24 opportunities: an analysis of the export potential of the Argentine provinces

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Abstract

The Argentine export basket has a high degree of geographic and product concentration and the features of each of the provinces have a certain level of heterogeneity. In the face of said situation, this work aims at creating a tool to measure the level of opportunity for each of the provinces to be inserted in international trade, depending on certain conditions related to the sophistication and concentration of their production and trade, and to their commercial openness. The results yielded by the index of opportunity show that Santa Fe, the City of Buenos Aires, Chubut and Santa Cruz are the provinces with greatest export potential, followed by Córdoba, San Luis, Buenos Aires and Mendoza. On the other hand, the least favoured are Jujuy, Catamarca and San Juan.







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1. Introduction

One of the main features of Argentina's exports is the presence of a strong concentration, both in terms of products and of productive regions. The export basket is made up mostly of raw materials, and the provinces that stand out are Buenos Aires, Santa Fe and Córdoba.

This article seeks to assess the potential of Argentine provinces to be inserted in international markets. This poses the challenge that there are many aspects to measuring the quality of trade integration, which means that it can be approached in different ways. This work is based on the analysis of four indicators —an index of sophistication, two of concentration (by destination and by product) and one of openness— which will be summarised in a global index named "Index of Opportunity", similar to that developed by authors Jesús, Kumar and Abdón (2010) for global trade.

The work is organised as follows. The second section includes a general characterisation of provincial exports based on data from 2013, with an analysis at provincial and regional levels, as well as by product and main item. The following section presents the methodology for the construction of the index of opportunity, which includes a description of all the indicators comprising it. Then, the results are displayed, which are followed by the final considerations.

2. Provincial exports: characterisation and stylised facts

The Argentine export basket presents an evident concentration both in terms of products and of their provincial origin. When observing provincial exports for year 2013 at current values (Chart 1), it can be seen that the provinces of Buenos Aires, Santa Fe and Córdoba make up nearly three-quarters of total exports, which account for 36.9%, 22.2% and 14.5%, respectively. In effect, the five best-performing provinces represent 80.1% of the total. Some of the provinces lagging behind in terms of exports are: Formosa, Tierra del Fuego, Corrientes, Chaco, Neuquén and La Rioja, all of them with shares of less than 0.5% and reaching, altogether, a total of only 1.8%.

This first feature demonstrates a strong regional heterogeneity with respect to foreign market integration.





References: MAO stands for Manufactures of Agricultural Origin and MIO for Manufactures of Industrial Origin. Source: CEI based on INDEC

If the analysis is carried out at the regional level¹, more than three-quarters of the country's

¹ Based on the criteria of the Ministry of Economy and Public Finance, the provinces were grouped as follows: Buenos Aires, Córdoba, Entre Ríos, Santa Fe and the City of Buenos Aires (CABA) comprise the region: "Centro y Buenos Aires"; Chaco, Formosa, Corrientes and Misiones comprise the region: "NEA";



exports originate from the area "Centro y Buenos Aires" (Centre and Buenos Aires) (77.53%), followed by "Patagonia" (8.44%) and, in almost equal proportions by "Nuevo Cuyo" (New Cuyo) (6.43%) and "NOA" (North west of Argentina) (6.2%). In turn, is "NEA" (North east of Argentina) is the region with the lowest percentage of exports in the country, with just 1.42%.

In turn, the map of chart 1 provides information about the share in the total per province based on the main item classification², which serves to identify the productive specialisation of each province. On the one hand, Santa Fe, Mendoza and Catamarca are provinces skewed toward the production of Manufactures of Agricultural Origin (MAO), which account for 67%, 69% and 90%, respectively, of their total exports. For example, in Santa Fe, the major export product is soy flour (38%), followed by refined soybean oil (15%); in Mendoza, wine-sector products dominate the exports (50%), with olive oil prevailing in the province of Catamarca, accounting for 86% of the total.

Regarding Manufactures of Industrial Origin (MIO), their production stands out in provinces such as Buenos Aires and Córdoba, a reflection of the importance of the automotive and metalworking sectors, and in the City of Buenos Aires, where the pharmaceutical industry prevails. In the case of the province of Buenos Aires, the MIO account for 55% of its total exports, which turns it into Argentina's major industrial goods exporting province. The main export products include: trucks (13%), automobiles (9%) and seamless tubes and profiles and gas (2%). In turn, in the province of Córdoba, 18% of the total corresponds to automotive complex exports, and in the City of Buenos Aires the main exports are hormones for medicinal use (15%) and general medication for therapeutic use, presented for retail sale (8%).

On the other hand, the provinces that export mainly primary products include Santiago del Estero, Corrientes, La Pampa, Río Negro, Jujuy and Chaco. In the case of the first two, the most important exportable goods are maize (59%), and rice (39%) and some citrus fruit (21%) –such as mandarins and lemons–, respectively. Río Negro is characterised by the production of pears and apples (66%) and Jujuy by mining industry products, such as silver ores and concentrates (32%), followed by tobacco (18%) and sugar (9%). Finally, in Chaco there is widespread production of maize (18%) and soybeans (12%) –like in Santiago del Estero and La Pampa; however, its main export product is *quebracho* extract and vegetable charcoal (24%).

Finally, the fuels and energy sector does not represent a significant share in the export basket: only 5% for 2013. The two provinces that stand out in this regard are Chubut and Santa Cruz, for which this item represents 52% and 21%, respectively, of their export baskets.

Catamarca, Jujuy, Salta, Santiago del Estero and Tucumán comprise "NOA"; La Rioja, Mendoza, San Juan and San Luis comprise "Nuevo Cuyo" and finally Río Negro, Chubut, La Pampa, Neuquén, Santa Cruz and Tierra del Fuego comprise the region of "Patagonia".

² According to this classification designed by INDEC (National Institute of Statistics and Censuses), exports can be divided into: primary products, manufactures of industrial origin, manufactures of agricultural origin and fuels.



3. Methodology

In order to observe each province's potential capabilities to increase their share in the foreign market an "Indicator of Opportunity" has been designed. This indicator is constructed on the simple average of other four indices: an index of sophistication (EXPY), two indices of concentration (by destination $-HHI_d-$ and by product $-HHI_p-$) and an index of openness (OPENNESS).



Source: CEI

3.1. Concentration

The first component of the index of opportunity is the index of concentration of exports in its two versions: by product and by destination. In general, when the pattern of export specialisation is concentrated on any of these two aspects, countries are more likely to remain vulnerable to fluctuations in the international context that can affect supply and demand. Therefore, it is desirable to have a diversified export basket, since, as Hidalgo *et al.* (2007) argue, this creates greater capabilities for countries –or, as in this case, provinces– to develop comparative advantage in other similar products.

For example, if the province of Mendoza specialises in grape must exports, this creates certain specific capabilities and know-how needed to develop more complex products, such as wine. The less concentrated exports are, the greater the chances of developing new products. On the other hand, making sure that exports are headed to a wide variety of destinations helps to contemplate eventual crises in demand from key trading partners and ensure continuous trade flows.

In order to measure this variable, the Hirschman-Herfindhal index of concentration has been selected, which assesses the level of exports diversification, either with respect to the export basket or in relation to export destinations. Box 1 shows the formula and calculation details.



Box 1

Hirschman-Herfindahl Index of Concentration

The Hirschman-Herfindahl index is an indicator of diversification and can be measured in relation to the exported products as well as to the destinations. It takes values ranging from zero to one, where 1 indicates a high level of concentration, while zero indicates a totally diversified basket. It is constructed as follows:

$$HHI_t = \sum_{k=1}^n (\frac{x_{tk}}{X_t})^2$$

Where X_t is the total value of exports in the period t, x_k are the exports of product k, and n is the number of products exported by said country.

However, as the number of products or destinations is not the same for all the years in the calculation sample, a correction to the index is used for the purposes of standardisation and therefore avoiding the bias by size*.

$$HHI_N_t = \frac{HHI_t - \frac{1}{n}}{1 - \frac{1}{n}}$$

*Size bias occurs when it is not taken into account that a concentration percentage must be seen in relative terms according to the total population. For example, it is not the same that exports are concentrated at 50% in a single trading partner, out of a total of 10 exports than out of a total of 100 exports. In the latter case, the level of concentration is qualitatively higher.

Source: CEI

3.2. Openness

Although in the literature of the subject there are several indicators of openness, the most commonly used is that which is obtained from the ratio of the addition of exports and GDP. To extrapolate this indicator into the case of the provinces, it would be necessary to have data of the Gross Geographic Product (GGP). However, in the absence of complete data that allow an updated analysis, we have opted for a more simplified indicator, which is equal to the ratio of provincial exports and provincial population. To facilitate the analysis, the index was standardised as follows:

$$Openness_{ijt} = \frac{i_{jt} - Min_{it}}{Max_{it} - Min_{it}}$$



Where *Openness*_{*ijt*} is the standardised indicator *i* to province *j* in the period *t*, which takes values ranging from 0 (provincial economy with little activity in the international market) to 1 (provincial economy actively inserted in the international market). In turn, i_{jt} is the value corresponding to the indicator of province *j* in the period *t*; Min_{it} is the minimum value of indicator *i* in all the provinces for the analysed period *t*; and Max_{it} is the maximum value of indicator *i* in all the provinces for the analysed period *t*.

A priori, this indicator might be considered a synonym of the degree of integration in the international division of labour, which would initially be favourable to increase exports, though it also renders the economy more vulnerable to the situation of the global market. During times of crisis, when aggregate demand stagnates in higher income economies, it becomes more difficult to increase exports. Additionally, there is a strong importer pressure due to increased export balances in these countries. In conclusion, for this work, a high openness index means it is easier for a province to increase its sales.

3.3 Sophistication

The export baskets of higher income countries tend to be made up of products with more sophisticated features or more complex technology. The conceptual basis for this arises from the stylised fact that they have high relative levels of mechanisation, human capital and R&D spending (Hausmann, Hwang and Rodrik, 2007).

On the basis of this logic, a first empirical approach to the analysis of the technological complexity of the export basket can be conducted through an indicator of sophistication of the exported products, called PRODY, which associates the level of sophistication with the countries' income levels.

From the calculation of PRODY, it is possible to obtain the EXPY index, which measures the level of sophistication of the export basket of a country –or, as in this case, a province– from the assessment of the level of productivity associated to the exported goods, weighted by their share in said country's total exports for a given year. Both indicators, listed below, are part of a pioneer work developed by Haussman, Hwang and Rodrik (2005).



Box 2 Indicators of Sophistication

The *PRODY* index is a weighted average of the per capita GDP of countries that export a certain product, where the weighting is given by the comparative advantage of each country *j* in a product *k*. In a certain way, this measure indicates that each product that is exported in the international market has a level of productivity or sophistication associated to the per capita GDP of the exporting countries. *PRODY* is formally written:

$$PRODY_{k} = \sum_{j} \left[\frac{x_{jk}/X_{j}}{\sum_{j} (\frac{x_{jk}}{X_{j}})} \right] \cdot Y_{j}$$

Where x_{jkt} is the export value for good k carried out by country j, X_j are the total exports of said country, while Y_j is the per capita GDP of country j measured at the exchange rate PPP (purchase power parity) for year 2005. This way, insofar as product k has a high share in the export basket of higher income countries, it will have a higher PRODY and will therefore be more sophisticated.

In turn, the EXPY index is defined as follows:

$$EXPY_{jt} = \sum_{k} \left[\frac{x_{jkt}}{X_{jt}} \ PRODY_k \right]$$

Where x_{jkt} is the export value for good k carried out by country j, in the period t.

Source: CEI based on Hausmann Ricardo, Jason Hwang and Dani Rodrik (2005)

3.4. Construction of the indicator of opportunity

Once these indexes are obtained, a standardisation is required since they are all expressed in different scales. This implies they take values ranging from 0 to 1, as explained for the indicator of openness. It should be noted that the concentration index plays a different role from the rest in the conformation of the Index of Opportunity since a low concentration, both in product and destination, is considered desirable. Therefore, the transformation will be as follows:

$$HHI_{ijt} = \frac{Max_{it} - i_{jt}}{Max_{it} - Min_{it}}$$



Where, HHI_{ijt} is the standardised indicator *i* to province *j* in the period *t*, which takes values ranging from 0 (best scenario) to 1 (worst scenario); i_{jt} is the value taken by the indicator corresponding to province *j* in the period *t*; Max_{it} is the maximum value of the indicator *i* in all the provinces for the analysed period *t* and Min_{it} is the minimum value of the indicator *i* in all the provinces for the analysed period *t*.

In this way, when the concentration index records low values, it will have a positive impact on the Opportunity index.

Once these indicators have been transformed, a weighting of 1/4 is assigned to each of them and the Index of Opportunity is obtained as a result.

Index of Opportunity= 0.25*Expy + 0.25*HHI_p + 0.25*HHI_d + 0.25 Openness

As it can be seen, this global index summarises the accumulated capabilities of each province and establishes which of them has better features to be inserted in the international market through trade. Likewise, according to Felipe, Kumar and Adon (2010), this indicator captures, in a way, the potential for upgrading³, growth and development.

The indicator ranges from zero to one: an elevated position in the ranking (values close to one) indicates that the province is well positioned and capable of deepening its trade integration, with the opposite happening for values close to zero.

4. Results

Graph 2 shows the results of the index of opportunity, measured in average values for the years 2011 to 2013, to avoid the bias of taking one year in particular.

As it can be noted, Santa Fe and Chubut obtained the highest levels of "opportunity", with an index of 0.75 and 0.74, respectively, followed by the City of Buenos Aires (0.73), Santa Cruz (0.72) and Córdoba (0.71). In turn, the worst conditions or opportunities for external integration were observed in Nuevo Cuyo and NOA, particularly in San Juan (0.29), Catamarca (0.33) and Jujuy (0.46). Also, a certain geographic distribution of opportunities for integration can be seen, as the provinces of the same region tend to have similar indices of opportunity. For example, the provinces of Centro and Buenos Aires are those better positioned when it comes to exporting. The region of NEA obtained values of around 0.5 and Nuevo Cuyo outperforms the average rates with values between 0.66 and 0.69, with the exception of San Juan which is well below. In turn, the regions of NOA and Patagonia present a more dissimilar performance. The opportunity levels of NOA range from 0.33 in Catamarca to 0.60 in Tucumán. As for Patagonia, Chubut and Santa Cruz meet more favourable conditions than their neighbouring provinces: La Pampa, Neuquén, Río Negro and Tierra del Fuego.

³ "Upgrading" means an upward repositioning in the value chain.

Once the results of our index of opportunity are presented, it is interesting to see the results of each component in particular.



Source: CEI based on INDEC

4.1. Concentration by origin and destination

From the assessment of export concentration by product, it is observed (Graph 2) that the provinces which have a greater level of concentration in their production are: Catamarca (0.74), San Juan (0.50), Santiago del Estero (0.36), Chubut (0.30) and Río Negro (0.27). This implies a greater level of vulnerability and dependence of the provincial economy, which engages in trade exchange of only a few products. Conversely, provinces such as Buenos Aires (0.04), the City of Buenos Aires (0.06), San Luis (0.07) and Neuquén (0.08) record a lower concentration; therefore they will have a greater capacity to obtain comparative advantage in other goods.





*Products were disaggregated at the harmonised system 6-digit level. Source: CEI based on INDEC

In relation to destination (Graph 4), the provinces of NOA are again the ones that demonstrate a high level of concentration. San Juan significantly stands out from the rest, with a value of 0.51; followed by Catamarca (0.22) and a number of provinces with similar values: Buenos Aires (0.16), Neuquén (0.15) and Chubut (0.15). Contrary to this, the provinces with more diverse export destinations are: Santa Fe (0.03), Chaco (0.05), Santiago del Estero (0.05) and the City of Buenos Aires, Entre Rios, Córdoba and San Luis, all with an HHI of 0.06.





Source: CEI based on INDEC

4.2. Openness and sophistication

In Graph 5, it is observed that Santa Cruz was the province with the highest ratio of openness, closely followed by Chubut and Santa Fe, and to a lesser extent by Córdoba and Catamarca. On the other hand, those with lower ratio are Formosa, the City of Buenos Aires, Chaco, Corrientes and Misiones. It is worth clarifying that it is an indicator in relative terms, given that although provinces such as Buenos Aires and Córdoba are the leading exporters, they lose relevance when measured with the relative size of their economies.





Source: CEI based on INDEC

Regarding the indicator of sophistication –EXPY–, the results obtained (Graph 6) indicate that the City of Buenos Aires recorded the highest level of sophistication for the year 2013, followed by Mendoza, La Rioja, Neuquén and Buenos Aires. On the other hand, the provinces with the worst levels belong mainly to the regions of NOA and NEA. In relation to the products exported by each of these regions, medicines stand out in the City of Buenos Aires, winesector products in Mendoza and La Rioja, natural gas in Neuquén and metalworking complex in Buenos Aires.





Source: CEI based on INDEC



5. Final considerations

Argentina's exports, analysed at the provincial level, demonstrate the existence of a great heterogeneity within the territory and a high level of concentration both in terms of regions and products. The dynamism of the provinces of the region "Centro y Buenos Aires" stands out, and among the exported products there prevail the primary products and the manufactures of agricultural origin.

In this context, the purpose of this work is to delve into the opportunities that each of the provinces has to be inserted in the external market, looking towards the coming years, and with the desire to provide new measurement tools that may prove useful. To this aim, an "Index of Opportunity" was developed, integrated by other four indicators: sophistication, concentration (by destination and by product) and openness.

The results obtained show that the best positioned provinces and, therefore, with best trade integration opportunities, can be separated into two groups: those in which their high index of opportunity is given by a significant openness and a relatively low sophistication of the export basket; and those with a low level of openness, but with a more important product sophistication. The first group includes: Santa Fe, Chubut and Santa Cruz; and the second includes the rest of the provinces, among them the City of Buenos Aires, Córdoba, San Luis and Buenos Aires.



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