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ASSESSMENT OF THE UNDER-EXPLOITED POTENTIAL OF KOREAN EXPORTS TO LATIN AMERICA: AN ANALYSIS BASED ON COMPARATIVE ADVANTAGES MATRICES

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2025

Sumário

ASSESSMENT OF THE UNDER-EXPLOITED POTENTIAL OF KOREAN EXPORTS TO LATIN AMERICA: AN ANALYSIS BASED ON COMPARATIVE ADVANTAGES MATRICES

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Abstract
This paper investigates the under-exploited potential of Korean exports to Latin American countries, based on a comparative advantage matrix methodology. Using international trade data from 2000 to 2019, the study identifies products and sectors in which South Korea holds comparative advantages globally, but which are not yet fully reflected in its exports to Latin America. The analysis compares worldwide and regional comparative advantage indexes, revealing specific trade opportunities. The results show considerable room for expanding Korean exports in sectors such as chemicals, manufactured goods, and machinery and transport equipment. Based on these findings, the study offers policy recommendations aimed at promoting Korean exports to the Latin American region.

Keywords: Korean exports; Latin America; comparative advantage; international trade.

JEL Classification: F14; F10; O24

Resumo
Este artigo investiga o potencial subexplorado das exportações coreanas para os países da América Latina, com base em uma metodologia de matrizes de vantagem comparativa. Utilizando dados do comércio internacional entre 2000 e 2019, o estudo identifica produtos e setores nos quais a Coreia do Sul possui vantagem comparativa em escala global, mas que ainda não se refletem de maneira expressiva nas exportações para a região latino-americana. A análise inclui comparações entre índices de vantagem comparativa mundial e regional, permitindo a identificação de oportunidades comerciais específicas. Os resultados revelam espaço significativo para o crescimento das exportações coreanas em setores como produtos químicos, bens manufaturados, máquinas e equipamentos de transporte. Com base nos achados, o estudo propõe recomendações de políticas públicas voltadas à promoção de exportações para a América Latina.

Palavras-chave: exportações coreanas; América Latina; vantagens comparativas; comércio internacional.

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1.Introduction

Trade between Korea and Latin American countries have grown at an average annual rate of 13% between 2000 and 2013. In 2013, the region absorbed 6% of Korean exports and originated 3.5% of its imports (ECLAC, 2015). In absolute terms, Korea exported approximately U$ 20 billion to Latin America in 2019. Also, Korea presents a growing trade surplus with the region over the last two decades. In terms of exports composition according to technological content, Korean exports to Latin America are mostly concentrated in Medium- and High-technology goods (Libanio and Chaib, 2021).

There is large potential for increasing cooperation and trade between Korea and Latin America, given the complementarity between their economies. Thus, there are many opportunities for the diversification of bilateral trade in the coming years. As an initial effort in that direction, free trade agreements have been signed between the Republic of Korea and countries in the region, such as Chile, Colombia and Peru (ECLAC, 2015).

This paper aims to identify products and/or sectors with increasing potential for Korean exports to Latin American countries. It will examine the evolution of exports from Korea to the world and, in particular, to Latin American countries between 2001 and 2020, in order to answer the following questions: first, how have Korean exports to Latin America evolved over time, both in terms of total value and in terms of sectoral composition? And, second, what are the products or sectors in which Korea presents comparative advantages, but that are not sufficiently represented in Korea's exports to Latin American countries?

The main assumptions that motivate this study are: (i) there are products or sectors with under-exploited potential for Korean exports to Latin American markets; (ii) the identification of these products or sectors is an important information to guide export-promotion policies in Korea.

The proposed research project was developed according to the following activities: investigation and classification of Korean exports to the world and, in particular, to major Latin American countries (e.g. Brazil, Mexico, Argentina, Colombia, Chile, Ecuador, Paraguay, Peru, and Uruguay) according to standard international trade classification; investigation and classification of imports in major Latin American countries according to standard trade classification; identification of sectors/products imported by Latin American countries that would match Korea's most relevant export sectors, but have not yet achieved Korea's full potential as trade partner; and policy recommendations for increasing penetration in Latin American markets.

The remainder of the paper is organized as follows. The next section briefly describes the methodology used in this paper, *i.e.* the comparative advantage matrix. Section 3 presents Korea's export profile, with a particular focus on its sectoral composition and on its main exported products. In section 4, we present and analyze the main comparative advantage matrices for the Korean economy, which allows for the identification of sectors or products with under-exploited export potential to Latin America. Section 5 summarizes the main findings and presents some policy implications of this research.

2.Research methods and approaches

The concept of comparative advantage in economics was first introduced by David Ricardo in the early 19th century as a fundamental principle of international trade (Ricardo, 1817). It suggests that a country should specialize in producing and exporting goods and services that it can produce at a lower opportunity cost than its trading partners, and import goods and services that it cannot produce as efficiently (Balassa, 1965 and Vollrath, 1991).

The comparative advantage matrix is a tool used to measure a country's relative advantage in producing and exporting certain products (Hausmann *et al.*, 2007). It is based on the principles of comparative advantage and allows countries to identify areas of potential growth in their exports.

Based on this concept of comparative advantage, the proposed project methodology was designed to conduct an extensive and thorough analysis of world trade flows with a focus on Korea's comparative advantages in different markets. Utilizing the UN Comtrade API, a vast trade flow database spanning from 2000 to 2019 was established, enabling the computation of matrices that provided valuable insights into comparative advantages.

The analysis primarily concentrated on exploring Korea's export flow, and matrices were formulated based on the diverse geographical coverages considered, including worldwide, Latin America as a whole, and each individual Latin American country. The worldwide matrix identified the products and industries where Korea demonstrates a comparative advantage over other nations. Each term of the matrix was calculated according to the following expression:

$$WWCA_{Korea,j} = \frac{\frac{X_{Korea,j}}{\sum_{i \epsilon WEF} X_{Korea,i}}}{\frac{X_{World,j}}{\sum_{i \epsilon WEF} X_{World,i}}} \quad (1)$$

where WWCA stands for Worldwide Comparative Advantage, WEF stands for the World Export Flow, $X_{Korea,j}$ represents Korea total exports of product j, and $X_{world,j}$ represents the world's exports of product j. A value greater than 1 of $WWCA_{Korea,j}$ suggests that Korea holds a comparative advantage in product j, and this information can be used to identify potential new trade opportunities and areas of competitive strength.

Similarly, a matrix for the trade flow from Korea to Latin America can be calculated using

$$LAECA_{Korea,j} = \frac{\frac{XLA_{Korea,j}}{\sum_{i \epsilon KEFtoAL} XLA_{Korea,i}}}{\frac{X_{Korea,j}}{\sum_{i \epsilon KEF} X_{Korea,i}}} \quad (2)$$

where KEFtoLA stands for the Korean Trade Flow to Latin America, $XLA_{Korea,j}$ represents Korean exports to Latin America of product j. By comparing the worldwide matrix indexes to the Latin America matrix, it will be possible to identify the products that Korea has not fully exploited its potential for trade with Latin America.

In particular, the ratio $LAECA_{Korea,j}/WWCA_{Korea,j}$ can be computed to identify under-exploited trade potentials in product j, and this information can be used to develop targeted strategies to increase trade with Latin America. The same analysis can be extended to each individual Latin American country, revealing the specific countries where Korea's trade potential remains untapped. For instance, if the ratio is equal to zero, it means that the numerator is equal to zero and the denominator is different from zero, that is, Korea will not have a comparative advantage for its exports to Latin America, but it will have it for the world. In other words, we have a capacity that appears for Korea's exports to the world that is not present in its exports to Latin America, therefore, its capacity is under-exploited. Moreover, if the ratio is between zero and one, although Korea has a comparative advantage for Latin America, this value is still smaller than its comparative advantage for the world, and even so, we have an underexploited export capacity. The most favorable case for Korea occurs when the ratio is above 1, thus, the comparative advantage for exports to Latin America is greater than that for the world, that is, Korea is fully exploiting its export capacity to Latin America.

Furthermore, we also calculated the comparative advantage index for each of the Latin American countries. Thus, in the index calculated by the previous formula, we have a vision of the positioning of Latin America as a whole in the Korean exports, and by calculating the next formula, we will have a vision of the individual positioning of each Latin American country in the Korea's exports.

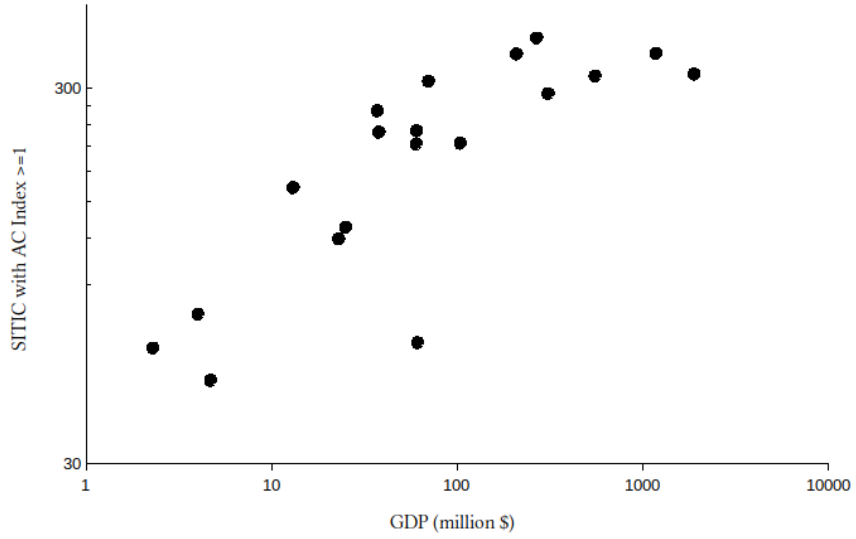
$$CountryCA_{Korea,j} = \frac{\frac{XCountry_{Korea,j}}{\sum_{i \epsilon KEFtoCountry} XCountry_{Korea,i}}}{\frac{X_{Korea,j}}{\sum_{i \epsilon KEF} X_{Korea,i}}} \quad . \qquad (3)$$

where KEFtoCountry stands for the Korean Trade Flow to the specific country we are analyzing, $XCountry_{Korea,j}$ represents Korean exports to this country of product j.

Again, by comparing the worldwide matrix indexes to the country matrix through the same kind os ratio proposed above, i.e. $CountryCA_{Korea,j}/WWCA_{Korea,j}$, it will be possible to identify the products that Korea has not fully exploited its potential for trade with the analyzed country.

After calculating the matrices to examine Korea's comparative advantages, we identified a bias in our analysis due to the differences in the size of the economies under assessment. Such a bias can be seen in Figure 1, which shows, for Latin American countries, their GDP on the horizontal axis and the number of 5-digit SITIC classes in which they have a comparative advantage index equal to or greater than 1. Figure 1 makes it clear the correlation between these two variables.

Figure 1



To investigate the bias in more detail, we calculated the correlation coefficient of three variables that we constructed from the comparative matrix, which are: the number of 5-digit SITIC classes whose values are equal to or greater than 1 (i.e., there is comparative advantage), the number of 5-digit SITIC classes whose values are between 0 and 1 (that is, there is export from Korea to the country, however, without comparative advantage) and the number of 5-digit SITIC classes whose values are exactly equal to 0 (that is, there were no exports from Korea to the country in the product under analysis). The correlation of these three variables is calculated in relation to 4 economic indicators: GDP in current dollars, GDP per capita, manufacturing value added and percentage of manufacturing value added in relation to GDP. All these economic indicators we obtained from the World Bank data.To investigate the bias in more detail, we calculated the correlation coefficient of three variables that we constructed from the comparative matrix, which are: the number of 5-digit SITIC classes whose values are equal to or greater than 1 (i.e., there is comparative advantage), the number of 5-digit SITIC classes whose values are between 0 and 1 (that is, there is export from Korea to the country, however, without comparative advantage) and the number of 5-digit SITIC classes whose values are exactly equal to 0 (that is, there were no exports from Korea to the country in the product under analysis). The correlation of these three variables is calculated in relation to 4 economic indicators: GDP in current dollars, GDP per capita, manufacturing value added and percentage of manufacturing value added in relation to GDP.

All these economic indicators we obtained from the World Bank data. The results for the correlations are shown in Table a.

Table a

	Average 2015-2019			
	GDP (current US$)	**GDP per capita (current US$)**	**Manufacturing, value added (current US$)**	**Manufacturing, value added (% of GDP)**
SITICs with CA Index >=1	0.52	0.23	0.54	0.22
SITICs with 0< CA Index <1	0.77	0.36	0.78	0.07
SITICs with CA Index =0	-0.74	-0.35	-0.75	-0.11

Analyzing these correlations, we can observe that the bias is due to a purely scale effect of the size of the country's economy, since when we look at the correlation for per capita GDP and for the percentage of manufacturing value added in relation to GDP, their values are considerably reduced.

The proposed analysis will provide decision-makers with a comprehensive understanding of Korea's comparative advantages and the trade potential with Latin America that remains untapped. This will allow policymakers to make informed decisions and develop effective strategies to establish mutually beneficial trade relationships with the region, potentially increasing economic growth and development for both Korea and Latin America.

3.Description of Korea's exports

This section aims to describe the main sectors of Korea's exports to the world, between 2000 and 2019.

Over the course of four decades, the Republic of Korea has transformed itself from a stagnant agrarian society into one of the world’s most dynamic industrial economies. By the early 2010s, Korea was considered to be the thirteenth largest economy and major trading country worldwide. It has achieved world prominence in areas such as semiconductors, liquid crystal displays, telecommunications equipment, automobiles, shipbuilding, and so on. Indeed, it is one of the key

players in the global economy (Chung, 2011). More recently, international trade and associated industries account for about 85% of GDP in the Korean economy (Shin, Lee, and Kim, 2017).

When it comes to trade between Korea and Latin America, the research conducted by ECLAC (2015) is worth noting, as it describes Korea's development process and provides a comprehensive overview of the trade relations between Korea and Latin American countries from 2000 to 2013. The report suggests that Korea has successfully increased its exports to Latin America over the period, while Latin American exports to Korea remain highly concentrated in a few countries, products, and companies, with a focus on primary goods.

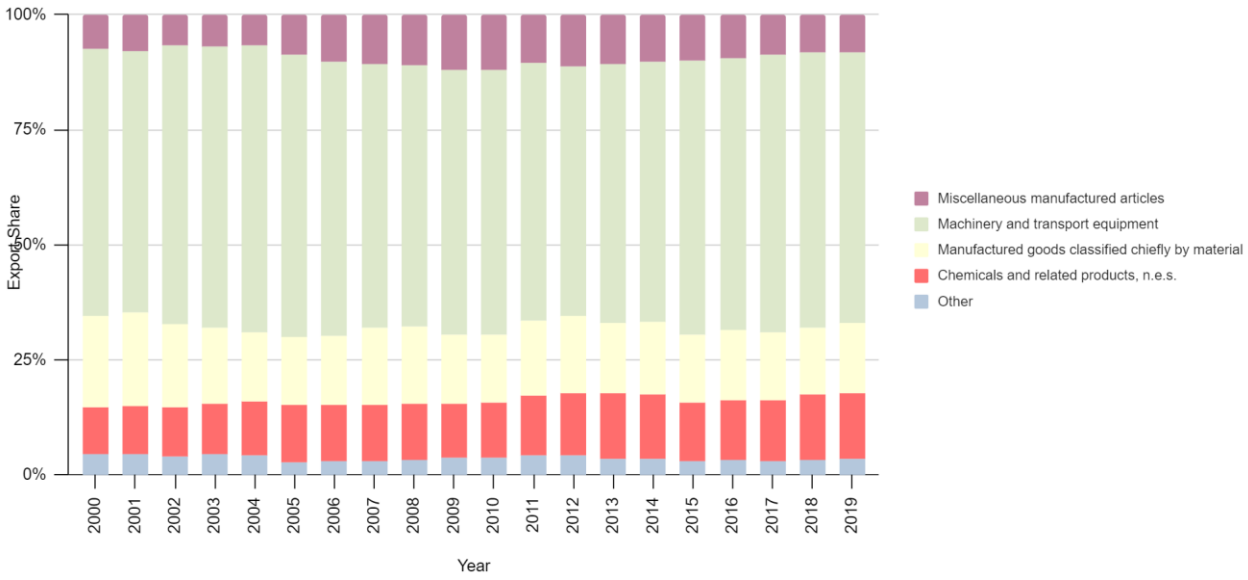
Kim (2002) describes the evolution of the bilateral trade relationship, and analyzes the trade pattern between Korea and Latin American countries. Korean exports to Latin America have increased at a higher rate than its exports to the rest of the world, especially, in the late 1980s and early 1990s when the Latin American countries were liberalizing trade and Korea could make the most of the opportunity to increase its exports to these countries. Korean imports from Latin America increased at a similar pace as its total imports. Korean imports from both Latin America and the rest of the world dropped drastically with the Korean currency crisis in 1997. The currency crisis and devaluation may have made the Latin American products more competitive, but it cannot observe a higher growth rate of imports from Latin America in periods of crisis in Mexico and Brazil. On the contrary, the increase of imports from Latin America was much smaller than that from other countries in the year 2000.

Herreros et al. (2018) analyzes Latin America's role in Korea's trade and integration strategy. Since 2000, economic relations between the Republic of Korea and Latin America and the Caribbean have expanded rapidly. Bilateral trade in goods has increased more than fivefold, and the region has become an important destination for Korean foreign direct investment. The authors also note that Korea's interest in the region stems from its successful experience of economic and social development, which allowed the country to evolve from one of the poorest in the world to a high-income economy in less than six decades.

Libanio and Chaib (2021) provide a detailed description of Korea's exports to Latin American countries in the period 2001-2019. The paper indicates that the total value of Korean exports increased during the 2000s, peaked between 2011-2014, and declined in recent years. In addition, the authors point out that medium and high technology goods were the main components of exports to Latin America throughout the period of analysis.

Figure 2 depicts Korea's exports to the world from 2000 to 2019, categorized by major products. The most significant items in the export list are chemicals and related products, manufactured goods classified chiefly by material, machinery and transport equipment, as well as miscellaneous manufactured articles, among others. Notably, machinery and transport equipment contributed the largest share of the country's total exports during the period. Throughout all the years examined, these products accounted for over half of the total exports. Manufactured goods classified chiefly by material and chemicals and related products followed closely behind machinery and transport equipment. Another important point to be highlighted is that the export profile of Korea does not vary much over the years analyzed, which indicates a certain consolidation in the products that the country exports to the world.

Figure 2 - Korea's exports to the world, 2000 to 2019



Source: author's calculations using COMTRADE data.

Table 1 highlights the products with the highest share in the total exported during the 4 periods that comprise the years between 2000 and 2019. It can be observed that some products such as Vessels appeared among the most exported products until 2014 and in the last period, they are no longer among the top eight exported products. On the other hand, some products such as Tankers are present in all 4 periods, although with some variation in their share. Additionally, some products such as memories increase their share in the total exports, becoming the most exported product in the most recent period, 2015 to 2019, representing almost 12% of the total. In general, we can note a concentration of more technologically sophisticated products.

Table 1 - Products with the highest share (%) of total exports, 2000 - 2019

2000 - 2004		2005 - 2009		2010 – 2014		2015 - 2019	
Product	**Value (%)**	**Product**	**Value (%)**	**Product**	**Value (%)**	**Product**	**Value (%)**
Transmission apparatus	9.49	Optical devices	5.65	Optical devices	6.34	Memories	11.82
Parts for use with the machines	7.14	Tankers of all kinds	5.58	Memories	5.16	Processors and controllers	4.65
Tankers	4.07	Telephone sets	4.5	Processors and controllers	4.41	Optical devices	3.13
Vessels	3.78	Vessels	4.29	Vessels	3.96	Tankers	3.01
Parts for use in the apparatus	3.52	Parts of the motor vehicles	3.6	Parts of the motor vehicles	3.82	Parts of the motor vehicles	2.86
Parts of the motor vehicles	2.14	Parts for use in the apparatus	3.26	Telephone sets	3.24	Parts of telephone sets	2.66
Gold	1.42	Memories	3.07	Tankers	3.23	Parts for use with the machines	1.86
Magnetic tape	1.23	Transmission apparatus	2.81	Light vessels	2.63	Parts for use in the apparatus	1.75

Source: author's calculations using COMTRADE data.

4.Analysis of the comparative advantages matrices for Korean exports

4.1 Sectors with increasing potential for Korean exports

In order to better understand the trade relations between Latin America and Korea, we have constructed normalized matrices of comparative advantage using data from Comtrade. Specifically, we have built these matrices at the world level, considering Latin America as a whole, and for each individual country in Latin America.

To accomplish this, we applied the methodology outlined in section 2, which involves calculating a Comparative Advantage Index (CAI) for each product category based on the ratio of the share of exports to the share of imports. This index allows us to identify which products each country or region has a comparative advantage in, which in turn can provide insights into potential areas for future trade.

Firstly, we aggregated the products in the single-digit SITC classification. This allowed us to get an overview of the major product classes that are being traded between the two regions. By analyzing these major product classes, we can identify any patterns or trends that may exist in the trade relationship between Korea and Latin America.

After analyzing the major product classes, we will then delve deeper into the analysis by stratifying the matrices for the 5-digit SITC class. This will allow us to focus on specific groups of products and gain a more detailed understanding of the comparative advantages that Korea has in relation to the world. By doing so, we can identify which products are driving the trade relationship between Korea and Latin America, and identify potential opportunities for further growth and cooperation.

Table 2 shows the Comparative Advantage Index (CAI) for different commodity groups of 2015 to 2019 for the Korean exports to the world, Latin America and various countries in Latin America, including Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, and Uruguay.

The CAI is a measure of the relative advantage that a country has in producing a particular product compared to other countries. A higher value of CAI indicates a greater comparative advantage in producing a particular product.

In the table, the commodity groups are labeled with codes ranging from 0 to 9, and include food and live animals, beverages and tobacco, crude materials (except fuels), mineral fuels, lubricants and related materials, animal and vegetable oils, fats and waxes, chemicals and related products, manufactured goods classified chiefly by material, machinery and transport equipment, miscellaneous manufactured articles, and commodities and transactions not classified elsewhere in the SITC.

For example, in the food and live animals category, Ecuador has a CAI of 3.27, which indicates that it has a comparative advantage in producing and exporting these products compared to the other countries listed. Similarly, Paraguay has a CAI of 27.45 in the beverages and tobacco, which indicates that it has a strong comparative advantage in producing and exporting these products.

A crucial analysis in the context of this project is the comparison of Korea's comparative advantage index in relation to its exports to the world and to Latin America, that is, the comparison between the third and fourth columns of Table 2.

Table 2

		Comparative Advantage Index from 2015 to 2019										
Commodity Group Name	**Code**	**World**	**LA**	**Argentina**	**Brazil**	**Chile**	**Colombia**	**Ecuador**	**Mexico**	**Paraguay**	**Peru**	**Uruguay**
Food and live animals	**0**	0.15	0.26	0.29	0.11	0.55	0.32	3.27	0.18	1.01	0.41	0.36
Beverages and tobacco	**1**	0.18	1.01	0.48	0.19	3.24	1.40	0.17	0.22	27.46	0.37	0.42
Crude materials, inedible, except fuels	**2**	0.53	0.58	0.91	0.56	2.48	0.75	1.17	0.38	0.05	0.73	0.87
Mineral fuels, lubricants and related materials	**3**	0.40	0.01	0.00	0.00	0.01	0.02	0.06	0.01	0.01	0.04	0.00
Animal and vegetable oils, fats and waxes	**4**	0.02	1.05	0.00	0.00	0.00	0.00	0.00	2.33	0.00	1.02	0.00
Chemicals and related products, n.e.s.	**5**	0.94	0.84	1.21	0.90	1.35	1.63	1.69	0.60	1.08	2.39	0.59
Manufactured goods classified chiefly by material	**6**	0.90	1.16	0.97	0.65	1.20	1.10	0.58	1.59	0.54	1.14	1.33
Machinery and transport equipment	**7**	1.51	1.01	0.96	1.17	0.93	0.93	0.85	0.89	1.05	0.77	1.14

Miscellaneous manufactured articles	**8**	0.61	1.14	1.22	0.83	0.45	0.53	1.46	1.65	1.11	0.41	0.32
Commodities and transactions not classified elsewhere in the SITC	**9**	0.07	0.04	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00

OBS. The World column was calculated from equation (1), as presented in the methodological section, the LA column from equation (2) and the other columns from equation (3) considering the respective country.

In this sense, we can observe that Korea has a comparative advantage in relation to the world for group 7. Therefore, in comparison to the world share, it exports more from these groups.

However, our analysis not only focuses on knowing in which groups Korea has a comparative advantage in relation to the world, but also on knowing the groups in which Korea's exports to Latin America or its countries are under-exploited. In this way, we can also look at groups whose index in relation to the world is less than 1. And, as long as it is greater than the corresponding index for Latin America or for the country under analysis, it already indicates that the export potential of that group that Korea has for the world is not being fully explored.

Thus, we can say that for groups 3, 5, 7 and 9 Korea is under-exploiting its exports to Latin America as a whole because the index for this region is below the index for the same product group for the world.

A similar analysis can be performed by comparing the world's index with that of each individual country. In this case, as an example, we can mention group 7 that for all countries the index is lower than the world rate. Therefore, Korea has under-exploited exports for this group to all Latin American countries. Thus, Korea's exports to Latin America in this product group is under-exploited when compared to its ability to export to the world. Consequently, there is room for growth in these exports to Latin America.

In the following analysis, we will focus on products at the 5-digit level, specifically on the four groups in which Korea has the highest comparative advantage index (even if its value is lower than 1). These groups (5, 6, 7, and 8) have a significant weight in Korea's export basket.

4.2 Products with increasing potential for Korean exports

This section explores in more detail the four product groups where Korea has a comparative advantage relative to the world. We will stratify the 5-digit SITC classification for these groups and create a table for each of them, so that we can analyze the main products (in terms of comparative advantage index) exported by Korea at different country levels.

Table 3 shows the Comparative Advantage Index for the top items of Group 5 for the years 2015 to 2019. The table includes information on the Item, Code, and the index values for the World, Latin America (LA) as a whole, and specific Latin American countries such as Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, and Uruguay. The Comparative Advantage Index measures the degree to which a country or region has a higher share of a particular product in its export basket compared to the rest of the world. The higher the index, the greater the comparative advantage. The items in Group 5 are classified as chemicals and chemical products, and the table lists the top items in descending order of the index value for the World.

In the previous table, the column "World" represents the percentage share of each item in world trade, while the column "LA" represents the percentage share of each item in the exportation of Korea to Latin American countries. Therefore, by comparing these two columns for each item, we can see the difference in the Korean capability of exploration given by its global trade versus its exportation to Latin America. For example, for the item "Dioctyl orthophthalates" (code 51383), its share in world trade was 11, while its share in Latin American trade was 4.77. This suggests that the Korea exportation capability of this product is not fully explored in Latin America. However, for the item "Cyanides,

cyanide oxides and complex" (code 52381), its share in world trade was 7.18, while its share in Latin American trade was 30.76. This suggests that this product is more exported (in share terms) to Latin America than it is globally, therefore, Korea fully explores its exportation capability to LA in this product.

In this table, we can see that the World column is higher than the LA column for all items listed. So, Korea shows under-explored exportation capabilities to LA in all of them.

When we look at the country level, we have just some exceptions where the country's comparative advantage index is higher than the world one, therefore, Korea is not under-exploring its capabilities. As examples we can cite:

1. Ecuador and Peru have a higher Comparative Advantage Index (CAI) for Dioctyl orthophthalates (code 51383) than the world average (55.50 and 50.43 vs 11.00).
2. Colombia has a higher CAI for Artificial waxes and prepared waxes (code 59835) than the world average (13.29 vs 7.73).
3. Peru has a higher CAI for Cyanides, cyanide oxides and complex (code 52381) than the world average (32.76 vs 7.18).

For all other countries and products the index is lower for the country than for the world, thus showing an under-exploited export capacity of Korea.

As highlighted in the single-digit aggregate analysis, it is crucial to compare Korea's comparative advantage to the world with its value to Latin America and its countries. To do this, we have marked in bold in Table 3 the products that Korea has an advantage in exporting to the world but not to Latin America. Therefore, for Xylenes, pure, Dimethyl terephthalate, Salts of oxometallic or peroxometallic acids, Inorganic compounds, Polyisobutylene, Halides and halide oxides of non-metals, Benzene, pure, Korea has underexploited exports to Latin America.

Table 3

		Comparative Advantage Index from 2015 to 2019 - Top items of Group 5										
Item	**Code**	**World**	**LA**	**Argentina**	**Brazil**	**Chile**	**Colombia**	**Ecuador**	**Mexico**	**Paraguay**	**Peru**	**Uruguay**
Dioctyl orthophthalates	51383	11.00	4.77	5.15	0.48	7.07	6.82	55.50	1.27	4.50	50.43	1.01
Xylenes, pure	**51124**	**7.98**	**0.04**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.09**	**0.00**	**0.00**	**0.00**
Dimethyl terephthalate	**51384**	**7.79**	**0.20**	**0.34**	**0.64**	**0.00**	**0.00**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**
Artificial waxes and prepared waxes;of	**59835**	**7.73**	**0.76**	**0.00**	**0.27**	**0.03**	**13.29**	**0.00**	**0.22**	**0.00**	**0.93**	**0.00**
Potassium carbonates	52374	7.57	1.00	2.69	2.40	2.49	0.94	0.75	0.18	0.00	1.27	0.00
Salts of oxometallic or peroxometallic acids	**52431**	**7.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**
Acrylonitrile-butadiene-styrene (ABS)	57292	7.51	1.72	1.34	2.21	0.56	1.43	0.19	2.31	0.03	0.05	0.52
Inorganic compounds, n.e.s. (including	**52499**	**7.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Cyanides, cyanide oxides and complex	52381	7.18	3.26	2.12	0.21	2.54	6.59	9.19	2.54	0.00	32.76	2.48
Polyisobutylene	**57512**	**7.14**	**0.15**	**0.01**	**0.35**	**0.09**	**0.30**	**0.10**	**0.10**	**0.00**	**0.00**	**0.00**
Halides and halide oxides of non-metals	**52241**	**6.52**	**0.01**	**0.00**	**0.01**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**
Benzene, pure	**51122**	**6.39**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Polymethyl methacrylate	57521	6.37	0.65	1.16	0.94	0.45	1.06	0.04	0.66	0.00	0.49	0.54

Polycarboxylic acids, n.e.s.; anhydrides,	51389	6.15	0.56	7.26	0.52	0.30	0.57	0.32	0.15	0.01	1.67	1.02

Moreover, a similar analysis can be performed by comparing Korea's comparative advantage index to the world with the value for each country in Latin America.

Table 4 shows the Comparative Advantage Index (CAI) of different items within Group 6, which includes products related to extractive industries and manufactured goods.

Again, we can see that the World column is higher than the LA column for all items listed. So, Korea shows under-explored exportation capabilities to LA in all of them.

Also, when we look at each country individually, there are very few cases where the country's index is higher than the world's. That is, for virtually all items and countries, Korea is showing under-exploited export potential.

For example, the item with code 67149, which refers to Ferro-manganese, has a CAI of 9.01 for exports from Korea to the world, indicating that Korea has a relative advantage in exporting this item to the world. However, in the case of exports to Ecuador, Peru, Uruguay and Paraguay, the CAI is 0.0.

Similarly, for the item with code 67942, which refers to Casing and tubing, of a kind used in drilling, Korean exports to the world have a CAI of 8.79, while in the case of exports to Latin American and each country, the CAI is 0.0. This suggests that there is underexploited Korean capability to export this product to the other analyzed countries.

On the other hand, for products such as flat-rolled products of iron or non-alloy steel, Korea has a CAI of 19.38 for Paraguay and 13.14 for Uruguay, indicating a greater comparative advantage for these countries than for the world as a whole.

Table 4

		Comparative Advantage Index from 2015 to 2019 - Top items of Group 6										
Item	**Code**	**World**	**LA**	**Argentina**	**Brazil**	**Chile**	**Colombia**	**Ecuador**	**Mexico**	**Paraguay**	**Peru**	**Uruguay**
Ferro-manganese;other	**67149**	**9.01**	**0.73**	**8.38**	**1.12**	**1.11**	**0.02**	**0.00**	**0.22**	**0.00**	**0.00**	**0.00**
Casing and tubing, of a kind used in drilling	**67942**	**8.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**
Cadmium, wrought, and articles of	**69983**	**7.37**	**0.07**	**0.00**	**0.29**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Other woven fabrics of cotton;bleached,	**65295**	**6.95**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Carbon paper, self-copy paper and other	64131	6.76	2.66	1.02	0.12	14.53	3.91	1.18	3.43	0.14	0.92	2.64
Cadmium, unwrought; cadmium waste and	**68982**	**6.42**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Flat-rolled products of iron or non-alloy steel,	67443	6.04	3.56	8.59	0.33	1.58	1.94	1.64	3.74	19.38	1.98	13.14
Flat-rolled products of iron or non-alloy steel,	67411	5.97	4.74	0.20	1.06	0.02	0.08	1.53	10.15	0.00	0.11	0.00
Flat-rolled products of stainless steel, not	**67532**	**5.23**	**0.19**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.44**	**0.00**	**0.00**	**0.00**
Fabrics, woven, of synthetic filament yarn	**65316**	**4.94**	**0.61**	**1.32**	**0.62**	**2.23**	**0.71**	**0.85**	**0.38**	**0.01**	**1.32**	**0.03**
Zinc alloys	**68612**	**4.85**	**0.01**	**0.00**	**0.00**	**0.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Line pipe of a kind used for oil or gas	**67941**	**4.80**	**0.26**	**0.00**	**0.08**	**0.19**	**0.59**	**0.00**	**0.35**	**0.00**	**1.02**	**0.04**
Other knitted or crocheted fabrics, not	**65522**	**4.49**	**0.72**	**0.38**	**0.27**	**2.94**	**0.59**	**0.07**	**0.15**	**0.00**	**1.29**	**0.00**

Glass of subgroup 664.3, 664.4 or 664.5,	**66491**	**4.31**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**

Again, we highlighted the products for which Korea has comparative advantage to the world but not to Latin America. Table 5 shows the top items of Group 7 ranked by their Comparative Advantage Index (CAI).

The top item on the list is "Nuclear reactors" with a CAI of 15.34 to the world. However, Korea has no comparative advantage exporting it to Latin America.

The second item is "Tankers of all kinds" with a CAI of 13.29 to the world, and at the country level none has a comparative advantage. Thus, there is room to increase Korean exports of this product to all other Latin American countries.

The third item is "Light vessels, fire-floats, floating cranes ", with a CAI of 11.57 to the world, and at the country level the exports to Mexico, Korea has a comparative advantage.

The fourth item is "Distilling or rectifying plant" with a CAI of 9.40 to the world, and it is explored for exports to Peru. On the other hand, Korea has no comparative advantage in exporting to other countries.

The other items on the list include "memories", "Parts of the equipment of heading", "Floating or submersible drilling", "Waste and scrap of primary cells", "Drying machines, each of dry linen", "Parts for the machines", "Molding boxes for metal foundry", "Other vessels for the transport of goods", and "Other vessels for the transport of goods ". These items have CAIs ranging from 9.1 to 4.7 for the world.

Table 5

		Comparative Advantage Index from 2015 to 2019 - Top items of Group 7										
Item	**Code**	**World**	**LA**	**Argentina**	**Brazil**	**Chile**	**Colombia**	**Ecuador**	**Mexico**	**Paraguay**	**Peru**	**Uruguay**
Nuclear reactors	**71871**	**15.34**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Tankers of all kinds	**79322**	**13.29**	**0.86**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Light vessels, fire-floats, floating cranes	**79359**	**11.57**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.29**	**0.00**	**0.01**	**0.29**
Distilling or rectifying plant	**74173**	**9.40**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**1.17**	**0.00**
Memories	**77644**	**9.11**	**0.27**	**0.01**	**0.92**	**0.00**	**0.00**	**0.03**	**0.07**	**0.00**	**0.00**	**0.00**
Parts of the equipment of heading 778.84	**77885**	**9.06**	**0.01**	**0.00**	**0.02**	**0.03**	**0.01**	**0.01**	**0.00**	**0.04**	**0.01**	**0.06**
Floating or submersible drilling or	**79355**	**8.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Waste and scrap of primary cells, primary	**77813**	**8.33**	**0.02**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**
Drying machines, each of dry linen	**72473**	**7.31**	**0.40**	**0.04**	**0.04**	**0.21**	**1.81**	**3.73**	**0.27**	**0.04**	**0.39**	**0.22**
Parts for the machines of subgroups 724.7	72491	6.33	2.33	0.10	2.02	0.19	0.41	0.20	4.06	0.00	0.06	0.14
Molding boxes for metal foundry	74911	5.89	4.34	0.00	0.06	0.09	0.00	0.00	9.93	0.00	0.00	0.00
Other vessels for the transport of goods	79327	5.64	2.60	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.01	0.23
Other automatic circuit-breakers	**77243**	**4.70**	**0.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Data in table 6 represents the top items of Group 8 sorted by the Comparative Advantage Index for various countries and the world as a whole.

Looking at the table, we can see that for the world as a whole, the top item in Group 8 is "Other optical devices" with a Comparative Advantage Index of 7.31. This is followed by "Other made-up clothing accessories" with a Comparative Advantage Index of 5.9 and "Articles of goldsmiths' or silversmiths' wares " with a Comparative Advantage Index of 5.49.

For the exports to Latin America, the top item in Group 8 also is "Other optical devices" with a Comparative Advantage Index of 1.63. This is followed by "Floor coverings of plastics, whether or not" with a Comparative Advantage Index of 1.36 and "Liquid or liquefied-gas fuels in containers" with a Comparative Advantage Index of 1.10.

To finalize this part of the report, it is worth noting to highlight the logic involved in the analysis that we propose in this project. Just compare the value of the comparative advantage index considering Korea's exports to the world with the index for Latin America or for each country. If the country/LA index is lower than the index for the world, it indicates that there is an under-exploited export capacity in Korea for the analyzed group or product.

Table 6

		Comparative Advantage Index from 2015 to 2019 - Top items of Group 8										
Item	**Code**	**World**	**LA**	**Argentina**	**Brazil**	**Chile**	**Colombia**	**Ecuador**	**Mexico**	**Paraguay**	**Peru**	**Uruguay**
Other optical devices, appliances and	87193	7.31	1.63	2.59	0.99	0.01	0.06	2.04	2.86	0.01	0.03	0.00
Other made-up clothing accessories; parts of	**84619**	**5.90**	**0.03**	**0.01**	**0.00**	**0.01**	**0.04**	**0.00**	**0.01**	**0.08**	**0.01**	**0.00**
Articles of goldsmiths' or silversmiths' wares	**89732**	**5.49**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Optical fibres and optical fibre bundles and	88419	4.78	1.05	0.02	0.64	0.00	0.02	0.36	2.00	0.00	0.04	0.00
Other cartridges and parts thereof	**89124**	**4.72**	**0.19**	**0.03**	**0.14**	**0.42**	**0.26**	**0.00**	**0.13**	**2.91**	**0.87**	**0.00**
Parts and accessories of revolvers or pistols	**89191**	**4.32**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Headbands, linings, covers, hat foundations,	**84848**	**3.30**	**0.10**	**0.00**	**0.01**	**0.03**	**0.05**	**0.00**	**0.20**	**0.15**	**0.01**	**0.21**
Liquid or liquefied-gas fuels in containers of a	89934	2.79	1.10	0.07	4.03	0.29	0.00	0.00	0.00	2.51	0.00	0.00
Lasers (other than laser diodes)	**87192**	**2.76**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**
Objective lenses for cameras, projectors or	**88431**	**2.32**	**0.01**	**0.01**	**0.01**	**0.02**	**0.00**	**0.00**	**0.01**	**0.00**	**0.04**	**0.03**
Apparatus and equipment for photographic	**88135**	**2.29**	**0.04**	**0.00**	**0.04**	**0.07**	**0.01**	**0.00**	**0.00**	**1.10**	**0.59**	**0.00**
Military weapons (other than revolvers, pistols	**89112**	**2.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floor coverings of plastics, whether or not	89331	1.97	1.36	2.34	2.94	2.53	1.81	0.40	0.32	2.08	2.67	6.43
Powder-puffs and pads for the application of	**89982**	**1.93**	**0.70**	**0.69**	**0.45**	**0.44**	**3.77**	**0.02**	**0.81**	**1.90**	**0.14**	**0.00**

5.Conclusions and Policy Implications

This research project aimed to identify sectors and/or products in which Korea has an untapped export potential to Latin American countries. To that purpose, we have developed a methodology based on comparative advantage matrices, and have calculated comparative advantage indexes for each product exported by Korea (disaggregated at SITC 5-digits), for Latin America as a whole and for the major Latin American countries, from 2000 to 2019.

During the period of analysis, machinery and transport equipment - as well as chemical products - contributed the largest share of Korea's total exports. Our research suggests that, for the majority of products which Korea has comparative advantages in international trade, there is under-exploited potential for growing exports to Latin America.

The results of this research bring about some clear policy implications. In particular, in order to better exploit Korea's export potential to Latin American markets, some directed export promotion policies should be employed, such as: (i) trade missions; (ii) fairs and exhibitions to promote the visibility of Korean firms in specific sectors; (iii) provision of more accurate information about L.A. market to Korean exporters; (iv) bilateral or multilateral trade agreements.

As we have mentioned before, there is an untapped export potential to Latin America in specific sectors and products. This potential has been identified and several trade policies could be adopted in order to promote Korean exports to the region.

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