

Relevance of exports for the economies of Mexico mesoregions.

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Abstract.

Over three decades (1985-2016), NAFTA (effective from January 1th, 1994 to date) allowed the accelerated expansion of the real value of Mexican exports (9% annually), increasing its participation in the GDP from 15.3 to 35.2%. In 2016, more than four fifths of the value exported from Mexico (83.7%) is concentrated in US (80.9%) and Canada (2.8%).

In a rather rugged context, the new commercial agreement (renamed as USMCA by US government and T-MEC by the Mexican government) was renegotiated and signed (November 30th, 2018), pending ratification by the legislative bodies of the three countries.

In a previous work, based on the same methodology proposed below (Dávila and Valdés, 2018), quantified the total weight of exports in the main variables of the Mexican economy (43.7% of total gross production, 36.2 of employment, 32.9 of wages, 39.1 in indirect taxes on production, 43.6 in gross surplus, 40.5 of GDP and 39.7 of household income).

The main goal of this work is to determine the importance of exports for each one of seven economies of Mexico mesoregions. Those ones, cover the whole country. It is expected that the effects will be differentiated, depending basically on: their sectoral structure, the importance of exports in their final demand, as well as of the amount and composition of their intermediate consumption.

Specifically, over this paper we try to: 1. Quantify the importance of international sales for the main aggregates of those economies; 2. Subsequently, the multipliers are used as inputs for the computation of total elasticities for international exports. By doing so we can determine the sensitivity of main economic variables of the mesoregions to the unitary fluctuations in the value of exports. 3. Next, we apply the techniques of additive decomposition (Stone, 1985, cited in Miller and Blair, 2009) to determine the weight of different effects (initial, direct, indirect and induced), in the total export elasticities. 4. Finally, we measure the effects of the unit variations in exports of productive activities on the allocation of primary income and private consumption of households.

To do it, we build seven mesoregional expanded Leontief production models, based on the related Social Accounting Matrices (SAM's), with data of 2013 year. Each of one includes 32 productive activities and five institutional sectors (Enterprises, Government, Rest of the World, Rest of the country and Households, the last ones are disaggregated into ten groups according to income levels).

This is an applied research on the Mexican mesoregional economies, whose main interest lies in addressing a relevant issue of the current economic situation.

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1. Introduction.

When applying the techniques of structural decomposition and total elasticity of exports to the mesoregions of Mexico with clearly differentiated characteristics (Northeast and the West)², we can appreciate the flexibility of these methodological resources in the regional economic analysis. Of course, these procedures are also very useful at the national level (Dávila & Valdés, 2018). In this paper, we generalize the study of the importance of changes in exports over economies of the seven mesoregions that compose the national territory of Mexico (Table 1 and Figure 1).

The exercise seems relevant to us in an international environment in which the processes of commercial integration are increasingly questioned. Of course, the geopolitical orbit in which our country is inserted is susceptible to these kind of turbulences. The frontal questioning of the policy of commercial opening promoted by the government of the United States of America (USA) during the postwar period, formed a substantial part of the political campaign that paved the way for Donald Trump to the White House. Particularly acrimonious were his criticisms of the North American Free Trade Agreement (NAFTA), which has regulated trade relations between the three countries of the region (Mexico, Canada and the United States) since January 1994. The USA president called it the worst trade agreement in history and pressured its business partners to begin its renegotiation. Under the permanent threat of invoking the termination clause, the rugged renegotiations concluded on September 30, 2018 and executives signed it two months later. Baptized by the Mexican government as T-MEC (Mexico, United States and Canada Treaty), before entering into operation it must be ratified by the legislative bodies of the three countries.

As was clearly observed at the national level (Dávila & Valdés, 2018), the rapid liberalization of foreign trade of the Mexican economy, whose culmination was the signing and entry into operation of NAFTA, allowed for an accelerated growth in its value, as well as a strong concentration of it in the North America region, especially in the US, and in the automotive sector. Although the integration process strengthened the interdependence between the value chains of important segments of the manufacturing of the three economies involved, from the evident asymmetry between them, a clear fragility is derived in the position of Mexico in the still unfinished process of renewal of the agreement with its commercial partners in the region.

As we saw in the essay on the economy of Northeast Mexico, vulnerability to possible disruptions in international transactions is magnified when, as in this case, exports acquire a growing and significant weight in final demand.

Likewise, it is important to note that in a region with less dependence on exports (Western Mexico), there is also a substantial fragility in the event of an adverse external shock. This suggests that the exposure of the economies of the different mesoregions to the vicissitudes of the international market is not limited to economies in which international sales have a preponderant weight in the level and structure of final demand. Factors such as the composition and amount of the mesoregional intermediate demand, its interregional trade flows with the rest of the national economy, as well as its effects on household income and expenditure levels, operate as chains of transmission of external shocks. even in regions with reduced participation in foreign sales. This is

² See Dávila, A. 2019, chapters 3 and 5.

what we intend to observe in greater detail when extending our analysis to all mesoregions in Mexico.

2. Some general indicators of the mesoregions of Mexico.

Table 1. lists the states that make up each of the seven mesoregions of the Mexican economy. Similarly, information is provided on the participation of each of them in the surface, population and gross domestic product of the country. Likewise, Figure 1.1 illustrates its geographical location on a geopolitical map of the Mexican Republic.

Table 1.

MEXICO'S MESOREGIONS: Participation (%) in land surface, population (H), gross domestic product (GDP), total gross production (GP) and mining and manufacturing exports (X). Weighted indexes with respect to the population (GDP / H, GP / H and X / H). Population (2015) GDP (2016, 2013 = 100), GP (2013, 2013 = 100) and X (2007 and 2017).

MESOREGION	STATES	Participation (%)						Weighted indexes		
		Land Surface	H	GDP	GP	X		GDP / H	GP / H	X / H
			2015	2016	2013	2007	2017			2017 / H
1. Northwest.	Baja California; Chihuahua; Sonora; Baja California Sur; Sinaloa;	32.1%	11.2%	12.6%	12.5%	30.9%	29.0%	1.12	1.11	2.58
2. Northeast.	Coahuila; Nuevo León; Tamaulipas.	15.1%	9.6%	13.5%	14.4%	25.1%	28.6%	1.41	1.50	2.97
3. North-Center Plateau.	Aguascalientes; Durango; Guanajuato; San Luis Potosí; Zacatecas.	15.1%	11.0%	9.5%	9.3%	7.8%	13.7%	0.86	0.84	1.24
4. West.	Colima; Jalisco; Michoacán; Nayarit	8.7%	12.0%	10.5%	10.5%	6.3%	6.1%	0.88	0.88	0.51
5. Center.	Distrito Federal; Hidalgo; México; Morelos; Puebla; Querétaro; Tlaxcala.	5.1%	32.9%	34.9%	34.2%	11.2%	14.8%	1.06	1.04	0.45
6. South.	Chiapas; Guerrero; Oaxaca.	11.8%	10.6%	4.6%	4.8%	0.7%	0.4%	0.43	0.45	0.04
7. South-East Gulf .	Campeche; Quintana Roo; Tabasco; Veracruz; Yucatán.	12.1%	12.5%	14.4%	14.3%	18.0%	7.3%	1.15	1.14	0.58
COUNTRY	MEXICO	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	1.00	1.00	1.00

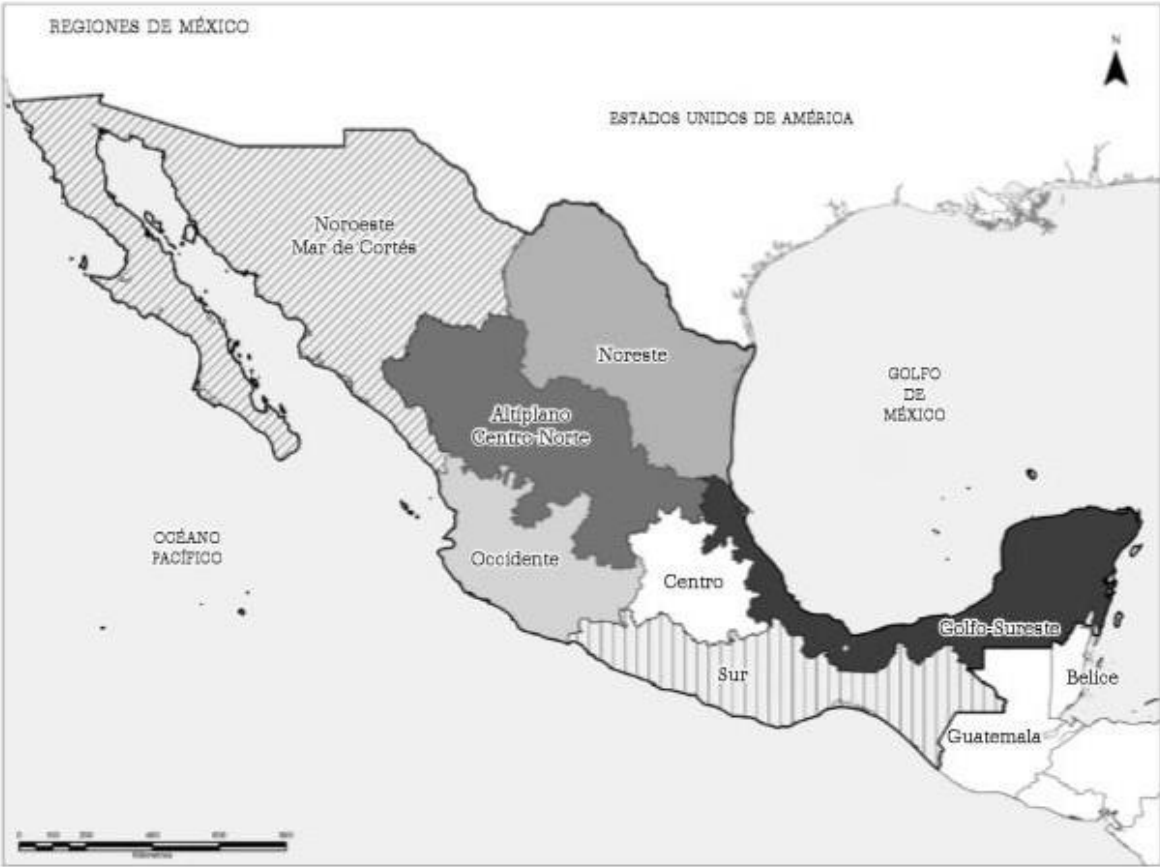
SOURCE: Elaborated with information from INEGI (Mexican National Agency of Statistics) and with data from the Regional Social Accounting Matrices of the Mesoregions of Mexico.

During 2013, total gross production (GP) of the Mexican economy amounted to 71 billion 722,934.0 million pesos, while exports (X) reached 4 billion 546,975.3 million pesos. Table 9.1 shows the relative contribution of each mesoregion to the conformation of these macroeconomic aggregates, as well as to the population (H) and the gross domestic product (GDP). In the case of foreign sales, the percentages contributed by each mesoregion are recorded in 2007 and 2017. The same table presents the indicators of GDP, GP and mining and manufacturing X (2017)³, weighted by the population (H) of each mesoregion. In each case, the three highest coefficients are bolded.

³ In the Economic Information Bank (<https://www.inegi.org.mx/sistemas/bie/>) of the INEGI (Mexican Agency of Statistics), the exports from Mexican states are published by sectors 21 (mining) and 31-33 (manufacturing industry). Data is reported in thousands of current dollars, and are disaggregated at the economic activity sub-sector level (3 digit NAICS -North American Industrial Classification System-), and cover the period from 2007 to 2017 (Requested on 27 February 2019). Exports from these two sectors (21 and 31-33) accounted for 84.7 percent of the total in 2013 (See INEGI, System of National Accounts of Mexico, Input Matrix of Product 2013).

With only one twentieth of the territorial surface, the Central region accumulates around a third of the population, total gross production and gross domestic product. However, its contribution to mining and manufacturing exports in the year 2017 was barely one seventh of the total (14.8%). Once we weigh these indicators (GDP, GP and X) by their population, we observe that, in the first two cases (GDP and GP), the Center region has a higher participation in 6 and 4 percent, with respect to its population quota, while its contribution to exports is less than half of what would correspond to the number of people living there.

Figure 1.
MAP OF THE MESOREGIONS OF MEXICO.



SOURCE: Taken from (Dávila, A. 2015, p. 276).

On the other hand, the least populous region (Northeast), occupies the first place in the weighted indicators in the three variables and the second by its absolute contribution to the GP, GDP and X 2017 reported here (14.4, 13.5 and 28.6 percent). With 29 percent in the value of the international exports of sectors 21 and 31-33 made by Mexico in 2017, the Northwest region occupies the first position in this area. Regarding the weighted indicators, it is located in the second site in the X 2017 / H and the third in the remaining two (GDP / H and GP / H). Thus, in the two regions of the Northern Border of Mexico, we found more than half of the value of the country's total exports of mining and manufacturing sectors (57.6 percent). By adding to the Central and Altiplano Center-North regions, a level of concentration in this variable of 86.1 percent is reached in the year 2017.

Given the purpose of this work, we will deepen our analysis of the exports of the mesoregions of Mexico. Initially we will use the statistics referred to in note 2 and later we will continue using the databases of the regional social accounting matrices (RSAM). At the aggregate level, foreign sales of mining and manufacturing products from the Mexican economy reached 237.8 billion dollars (BD) in 2007. Ten years later this figure rose to 349.8 BD, which meant an increase of 47.1 percent in current dollars, that is, an average annual expansion of 3.9 percent.

In addition to its dynamism, international exports made from Mexico experienced a significant change in its sector structure throughout those years: The value of foreign oil sales fell from 43,341.5 to 20,023.5 BD, with which the participation of this sector in total exports analyzed here continued to decrease rapidly (from 16 to 5.7 percent during that decade, that is 10.2 percentage points less). Although absolute sales of computer equipment in current dollars grew marginally during the decade (at a rate of 0.6 percent per year), its share in exports fell from 25.1 to 18.2 percent (-6.9 points). To a lesser extent, the external sales of basic metals (3.4, 2.8 and -1.4, respectively), chemistry (4.1, 2.8 and -1.2) and garments (1.9, 0.9 and -1) also lost relative importance.

The reverse of the medal was the explosion of exports of transport equipment, which increased their amount by 82,953.3 BD during that decade, going from 60,951.5 BD in 2007 to 143,904.8 BD ten years later. Thanks to a growth rate of 9 percent per year, this industry's share of Mexico's mining-manufacturing exports during this period went from 25.6 percent to 41.1 percent of the total.

Except for what was observed in Western Mexico, depending on the sectoral mix of its exports, the other mesoregions suffered the consequences, positive or negative, of these transformations.

Thus, three mesoregions observed expansion rates in this indicator above the national average: Center-North Plateau (10 percent per year); Center (6.9) and Northeast (5.3); two more reached a positive growth, but lower than the country average: West (3.7) and Northwest (3.3); the last two, recorded negative figures at an annual rate of -1.4 percent in the case of the South mesoregion and -5.1 in the Southeast-Gulf.

Reading these figures allows us to identify several trends:

1. The relative displacement of the export boom towards the Center-North Plateau of the Mexican Republic, which doubles its participation in mining-manufacturing exports during that decade (going from 7.8 to 13.7 percent of the total, with an increase of 5.9 points), as well as to Central Mexico, whose share rose 11.2 to 14.8 percent (+3.6 points). The first case highlighted the sales of the states of Guanajuato (with average annual growth of 13.6 percent during those years - 2007-2017-), San Luis Potosí (10.2), Aguascalientes (6.7) and Durango (5.7). The dynamics of exports were fundamentally based on the manufacture of transport equipment and, to a lesser extent, non-oil mining, as well as the plastic and rubber industry. In the second, the states of Querétaro, Mexico, Puebla and Tlaxcala, with rates of 11.7, 8, 6.8 and 6 percent, respectively. Also in these states, the expansion of sales, are based on the manufacture of transport equipment and in many cases, in the manufacturing industries, as well as in the manufacture of accessories, appliances and electrical equipment.
2. The weakening of exports from the Northwest, whose contribution dropped by almost two points during those years, accompanied by the consolidation of the Northeast, a mesoregion whose participation in the country's international sales rose 3.5 percentage points, thanks to the sustained increase in international sales in the states of Coahuila (which reached an average annual rate of 8.5 percent during that decade) and Nuevo León (5.9). The relative deceleration of exports from the Northwest is explained by the stagnation in international sales of computer equipment. On the

other hand, in the Northeast region of Mexico there was an extraordinary expansion in transportation equipment, which grew by more than 29 billion dollars, to reach an amount close to 47 BD, almost triple the level that they were ten years ago. Even though its base was very small in 2007 (473.4 million dollars), the exports of the beverages and tobacco industry from the Northeast also grew by 2.6 BD. The cost was less diversification of the region's export sector, as there were absolute and / or relative drops in those of several of its most important sectors (computer equipment, chemistry, basic metals, metal products and clothing).

3. The resistance of the export capacity of the Western region. However, more than two thirds of its exports (69.3 percent) depended on the manufacture of computer equipment in 2007, a subsector whose foreign sales grew nationally at a slower rate (0.6 percent per year) than those of mining-manufacturing activities (3.9 per year), the region managed to keep its relative presence in exports practically stable (see Table 1, which shows a marginal decrease of only -0.2 points in this variable between 2007 and 2017). To obtain this result, the Western region of Mexico had to achieve growths much higher than the national ones in exports of non-oil mining (annual rates of 59.4 and 10.4 percent, respectively), of the food industry (9.7 and 0.9), of the chemical industry (8.7 and 0.2) and of the plastic and rubber industry (20 and 9.4). Even the exports of computer equipment made from the Western mesoregion, were more dynamic (1.6 percent annual) than those observed at the national level. By virtue of the above, this mesoregion decreased by 12.9 percentage points its dependence on computer equipment exports in 2017, which still represent 56.5 of total.

4. The deepening in the collapse of oil exports that severely hit the economy of the Southeast-Gulf region, particularly the states of Tabasco and especially Campeche. In this last entity, was concentrated 92.8 percent of the depreciation in the value of oil exports over the period. As a result of the above, the participation of this region in mineral-manufacturing exports shrank from 18 percent in 2007 to only 7.3 in 2017 (Table 1).

5. The worsening of the productive disarticulation of the South mesoregion. Except for its participation in the total population of the country (10.6 percent), this region has the lowest values in the rest of the indicators included in Table 1. Its share in exports continued to decline over the decade (0.7 percent in 2007), to represent only 0.4 percent in 2017. In this region, the export value per capita is 25 times lower than the national average.

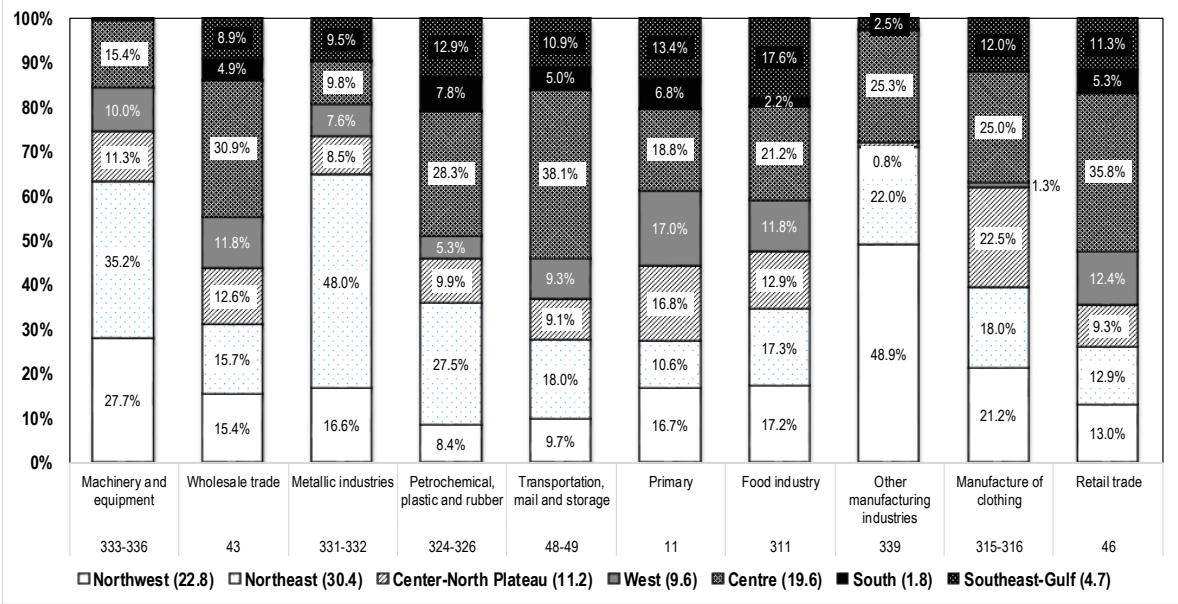
We return now to the information provided by the RSAM for the year 2013. 73.9 percent of Mexico's total exports were concentrated in five of the 32 productive activities contemplated: 333-336 Machinery and equipment (48.1%), 431 Wholesale (10.1%), 324-326 Petrochemical, plastic and rubber (6.5%), 331-332 Metal (6.3%) and 48-49 Transport, mail and storage (2.9%). If we add the following five, the simple concentration index reaches 83.2 percent. Graph 1 contains information on the relative contribution of each region to exports in each of these activities.

In view of the fact that in the accounting multipliers models private consumption is part of their endogenous variables, the final exogenous demand only includes the rest of the components of the final demand (government consumption, investment and exports, both international and from the rest of country). Considering the objectives of paper, it is convenient to measure the relative weight of international exports in the final exogenous demand of each of the mesoregions of Mexico. The highest percentage (48.9 percent) was observed in the Northeast mesoregion, followed by the Northwest (46.8), the West (34.9), Center-North Plateau (34.8), South-Gulf (31.4), Centro (22.5) and South (14.7).

Although it is logical to expect that the greater the share of exports in the final exogenous demand of an economy, the greater the degree of impact in a generalized shock in that variable, it is convenient to evaluate this perception with greater care, as there are other factors in work. To do this, we will use two techniques: 1. The extraction of exports from the final exogenous demand

vector in the extended production models of each mesoregion and; 2. The calculation of the total elasticities to unitary variations in international exports of each productive activity in each mesoregion. The results are presented and analyzed in the same order in the subsequent sections.

Graph 1.
MESOREGIONES OF MEXICO. Participation in exports (10 of 32 economic activities). 2013. (%).



SOURCE: Own elaboration with information of the extended production models built with the Regional Social Accounting Matrices of Mesoregions of Mexico.

3. The weight of exports in the economies of the mesoregions of Mexico.

Once the exports of the exogenous final demand of each sector of economic activity are discounted, the expanded production model of each region is resolved. The results obtained are compared with the base solution and the differences allow to quantify the influence of exports of goods and services in the magnitude of the main economic aggregates of each of the mesoregions of Mexico.⁴

Table 2 summarizes these calculations. In the first column the variables are listed, starting with the total gross product and employment, to continue with the added value and its components (Salaries, gross operating surplus and indirect taxes on production). Subsequently, the gross domestic product, followed by imports (interregional and international), domestic private consumption, savings, taxes and imported private consumption. Finally, the variations of disposable income of the total number of households are presented, as well as of each of its ten income strata. In the columns, the percentage variations of each variable are computed in the seven mesoregions of the Mexican economy. The three lower values of each line are highlighted by coloring the corresponding cells with shades from black to light gray.

As expected, the Northeast and Northwest regions are the most vulnerable facing a generalized export shock. In the third site, depending on the variable, the regions alternate: Southeast-Gulf (it occupies this position in the value added, GDP and the disposable income in all

⁴ The conformation of the RSAM's, as well as the models of production and prices built with them, are explained in (Dávila, A. 2019, pp. 6-11).

the income strata of households); Central-North Plateau (in total GP, labor, indirect taxes on interregional production and imports) and; West (in remunerations and international imports). The least damaged mesoregions are the Center and South, but in all cases, without exception, the levels of affectation are higher than the shares of each region in exports reported in 2017 (Table 1).

Table 2.
MESOREGIONS OF MEXICO: Percentage variations in each variable related with the extraction of international exports. 2013. (%)

Variable	Northwest	Northeast	Center-North Plateau	West	Center	South	South-east Gulf
Gross Production	-40.8%	-43.6%	-28.9%	-28.9%	-19.5%	-12.1%	-28.5%
Labor	-29.0%	-32.8%	-22.1%	-21.9%	-16.6%	-9.4%	-20.0%
Value Added	-32.5%	-35.5%	-24.2%	-24.5%	-17.2%	-11.2%	-30.3%
Salaries	-29.3%	-32.2%	-20.1%	-20.2%	-13.8%	-6.8%	-18.8%
Gross Operating Surplus	-33.8%	-36.8%	-25.9%	-26.2%	-18.8%	-13.2%	-33.3%
Indirect Taxes on Production	-42.4%	-44.9%	-30.5%	-29.9%	-18.3%	-12.8%	-22.6%
Gross Domestic Product	-32.4%	-35.5%	-24.1%	-24.5%	-17.2%	-11.1%	-30.3%
Interregional Imports	-45.0%	-47.9%	-30.2%	-27.8%	-20.4%	-13.0%	-27.3%
International Imports	-62.1%	-61.6%	-43.7%	-48.4%	-28.6%	-15.3%	-27.1%
Domestic Private Consumption	-30.4%	-33.6%	-20.6%	-22.5%	-16.2%	-8.4%	-25.5%
Savings	-31.1%	-34.3%	-23.0%	-23.7%	-16.9%	-11.4%	-27.5%
Taxes	-30.8%	-33.8%	-21.2%	-22.8%	-16.3%	-8.7%	-25.9%
Private Consumption Imports	-30.4%	-33.7%	-20.8%	-22.6%	-16.3%	-8.3%	-25.6%
Total Disposable Households Income	-30.5%	-33.8%	-21.0%	-22.7%	-16.3%	-8.7%	-25.8%
H1	-21.9%	-28.2%	-9.5%	-17.4%	-12.1%	-3.7%	-18.5%
H2	-27.2%	-29.8%	-15.8%	-16.0%	-14.0%	-6.2%	-20.7%
H3	-29.7%	-31.1%	-17.8%	-20.1%	-15.2%	-6.7%	-23.0%
H4	-28.8%	-34.0%	-18.6%	-21.1%	-15.9%	-8.1%	-24.6%
H5	-29.6%	-32.8%	-19.2%	-22.0%	-16.1%	-8.3%	-25.4%
H6	-30.0%	-33.9%	-20.0%	-22.0%	-15.8%	-8.9%	-25.1%
H7	-29.8%	-33.9%	-19.8%	-23.0%	-16.1%	-9.6%	-25.8%
H8	-30.4%	-33.3%	-21.8%	-23.2%	-16.3%	-9.8%	-26.2%
H9	-31.8%	-34.0%	-22.9%	-23.0%	-16.6%	-10.2%	-26.9%
H10	-31.1%	-34.3%	-23.3%	-23.9%	-16.8%	-10.6%	-27.8%

SOURCE: Own elaboration with information of the extended production models built with the Regional Social Accounting Matrices of Mesoregions of Mexico.

The reason for the above is that the direct impacts associated with an alteration in the level of economic activity caused by a generalized external shock, are amplified and ramified through the productive sectors by the way of various transmission mechanisms. The reduction in exports contracted the level of economic activity, affecting not only the demand for intermediate inputs (both locally produced as those from the rest of the country or the international economy), but also, the amounts of employment and income of the employees. Lower gross production also has an adverse impact on the magnitude of the gross operating surplus, as well as on indirect taxes on production. As a result, there is a fall in the income levels of economic agents (Government, Enterprises and Consumers), which, in turn, has an impact on the consumption of goods and services, both domestic and imported. On the other hand, the contraction of domestic consumption

activates a new cycle of production reduction with all the chain effects described above (these are the so-called feedback effects).

Thus, the contraction of the demand for goods and services resulting from an export shock in a mesoregion of the country is transmitted, to a greater or lesser extent, to other mesoregions that are suppliers of intermediate inputs or final consumption goods of the former.

From a sectoral point of view, the effects of extracting the export vector from exogenous final demand depend on the sectoral mix of each mesoregion, its local linkages, and those to the economies of the rest of the country and the world, as well as on the way as its processes of generation, allocation, distribution, redistribution of income and consumption of goods and services, are articulated in the same mesoregion, with the rest of the country and with the world economy. Considering the previous factors: Which would be the economic sectors with greater degree of affectation in their GP levels in front of this scenario (the extraction of the foreign sales in the final exogenous demand of the extended model of Leontief) in the national economy, as well as in its different mesoregions?

In the case of the Mexican economy as a whole: Machinery and equipment (SCIAN codes 333-336), Other manufacturing industries (339,) Metallic industries (331-332), Petroleum mining (21P), Manufacture of textile inputs (313-314), Manufacture of clothing, Tanning and finishing of leather and fur (315-316); Wholesale trade (43); Non-oil mining (21NP), Petrochemical, plastic and rubber (324-326) and; Management of corporations and companies (55) (with falls in gross production of each sector by 80.90%, 80.09%, 67.49%, 66.97%, 65.31%, 58.94%, 57.67%, 55.28%, 51.55% and 51.17%, respectively).

In the Northwest mesoregion: Manufacture of garments (315-316); Tanning and finishing of leather and fur and Manufacture of furniture and related products (337); Machinery and equipment (333-336), Other manufacturing industries (339) and Metallic industries (331-332) (with contractions of 87.17%, 80.14%, 75.29%, 69.24% and 66.54 %, respectively).

Northeast: Machinery and equipment (333-336); Manufacture of textile inputs (313-314); Other manufacturing industries (339), Manufacture of clothing; Tanning and finishing of leather and leather (315-316) and; Metal industries (331-332) (78.82%, 75.92%, 66.32%, 65.70% and 58.07%).

Center-North Plateau: Machinery and equipment (333-336); Wholesale trade (43); Beverage and tobacco industry (312); Manufacture of textile inputs (313-314) and; Metallic industries (331-332) (61.61%, 49.22%, 40.52%, 40.46% and 40.42%).

West: Machinery and equipment (333-336); Wholesale trade (43); Metallic industries (331-332); Manufacture of textile inputs (313-314) and; Petrochemical, plastic and rubber (324-326) (83.92%, 42.27%, 40.13%, 34.00 % and 31.78%).

Center: Other manufacturing industries (339); Machinery and equipment (333-336); Wholesale Trade (43); Primary Sector (11) and; Manufacture of clothing, Tanning and finishing of leather products (315-316) (53.76%, 41.92%, 34.16%, 33.91% and 33.48%).

South: Machinery and equipment (333-336); Oil mining (21P); Wholesale trade (43); Beverage and tobacco industry (312) and; Petrochemical, plastic and rubber (324-326) (78.36%, 55.11%, 33.31%, 22.72% and 22.19%).

Southeast-Gulf: Other manufacturing industries (339); Manufacture of clothing, Tanning and finishing of leather and leather (315-316); Manufacture of textile inputs (313-314); Machinery and equipment (333-336) and; Oil mining (21P) (75.84%, 65.97%, 57.81%, 49.95% and 48.60%).

It can therefore be concluded that, given the high level reached by the external opening index of the Mexican economy, exports have a relevant role in the productive activities of the country and that, although this pre-eminence is significantly greater in mesoregions whose exports

have a high participation in exogenous final demand, is also highlighted in those with greater relative orientation towards the supply of the internal market.

4. Total export elasticities in the mesoregions of Mexico.

4.1. Total elasticities computation.

Elasticities, in the context of Leontief's expanded model, are obtained by calculating the quotient of unit percentage changes in the exogenous final demand and their relative effects on the endogenous variable studied (in our case: gross production, employment, wages and value added).

It is an indicator of great utility, since it allows weighted the effects generated by changes in the final demand, quantified through the multipliers, by the absolute dimension of each productive activities. The weighting factor used for this purpose is the quotient of the exogenous final demand value of a sector (f_j) divided by the total gross output of the economy analyzed ($\mathbf{i}'\mathbf{x}$):

$$f_j / \mathbf{i}'\mathbf{x}$$

Using Miller and Blair (2009) notation, the total elasticity of production of a sector is defined as:

$$oe_j = m(o)_j \left[f_j / \mathbf{i}'\mathbf{x} \right] \quad (1)$$

Where: oe_j = Elasticity of gross output of sector "j" and; $m(o)_j$ = Multiplier of the gross production of sector "j".

Equivalently, the total employment elasticities (\mathbf{t}), wages (\mathbf{w}), and value added (\mathbf{va}) are calculated.

In turn, the production multipliers of each productive activity are obtained by adding the elements of the Leontief inverse columns linked to the sub-matrix A (dimension 32 x 32).

If:

$$\mathbf{L} = (\mathbf{I} - \mathbf{S})^{-1} \quad (2)$$

Then:

$$m(o)_i = \mathbf{i}'\mathbf{L} \quad i = 1, \dots, 32$$

In order to calculate the multipliers of the remaining variables (employment, wages and value added), the enlarged Leontief inverse is premultiplied by diagonal matrices with corresponding coefficients and zeros in the rest of the positions. For instance, if \mathbf{t} is a column vector with the employment coefficients by sector, then:

$$m(t)_i = \hat{\mathbf{t}}\mathbf{L} \quad i = 1, \dots, 32$$

As the expanded Leontief model incorporates household income and expenditure as endogenous variables, these are truncated total multipliers and, in the case of all variables except gross production, type II multipliers. This means that are weighted by the value of their respective coefficients in order to get normalized variations.

4.2. Empirical results.

Table 3 contains the total elasticities of the 10 sectors in which the highest values are reached. The results are presented for the four variables and the seven mesoregions included in the analysis. The table is composed of four sections, one for each variable. At the end of each section three lines are added: in the first, the aggregate of the total elasticities of 31 activities is computed (oil mining is excluded), in the second, the subtotal reached by the ten sectors that appear in the table and, finally;

the third gives an account of the participation of the latter in the total elasticities of each variable. The first two columns contain the SCIAN code (North American Industrial Classification System) and the activity descriptor, the next seven correspond to the mesoregions. In each line of each section the three highest values are identified: the first with black background and white numbers, the second with dark gray (also with white numbers) and the third with light gray and black numbers.

Let us now remember the way in which the results reported in the table are interpreted. Take as an example the total elasticities of exports of the Machinery and equipment sector (codes 333-336) for the variable gross production. The Northeast region reached the maximum value (0.258), which means that a unitary variation of exports in this activity produces a change of 0.258 percent in the total gross production of the Northeast region. The minimum values are observed in the South and Southeast- Gulf regions, in which this indicator was only 0.002 percent. In the rest of the variables (labor, added value and wages), the interpretation is as follows: What is the total effect on the regional economy on the level of (employment, wages or value added), associated with a change in the exports enough to produce a unitary change in the (employment, salary or added value) of the corresponding sector? In the case of employment, the highest record in Machinery and equipment was observed in the Northwest region (0.456), which means that a change in the value of the exports of that industry capable of altering in one unit the level of employment, produces a change of this magnitude in total employment (0.456) in the region. In the cases of value added and wages, the maximums were observed in Northeast Mexico (0.391 and 0.332, respectively).

The third to last row of each section of the table (Total elasticity - All sectors except oil mining -), computes the cumulative effect of unit variations in exports or in the other variables (employment, value added and wages) over all productive activities. Once again, the strategic importance of the external sector is observed for the great majority of the mesoregions of Mexico. The repercussions, in the case of gross production, reach 43.4 percent in the Northeast, 40.8 in the Northwest, 28.9 in the mesoregions Center-North Plateau and West, and 19.5 in the Center. Even in the regions less articulated to the external market (South and Southeast-Gulf, if we exclude oil exports in the last one), the repercussions reach 10.4 and 8.3 percent, respectively.

Another relevant observation is the high degree of concentration of the total elasticities of exports in the ten sectors reported in the table, since they alone account for more than 90 percent of the effects of an external shock on the main variables (total gross production, employment, added value and salaries) of the economies of the regions of Mexico⁵.

It is also interesting to analyze how regional specialization profiles affect the exposure of their economies to changes in the value of international exports. Thus, for example, the two regions of the Northern Border of Mexico (Northwest and Northeast) are particularly sensitive to fluctuations in foreign sales in the Machinery and equipment sectors; metal industries; other manufactures and; manufacture of clothing, leather and leather. However, these regions also show some differences between them: The Northwest Region is the second in sensitivity to the changes in the exports of the food industry, while the Northeast is affected by those of Petrochemicals, plastic and rubber, as well as transportation, mail and storage.

The economies of the Central-North Plateau and the West are vulnerable to fluctuations in the exports of the primary sector and the food industry. In the same way, in the first of these two regions, the garment industry has the greatest national exposure to the aforementioned changes.

The Center and the West of the country, very populous areas with important distribution nodes, are particularly sensitive to export shocks in services activities (wholesale and retail trade, as well as transportation and storage).

⁵ The only exception was the percentage of 89.4 for the variable employment, in the South Mesoregion.

Table 3.

MESOREGIONS OF MEXICO: Ten sectors with the highest total elasticities of exports. Gross production, labor, added value and wages. 2013. (%).

SCIAN Code	Descriptor	Gross Production							Labor						
		Northwest	Northeast	Center-North Plateau	West	Centre	South	Southeast -Gulf	Northwest	Northeast	Center-North Plateau	West	Centre	South	Southeast -Gulf
333-336	Machinery and equipment	0.244	0.258	0.140	0.147	0.072	0.002	0.002	0.456	0.441	0.262	0.342	0.171	0.005	0.005
43	Wholesale trade	0.039	0.032	0.043	0.049	0.041	0.033	0.017	0.081	0.059	0.084	0.113	0.091	0.065	0.030
331-332	Metallic industries	0.027	0.053	0.018	0.017	0.007	0.000	0.011	0.049	0.080	0.031	0.034	0.014	0.000	0.018
324-326	Petrochemical, plastic and rubber	0.011	0.031	0.017	0.010	0.018	0.029	0.018	0.039	0.081	0.051	0.039	0.069	0.074	0.044
48-49	Transportation, mail and storage	0.007	0.010	0.009	0.010	0.014	0.010	0.007	0.010	0.013	0.012	0.015	0.019	0.013	0.008
311	Primary	0.011	0.008	0.010	0.012	0.006	0.004	0.009	0.030	0.015	0.023	0.031	0.012	0.010	0.020
11	Food industry	0.011	0.006	0.015	0.017	0.006	0.012	0.007	0.007	0.003	0.010	0.011	0.003	0.008	0.005
339	Other manufacturing industries	0.016	0.006	0.000	0.000	0.005	0.000	0.001	0.016	0.006	0.000	0.000	0.005	0.000	0.001
315-316	Manufacture of clothing	0.008	0.005	0.010	0.001	0.005	0.000	0.004	0.007	0.004	0.008	0.001	0.004	0.000	0.003
46	Retail trade	0.004	0.003	0.004	0.006	0.006	0.005	0.003	0.003	0.002	0.003	0.004	0.004	0.003	0.002
Total Elasticity (All sectors, except Oil Mining)		0.408	0.434	0.289	0.289	0.195	0.104	0.083	0.747	0.735	0.524	0.635	0.424	0.201	0.143
Sub-total. 10 sectors with the highest values		0.378	0.414	0.267	0.271	0.181	0.094	0.079	0.697	0.705	0.484	0.590	0.392	0.180	0.135
Participation (%) in the global change of total elasticity		92.5%	95.4%	92.3%	93.7%	92.6%	90.4%	95.4%	93.4%	95.9%	92.4%	92.9%	92.4%	89.4%	94.7%

SCIAN Code	Descriptor	Value added							Wages						
		Northwest	Northeast	Center-North Plateau	West	Centre	South	Southeast -Gulf	Northwest	Northeast	Center-North Plateau	West	Centre	South	Southeast -Gulf
333-336	Machinery and equipment	0.381	0.391	0.219	0.273	0.140	0.004	0.004	0.323	0.332	0.185	0.209	0.114	0.003	0.003
43	Wholesale trade	0.035	0.028	0.037	0.043	0.036	0.030	0.016	0.142	0.113	0.150	0.192	0.182	0.114	0.050
331-332	Metallic industries	0.042	0.071	0.027	0.026	0.012	0.000	0.016	0.049	0.083	0.031	0.031	0.015	0.000	0.018
324-326	Petrochemical, plastic and rubber	0.020	0.050	0.027	0.019	0.035	0.045	0.035	0.021	0.051	0.029	0.020	0.039	0.046	0.027
48-49	Transportation, mail and storage	0.007	0.010	0.009	0.011	0.014	0.010	0.007	0.007	0.010	0.009	0.010	0.014	0.010	0.006
311	Primary	0.016	0.011	0.013	0.017	0.008	0.005	0.011	0.025	0.016	0.021	0.026	0.014	0.008	0.016
11	Food industry	0.011	0.006	0.014	0.017	0.006	0.012	0.007	0.014	0.007	0.018	0.022	0.008	0.015	0.008
339	Other manufacturing industries	0.022	0.009	0.001	0.000	0.008	0.000	0.001	0.016	0.006	0.000	0.000	0.005	0.000	0.001
315-316	Manufacture of clothing	0.011	0.007	0.012	0.001	0.007	0.000	0.005	0.008	0.005	0.010	0.001	0.005	0.000	0.004
46	Retail trade	0.004	0.003	0.003	0.005	0.005	0.004	0.003	0.004	0.003	0.004	0.006	0.006	0.004	0.003
Total Elasticity (All sectors, except Oil Mining)		0.587	0.612	0.389	0.435	0.290	0.120	0.109	0.650	0.655	0.490	0.548	0.421	0.217	0.141
Sub-total. 10 sectors with the highest values		0.548	0.586	0.363	0.413	0.272	0.110	0.104	0.608	0.627	0.458	0.517	0.401	0.202	0.136
Participation (%) in the global change of total elasticity		93.3%	95.8%	93.5%	95.0%	93.7%	91.0%	95.8%	93.5%	95.8%	93.5%	94.2%	95.4%	93.1%	96.5%

SOURCE: Own elaboration with information of the extended production models built with the Regional Social Accounting Matrices of Mesoregions of Mexico.

In the case of the South Region, there is greater exposure to changes in Petrochemicals exports (a situation that also occurs in the Southeast-Gulf Region), the primary sector and retail trade.

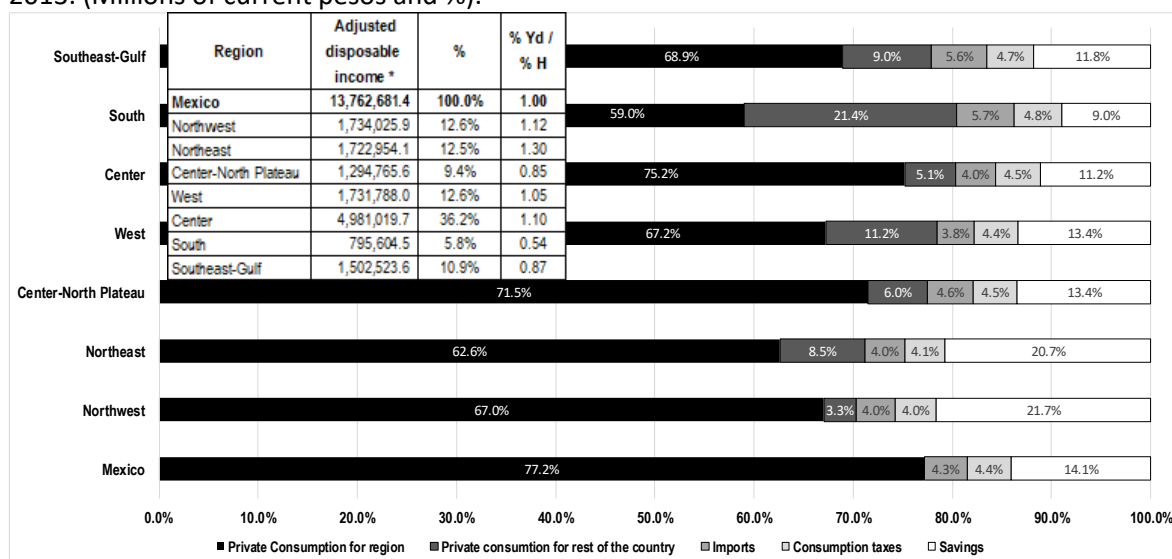
5. Household income and consumption impacts.

The extraction of exports allowed us to quantify its impact on disposable income in households. In order to determine the repercussions on private consumption, it is previously necessary to analyze the allocation structure of disposable income. For reasons of space, figures are presented for all the households of each economy, but a similar analysis can be made for each of the ten income groups.

The data is show in Graph 2, as well as in the table inserted in it. Let's start with the latter, whose second column shows the adjusted disposable income of the households of each mesoregion and of the Mexican economy in millions of current pesos. The following column computes the participation of each region in the total household income at the national level and in the last one the coefficient that results from relating the regional participation rates in the income (numerator) and population (denominator). The Central Mesoregion concentrates 36.2 percent of disposable income, which contrasts with the 5.8 reached by the South. When weighted by the population, the greatest contrasts are observed among households in the Northeast, which obtain an income higher by 30 percent than the national average, and those in the South mesoregion, whose households receive resources whose amount is 46 percent lower than the national average.

Graph 2.

MESOREGIONES MEXICO. Households adjusted disposable income and its allocation structure. 2013. (Millions of current pesos and %).



SOURCE: Own elaboration with information of the extended production models built with the Regional Social Accounting Matrices of Mesoregions of Mexico.

In addition to households in the Northeast, those in the Northwest, Central and West mesoregions also receive incomes above the national average of 12, 10 and 5 percent, respectively. The opposite happens in the homes of the Southeast-Gulf and the North-Central Plateau, where the perceptions are below average by 13 and 15 percent, successively.

On the other hand, the bars in Graph 2 contain the allocation structure of the disposable income of the households of each mesoregion, which can be alternatively allocated to: Private consumption of goods and services produced into the region; in the rest of the country; or in the world economy; to the payment of taxes on consumption and, finally, to private savings.

The structure corresponding to the country's total appears in the bottom bar, in which case there is no interregional imports of goods and services. At this level, families allocate 77.2 percent of their income to private consumption of domestic goods and services, 4.3 percent for the purchase of imported goods and services, 4.4 to the payment of consumption taxes and the rest (14.1 percent) for the private savings.

The households of the South Mesoregion not only have the lowest absolute and relative levels of disposable income, additionally, they are proportionally the most dependent on imports of consumer goods from the rest of the country (equivalent to 21.4 percent of their income) and from the international market (5.7). Consequently, it is the region with the lowest capacity to supply its regional market (equivalent to 59 percent of income) and also the region with the least capacity for private savings (9 percent of its income).

Accepting the assumption of fixed coefficients of Leontief's extended model, we are now in a position to quantify the impact of the extraction of exports on the private consumption of goods and services of domestic origin in the Mexican economy and in its seven mesoregions.

The data of the sectors of economic activity contemplated in our analysis are presented in Table 4. The first two columns contain the SCIAN codes and the description of the respective sector. The following activities show the values, in millions of current pesos, the private consumption of goods and services in each mesoregion.

In the lower section of the table, highlighted in bold, seven lines are added that we will describe below: The first computes the sub-total value, in millions of current pesos, of regional private consumption in the goods and services of the ten sectors selected. The second line gives us the percentage of the total value of private consumption of goods and services of regional origin reached by these ten sectors, which, in all cases, exceeds four fifths of the total. The third row shows the participation of each region in the private consumption of goods and services of national origin and in the fourth, this coefficient is related to the share of each region in the country's population. Also in this indicator regional differences stand out, because while the average consumption in the South region is 54 percent lower than the national one, in the Northeast it is higher than the average by 25 percent. The Central Region also shows consumption above the average (by 19 percent), the same as the West and the Northwest, even when only 1 percent. Although in a smaller proportion than in the South region, the Central-North Plateau and the Southeast-Gulf also show lower than average shares in this variable: (-12 and -14 percent, successively).

The three final lines measure the estimated impact of the extraction of international imports from the final demand vector in the Leontief extended model. Its calculation is derived from the effect of this shock on the adjusted disposable income of households in each mesoregion (reported in Table 2), as well as the weight on it represented by private regional consumption and interregional imports (from the rest of the country) (See Graph 2). At the national level, domestic private consumption falls by 21.8 percent. In the case of mesoregions, this contraction is broken down into two components: the reduction in private consumption of goods and services produced in the same region (second-last row of the table) and the contraction in value of purchases for this purpose made in the rest of the country (penultimate line). Its aggregation shows the total effect on the consumption of goods and services of national origin destined for the private consumption of households, which appears in the last row of the table.

Table 4.

MESOREGIONES MEXICO. Value of private consumption of regional goods in ten selected sectors and indicators of domestic private consumption. 2013. (Millions of current pesos and %).

SCIAN Code	Descriptor	Region						
		Northwest	Northeast	Center-North Plateau	West	Centre	South	Southeast-Gulf
53	Real estate and rental services	189,312.7	199,831.4	126,305.8	202,667.6	656,571.8	60,459.0	160,468.4
46	Retail trade	185,744.0	164,376.0	144,604.2	187,455.0	547,543.2	83,481.4	175,037.6
311	Food industry	135,511.1	125,160.0	123,474.6	148,018.1	425,031.0	45,712.8	142,284.0
48-49	Transportation, mail and storage	100,750.9	117,238.0	96,622.4	102,785.8	419,433.2	56,278.1	120,374.5
61	Educational services	87,097.4	74,449.9	63,626.6	70,474.8	267,358.9	39,104.8	65,086.2
324-326	Petrochemical, plastic and rubber	17,761.4	73,054.5	69,859.9	76,455.0	213,067.1	38,800.5	72,841.6
52	Financial and insurance services	54,235.6	82,653.4	41,264.1	55,816.7	193,520.2	21,232.6	44,104.2
62	Health and social assistance services	57,505.8	48,940.1	54,101.7	55,926.8	196,087.0	33,215.9	68,875.6
72	Temporary accommodation and food and beverage preparation services	55,179.7	37,184.1	30,003.7	55,696.8	124,638.9	26,045.4	43,968.1
333-336	Machinery and equipment	44,582.3	43,408.1	44,507.9	29,371.0	129,535.2	505.3	10,734.1
	Total	927,681.0	966,295.4	794,370.9	984,667.6	3,172,786.5	404,835.8	903,774.4
	Percentage of regional total consumption	85.4%	83.7%	85.8%	84.6%	84.7%	86.2%	87.3%
	Total regional / total national consumption	11.3%	12.1%	9.7%	12.1%	39.1%	4.9%	10.8%
	% Consumption / % Population	1.01	1.25	0.88	1.01	1.19	0.46	0.86
	Change of regional private consumption	-32.7%	-31.6%	-21.0%	-22.7%	-16.3%	-8.7%	-25.8%
	Changes of imports from the rest of the country	-1.6%	-4.3%	-1.8%	-3.8%	-1.1%	-3.1%	-3.4%
	Changes in national private consumption	-34.3%	-35.9%	-22.8%	-26.5%	-17.4%	-11.8%	-29.2%

SOURCE: Own elaboration with information of the extended production models built with the Regional Social Accounting Matrices of Mesoregions of Mexico.

It is worth highlighting four elements in the interpretation of these figures:

1. The effects on private consumption of goods and services of national origin are more acute in the mesoregions clearly oriented towards exports. In the two regions of the Northern Border of Mexico they exceed one third of the total; in the Southeast-Gulf they reach almost 30 percent⁶.
2. As the export boom has gradually moved towards the center of the country, its mesoregions are increasingly vulnerable to the vicissitudes of the international market. Exports account for around a quarter of the private consumption of goods and services of national origin in the mesoregions West and the Center-North Plateau, and amount to 17.4 in the Center of the country.
3. The consequences of an external shock are also relevant in regions less articulated to the foreign market, such as the South, whose exports do not even reach half a percentage point of Mexico's external sales. However, exports account for 11.8 percent of regional consumption in goods and services of domestic origin.
4. The foregoing is due to the relevance of the generation, allocation, redistribution and income expenditure mechanisms, as transmission and amplification channels of a shock in the external sector of the economy.

⁶ This exercise includes oil exports, which are strongly concentrated in this area of the country.

6. Concluding remarks.

Within the framework of linear models of applied general equilibrium, export extraction techniques and the calculation of their total elasticities were used to measure the importance of foreign sales of goods and services in the economies of the mesoregions of Mexico.

In order to contextualize our research topic, at first we made a general analysis of the statistics of exports made from the states of Mexico. This allowed us to identify some trends:

The relative displacement of the export boom towards the Central-Northern Plateau of the Mexican Republic, a region that practically doubled its share of mining-manufacturing exports between 2007 and 2017 (from 7.8 to 13.7 percent of the total), as well as Central Mexico, whose share rose from 11.2 percent to 14.8 percent. In the first case, the dynamism of exports of transport equipment and, to a lesser extent, non-oil mining, as well as the plastic and rubber industry, from the states of Guanajuato, San Luis Potosí, Aguascalientes and Durango stood out. In the second, the states of Queretaro, Mexico, Puebla and Tlaxcala, with significant growth in exports of transport equipment and, to a much lesser extent, in other manufacturing industries, as well as in the manufacture of accessories, appliances and electric equipment.

Meanwhile, in the Northern Border of Mexico there were contrasts between the Northwest, where the stagnation of exports of computer equipment led to the relative decline in international sales, while the Northeast consolidated its exporting vocation thanks to the extraordinary dynamism of foreign sales of transportation equipment, which grew by more than 29 billion dollars, to reach an amount close to 47, almost triple the level they had ten years ago.

Despite the high concentration of its exports in a sector in which these practically stagnated (computer equipment), the Western mesoregion managed to sustain its participation in the external market supplied by the Mexican economy. To achieve this result, this region had to reach rates of expansion of these sales well above the national averages in the same manufacturing of computer equipment, in non-oil mining, as well as in the food and chemical, plastic and rubber industries.

The exacerbation of the depletion of oil exports, which severely hit the economy of the Southeast-Gulf region, particularly the states of Tabasco and especially Campeche.

The worsening of the productive disarticulation of the South mesoregion. Its share in exports continued to decline over the decade to only represent 0.4 percent in 2017 (an exported value per inhabitant 25 times lower than the national average).

Subsequently, the importance of exports in the main economic aggregates of the mesoregions of Mexico was evaluated. For this purpose, the component of foreign exports was eliminated in the exogenous final demand vector of the accounting multipliers model. The results, reported in Table 2, allow us to gauge the strategic importance of the external market for the Mexican economy, not only in the regions with greater orientation towards that market (such as those of the Northern Border, the North-Central Plateau and the Southeast-Gulf -the latter because of its weak oil exports-), but in those in which the domestic market has a greater relative weight (West and Center) and even in the South, the region with the weakest ties to external and internal markets.

Then, using the method proposed by Richard Stone (1985), the total elasticities of exports of the 31 productive activities of the seven mesoregions of the country were calculated (oil exports were excluded in this exercise). The analysis shows that a unitary variation in the respective component of final demand would produce relevant changes in the same direction in the main macroeconomic variables of all the mesoregions of Mexico (Total gross production, employment, added value and wages). In the case of gross production, the effects would be greater in the entities of the Northern Border (Northeast, 0.434; Northwest, 0.408; Center-North Plateau and West, 0.289

in both of them; Center, 0.195; South, 0.104 and, Southeast-Gulf-, 0.083 -0.285 including oil exports-).

It is also important to note the high concentration of total elasticities in the exports of ten sectors, which produce more than 90 percent of the effects of an external shock on the main variables (total gross production, employment, value added and wages) on the economies of the regions of Mexico.

Another aspect to be highlighted is the incidence of productive specialization profiles of the economies of the mesoregions of Mexico on their exposure to fluctuations in the external market. The Northern Border of Mexico (Northwest and Northeast) is particularly sensitive to the dynamics of foreign sales of machinery and equipment; metal industries; other manufactures and; manufacture of clothing, leather and leather. They also have some divergences: Changes in the exports of the food industry have a relevant impact in the Northwest, while the Northeast shows greater sensitivity to those of Petrochemical, plastic and rubber, as well as transport, mail and storage.

The exports of the primary sector and of the food industry are especially important for the economies of the Central-North Plateau and the West. Similarly, the first of these two is the most affected by changes in the exports of the garment industry.

Mesoregions with a high population concentration, such as the Center, or which play a key role as distribution nodes (Central and Western), are especially vulnerable to alterations in the commercial value of tertiary activities (wholesale and retail trade, as well as transportation and storage).

Petrochemical activities in the South and Southeast- Gulf regions are very reactive to changes in exports, while the primary sector and retail trade, in the first of these two, are also affected.

Finally, in section five of the chapter, we examine the role of international exports of the Mexican economy in the determination of adjusted disposable income of households in its seven mesoregions and, depending on their corresponding allocation structure, on the levels of private consumption of goods and services produced in them or imported by these from the rest of the country.

Once we have weighted them by their population, both the data on disposable income and on consumption, highlight the territorial disparities in the matter. While households in the Northeast region of Mexico have income and consumption 30 and 25 percent higher than the national average, those in the South have incomes lower than average by 46 percent and consumption by 54.

Also households in the Northwest, Central and West mesoregions, have incomes higher than the country average by 12, 10 and 5 percent, respectively. On the other hand, the consumptions exceed the national average in 1, 19 and 1 percent, respectively.

In the Southeast-Gulf and the Central-North Plateau regions, households receive below-average perceptions at -13 and -15 percent, while their consumption is lower at -14 and -12, respectively.

The structure of allocation of disposable income in the households of the South mesoregion of Mexico shows once again its productive disarticulation and its strong dependence on imports of goods and services from the rest of the country and abroad. Both, in absolute and relative terms, their income is much lower than the national average, which is why their private savings capacity is also (only 9 percent, against 14.1 of the national total and 21.7 of the maximum value reached by the Northwest homes). In addition, South households allocate only 59 percent of their income to purchase goods and services produced in the same region (national minimum value, see Graph 2).

As a result of the above, the population of the South mesoregion depends proportionally more on imports from the rest of the country and the rest of the world than any other mesoregion of the country (in both cases it reaches the maximum values: 21.4 and 5.7 percent, respectively) .

With the information of the disposable income for the households of the seven mesoregions, as well as the proportion of the same destined to the private consumption of goods and services of regional and interregional origin, it was possible to determine the weight of exports in that variable. At the national level, 21.8 percent of consumption is linked to the income originated by the export component in the exogenous final demand vector. Also in this case, the repercussions are greater in the mesoregions mainly related to the foreign market; the two of the Northern Border (Northwest and Northeast), in which the affectation reaches more than one third of the regional private consumption and the rest of the country, as well as the Southeast-Gulf, with just under 30 percent (because of being the origin of the bulk of oil sales abroad).

The influence of exports on national private consumption has shifted towards the mesoregions of the West, Center-North Plateau and Center. In the first two, it determines almost a quarter of the total, while in the third it accounts for a little less than a fifth.

An important result of the work is that the repercussions of a possible external shock are also considerable in the areas of the republic less dependent on its sales to the external market, such as the South, mesoregion in which they do not even reach half a percentage point of the national total. In spite of the above, exports account for 11.8 percent of regional consumption in goods and services of domestic origin (originating in the region itself or in the rest of the country).

The productive activities whose private consumption in goods and services of regional origin are more vulnerable to oscillations in exports of goods and services in the different mesoregions of Mexico are shown in Table 4. Among the five with the highest absolute impact, four tertiary activities stand out (Real estate services; Retail trade; Transport and storage, as well as Educational services) and one manufacturing (Food industry). All with the characteristic of being goods and services with a high presence in the consumption basket of Mexican households.

This situation reveals the existence of mechanisms of transmission and amplification of the changes of exports that go through the processes of generation, allocation, redistribution and expenditure of income, to finally impact the levels of demand, consumption and, finally, the production of the economic sectors.

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