dataset of Chilean cultural exports from 2005 to 2015, the study combines a Logit binary choice model with a Random Forests algorithm to identify and rank the most influential predictors of import likelihood. The Logit analysis shows that shorter distances, shared language, cultural proximity, political stability, and preferential trade agreements increase the probability of trade, while partial scope agreements

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reduce it. Machine learning results reinforce the importance of strong macroeconomic performance, higher capital stock, and robust institutions, alongside comprehensive trade frameworks, especially economic integration agreements, free trade agreements, and preferential trade agreements. Cultural affinity, proxied by a common language, also emerges as a consistent positive factor.

By integrating econometric and predictive modelling, this research isolates the key variables shaping cultural trade and translates them into strategic guidance for policymakers. The findings point to actionable pathways for Global South exporters to diversify markets, strengthen trade partnerships, and improve the economic resilience of their creative sectors.

Keywords: Cultural Exports – Trade Agreements – Creative Workforce – Machine Learning.

Resumen

Para muchos países del Sur Global, la demanda interna de bienes culturales no puede sostener los medios de vida de los trabajadores culturales. Por lo tanto, la expansión de las exportaciones resulta esencial; sin embargo, el acceso a los mercados del Norte Global sigue estando limitado por persistentes barreras comerciales. Este artículo examina los determinantes de las importaciones de bienes culturales provenientes del Sur Global, con un enfoque en Chile como caso representativo.

Utilizando una base de datos de exportaciones culturales chilenas entre 2005 y 2015, el estudio combina un modelo Logit de elección binaria con un algoritmo de Bosques Aleatorios

(Random Forests) para identificar y jerarquizar los predictores más influyentes de la probabilidad de importación. El análisis Logit muestra que menores distancias, idioma compartido, proximidad cultural, estabilidad política y acuerdos comerciales preferenciales aumentan la probabilidad de comercio, mientras que los acuerdos de alcance parcial la reducen. Los resultados de aprendizaje automático refuerzan la importancia de un sólido desempeño macroeconómico, un mayor stock de capital y la robustez institucional, junto con marcos comerciales integrales, en particular los acuerdos de integración económica, los tratados de libre comercio y los acuerdos preferenciales. La afinidad cultural, medida a través de un idioma común, también aparece de manera consistente como un factor positivo.

Al integrar modelos econométricos y predictivos, esta investigación aísla las variables clave que configuran el comercio cultural y las traduce en orientaciones estratégicas para los responsables de políticas públicas. Los hallazgos apuntan a vías de acción concretas para que los exportadores del Sur Global diversifiquen mercados, fortalezcan asociaciones comerciales y mejoren la resiliencia económica de sus sectores creativos.

Palabras clave: Exportaciones Culturales – Acuerdos Comerciales – Fuerza Laboral Creativa – Aprendizaje Automático.

I. Introduction

This investigation aims to provide evidence on strategies to strengthen cultural exports by signaling the most relevant predictors of it. Furthermore, this article is mainly driven by the fact that the internal demand for cultural products is not enough to create a stable socioeconomic situation for cultural workers. In that context, by focusing on improvements in cultural exports, one can benefit the cultural sector and their workers, which ultimately leads to higher incomes and a better socioeconomic situation for those involved in the productive process.

However, there are restrictions that countries face to improve their cultural export strategies, such as limitations in terms of market access taken mainly by a few countries, local institutionalisation to develop proper cultural export strategies and commercial barriers due to agreements between specific countries on cultural products. All of these variables affect cultural exports, especially those from Latin America, which this study focuses on, as most of the market share is controlled by countries of the Global North.

Consequently, this article acknowledges those limitations and aims to develop a model using a Logit Binary Choice Model to understand the significant variables affecting the probability of countries to import Chilean cultural goods, and later designing predictive models based on Regression Trees and Random Forests, to highlight the most significant predictors of the probability of foreign countries importing Chilean cultural goods.

2. Literature Review

The reason to analyse the particular case of Latin America is because of the underrepresentation of this region in the international cultural trade market, affecting the possibilities of cultural workers of Latin America to benefit from a global market. In that context, Latin American cultural and creative industries revenues constitute 6% of the worldwide market share, substantially below North America (28%), Europe (32%), and Asia-Pacific (33%) (Times, 2015). In that context, the literature developed several theories explaining the difference of export levels from Latin America and countries of the Global North.

One approach to the difference between the cultural trade volume from the Global North and Global South is based on 'cultural distance´, where common norms and values diverge from two particular countries (Hofstede, 2001). Or said differently, countries with similar cultural tastes will often trade more (Disdier et al., 2010; Guiso et al., 2009).

In this context, a study (Tadesse & White, 2010) analyzed the trade flows of the US and its trading partners, considering the presence of immigrant and cultural distance. The results show that the effect of cultural distance reduces exports, where cultural exports are more sensitive (-0.49%), than non-cultural exports (-0.27%), and that the presence of immigrants reduces the effect of cultural distance more for cultural exports (-0.386%) than non-cultural exports (-0.144%). In that sense, the top ten countries by the number of immigrants are predominantly from the Global North, led by the US and followed by Germany, Russia, the UK, France, Australia, Canada and Spain, with a few exceptions from Saudi Arabia and the United Arab Emirates (Center, 2020).

Another related argument is that European countries have a beneficial situation in terms of cultural exports as they are part of a political and economic union (EU), which reduces cultural distance, guaranteeing significant flows of citizens from those countries. In the case of the US, the cultural hegemony of Anglo-Saxon culture ensures a constant flow of immigrants, benefiting their cultural exports. This situation is far from the reality of the Latin American regional block, as their countries have significantly lower levels of immigration compared to countries of the Global North. Moreover, this situation cannot be justified by the size of the nations, as Argentina has immigrant levels similar to the Netherlands and Sweden, and Brazil to Denmark or Poland (Center, 2020). The difference in immigration levels can be attributed to the cultural and geographical isolation of Latin America, impacting cultural exports.

Some authors link Latin America's lower cultural production to historically high illiteracy rates, which constrained demand for cultural goods and reduced incentives for private production (Stanziola, 2002). Illiteracy also shaped broader cultural differences that affected creative output (Acosta, 2014). For comparison, by 1920 England's illiteracy rate was 3% and France's 10% thirty years earlier (García Canclini, 1996). In the United States, rates varied widely across states in the early 20th century but fell below 10% by 1950 (Mueller, 1959). In contrast, Brazil's rate in 1920 was 75%, and regional averages in Latin America and the Caribbean remained near 20% even in the 1980s (Macrotrends, 2020). These disparities reinforced the advantages of the Global North in cultural production and exports, consistent with evidence that education, language, and religion significantly boost cultural trade, as shown in a study of U.S. film imports in 33 countries (Marvasti & Canterbery, 2005).

Consequently, countries with higher literacy rates have a more privileged position to develop cultural production and export it. Nevertheless, the actual situation shows a more even status between countries in the Latin American region and the Global North, where most of them present illiteracy rates below 10% (Roser & Ortiz-Ospina, 2016). However, the cultural sector of regions, like North America and Europe, had the temporary advantage over countries of the Global South because they developed their cultural export strategy first and captured a more significant part of the market share.

Based on the previous theories explaining the uneven situation of Latin American cultural exports, the future challenges advocate increasing cultural exports, both in terms of volume and trade partners.

A significant role towards that objective is the one represented by WTO and UNESCO, which can generate a common framework contributing to skill-transfer and capacity building for peripheral countries (Richieri Hanania, 2016), increasing their cultural exports. Another institutional example is the summit EU-CELAC, which provides an instance of dialogue and negotiation between both regional blocks, wherein 2015 they highlighted the importance of cultural trade between the Global North and the Global South (García Leiva, 2016).

However, the result depends on each nation's different social and economic context, resulting in varying levels of development of the public apparatus. Especially for peripheral countries, this situation creates different results in implementing cultural policies due to the national considerations regarding international agreements. Thus, the objective of establishing fairer trade agreements between the Global Nor-

th and the Global South can potentially fail due to national and local normative institutions and their lack of capacity to implement international support.

As an example, the impact of the UNESCO Convention 2005 in terms of cultural trade has been visible in Latin America, with the development of institutional frameworks like Ministries of Culture and other governmental departments (Baltà, 2014). Such is the case of Peru, where the UNESCO Convention was the primary guideline to describe the Cultural Policy Guidelines for 2013–2016 (Ministerio de Cultura, 2012) or the National Culture Plan 2011–2020 in Brazil (Ministério da Cultura, 2011). Based on the previous examples, a challenge for countries of the Global South is that cultural industries are not as vital in peripheral countries as in the Global North. This situation can lead to limitations on how effectively the legislation, policies and international agreements are applied in this sector (Baltà, 2014).

However, one has to consider that countries of the Global North prefer to trade and support preferential treatment from countries with past colonial ties (Rose, 2000) and linguistic proximity (Melitz, 2008). As a result, countries of the Global North are selective and arbitrary. They often will not apply preferential treatment to economic leaders of the Global South such as Brazil, China, India and South Africa (Singh, 2017). The main reason is that those countries can potentially take a considerable market share or initiate a partnership with countries of the Global South, which will endlessly put the paternalistic position of the Global North in danger.

Another relevant challenge is the regional collaboration as an economic block, which is an ongoing process. In this context, several international institutions are contributing

to building a more robust regional partnership. For instance, since 2012, the South American Cultural Council of the UNASUR has facilitated collaborations on cultural trade in the region. Additionally, in 2014, the II Summit of CELAC established both The Habana Declaration and an action plan 2014-2021 to reinforce cultural exports within the region (Garcìa Leiva, 2016). Furthermore, the cultural development plan of the IDB uses bilateral agreements with institutions in 26 countries (CNCA, 2015). Finally, *Programa Ibermedia grants* Iberoamerican cultural projects around the world, financially supporting their promotion and exports with subprograms, such as *Ibermedia* in the audiovisual domain, *Iberescen*a for performing arts and *Ibermusica* for the music sector.

A final challenge is to set regional collaboration at a micro level, considering local initiatives coming from communities. In that sense, *Corredor Cultural Caribe and Ibercultura Viva*, have been taking the lead on the development of those kinds of initiatives in the region (Melguizo, 2013).

Now, Chile is a relevant case study, as it is the leading net exporter of cultural goods in Spanish-speaking countries of South America. Moreover, the Chilean case represents a benchmark in terms of export strategies. For example, their contribution to cultural goods exports in 2016 reached US$69 million, followed by Argentina (US$58 million) and Peru (US$44 million) (UN, 2020).

However, the balance between cultural exports and imports of the country has room for improvement, as the country substantially imports more than it exports. In this context, the exports of cultural goods represent 10% of the volume of imports of cultural goods, with 64% of it being

supplies, 28% finished products and 8% equipment for audiovisual reproduction (Aspillaga, 2014). Moreover, the lack of promotion of cultural products abroad can be observed by the results of Trama´s study, which shows that 71.1% of cultural workers in Chile struggle to distribute and promote their cultural goods and services (Brodsky et al., 2014).

Another significant aspect of the cultural trade context is that their cultural goods are much more restricted to specific cultural domains. Furthermore, 70% of cultural goods exports are equally distributed between craft and editorial products (books, newspapers and magazines), and 80.7% of the cultural services exports are attributed to infrastructure and equipment, primarily associated with informatics media, audiovisual, radio, TV and videogames (CNCA, 2019).

The evidence on Chilean cultural exports goes in line with the regional trade in countries of Latin America (Singh, 2017), where the top importers of cultural exports from Chile are Argentina, Peru and Brazil. Followed by Mexico, the US and Europe (Aspillaga, 2014). The narrowed pool of cultural importers can also be attributed to the consistent collaboration of several institutions promoting partnerships between Iberoamerican countries. Such as SEGIB, OEI, CAB, CERLALC, OEA, CELAC, MERCOSUR, UNASUR, ALBA, CAN and SICA (García Leiva, 2016), to name some of them.

Regarding the importance of creative industries in the Chilean economy, they account for 2.2% of the GDP (CNCA, 2017), over other sectors such as tobacco and fishing. However, the evidence shows that the percentage of representation decreases significantly when comparing cultural exports and total exports. Public reports on the matter revealed that in 2013, the cultural sector in Chile represented 0.29% of total

exports, USD$ 221 Million. Then, as previously mentioned, there are possibilities to increase the cultural goods exports due to the importance of the sector in the economy and the significant gap between cultural goods exports and total exports of the country.

There are other mechanisms of support, such as international agreements via preferential treatment, from where the UNESCO Convention 2005 supports the cultural exports of peripheral countries. However, the quadrennial reports 2012 and 2016 on cultural policies for Chile explicitly manifest that there is no evidence of cooperation programs in line with the UNESCO Convention, exposing the discursive rather than pragmatic essence of the convention in the country. On the other hand, Chile has more than 130 bilateral agreements for cultural trade, but most of them are not updated.

Finally, Chile has an important FTA with countries like the US. Therefore, it is essential to protect cultural exports on commercial agreements that could potentially harm them. That was the case with the FTA with the US, where Chile created the coalition for cultural diversity to exclude certain cultural products from the FTA to protect them.

3. Hypothesis and Research Questions

Based on the previous section, this study's hypothesis suggests that Chilean cultural goods don´t face barriers that affect exports with potential partners. Understanding the variables and predictors explaining the decision to import Chilean cultural goods could rethink their export strategy and increase the incomes of cultural workers associated with the production of those goods.

The hypothesis of this article is represented as follows:

H_0: Chilean cultural export are not constrained by international trade barriers affecting the possibility of improvements and new trade partners.

H_1: Chilean cultural export are constrained by international trade barriers affecting the possibility of improvements and new trade partners.

The research questions are represented as follows:

1. How to explain the actual export levels of cultural goods from Chile to other countries?

2. What are the possible variables that could predict new trade partners with Chile? (eg: physical proximity, cultural proximity, established trade links)

4. Methodology

This article uses a Logit binary choice model to run a regression and calculate the probability of a country importing Chilean cultural goods, then identifies which variables are significant to that decision. Later, using marginal effects for that regression, one can identify the individual effects of each critical variable on the probability of importing Chilean cultural goods and whether that effect is positive or negative.

Afterwards, this study builds predictive models using regression trees and random forests, as machine learning techniques, analyzing the most relevant predictors to the probability of other countries importing Chilean cultural

goods. The strength of this methodology is that it simply allows the identification and ranking of the most relevant predictors. On the other hand, the potential opportunity of the result is forecasting new trade partners. The weakness of the predictive model is that it does not provide a quantifiable measure of the effect of the independent variables on the dependent variable. Hence, it is possible to rank the importance of the independent variables but not determine the size of the impact.

For data collection, this study merges two databases to construct a sample of countries importing goods from Chile during the years 2005 and 2015. The reason to build this database is that it reflects the volume of exports and demographic, sociological, economic and commercial variables of both the country of origin and the one of destination.

Firstly, this article takes information from the UNCTAD database on exports of Chile to all the countries importing cultural goods from Chile. This information is gathered for the period between 2005 and 2015 and expressed in US$ Millions. The database breaks down the trade volume by sub-domain and sub-product, applying the categories from UNCTAD for cultural goods. One of the limitations of this database is that UNCTAD focuses mainly on physical goods, which leaves a restricted space for services. The reason why cultural services are put aside from this study.

Nevertheless, reports from UNCTAD show that creative goods exports have a more extensive representation of CCI's international trade than services. More specifically, 69% creative goods and 31% creative services in 2008 (Staines & Mercer, 2013). Therefore, this database has a good indication of cultural exports from Chile and their commercial partners.

Overall, the first dataset is helpful because it quantifies and ranks the importers of Chilean cultural goods, providing disaggregated information on the cultural goods that each country imports.

Secondly, this research incorporates a United States International Trade Commission (USITC) database named Dynamic Gravity Dataset (DGD). This dataset specialises in international trading, covering the period between 1948 to 2016, displaying the information between two trading partners (countries) and their macroeconomic indicators, geographic attributes, cultural relations, institutional strength, and trading agreements. The second dataset contributes to each country's specific characteristics, which will later be helpful for the construction of predictive models on Chilean cultural exports.

The outcome of merging both datasets is a sample from 2005 to 2015 of Chilean cultural exports volume and the characteristics of each country importing them.

Regarding the limitations of the database, from a statistical point of view and considering the list of countries, there will be a significant representation of missing values. Throughout the decade of analysis, most countries have not imported cultural goods from Chile, so the vast amount of zeros has to be compensated for by using data imputation to help explore the patterns of missingness in the dataset. Secondly, there is some limitation in regards to the structure of the database, which can be described as time-series observations on a set of different variables, often called panel data or longitudinal data (Hsiao, 2007). For instance, as several variables are analysed through periods, it is not possible to isolate the effect of specific years on the independent variables. To solve

the previous problem, this study proposes fixed effects for the years.

Now this article presents the different variables of analysis, with their respective categories. Firstly, the exports of cultural goods from Chile are categorized based on the definitions of a domain, sub-domain, and cultural goods on the UNESCO Statistical Framework 2009 (UNESCO, 2009). The reason to choose this criterion for the study is that, on one hand, the dataset comes from UNCTAD. Therefore, the cultural goods categories follow the general guidelines of UNESCO. On the other hand, the UNESCO Statistical Framework (FCS) allows comparisons of data for cultural industries between different countries, using a standard international criterion.

The specific domains and sub-domains unveil the most disaggregated description possible for cultural goods. Consequently, the categories of cultural goods exports are: Art Crafts, Audiovisual, Design, New Media, Performing Arts, Publishing and Visual Arts.

With the previously described categories, one can identify the volumes of exports from the most aggregated definition of 'All Creative Goods' to the most detailed description of cultural goods.

Later, from the DGD database, it is possible to identify countries importing Chilean cultural goods. The description of those variables is the following:

> *Pop* = Population of destination country

> *Capitalconst* = Capital stock at constant prices of destination country

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GDP.PWTconst = Real GDP inflation and PPP adjusted of destination country (PWT)

GDP.WDIconst = Real GDP of destination country (WDI)

GDP.WDIcapconst = Real GDP per capita of destination country (WDI)

Distance = Population weighted distance between country pair

Contiguity =   Yes if Country pair shares common border
No   if Country pair does not shares common border

Landlocked =   Yes if Destination Country is landlocked
No if Destination Country is not landlocked

Island =   Yes if Destination Country is an island
No if Destination Country is not an island

Region =   Geographic region of origin/ destination country.

Common Language =   Yes   if Country pair speak at least one common language,

No if Country pair do not speak at least one common language,

Agree PTA =   Yes if Country pair in at least one active preferential trade agreement
No if Country pair not in at least one active preferential trade agreement

Agree PTA Goods =   Yes   if Country pair in at least one active PTA on goods,
No   if Country pair not in at least one active PTA on goods,

Agree CU =   Yes   if Country pair is in at least one customs union,
No if Country pair is not in at least one custom union

Agree EIA =   Yes if Country pair is in at least one economic integration agreement,
No if Country pair is not in at least one economic integration agreement,

Agree FTA =   Yes if Country pair is in at least one free trade agreement,
No if Country pair is not in at least one free trade agreement,

Member EU D =   Yes if Destination country is a EU

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	member, No if Destination country is not a EU member,
Member *WTO D =*	Yes if Destination country is a WTO member, No if Destination country is not a WTO member,
Member *WTO Joint =*	Yes if Country pair are WTO members, No if Country pair are not WTO members,
Member *GATT D =*	Yes if Destination country was a GATT member, No if Destination country was a GATT member,
Member *GATT Joint =*	Yes if Country pair were GATT members, No if Country pair were GATT members,
Polityd =	Polity (political stability) score of the destination country.

In relation to the variables selection, the first variable of analysis is *Pop*, where flows of international trade are directly proportional to the size of countries, measured by

population or GDP (Ramos, 2016). Hence, for international trade models (gravity models), the population is a relevant variable included in the models of this article.

Later, *Capitalconst* is included in extensions of the classic gravity model, where high levels of R&D, FDI and indirectly capital stocks explain higher flows of international trade between countries (Wang et al., 2010).

From the database, there are three different expressions of GDP, whose inclusion are supported by the gravity model theory, where the GDP of countries have significant variables explaining the volume of trade between countries (De Benedictis & Taglioni, 2011). However, it is not possible to include all of the expression of GDP, as they could present statistical problems between them. Thus, this study chooses to use *GDP.PWTconst* as the representation of GDP because it has a better picture of the GDP volumes adjusted for inflation and PPP.

In regards of the geographical variables, the database provides five relevant variables *Distance, Region, Contiguity, Landlocked and Island*. Moreover, *Distance, Region and Contiguity,* are related to the idea that geographical proximity is directly proportional to higher volumes of trade (Pöyhönen, 1963). A relevant aspect is the exclusion of *Region* as the fixed effects of that variable affects *Distance* due to high correlation. On the other hand, previous literature on international trade explains the effect of landlocked countries, where *Landlocked* countries tend to decrease trade (Moisé & Sorescu, 2013) due to larger border crossing times. In the same way, *Island* has been previously reported as a variable that isolates countries and negatively affects trade (Melitz, 2007). Both variables are included in the model, expecting similar outcomes to those one from previous literature.

The reason to choose language as a 'cultural' descriptor is that it is a behavioural indicator that builds cultural identity (Felix-Ortiz et al., 1994) and people's perception of their reality (Bonvillain, 2019). Hence, one could expect that sharing a language facilitates communication and the ability of a country to trade with other countries, as they perceive a 'cultural proximity' of their norms and behaviour. Moreover, language has been effectively used as a proxy of 'cultural proximity' in other models of international trade (Frankel et al., 1997). For those reasons, *CommonLanguage* is included in the model.

The variables on trade facilitation include *AgreePTA, AgreePTAGoods, AgreeCU, AgreeEIA, AgreeFTA* and *AgreePSA*. Specifically, on preferential trade agreements, the literature suggests an increase of bilateral trade in the presence of PTAs, (Cardamone, 2007; Yao et al., 2021). For FTAs, the literature suggests positive effects on trade (Baier & Bergstrand, 2007), with more evident effects in the long run (P. Egger, 2004). In the case of custom unions, the literature mentions it as a superior expression of the regional trade agreement. Hence, their effects on trade are more beneficial than FTA (Park & Park, 2009). The same tendency is proved by literature on EIAs, where their presence increases the trade between countries (Baier et al., 2014). Finally, literature on PSA also suggests a positive outcome on international trade (P.H. Egger & Tarlea, 2015).

Later, the variables on trade memberships include *MemberEUD, MemberWTOD, MemberWTOJoint, MemberGATTD* and *MemberGATTJoint*. For the case of EU membership, previous works talk about the trade benefits of been part of the EU, with a positive effect on trade (Shepotylo, 2010). Other studies target the trade relation between EU countries

and non-EU countries, which proved to be negative but not significant in terms of the volume of trade (Gudgin et al., 2017). For the case of GATT/WTO members, recent studies show a positive and significant effect (Bodin, 2017; Larch et al., 2019) on both memberships. In the case of *Polityd*, the literature supports the idea that better institutionalism provides better international trade (Anderson & Marcouiller, 2002; Belloc, 2006). For that reason, this variable is also included in the models.

Finally, some of the variables (*Logcapital , LogGDP, Logpop*) are converted to logarithmic values because of outliers´ presence, which ultimately affected the convergence of the model's likelihood. The origin of the outliers comes from the existing economic, capital and population concentration of certain countries. Hence, by applying logarithmics, one can mitigate the difference between the values of countries.

To capture the effect of each year, this study applies a fixed effect for each year, where instead of considering the set of independent variables for each year, this study converts the years into dummy variables and establishes the first year of analysis (2005) as the reference to compare the subsequent years.

The use of the Logit Regression model is explained because this study aims to use the probability of importing Chilean cultural goods as the dependent variable. For that reason, when using probability, the most suitable regression model is Logit regression. In that context, the outcome of the regression model is materialised in the marginal effects. In other words, this regression model shows the marginal and individual effect of each variable on the chance of importing Chilean cultural goods. Hence, with those results, one can

understand the significant variables affecting the probability of importing Chilean cultural goods the most, either positively or negatively.

In general, previous studies applied trade volumes as a dependent and continuous variable (Bergstrand, 1985; De Benedictis & Taglioni, 2011). In this investigation, using probabilities as a dependent variable comes from the idea of individualising the probability of importing Chilean cultural goods from each country globally by predicting that probability and later using it as a reference for further export policymaking.

Later, this study applies predictive models to understand the independent variables that will affect the probability of importing Chilean cultural goods. Those independent variables are expressed as predictors of the future likelihood of importing Chilean cultural goods.

The reason to do so is that, by designing a predictive model with good predictive power, other countries can use it, applying other databases. The model itself would not necessarily change its accuracy if the case study or the database changes.

5. Results

This section covers the different statistical models, both Logit and Predictive models, to estimate the first and second investigation questions. For the first question, this study uses a Logit binary choice model to understand the independent variables explaining the probability of a foreign country importing Chilean cultural goods.

Later, this study applies predictive models, using machine learning, such as regression trees and random forests to answer the second question of investigation, to explore the variables predicting higher possibilities of importing Chilean cultural goods. The final subsection compares the different models to conclude which one has a higher predictive power.

This study designs a binary choice Logit regression to analyse the probability of a foreign country importing Chilean cultural goods, which is the dependent variable. And later, identify the effect of each independent variable on the probability of importing Chilean cultural goods through the marginal effects.

On the other hand, the Logit regression considers macroeconomic indicators, geographic variables, cultural variables, trade facilitation variables on agreements, trade facilitation variables on country membership and measures of institutional stability, all of them as independent variables.

The dependent variable is expressed as it follows:

$Pr\ (Import) =$ 1 if Country imports Chilean cultural goods,
0 if Country does not import Chilean cultural goods,

Then, the independent variables are the ones considered after the database treatment, which results in a Logit regression model expressed in the following equation:

$Pr\ (Import) = \beta 0 + \beta 1 Logcapital + \beta 2 LogGDP + \beta 3 Logpop + \beta 4 Distance + \beta 5 Contiguity + \beta 6 Landlocked + \beta 7 Island + \beta 8 CommonLanguage + \beta 9 AgreePTA + \beta 10 AgreeEIA + \beta 11 AgreeFTA + \beta 12 AgreePSA + \beta 13 MemberEUd + \beta 14 MemberWTOd + \beta 15 MemberGATTd + \beta 16 Polityd + \beta 17 Year\ 2006 + \beta 18 Year\ 2007 + \beta 19 Year\ 2008 + \beta 20 Year\ 2009 + \beta 21 Year\ 2010 + \beta 22 Year\ 2011 + \beta 23 Year\ 2012 + \beta 24 Year\ 2013 + \beta 25 Year\ 2014 + \xi$

The results of the regression are presented in the next table:

Categories	Coef.	Std.Error	Statistic	P-Value	Signif.
(Intercept)	-18.9391	3.201235	-5.91619	0.0000	***
Logcapital	1.4303	0.6307	2.2680	0.0233	*
LogGDP	1.2686	0.5778	2.1957	0.0281	*
Logpop	-0.6842	0.2431	-2.8151	0.0049	**
Distance	-0.0003	0.0000	-9.2544	0.0000	***
Contiguity	15.1644	596.7153	0.0254	0.9797	
Landlocked	-0.6639	0.2828	-2.3472	0.0189	*
Island	-0.3107	0.2989	-1.0395	0.2986	
CommonLanguage	1.0957	0.2245	4.8803	0.0000	***
AgreePTA	2.0359	0.7237	2.8132	0.0049	**
AgreeEIA	1.2005	1.0252	1.1711	0.2416	
AgreeFTA	0.8745	0.8393	1.0420	0.2974	
AgreePSA	-1.9126	0.6964	-2.7464	0.0060	**
MemberEUd	-3.7748	0.8155	-4.6289	0.0000	***
MemberWTOd	0.4888	0.3940	1.2407	0.2147	
MemberGATTd	-0.1499	0.2865	-0.5234	0.6007	
Polityd	0.0653	0.0190	3.4340	0.0006	***
Year 2006	-0.0655	0.3808	-0.1720	0.8634	
Year 2007	0.0160	0.3792	0.0423	0.9663	
Year 2008	-0.0894	0.3812	-0.2345	0.8146	
Year 2009	0.0339	0.3801	0.0891	0.9290	
Year 2010	-0.1042	0.3808	-0.2735	0.7845	
Year 2011	-0.3201	0.3832	-0.8354	0.4035	
Year 2012	-0.7135	0.3910	-1.8248	0.0680	.
Year 2013	-1.0015	0.3962	-2.5281	0.0115	*
Year 2014	-0.7115	0.3906	-1.8213	0.0686	.

Table 1: Logit Regression Results.

The Logit regression results show that a large set of variables are significant, excluding most of the fixed effects of years.

Firstly, *Distance* appears as a strongly significant variable, with negative coefficients, analysed in the marginal effects. On the other hand, *CommonLanguage* seems to be another critical variable, possibly represented as a proxy of cultural similarities. Additionally, *Polityd* has a positive coefficient, discussed later in the marginal effects. Finally, the last variable from the

group of 99.999% of significance is *MemberEUd*, reflecting the relevance for the model to have importers from the European Union, with a negative coefficient.

In the second group, variables with a significance level of 99.99% are *Logpop*, coherent with international trade theory. Additionally, *AgreePTA* and *AgreePSA*, with different coefficients, even though are both trade agreements.

The third group of variables with 95% significance are *Logcapital, LogGDP, Landlocked* and the fixed effect of Year 2013, which is worth analysing and observing if there was any contingency explaining that difference.

Finally, the group of variables showing a 90% significance are the fixed effects on Year 2012 and Year 2014.

To understand the impact of the variables taken from the Logit regression results, one can observe the marginal effects of those variables to measure the impact of percentage on countries' probability of commercialising Chilean cultural goods.

Categories	AME
Logcapital	0.3514
LogGDP	0.3117
Logpop	-0.1681
Distance	-0.0001
Landlocked	-0.1642
Commonlanguage	0.2659
AgreePTA	0.4688
AgreePSA	-0.4443
MemberEUd	-0.6764
Polityd	0.0160
Year 2012	-0.1765
Year 2013	-0.2442
Year 2014	-0.1760

Table 2: Marginal Effect Results.

The marginal effects suggest that Distance has a contribution of -0.1% to the probability of importing Chilean cultural goods. Even though it is statistically significant, the impact is not substantive. This result is supported by the gravity model theory, where countries tend to commercialise more with other countries that have more minor trade frictions (Bergstrand, 1985), often based in the same geographical region.

Later, *CommonLanguage* shows a positive contribution of 26.6% to the probability of commercialising Chilean cultural goods. This variable works as a proxy of cultural proximity as sharing a language bring commercial partners closer. This effect has been documented together with the impact of colonial history and similar per capita income between trade partners, defined as 'extended gravity model' (Defever et al., 2015).

Additionally, *MemberEUd* shows a high and negative contribution to the probability of trading Chilean cultural goods, by -67.6%, reflecting how determinant is to be a member of the European Union for a Chilean cultural trade partner. The effect can be explained by the EU import policies on cultural goods from countries outside of the region. In that context, since 2019 the EU enforces importers to provide evidence on the legitimacy of the cultural goods, especially on craft, jewellery and sculptures (Dehouck, 2019).

In the case of *Polityd*, the contribution is positive but not large, as a marginal increase on it contributes with 1.6% to the probability of trading Chilean cultural goods. Nevertheless, it backs up the idea that political stability and trust in their financial system makes a country more attractive to commercialise with, even more determinant than transportation costs (Haberler, 1936). Moreover, from the 'Lucas Paradox' it is possible to conclude that low institutional quality is the most relevant explanation for the

lack of capital flows and investment from countries of the Global North to countries of the Global South (described as rich and emerging countries) (Alfaro et al., 2008). The previous argument goes in line with the results of this regression.

Later, *Logpop* contributes with -16% to the probability of importing cultural goods from Chile. Hence, countries with larger populations tend to have lower possibilities of importing Chilean cultural goods. This statement at first could sound contradictory, as the literature suggests that in general, larger countries have larger trade volumes (Yotov et al., 2016).

However, suppose one considers this effect jointly with the result on *LogGDP*. In that case, it becomes easier to understand the logic behind the outcome. *LogGDP* shows a contribution of 31.2% to the probability of importing cultural goods from Chile, suggesting that countries with higher GDP will be more likely to trade Chilean cultural goods, coherent with the trade gravity model. Then considering this result and the one obtained for *Logpop*, it is possible to conclude that countries with lower volumes of the population but high GDP levels have higher chances of importing Chilean cultural goods, hence, countries with high GDP per capita. This could potentially be explained by the fact that often more wealthy countries with a lower base of the population tend to have a more homogeneous distribution of educated citizens (OECD, 2020) and better access to culture (Eurobarometer, 2007).

Additionally, *Logcapital* has a marginal effect of 35.1% as higher levels of capital stock represent a more elevated level of productions and, therefore, economic growth (Acemoglu, 2012). Hence, it is expected that *Logcapital* and *LogGDP* have similar marginal effects.

Regarding the agreements, *AgreePTA* shows a marginal effect of 46.9% on the probability of trading Chilean cultural goods, showing that if the country pair are in any preferential trade agreement, the chances of commercialising will increase. The result is condescending with significant international efforts to balance the cultural flows from the Global South to the Global North and give them more visibility and market share. Examples of preferential treatment can be found in Article 16 of UNESCO 2005 Convention (Von Schorlemer & Stoll, 2012), PTAs from WTO (Horn et al., 2010) and more particularly Article IV of GAT, which allows screen-quotas for films (Marvasti, 1994).

On the other hand, *AgreePSA* reflects a negative marginal effect of -44.4%, suggesting that if countries are paired in at least one partial scope agreement, then the chances that one country will import Chilean cultural goods are lower. The results can be supported by the fact that Partial Scope Agreements (PSA) only cover certain products and are not referred to as WTO Agreements. Moreover, PSA has become less and less attractive, even for countries of the Global South (Nugroho, 2007), because they are often interpreted as the first approach to a Free Trade Agreement (FTA)(Fiorentino et al., 2007). Furthermore, FTA negatively affects the competitiveness of countries (Saadé & Turkina, 2019), especially those trying to improve their position in a given industry, hence adversely affecting their economic growth (Zhu & Li, 2017).

Landlocked shows a marginal effect of -16.4%. Then countries that do not have maritime access have lower probabilities of trading Chilean cultural goods. This result can be explained since naval access is often associated with ports, a relevant import channel. Later, *MemberWTOd* has a positive marginal

effect of 12.1%, suggesting that country members of the WTO have higher chances of importing Chilean cultural goods.

Finally, *Year 2012, Year 2013* and *Year 2014* have low significance and negative marginal effects, -17.7%, -24.4% and -17.6% respectively. As those marginal effects are compared to the year 2005, one can conclude that Chilean cultural imports experimented a decrease in their volumes compared to pre-crisis levels (2009). The previous outcome is coherent with the reports on international trade of goods (UNCTAD, 2014) and cultural goods specifically (Deloumeaux, 2016).

In summary, the results show that being a member of the EU has a negative impact on the probability of importing Chilean cultural goods, reflecting the barriers that countries and regional blocks of the Global North have to cultural exports of the Global South. Additionally, higher GDP and capital stock levels contribute to the probability of importing Chilean cultural goods, representing core countries´ profile, in line with the theory on international trade previously mentioned. Besides, the results suggest that preferential trade agreements have a considerable contribution to the probability of importing Chilean cultural goods. Thus, PTA could be encouraged at a national and international level to balance the export share of cultural goods and services between the Global North and the Global South. Finally, partial scope agreements provide a negative and significant impact on the probability of importing Chilean cultural goods. Moreover, PTAs are seen as the initial step to FTAs, which tend to benefits countries that are more consolidated in specific industries, which is not the case for Chile and the CCIs.

Later, this research encloses the results of the predictive models, identifying the most relevant interactions between

predictors for regression trees and the essential individual predictors for random forests, both to explain the probability of importing Chilean cultural goods.

By using these results is not possible to talk about causalities, as prediction models offer correlations between variables.

Using regression trees, this study focuses on finding the most relevant categories on each variable to predict which country has higher probabilities of importing cultural goods from Chile. Using this methodology, it is possible to observe the set of interactions between different categories or levels on certain variables that significantly affect the probability of trading cultural goods from Chile with another country partner.

When applying regression trees, the sample is partitioned into two groups, finding the value of the most relevant independent variable as a predictor, providing the minimum sum of square residuals (SSR).
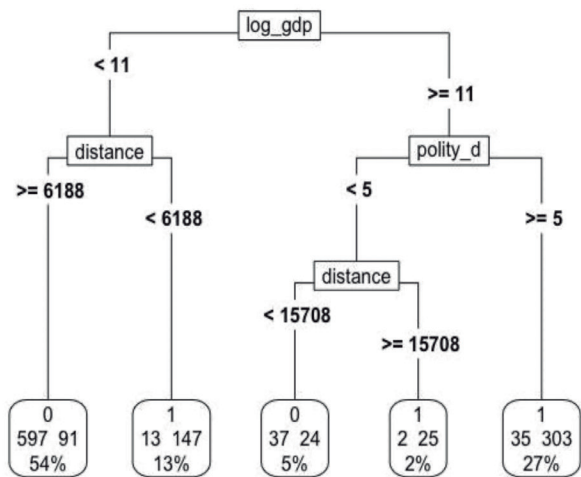

Figure 1: Regression Tree for Trade Partners on Chilean Cultural Goods Exports.

Categories Interaction	Predicted	Actual/Total (%)
LogGDP < 11, *Distance* >= 6, 188	Do not Trade With Chile	54%
LogGDP < 11, *Distance* < 6, 188	Trade With Chile	13%
LogGDP >= 11, *Polityd* >= 5	Trade With Chile	27%
LogGDP >= 11, *Polityd* < 5, *Distance* >= 15, 708	Trade With Chile	2%
LogGDP >= 11, *Polityd* < 5, *Distance* < 15, 708	Do not Trade With Chile	5%

Table 3: Regression Tree Summary for Trade Partners on Chilean Cultural Goods Exports.

From the regression tree results, one can conclude that the most relevant predictor related to the probability of trading Chilean cultural goods exports is *LogGDP*, where values below 11 represent 67% of the sample. In contrast, values over 11 equal 34% of the sample.

Those countries with a *LogGDP* lower than 11 and Distance from Chile inferior to 6,188 km are correlated with importing cultural goods from Chile, representing 13% of the sample. Implicitly, in that case, the interaction of variables highlight countries from the South and Center American region. On the other hand, those countries with *LogGDP* lower than 11, but further Distance than 6,188 km from Chile, do not trade with Chile and represents 54% of the sample. That percentage represents countries from other regions, different from South and Central America.

On the other hand, for those countries with a *LogGDP* equal or higher than 11, and a *Polity*d equal or over 5, are related with trading with Chile, representing 27% of the sample. Additionally, for those with *LogGDP* equal or higher than 11 and with a *Polityd* lower than 5, the distance determines the relation with the binary dependent variable. Where *Distance* over 15,708 km are associated with countries trading with Chile, representing 2% of

the sample. While those countries with the same conditions but with *Distance* below 15,708 km correlates with not importing Chilean cultural goods, meaning 5% of the sample.

Overall, it is interesting to observe that for *LogGDP*, value 11 is the cut point for the predictor, as this is the *LogGDP* level of Chile. Hence, there are more countries with *LogGDP* >= 11 importing Chilean cultural goods (29% of the sample) than those countries with lower levels of GDP (13% of the sample). The result goes in line with the theory of the extended gravity model, where governments tend to trade more when their GDP is similar (Defever et al., 2015).

Later, this study uses random forests to predict the categories correlated with the action of importing cultural goods from Chile. This methodology is often interpreted as an improvement from regression trees because, in general, increases the predictive power of the model and solves the problem of overfitting regression trees.

The results are the following:

Categories	% of MDA	Corr. with *dp*1
1. *LogGDP*	0.1161	0.52
2. *Distance*	0.0921	-0.291
3. *Logcapital*	0.0757	0.479
4. *Polityd*	0.039	0.3843
5. *Logpop*	0.0388	0.1874
6. *AgreeEIA*	0.0295	0.4195
7. *AgreeFTA*	0.0274	0.4218
8. *CommonLanguage*	0.0227	0.2846
9. *AgreePTA*	0.0185	0.4284
10. *MemberGATTd*	0.0124	0.2959

Table 4: Random Forest Top Ten Variables.

From the results of table 4, it is not possible to identify causalities between the dependent variable and the sets of independent variables. However, it is possible to identify the most relevant predictors of the dependent variable ranked from the one with a high percentage of Mean Decrease Accuracy (MDA). A high percentage of MDA shows the higher importance of a specific predictor, showing that an absence of that predictor will cause a fall in the accuracy of the random forest model because of randomly permuted predictors in out-of-bag samples.

Even though random forests cannot conclude any causalities, it is worth noticing the correlation between the predictors and the dependent variable, taking the predictors with the highest MDA percentage as the most important ones.

In that context, the most relevant variable explaining countries importing Chilean cultural goods is *LogGDP,* which has a correlation of 0.498, which is considered substantial (>0.4). These results suggest that at higher levels of *LogGDP*, there should be higher probabilities that a country will import Chilean cultural goods.

The following predictor is *Distance*, with a weak correlation of -0.286. The results suggest that an increase in distance is negatively related to the possibility of importing Chilean cultural goods, which goes in line with the international trade theory where countries tend to trade with partners of the same region, which have lower distance proximity. Furthermore, implementing technology improvements and digital platforms could potentially compensate for the negative effect of geographical distance (Chaney, 2011).

In third place comes *Logcapital*, which has a positive and strong correlation of 0.456, predicting that increases in the

logarithm of capital stocks are associated with a higher probability for trade partners to import Chilean cultural goods. This result goes in line with the theory on international trade, where higher capital stocks are related to higher flows of international trade between countries (Wang et al., 2010).

In the fourth place comes *Logpop*, which represents the logarithm of the population size of the destination country. This predictor has a positive and weak correlation of 0.175 and suggests that more prominent countries, in terms of their population size, are linked with higher probabilities of importing Chilean cultural goods. The result is very much related to the classical outcome of the Trade Gravity Model, where countries tend to trade more with countries with higher populations (Pöyhönen, 1963).

In fifth place is *Polityd*, a scoring system reflecting the political stability of the destination country. This predictor has a high and reasonably strong correlation of 0.371, where higher levels of political stability are positively related to increasing chances of trade partners importing Chilean cultural goods. This result goes in line with the literature, where countries with robust public institutions tend to trade more. To extend that argument, countries with good governance have high trade patterns between them, due to lower transaction costs. Still, countries with bad and similar governance will not have high trade patterns, because the transaction costs remain high, same as the institutional insecurity (De Groot et al., 2004).

Later, *AgreeEIA* shows a strong correlation of 0.397, explaining that those countries paired with Chile in at least one economic integration agreement should have higher chances of importing their cultural goods. This result is supported by literature on how integration agreements, often with countries

of the same region, tend to reduce the trade cost, keeping the benefits of free trade (Krugman, 1993). This effect has particular applications in Latin America and the positive impact on international trade by the application of economic integration agreements between members (Soloaga & Wintersb, 2001).

In seventh place is *AgreeFTA*, which also presents a strong correlation of 0.4, consistent with the previous predictor, showing that countries paired with Chile in at least one free trade agreement should perceive higher chances to import cultural goods from Chile.

Later comes *CommonLanguage*, with a weaker but positive correlation of 0.272, suggesting that countries with a common language with Chile are associated with higher probabilities of importing Chilean cultural goods. This study applies ´common language´ as a proxy of cultural proximity. In that context, the literature suggests that 'cultural familiarity´ should have a positive effect on trade between countries (Frankel et al., 1997). Hence, the results are coherent with the theory and other international trade models, where the language was used as a proxy of 'cultural familiarity´ (De Groot et al., 2004).

In ninth place is *AgreePTA*, which, similar to other predictors related to agreements, has a strong and positive correlation of 0.416. Results suggest that countries paired with Chile in at least one active preferential trade agreement should expect higher chances of import Chilean cultural goods.

Finally, the tenth most relevant predictor is *MemberGATTd* , which has a weaker and positive correlation of 0.287, suggesting that those countries that are state members of the General Agreement on Tariffs and Trade are related with higher chances of importing cultural goods from Chile. This result

differs from other studies, where being a member of WTO or GATT proved to be insignificant to the trade patterns of the countries (Rose, 2004).

From the findings of random forests predictors, one can outline that countries with higher probabilities of importing Chilean cultural goods are those with stronger public institutionalisation, better economic performance, larger populations and closer geographical and cultural distance.

Finally, this article analyses the Area Under the Curve (AUC) of the Logit model, regression trees and random forest, comparing which one has better predictive power. AUC is a good estimation of the predictive power of binary models and can be described as the probability of categorising observations in one group or the other correctly. In this case, the likelihood of categorising countries as importers or not correctly.

AUC calculates the relative predictive power of the model, where AUC can take values [1, 0], considering 1 as the value for a perfect predictive power, being able to perfectly separate those countries importing cultural goods from Chile, from those that do not. On the other hand, values closer to 0, represent an insufficient predictive power from the model. Nevertheless, having a predictive power of 1 would also be unsuitable, as, in practice, one could expect some degree of variance in the results, depending on the dataset used.

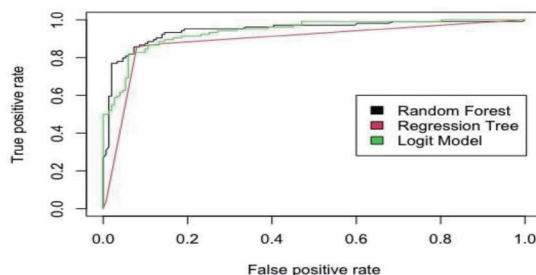Graphically, the results of predictive power can be expressed as follows:

Figure 2: Models´ Predictive Power on the Probability of Importing Chilean Cultural Goods.

From the graph, the x-axis is the 'false positive rate´, representing the probability that the predictive model categorises false positives, where the model predicts a specific value. Still, the real value ends up being different. Hence, high values on the x-axis represent an insufficient predictive power of the model.

On the other hand, the y axis is the 'true positive rate´, representing the probability that the predictive model categorises a true positive, reflecting concordance between the predicted and the effective value. Hence, higher values of the y-axis represent a better predictive power of the model.

The highest predictive power comes from the random forest model with 0.9457, followed by the Logit model with 0.9385 and the regression tree model with 0.891. Even though the three models have high predictive power, random forest leads the rank as the model that can be replicated with other datasets and is expected to yield significant results with the best accuracy among the three models.

6. Conclusions

This article analyses the variables affecting Chilean exports of cultural goods and creates predictive models to identify the most relevant predictors correlating with importing Chilean cultural goods. From the results, one can conclude three relevant outcomes.

Firstly, applying a Logit binary choice model, this article calculates countries' probability of importing Chilean cultural goods. The results identify the most significant variables and the contribution of those variables to the likelihood previously described. Later, from the significant variables, this study concludes that the highest marginal effect is the GDP (31.1%), where higher GDP levels are associated with higher chances to import Chilean cultural goods if the trade partner is an EU member (-67.6%), which this study attributes to the established norms by the EU in terms of imports of cultural goods to avoid illicit traffic. And variables associated with trade agreements, country pair in; preferential trade agreements (46.8%), economic integration agreements (27.6%) and partial scope agreements (44.4%).

Being the first two types of agreements, positively related to the probability of importing Chilean cultural goods, as they refer to trade strategies that privilege Chile's position as an exporter from Latin America. On the other hand, partial scope agreements negatively relate to the chances of importing Chilean cultural goods, as those types of agreements are selective and not built into the WTO framework.

Secondly, this study applies predictive models based on regression trees and random forests to identify the most critical predictors correlating with the probability of importing Chilean

cultural goods. Regression trees show that the most relevant predictor is *LogGDP*, where values under 11 represent 67% of the sample and values over 11 represent the remainder. It is essential to highlight that from all the relevant interactions between predictors, 42% are linked with importing Chilean cultural goods. Moreover, the results of the regression trees show that macroeconomic, geographic and institutional stability variables are determinants of the decision to trade Chilean cultural goods. Furthermore, countries with a *LogGDP* equal or higher than 11 have higher chances of importing Chilean cultural goods, which is the exact *LogGDP* value for Chile, reaffirming the theory that countries tend to trade with countries with similar GDP.

Another relevant insight is the fact that for lower GDP levels than in Chile, *LogGDP* lower than 11, the model predicts that trade partners could import Chilean cultural goods if the distance between them is less than 6,188 km, which is a discretionary range that targets most of the countries in South America. Implicitly, what the model suggests is that for those countries with a lower GDP level than Chile, if they are based in the same geographical region as Chile, then those countries will import Chilean cultural goods. Finally, for those countries with *LogGDP* equal or higher than 11, the only way not to be associated with importing Chilean cultural goods is to have a political stability score below five and a distance from Chile below 15,708 km.

Subsequently, random forests show the most relevant predictors individually, based on the percentage of MDA, where the ranking is led by *LogGDP*, which positively correlates with the probability of importing Chilean cultural goods. Followed by *Distance*, which is the only predictor negatively associated with the probability of the event. The rest of the

top ten variables are *Logcapital, Polityd, Logpop, AgreeEIA, AgreeFTA, CommonLanguage, AgreePTA* and *MemberGA-TTd*. The results show that macroeconomic variables are the most important predictors (1, 3 and 5), also geographical variables (2), institutional stability variables (4) and a large section of predictors associated with agreements (6, 7 and 9). Cultural variables are also considered (8), and finally, trade facilitation memberships are mentioned (10). Hence, from a policy perspective, to ensure better export levels for Chilean cultural goods, it is important to focus mostly on countries with high GDP and capital stock. Additionally, as the distance is a given variable, improving transport and relying more on digital products can bring trade partners closer. The conclusions of this paper are mainly based on the random forest predictive model of the three models. It was the one that presented better predictive power or a higher AUC.

The results show which variables are more sensitive to affect cultural goods exports. The predictive model implicitly provides recommendations on which governments Chile should allocate its efforts to develop more robust trade channels. Finally, the extensions of the predictive model are vast due to the possibility of replicating it with any other country and comparing and grouping export strategies. This application is especially significant for Latin American countries, where block negotiation is key for better trade conditions with the Global North. Endlessly, the improvements in export strategy will benefit producers of cultural goods, improving their socioeconomic situation.

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