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Economic Watch

Mexico

Mexican computer exports: excessive industrial focus on desktops*

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Economic Analysis

Mexico

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- Computers shipments to the U.S. have bolstered the performance of electronic products exports made in Mexico in 2010-2012 with a compounded annual growth rate of 19.4%.
- Desktop computers have taken the lion's share of computing equipment exports to the U.S. According to the figures available for the second quarter of 2013, these exports accounted for 81.2% of such equipment.
- However, over the last four quarters, exports of these products to the U.S. have registered an accumulated net shift of 977 million dollars less than the peak reached in the second quarter of 2012.
- This negative performance is mainly due to the greater industrial focus in Mexico on desktop computers *vs.* other durable manufactured products compared to its competitors in that market. This factor accounts for 75.4% of the accumulated annual reductions of these exports over the last four quarters, while the lower demand for imports in the U.S. contributes with 20.7%.
- Mexican exports of laptop computers show a relatively lower competitiveness, which mainly explains the negative annual changes in these exports to the U.S.

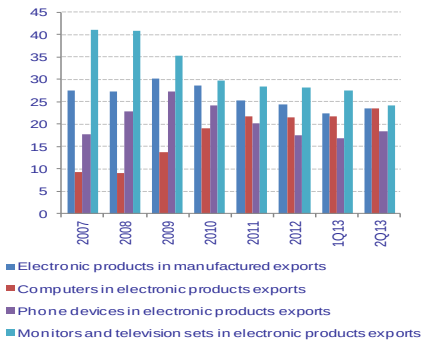
Mexican exports of electronic products and computers represent a significant share of total manufacturing exports to the United States. The annual figures for 2007-2012 show that these exports had an average share of 27.3% in total manufacturing exports to that country. The main electronic products exported to the U.S. are monitors and television sets, computers and phone devices (see Chart 1). The information for the second quarter of 2013 obtained from the U.S. International Trade Commission (USITC) shows that these goods accounted for 24.2%, 23.4% and 18.5% of total exports by the Mexican electronics industry, respectively. The U.S. market is the main exports destination of television sets and monitors, computing equipment and phones, which accounted for 83.5%, 91.9% and 70.1% of their respective total exports in 2012.

Since the rebound in production following the global economic recession in 2008-2009, the performance of the Mexican electronics industry had been bolstered mainly by computer exports to the U.S. (see Chart 2). For the 2010-2012 period, the compounded annual growth rate (CAGR) of these exports was 19.4% *vs.* 0.5% and -4.7% for exports of monitors and television sets, and phone devices, respectively. However, these exports slowed down after the second quarter of 2012, and even registered rapid annual declines in the three following quarters (see Chart 3).

* We would like to thank Alma Martínez, Carlos Serrano and Samuel Vázquez for the suggestions they made in relation to the first draft of the document.

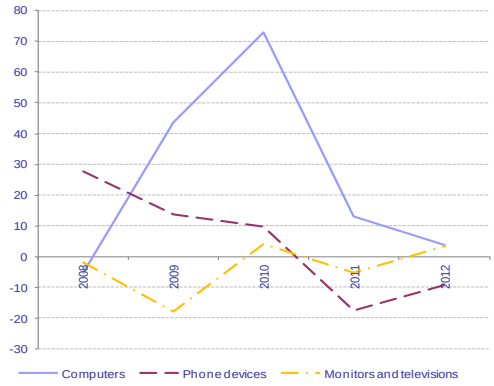
Although the real effective exchange rate appreciated 15.2% from the second quarter of 2012 to the first quarter of 2013, the negative performance of Mexican computer exports in those three quarters is more likely the result of the lower demand for computers worldwide. A press release by International Data Corporation (IDC) points out that global computer shipments registered an 11.4% annual decline in the second quarter of 2013, marking five consecutive quarters of annual reductions (in the previous quarters the declines were 13.9%, 6.4%, 8.6% and 0.1%, respectively).[1] It is worth mentioning that desktop computers have taken the lion's share of Mexican exports of data processing equipment, with 81.2% of the total exported to the U.S. in the second quarter of 2013 (see Chart 4). In that quarter, Mexico also had the largest market share in that country's desktop computer imports market with 75.7% of the total *vs.* 15.9% for China, the runner-up competitor.

Chart 1
Exports of electronic products to the U.S. (% share)



Source: BBVA Research with USITC data

Chart 2
Exports of main electronic products to the U.S. (y/y % change)



Source: BBVA Research with USITC data

The lower demand faced by the computer industry worldwide (which is reflected in the performance of domestic exports of desktop computers) could be attributed to a change in consumer preferences when buying or upgrading this type of computers. Among other reasons, both the relatively less rapid technological advances in hardware and the degree of substitutability by tablets and smartphones would imply a less frequent use of computers (thus reducing the likelihood of replacement).[2]

In order to examine the recent dynamism of computer exports and, at the same time, be able to attribute their performance to factors such as the demand for these products in the U.S. market, the competitiveness of the domestic computer industry compared to other countries' and the role of the domestic industrial composition focusing on sectors with relatively higher or lower growth, the shift share analysis was used. Ahmadi-Esfahani (2006) point out that the usefulness of this methodology for assessing a country's exporting performance depends on the empirical validity of the aggregation assumptions of the theoretical model used for diagnosing such performance. Meanwhile, Fagerberg and Sollie (1985) criticize the use of this methodology due to the interdependence between the market distribution of exports and the industrial composition

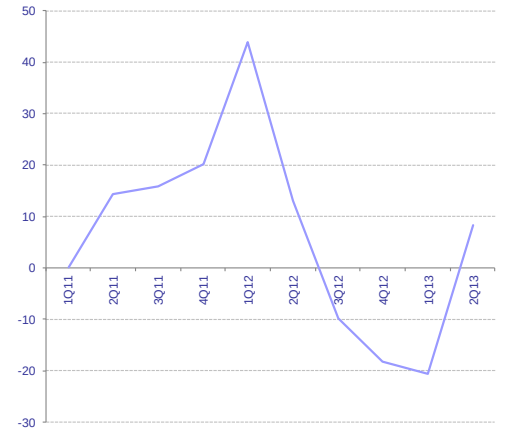
[1] The press release is available on http://www.idc.com/getdoc.jsp?containerId=prUS24213513. For more information on the annual declines in global computer shipments in recent quarters, please refer to the article "Spoiler Alert: PC Sales In Free Fall" by Elliot Markowitz, in the "Computer Technology Hardware Solutions and News" section www.thevarguy.com.

[2] In The Wall Street Journal's article "Computer Sales in Free Fall" published on April 11, 2013, the reporters Clint Boulton and Michael Hickins documented that the new Windows 8 operating system had not only failed to encourage the purchase of computers, but had even reduced demand for this type of equipment by providing it with functions that in tablet mode are confusing and suboptimal. They also claimed that consumers today prefer mobile devices given the marginal increases in performance offered by computer hardware technology. Finally, the article refers to the comments made by the market research company IDC, according to which companies have extended the life cycle of their computers from three to four or five years.

effects. For purposes of this document, such criticism does not apply as it is analyzed the exporting performance in the U.S. imports market only.

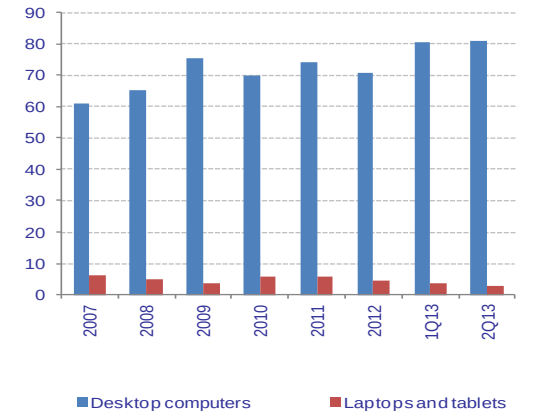
In this document the procedure described in Wan (2013) was used. This author analyzes the exports of electronic products of several Asian countries in order to determine which countries, and in what type of products, have been losing ground to others. The shift share analysis was also applied to determine whether imports of laptop computers and/or cell phones into the U.S. might be replacing the imports of desktop computers in that country.

Chart 3
Mexican exports of computers to the U.S. (y/y % change)



Source: BBVA Research with USITC data

Chart 4
Breakdown of computing equipment exported to the U.S. (% share in total)



Source: BBVA Research with USITC data

Description of the methodology

The shift share analysis makes it possible to identify four types of effects to explain the variations in exports. For the cases analyzed in this document, the components of the changes in exports are the following: the effect of the U.S. imports market for the product being analyzed, the relative competitiveness (compared to the reference group) corresponding to such product, the relative focus (compared to the reference group) on manufacturing the product *vs.* manufacturing other durable goods, and the interaction between these two last components.[3,4] The net shift concept refers to the change in exports in relation to the variation explained only by the effect of the U.S. imports market. In other words, a positive net shift would indicate that exports of such product from a given economy performed better than the exports of the reference group, while a negative shift would indicate the opposite. For a clear understanding of the mathematical notation and a more complete explanation of this type of analysis, please refer to the Appendix at the end of this document.

The economic intuition behind the components that explain the changes in exports can be summarized as follows:

1. The effect of the U.S. imports market for the product being analyzed: part of the changes explained by the demand itself in the market where the product competes.

[3] For the cases analyzed in this document we used data on exports of desktop computers, laptops and cell phones to the United States, obtained at the interactive site of the U.S. International Trade Commission (USITC). These data are denominated in dollars, represent the customs value of the goods, correspond to a code on the U.S. Harmonized Tariff Schedule (HTS) and are released on a quarterly basis. For desktop computers, laptops and cell phones, the HTS codes 84715001, 8471300100 and 85171200, respectively, were used. The data on total exports of durable goods were taken in accordance with the North American Industry Classification System (NAICS), code NAIC: 33.

[4] Quarterly data from the original series were used, for which annual changes were calculated. The data were not seasonally adjusted, due mainly to two reasons: 1) the widespread practice of reporting data on global computer shipments in their original series; and 2) the questions derived from the dilemma of seasonally adjusting the total series or each one of its components. The latter is important, given the breakdown used by the shift share analysis.

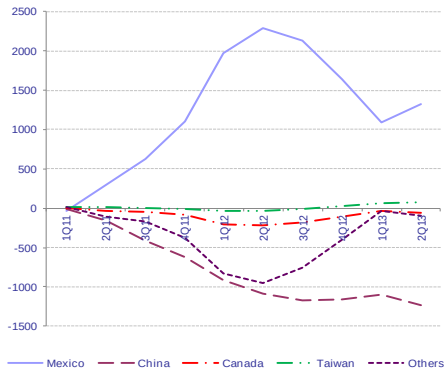
2. The relative competitiveness of the product being analyzed: part of the changes that reflects the higher or lower growth rate of the product's exports in relation to the growth rate in the market where they compete.
3. The relative industrial focus on manufacturing the product *vs.* manufacturing other durable goods: part of the changes due to the greater or lower concentration in relatively more dynamic manufacturing sectors in relation to the reference group.
4. The interaction between the competitiveness and industrial focus effects: when this component of the change is positive, it means that the country is more focused (compared to the reference group) on manufacturing products in more dynamic sectors or less focused on manufacturing products in less dynamic sectors. A negative component would show a country focusing more on less dynamic sectors or focusing less on more dynamic sectors.

Analysis of results

The shift share analysis was applied to the Mexican exports of desktop computers that are part of the total U.S. imports of these products. A similar analysis was conducted for laptop computers. In the case of desktop computers, Chart 5 shows that Mexican exports registered a positive accumulated net shift of 1,317 billion dollars from the first quarter of 2010 to the second quarter of 2013. However, over the last four quarters, these exports showed an accumulated net shift of 977 million dollars less than the peak reached in the second quarter of 2012. Furthermore, as of the third quarter of 2012, the accumulated loss due to the effect of the U.S. market has only been 254 million dollars, or 20.7% of the total accumulated loss.

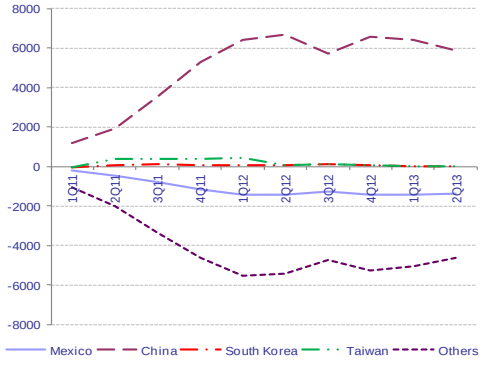
Chart 6 shows that, unlike desktop computers, the Mexican exports of laptop computers did not have a positive accumulated net shift for the same period. The same chart also shows that the Mexican exports of laptop computers were strongly displaced by Chinese exports in 2011. Consequently, for the whole analyzed period, the accumulated net shift of Mexican exports of these computers was -1,360 billion dollars.

Chart 5
Accumulated net shifts of desktop computer exports (million USD)



Source: BBVA Research with USITC data

Chart 6
Accumulated net shifts of laptop computer exports (million USD)

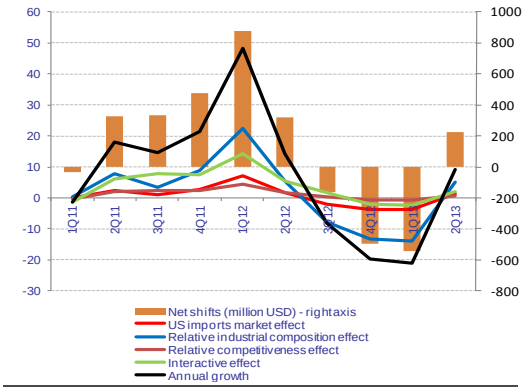


Source: BBVA Research with USITC data

In order to gain a better understanding of what underlies the negative accumulated net shift of the Mexican desktop computer exports from the third quarter of 2012 onwards, we calculated the contribution of all three components to the accumulated net shift: the relative industrial composition, the relative competitiveness and the interactive effect (see Chart 8). As shown in Charts 7 and 8, the negative net shifts seen after the third quarter of 2012 are due to a great extent to an industrial composition more focused on the production of desktop computers *vs.* other manufactured durable products compared to the group of countries that export these

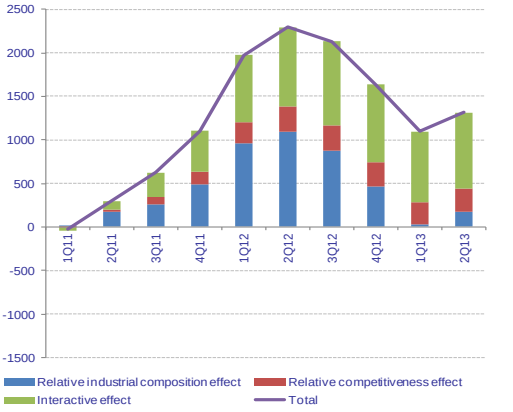
products to the U.S. After quantifying this effect it was found that it accounts for 75.4% of the accumulated total annual reductions in exports of these computers.

Chart 7
Breakdown of the annual changes in Mexican exports of desktop computers (%)



Source: BBVA Research with USITC data

Chart 8
Contribution to the accumulated net shift of Mexican desktop computer exports (million USD)



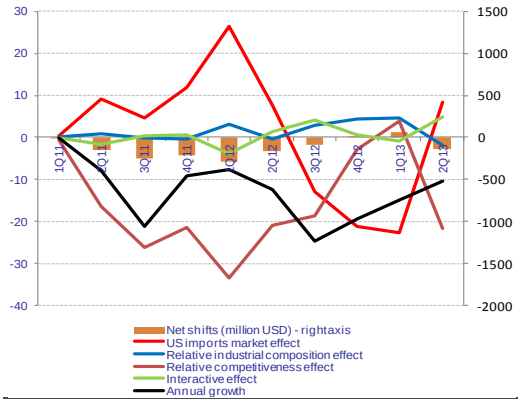
Source: BBVA Research with USITC data

During the fourth quarter of 2012 and the first quarter of 2013, it can be seen how the relative competitiveness effect becomes negative, making the interactive component to also turn from positive to negative given this industrial composition relatively more focused on a sector that not only is less dynamic, but also declined in both quarters. These findings on the relevance of the industrial composition factor should not be surprising in view of the specialization of the electronics industry in Mexico in higher-volume products, given transportation costs and its geographical proximity to the U.S.

A similar approach was followed to analyze the situation of Chinese desktop computer exports to the U.S. As shown in Charts 9 and 10, the relatively lower industrial composition of China favoring this type of products, together with the improvements in its relative competitiveness, have enabled it to cushion the U.S. market's decline during the three quarters following the second quarter of 2012 (China even registered a positive net shift in the first quarter of 2013).

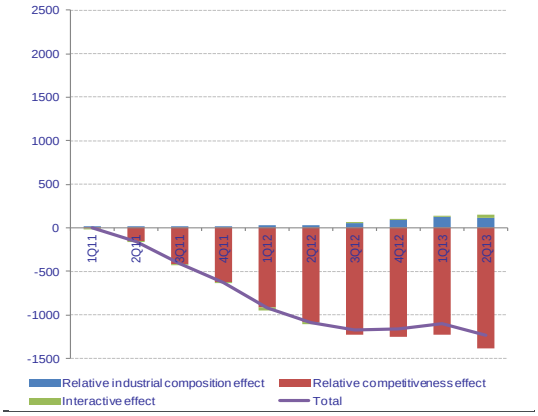
In the case of laptop computers, in order to understand in greater detail the reason for the ground loss of the Mexican exports of these computers mainly during 2011, we also calculated the contribution of all three components to the accumulated net shift: the relative industrial composition, the relative competitiveness and the interactive effect. Charts 11 and 12 show that negative shifts occurred in 2011 despite the positive annual growth rates in three of the four quarters of that year. These shifts were due to a great extent to unfavorable relative industrial composition and competitiveness against the background of a growing U.S. market for these products. Although the negative percentage contributions from the relative competitiveness effect have stabilized since the second quarter of 2012, this has not been enough for Mexican exports of laptop computers to show positive annual growth rates since the fourth quarter of 2011.

Chart 9
Breakdown of the annual changes in Chinese exports of desktop computers to the U.S. (%)



Source: BBVA Research with USITC data

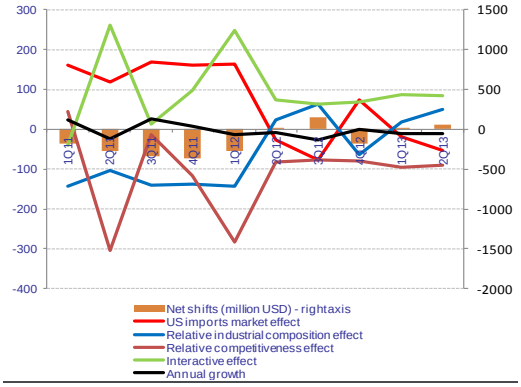
Chart 10
Contribution to the accumulated net shift of Chinese desktop computer exports (million USD)



Source: BBVA Research with USITC data

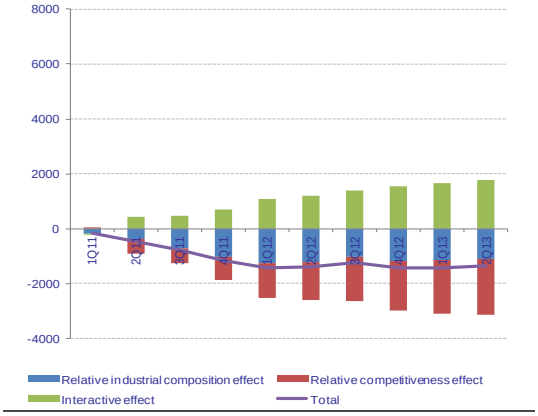
In regard to Chinese laptop computer exports, Charts 13 and 14 show that the relatively successful experience for these products making inroads into the U.S. market is mainly due to a relatively favorable industrial composition, which explains a large part of the percentage annual growth throughout the period being analyzed.[5]

Chart 11
Breakdown of the annual changes in Mexican exports of laptop computers (%)



Source: BBVA Research with USITC data

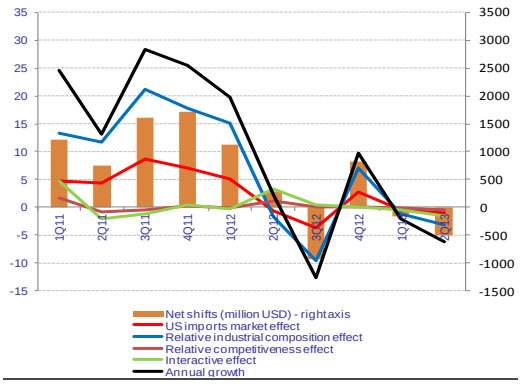
Chart 12
Contribution to the accumulated net shift of Mexican laptop computer exports (million USD)



Source: BBVA Research with USITC data

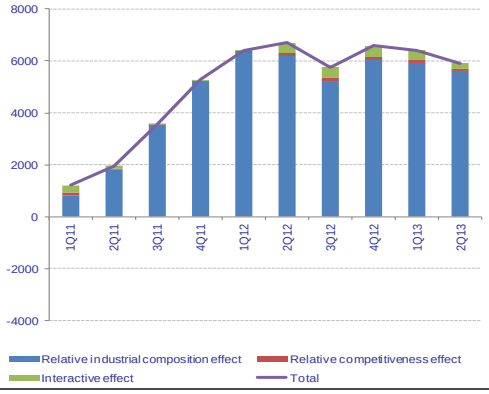
[5] China is the country with the largest market share (93.7% in 2Q2013 *vs.* a Mexican share of 1.2%) in total U.S. imports of these products.

Chart 13
Breakdown of the annual changes in Chinese exports of laptop computers to the U.S. (%)



Source: BBVA Research with USITC data

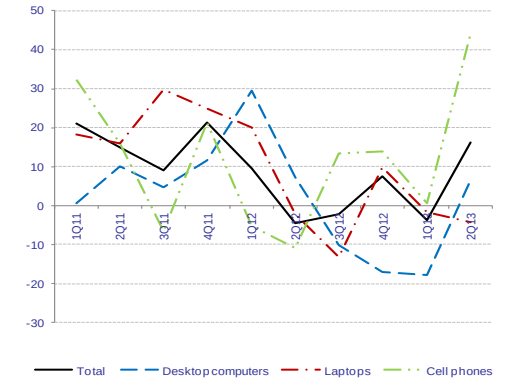
Chart 14
Contribution to the accumulated net shift of Chinese laptop computer exports (million USD)



Source: BBVA Research with USITC data

Finally, the shift share analysis was applied to determine whether imports of laptop computers and/or cell phones in the U.S. might be displacing the imports of desktop computers in that country. Chart 16 shows that, as of the third quarter of 2012, desktop computers have been steadily replaced by cell phones. Since then, the accumulated net shift of the U.S. imports of desktop computers amounts to -2.335 billion dollars whereas laptops imports register a corresponding figure of -2.838 billion dollars.

Chart 15
U.S. imports of desktop computers, laptops and cell phones (y/y % change)



Source: BBVA Research with USITC data

Chart 16
Net shifts in U.S. imports of desktop computers, laptops and cell phones (million USD)

Source: BBVA Research with USITC data

Consequently, cell phone imports in the U.S. have registered an accumulated net shift of 5.173 billion dollars during the same period, or an amount equivalent to 10.9% of all the cell phones imported since the third quarter of 2012. Although the tariff fraction used for cell phones includes all types of cell phones, this result might suggest an increased preference for products such as smartphones among U.S. consumers.[6]

[6] Using information provided by IDC on global shipments of cell phones, available on http://www.idc.com/getdoc.jsp?containerId=prUS24239313, and the annual growth of U.S. imports of cell phones in the second quarter of 2013, it is estimated that smartphones represent 89.2% of the total number of cell phones imported by the U.S. in such quarter. Furthermore, when using this last approximation, the net shift registered in that quarter by cell phones would have represented 21.8% of total smartphone imports. This suggests that around one-fifth of smartphones are replacing computers.

Conclusions

In this document we applied the shift share analysis to Mexican exports of desktop and laptop computers to the U.S. It was decided to resort to this type of analysis to be able to identify the impact on the recent dynamics of such exports of the following factors: 1) U.S. demand for computers; 2) the relative competitiveness (compared to other countries) of Mexican computer exports; and 3) the relative focus (compared to other countries) on the computer industry *vs.* other manufactured durable goods.

The main findings of this analysis are: i) computer exports to the U.S. have bolstered the exports performance of electronic products made in Mexico in 2010-2012, with a compounded annual growth rate of 19.4%; ii) according to the shift share analysis, Mexico has proven to have a comparative advantage in the production of desktop computers, but not in laptops; iii) however, as of the third quarter of 2012, desktop computer exports to the U.S. have registered an accumulated net shift of 977 million dollars less than the peak reached in the second quarter of the same year; iv) Mexican desktop computer exports to the U.S. have been affected in 75.4% by the greater industrial focus in Mexico on desktop computers vs. other manufactured durable products when compared to its competitors in that market, and in 20.7% by the lower demand for these products in that country; v) in the case of Mexican laptop computer exports, the effect of lower relative competitiveness explains to a great extent the negative annual changes in these exports to the U.S.

Appendix

In this section the mathematical procedure used to break down the changes in the exports of a given economy is explained. Such economy belongs to a group of countries against which competes in an imports market. To do so, the following terms are defined:

TE_j = Total exports of manufactured durable goods of economy *j*;

E_{ij} = Exports of product *i* of economy *j*;

TE_g = Total exports of manufactured durable goods of reference group *g*;

E_{ig} = Exports of product *i* of reference group *g*;

GR_{ij} = Growth rate of exports of product *i* of economy *j*;

GR_{ig} = Growth rate of exports of product *i* of reference group *g*;

$$ES_{ij} = \frac{E_{ij}}{TE_j};$$

$$ES_{ig} = \frac{E_{ig}}{TE_g}$$

Using the above mathematical notation, the change in the exports of product *i* of economy *j* is given by the following equation:

$$\Delta E_{ij} = ES_{ij} TE_j GR_{ij} \qquad \text{(A.1)}$$

Based on the breakdown proposed by Wan (2012) to distinguish the factors behind the changes in exports, by adding and subtracting a series of terms in different parts of the right side of the above equation, the expression (A.1) is transformed into:

$$\Delta E_{ij} = ES_{ig} TE_j GR_{ig} + \left(ES_{ij} - ES_{ig}\right) TE_j GR_{ig} + ES_{ig} TE_j \left(GR_{ij} - GR_{ig}\right) + \left(ES_{ij} - ES_{ig}\right) TE_j \left(GR_{ij} - GR_{ig}\right) \qquad \text{(A.2)}$$

It is important to note that the algebraic simplification of equation (A.2) produces the term shown on the right-hand side of equation (A.1). For the cases analyzed in the text of this document, the four terms to the right of the equality sign in equation (A.2) explain, respectively, the part of the change in the exports of product *i* of economy *j*, which is due to the following: (1) the dynamics of the imports market for product *i* in the U.S.; (2) the relative industrial composition (compared to other countries) for product *i vs.* other manufactured durable products in economy *j*; (3) the relative competitiveness (compared to other countries) of the exports of product *i* of economy *j*; and (4) the interaction between the relative industrial composition and competitiveness effects. In other words, in terms that imply an economic intuition, equation (A.2) could be expressed as follows:

ΔE_{ij} = Effect of the U.S. imports market + Effect of the relative industrial composition + Effect of the relative competitiveness + Interactive effect (A.3)

Meanwhile, the net shift concept refers to the variation in the exports of product *i* of economy *j* in relation to their change explained by the effect of the U.S. imports market for product *i*. Thus, we have a measurement that enables us to determine whether the exports of product *i* of economy *j*

performed better, equally or worse than those of the reference group. The mathematical expression for the net shift would therefore be given by:

$$NS_{ij} = \Delta E_{ij} - ES_{ig} TE_{j} GR_{ig} \quad \text{(A.4)}$$

Alternatively, the net shift can be expressed as:

$$NS_{ij} = \text{Effect of the relative industrial composition} + \text{Effect of the relative competitiveness} + \text{Interactive effect} \quad \text{(A.5)}$$

It is important to note that the sum of the net shifts of all the economies that make up the reference group is, by construction, equal to zero.

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