

Local and Global productivity and their effects on value added in Mexico, 2015

CONTRERAS-ÁLVAREZ, Isaí *†, RÍOS-NEQUIS, Eric Israel

Universidad Politécnica Metropolitana de Hidalgo

Received July 28, 2017; Accepted December 20, 2017

Abstract

This paper analyses the effects originated by global and local productivity of 81 manufacturing sub branches in México for 2015 according to INEGI data base. The article shows the evolution of manufacturing sub branches productivity and their value in international trade

The current work focus on the value of exportations gained in Mexican manufacturing sub branches and current trends indicate that liberalization has tried to improve economic growth trough exportations. Although national manufacturing exportations contains an important percentage of imported inputs.

The obtained results from current research in a cross sectional regression model indicates that whole value added is explained by global manufacturing productivity. In other words, local productivity can't generate significant value added in Mexico.

In the other hand, the complexity of productive chains is remarkable in a context of productive evaluation in the global value chains and high dependence of the national economy on foreign direct investment.

Productivity, exports, value added, competitiveness

Citation: CONTRERAS-ÁLVAREZ, Isaí, RÍOS-NEQUIS, Eric Israel. Local and Global productivity and their effects on value added in Mexico, 2015. Journal-Industrial Organization 2017. 1-1:1-13

† Researcher contributing first author.

Introduction

In a context of free market and trade openness, economic growth via exports is fundamental to achieve competitive success and economic development. Therefore, it is crucial to analyze the added value that industries can generate in their productivity.

In this scenario, the analysis of global value chains is fundamental to evaluate the economic dimension that can obtain the productive chains in the national industry. In this sense, it is crucial to assess the impact generated by possible decisions made in relation to NAFTA and to explain a possible answer to a situation that is not yet realized but that is latent.

On the other hand, competitiveness is a basic subject in the economic and administrative sciences to explain the degree of success that can have the national industry of a country. In this sense, Porter explains that the economic gains of a country is due to the competitiveness of the industrial sectors. Therefore, it is pertinent to evaluate the value added generated by the local industry in a comparative context with global productivity (global value chains) in order to establish a valid reflection on the subject.

The first section of the article approaches the theoretical framework and the explanation of a function that talks about the correlation between exportations and productivity from Kaldor's perspective. The second section explained the development of manufacturing industry in Mexico. Consequently the article show the econometric analysis to test hypotheses. Finally the conclusions are presented to make a deep reflexion about competitiveness in Mexico.

The research has an objective that is to evaluate the effects generated by global and local manufacturing productivity on value added. In particular, the work will analyze if the amount of productivity represented in a monetary form is positively correlated to added value.

The article pretend to test that value added in manufacturing industrial sector is explained by global manufacturing productivity. By the other hand, local manufacturing productivity can't generate the same effects as the first one in Mexico. That phenomena es caused by productive chains and global value chains and lack of competitiveness in local manufacturing sectors. In a secondary way, the research pretend to test that the amount of productivity in industrial sub branches is not correlated to value added. In other words, the size of productivity does not depend on value added.

Theoretical framework

The current section approaches two theories to support the idea of evaluate the added value in exports and the latest mentioned as a key factor of competitiveness and productivity.

From the perspective of demand, the link between exports and economic growth is explained by the effect of the first in the components of global demand through two mechanisms, specifically: a) directly, since exports are a component of aggregate demand and. b) indirectly, by the multiplier effect of exports, which allows the expansion of other components of global demand.

Under the same approach, Kaldor (1966) considers that demand is an element capable of boosting economic growth, in such a way that supply-side factors increase as it also does, thus generating the growth of the economy in the long term.

In this context, CEPAL (1998) notes that manufacturing exports are a source of real growth through the transmission channels of export growth, namely: 1) currency generator, since these are necessary to import the intermediate goods and inputs required in the production process, 2) a greater internal productive chaining of the exporting activities causes two important effects: First, a greater multiplier effect on demand and therefore on production (due to direct and indirect impulse of exports to the product and to other sectors, respectively) and secondly, it generates a substitution process of imports, which in turn causes a decrease of the income elasticity of imports and a decrease in the demand of these as the product grows, 3) the positive externalities generated within an economy due to the character of competitiveness and innovation demanded by the exporting activities.

A key concept for Kaldor is the process of interaction established between demand increases caused by increases in aggregate supply as a result of an increase in demand (Jesús Felipe, 1998). This process is known as the *cumulative circular causation model*, which is the result of the Kaldor's three laws, which are explained below. According to Mc Combie and Thirlwall (1994:164-166), the basic assumptions of the model are as follows: i) the faster the rate of growth of the manufacturing sector, the faster will be the rate of growth of GDP; ii) the faster the rate of growth of manufacturing output, the faster will be the rate of growth of labour productivity in manufacturing owing to static and dynamic economies of scale, or increasing returns in the widest sense; iii) The faster the rate of growth of the manufacturing output, the faster the rate of transference of labour from other sectors of the economy where there are either diminishing returns, or where no relationship exists between employment growth and output growth.

iv) As the scope for transferring labour from diminishing returns activities dries up, or as output comes to depend on employment in all sectors of the economy, the degree of overall productivity growth induced by manufacturing growth is likely to diminish, with the overall growth rate correspondingly reduced; v) The growth of manufacturing output is not constrained by labour supply [...] but is fundamentally determined by demand from agriculture in the early stages of development and the exports in the larger stages; vi) A fast rate of growth of exports and output will tend to set up a cumulative process, or virtuous circle of growth, through the link between output growth and productivity growth”.

In relation to the presence of growing returns within the manufacturing sector, Kaldor emphasizes the Verdoorn's law, which establishes a statistical relationship between labour productivity and production in terms of manufactures and industry (also includes manufacturing activities, in addition to construction and public services). This law is important because it constitutes the basis of the cumulative circular-cause model of economic growth and then, because it's an important component within the demand-oriented approach to economic growth (Mc Combie and Thirlwall, 1994), and is defined as:

$$p = a + bq; \quad (1)$$

where “p” and “q” are the exponential growth rates of productivity and product, while the slope coefficient “b” is defined as the Verdoorn's coefficient.

However, to develop these ideas, it's necessary to study the Kaldor's three laws of that establish a link with the cumulative circular causation model, as shown below: a) *first law*. It establishes that there's a positive correlation between total GDP growth and manufacturing.

The foregoing is explained by the following reasons, namely: in the face of an expansion in industrial production and the product, there is a transfer in labour resources from sectors characterized by underemployment and unemployment, which ensures that there is no decrease in the product in these and that, at the same time, the industrial sector experiences an increase in productivity. So, as the manufacturing sector grows, the rate of transfer of work from the sectors described above will be faster; b) *second law* (also known as the Verdoorn's law). It refers to the direct relationship between the growth of labour and product productivity in both the manufacturing sector and the industry level; c) *third law*. There's a positive relationship between the growth of total productivity and the growth of employment in the manufacturing sector. While at the microeconomic level, the increase in productivity could be reflected in a displacement of physical capital by human, it is considered that at an aggregate level (macroeconomic perspective), the jobs that are generated are greater with respect to those that are lost (De la Rosa, 2006).

Once the causality is established, at least partially, from the growth of the product to the productivity of the work through the Verdoorn's Law (Thirlwall, 1975), it's necessary to establish that the link between exports and growth is given by the growth of productivity and price competitiveness within an international context (see figure 1).

Starting analysis from exports (x), then it has to be located within a context of competition, manufacturing exports compete for the price side (d_p), so they are based on the relationship of internal/external prices and the income of the rest of the world. In such a way that the lower the domestic price, the greater the volume of exports, thus the growth of these will drive the aggregate demand, which will allow to achieve a certain level of growth, denoted as " \dot{y} ".

Then, because of the growth of the product, there will be an increase in productivity (δ) through the Verdoorn's law. However, through increased productivity it's possible to improve the domestic price (d_p), which allows a better positioning in the international market, achieving with it a sustained growth of exports. Finally, it should be noted that this system will tend to balance because the expansive effects on exports and products are becoming smaller.

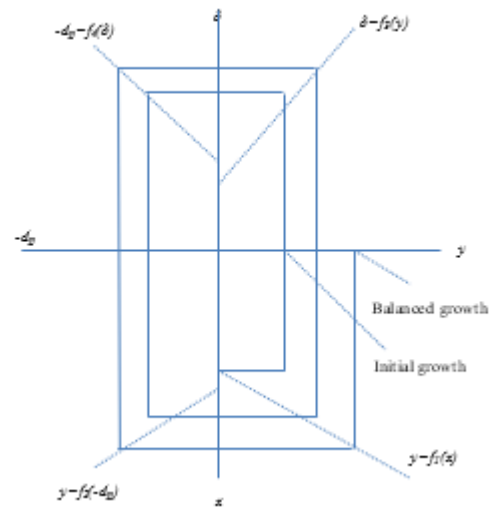


Figure 1 Cumulative circular causation. De la Rosa, Juan Ramiro (2006). Dos enfoques teóricos sobre el proceso de crecimiento con énfasis en las exportaciones manufactureras. *Análisis Económico*, vol. XXI, núm. 48

The classic theory of international trade explains the success of nations as a natural consequence of the endowment of factors that count: natural resources, labor and capital; Countries specialize in those sectors where they have a more intensive use of some factor. However, for Porter (1999:170) classical theory has been eclipsed in advanced countries and industrial sectors and by the globalization of the competition and technological development.

Porter argues that there are additional elements to national comparative advantages.

These are the competitive advantages, which are generated internally, ie the industrial dynamics and the way it's organized in a country, will determine the degree of technological progress and competitiveness (Buendía, 2013).

As we analyzed previously, the classical international trade theory explains the success of the nations as natural consequences of the natural factors dotations with each is counted: natural resources, labor and capital; the countries specializes in those sectors where they have an intense use of a factor. However, for Porter (1999:170) the classical theory has been eclipsed in the sectors and advanced countries for the competition globalization and the technological development.

Based on a study realized in ten countries that distinguish in the foreign trade in the 80's, Michael Porter made a national competitiveness theory based in the productivity causes, because this is the only variable that explains the competitiveness of a nation, instead of what it explains the classical theory (traditional competitive advantages); there is an important quote from this theory "the national prosperity is not hereditary, it is created by the opportunities that a country gives to their enterprises, because they are the only in charge of creating a competitive advantage through innovation. For this author, once the enterprise achieves the competitive advantage, it can only be maintained by a constant improve, wich it has to renew or die, otherwise, competitors will overtake any enterprise that quits innovation.

What generates competitive advantage? Competitive advantage is created and maintained by a highly located process, even the most developed countries are not competitive in every sector, that's why nations succeed in specific sectors because the national environment is the most progressive, dynamic and stimulating (Porter, 1999:163).

This competitive environment, according to Porter, is reached through four competitive factors that individually and as a system define the competitive environment in wich, enterprises learn and develop their competitiveness, this model known as "Diamond's Model" (1990), conformed by four awns, defines the next competitive factors: 1) factor's Conditions: Talks about the specialized factors creation (specialize workforce, infrastructure creation, etc.) needed for making a competitive nation, because the key of the competitiveness is not constituted by the natural factors dotation, it's the ability of how there are processed for making an efficient production. Aversely as it's known, providing a wide specialized workforce don't represent any advantage, because it's needed a specialized workforce in specific enterprises necessities, as well as counting with investigation centers specialized in innovation, development, assimilation and application of the science and technology knowledge, because this factors are limited and hardly to imitate for the national and foreign competitors, and it's needed a sustained investment for creating them; 2) demand conditions: we can believe that globalization has been reducing the intern demand importance, that the international competition and the external demand are more important to develop nation's competitive capabilities but it is not true at all because from Porter's point of view the composition and character of the internal market often has a disproportionate effect on the way companies perceive, interpret and respond to the needs of buyers. Companies start production close to the observed market, ie the conditions of domestic demand help create competitive advantage when a particular segment of the sector is larger or more visible in the domestic market than in foreign markets (Porter, 1999:182).

If consumers in an economy are demanding and well informed, the pressure they put on business will be greater and will force them to constantly improve their competitiveness; Companies will benefit from these demanding consumers because they will open their eyes to the new needs of markets; 3) related sectors. The third element of national advantage deals with the availability of nationally competitive national suppliers. Through these related and auxiliary sectors, timely and efficient access to the main inputs is allowed, spatial proximity between suppliers and end users facilitates the exchange of information and promote a continuous exchange of ideas and innovations. Companies have the opportunity to influence the technical efforts of their suppliers and can serve as testing sites for R & D work, accelerating the pace of innovation. Firms benefit to the fullest extent when suppliers are, in turn, competitors worldwide (Porter, 1999:184); 4) strategy, structure and rivalry of companies. The fourth determinant tells us that national conditions strongly influence the way companies are created, organized and managed, as well as internal competition. No management system is universally appropriate (whether Japanese, German, Italian, etc.), these systems are appropriate in different national contexts, the Japanese management system may be very successful, but this is only appropriate in certain industries of one size and hierarchical structure; but isn't appropriate in Italian family enterprises that are not very organized because of their family structure (Porter, 1999:185).

On the other hand for the same author, competition between national rivals encourages the creation and improvement of competitive advantage, as it encourages companies to innovate and improve; this competition between companies forces to reduce costs, improve the quality of products, as well as a new variety and diversification of products. In addition, internal competition helps to nullify the advantages of a certain company simply by being in a given nation (labor cost, market access, etc.) and this forces it to innovate and move beyond these advantage.

It's important to understand that if a firm wants to gain important competitive advantages from the presence in its home nation of world class buyers, suppliers and related industries. They provide insight in to future market needs and technological developments. They contribute to a climate for change and improvement, and become partners and allies in the innovation process (Porter, 1990a). The same author mention that having a strong cluster at home unblocks the flows of information and allows deeper and more open contact than is possible when dealing with foreign firms.

For Porter, the governmental policy can influence the acquirement of the competitive advantage being considered as the most important determinant. This is related to the fact that a government can influence the local market by subventions, investments in education, regulating the domestic market, creating a competitive infrastructure for reducing the accessing costs of the factors. The state is also an important buyer for certain industries, such as defence industry, aeronautics, telecommunications (Porter 1990b).

Porter (1990a) emphasises that the diamond is a system and that all four conditions identified in the Diamond framework must hold (be strong) for an industry to be truly internationally competitive.

Countries with the strongest diamonds are therefore supposed to end up with the most competitive firms in that industry.

According to previous source of information. Important is to approach the system of the competitiveness conditions with a coherent governmental action in order to create or improve the national competitive advantages.

For Economic Sciences is important to measure productivity and added value as an indicator that tries to give information between processes involved in whole manufacturing of a product. Productivity is a measure of the rate at which inputs are transformed in to output. Hence productivity provides the technical relationship that exists between inputs and outputs (Diewert, 1992). It measures the relationship between output such as goods and services produced and inputs that include labour, capital, material and other resources (Hill, 1993).

The level of productivity with in an organization depends on labour, capital, and the state of technology. Productivity growth over time will reflect the growth in these factors over time (Velnampy, 2011).

According to previous author, there are predefined methods for measuring the performance of a firm. Measuring all of sales growth, market share, profitability, overall performance and stock holder satisfaction will provide a more accurate view of such firms' performance.

Grunberg (2004) conceptualize the triple P method, which describes productivity as phenomenon. Profitability is also seen as a relationship between output and input, but it is a monetary relationship in which the influences of price factors are included.

Performance is the umbrella term of excellence and includes profitability and productivity as well as other noncost factors such as quality, speed delivery and flexibility.

Some corporate reports include measures of productivity such as sales per employee, value added per employee, profit before tax per employee, labour cost to sales and labour cost to value added, where as engineering federation of employers identified some performance ratios, namely (i) standard hour to actual hour, (ii) value added per rupee of fixed asset, (iii) value added per rupee of material cost of production, (iv) value added per direct labour hour (Velnampy, 2011) but it's difficult to find research related to value added and it's consequences in productivity.

Some of research desinged to evaluate productivity with value added find a positive correlation between value added and profits before taxes and they found other correlation between the labour cost to value added and gross profit (Velnampy, 2011). Others use value added to analyze the performance from a financial perspective and it's viewed as a useful tool to judge the efficiency and effectiveness of the enterprise as regards sales promotion, utilization of fund, capital productivity, labor productivity (Mandal & Goswami, 2008).

Value Added for Liebermand and Kang (2008) is the difference between the firm's total sales and its purchases of raw materials and contracted services through the efforts of employees and the application of capital, the firm "adds value" to its purchases of raw materials.

Value Added and Global Value Chain

More recently, the concept of Global Value Chains GVCs, which was already very popular among firms, has also become an important tool to analyse the extent of international trade integration of countries. Since different stages in the production process are increasingly located across different economies, more and more intermediate inputs are produced in one country and often exported to others for further inclusion in final products. Consequently, a country's exports increasingly comprise value added by imports (UNCTAD, 2015).

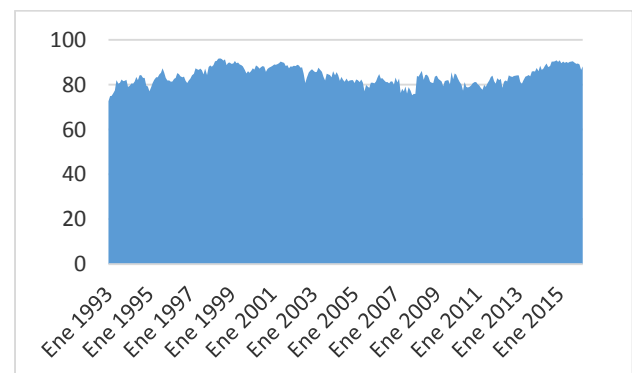
According to the same source of information. A country's exports can be divided into domestically produced value added and foreign value added (imported input that is incorporated in exported goods and services). Thus, GVC participation rate, which is the foreign value added used in a country's exports (upstream perspective) plus the value added supplied to other countries' exports (downstream perspective), divided by total exports indicates the share of a country's exports that's part of multiple processes and is a useful indicator of the level of integration in international production networks.

UNCTAD (2015) make an analysis about the influence of GVCs inside manufacturing processes, where the eight most developed economies which highest participation rate in Global Value Chains has more equilibrated participation inside manufacturing processes better known as domestic value added (downstream component) than upstream component that is the rate of foreign value in manufacturing processes. For Mexican case is viewed that foreign rate of value added is bigger than domestic. This is the reason to analyze the problem that's going to be explained in the next section of the article.

Manufacturing development, value added, and exports

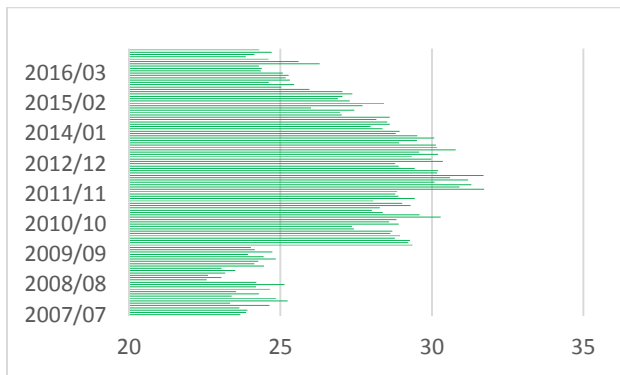
With Mexico's entry into GATT in 1986, trade began a phase of liberalization in which it was intended to integrate the country in a different way in the world market. Then, the economy was oriented towards the foreign with the intention of achieving greater competitiveness through trade, boosted by the dynamics of exports. As can be seen in chart 1, within the total exports, the most dynamic component is the manufacturing exports, which have experienced a huge boom since 1980 and which prevails until today. In particular, these exports experimented some decline in their participation during the period corresponding to the financial crisis of 2008, which originated in the sub-prime mortgage problem.

All mechanisms aimed at the liberalization of trade and capital were part of a policy whose purpose was to boost economic growth through the increase in manufacturing exports. Thus, by increasing exports, aggregate demand would also increase, which would lead to increases in domestic production and employment (Ruíz & Moreno-Brid, 1996).



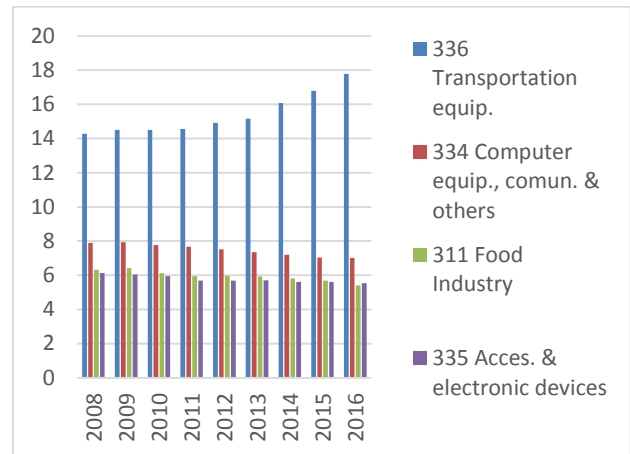
Graphic 1 Share of manufacturing exports with respect to total exports, 1993:01-2016:12. Source: Own elaboration with information from CEFP

During the period of trade liberalisation, manufacturing exports have been characterized by a high content of imported inputs, which is explained, among other things, by the exiguous national production, thus causing local companies to have to resort to external consumption. This trend is corroborated by observing the consumption of national inputs by local manufacturing establishments, which, at best, doesn't exceed 32% of the total (see chart 2).



Graphic 2 Consumption of national inputs in respect of total inputs by manufacturing establishments in Mexico, 2007:01-2017:01. Source: Own elaboration with information from INEGI.

According to chart 3, within the manufacturing establishments in Mexico, subsector 336 (corresponding to manufacturing of transport equipment) has grown progressively from 14 to 18 establishments, followed by subsector 334 (manufacture of electronic components) and food industry (subsector 311) during the period 2008-2016.



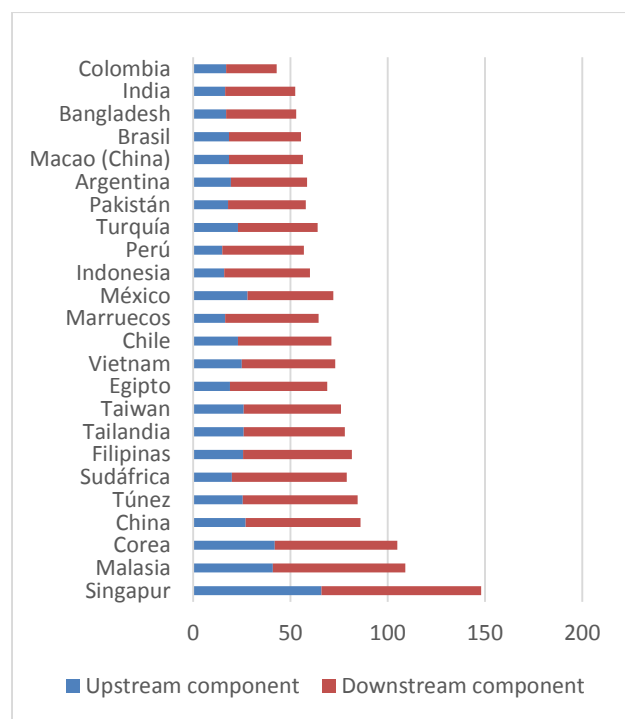
Graphic 3 Number of manufacturing establishments in Mexico, 2008:01-2016:12. Source: Own elaboration with information from INEGI.

In particular, the subsectors 334 and 311 are characterized by being highly intensive in technology and therefore, have become important consumers of it, which exacerbates, even more, external dependence.

As a result of the strong tendency to import, the added value that local companies incorporate at the final price of the market is very low. This fact is important as the value added of exports is the percentage of the final value of a product that is explained by processes developed in Mexico, and not by the rest of the countries that were part of the production chain of that product.

As can be seen in chart 4, the main exporting countries of East Asia and South-East Asian are located at the top of the ranking of participation in the GVCs, what is explained because they import a significant portion of their exports, while a significant portion of their exports are intermediate goods used in exports from other countries.

On the other hand, other developing exporting countries, such as India, Brazil, Mexico, Argentina, and Turkey, have a relatively low rate of participation in global value chains, because they have a lower level of ‘upstream component’ participation due to the nature of their exports. However they also have a low level of participation ‘downstream component’ because most of their exports are final goods or services that are not used as intermediate goods of exports from other countries.



Graphic 4 GVC Participation per country, 2010. Source: UNCTAD (2013)

As a reflection: while the growth of the manufacturing sector has been highlighted, the truth is that it doesn't have the capacity to transfer its positive effects to the economy as a whole because it's accompanied by a strong increase in the volume of imports (as already mentioned), which implies the existence of a high income elasticity of imports.

As a result of a predominant specialization in the assembly by local manufacturing establishments and the growing tendency to import intermediate inputs, machinery and equipment to carry out this process, the aggregate value generated with respect to global manufacturing production is scarce.

Econometric model and results

Data were collected from INEGI, particularly of National Accounts System (see Global Manufacturing Productivity per sub branches). Also, the study embraces 81 manufacturing subbranches for 2015, according available information. The variables used are expressed in logarithms, except for the variable “Top sub branches” which discriminates the production value of sub-branches from average.

The econometric equation used is defined as:

$$\ln \text{Value Added} = \beta_0 + \beta_1 \ln \text{PMG} + \beta_2 \ln \text{PM} + \beta_3 \text{Top sub branches} + \varepsilon \quad (2)$$

R-squared	0.9365	Obs	81	Marginal Effects
Variable	Coef	T	p>t	%
Lpmg	0.9096096	28.08	0.000	90.96
Lpm	0.0607997	1.000	0.320	
Top	0.0207938	0.07	0.941	

Table 1 Econometric results. Source: Elaborated by the authors using Stata 12

According table 1, the R-squared indicates that 93.65% of variability of added value is originated by global manufacturing productivity.

The results of marginal effects mention that a 1% of increase in global manufacture productivity, it will cause a growth of 90.96% in value added for mexican manufacturing sub branches. By the other side, local manufacturing productivity can't have effects on added value and the size of productivity is not correlated to value added. In other words, the size or amount of productivity isn't necessarily a case of high value added production.

The econometric model was tested to have statistical validity. The tests of homoscedasticity, collinearity, specification, linearity were satisfactory except for normality.

Conclusions

The current work concludes that mexican manufacturing productivity has been growing up through exportations. They can be manufactured in a local way or could be part of global value chain.

The relevance of global value chains explain productivity in Mexico but the main problem is related to the importance of value added which is explained by global manufacturing productivity. The result is important to be reconsidered because local production represents an important percentage of total productivity but they are lack of value added.

The phenomena is due to productive chains where national industry is part of a global manufacturing process but mexican apportionation of value added in global value chain is not as big as Asian cases. Therefore is important to recognize that value added isn't big comparing to other cases and local manufacturing does not contribute to this item.

The general reflection is about the dependence of an important item, which explain the competitiveness of nations.

For mexican case renegotiation in NAFTA could affect mexican productivity and competitiveness in many ways but principally in value added. According to data recovered from UNCTAD, cases such as China, Singapur and other countries with a high contribution of value in global value chains are economies with bigger dynamism and economic growth than mexican case.

References

- Buendía E. (2013) El papel de la Ventaja Competitiva en el desarrollo económico de los países. *Análisis Económico*, num. 69(28), 56-78.
- Diewert, W.E. (1992). The measurement of productivity, *Bulletin of Economic Research*, 44(3), 163– 198.
- De la Rosa, Juan Ramiro (2006). "Dos enfoques teóricos sobre el proceso de crecimiento con énfasis en las exportaciones manufactureras". *Análisis Económico*, vol. XXI, núm. 48, tercer cuatrimestre, pp. 93-119. Universidad Autónoma Metropolitana, unidad Azcapotzalco.
- Grunberg, T. (2004). "Performance improvement towards a method for finding and prioritizing potential performance improvement areas in manufacturing operations". *International journal of productivity and performance management*, 53(1), 52-71.
- Hill, T. (1993). *Manufacturing strategy: The strategic management of the manufacturing function*, Open University, Macmillan, London.
- Kaldor, N. (1966). "Causes of the Slow Rate of Economic Growth in the United Kingdom", *Lectura inaugural en la Universidad de Cambridge*, Cambridge University Press, versión en español: *Investigación Económica*, núm. 167, enero-marzo 1984, pp. 2-27.

Lieberman, M. & Kang, J. (2008) How to measure company productivity using value-added: A focus on Pohang Steel (POSCO). *Asia Pacific Journal of Management*. 25(2): 209-224

Mandal, N. & Goswami, S. (2008). Value added statement (VAS) – A critical Analysis. *Great Lakes Herald* 2(3): 98-120.

McCombie, J. S. L. & A. P. Thirlwall (1994). *Economic growth and the balance of payments constraint*, New York: St. Martin's Press.

Porter M. E. (1990a) *The Competitive Advantage of Nations*. New York: Free Press, MacMillan.

Porter, M.E. (1990b). *The competitive advantage of nations*. *Harvard Business Review*, vol. 68, num. 2, march-april, 73-93.

Ruiz Nápoles, Pablo y Juan C. Moreno Brid (2006). Efectos macroeconómicos de la apertura y el TLCAN. En Mónica Gambrill (Edit.) *Diez años del TLCAN en México*. Universidad Nacional Autónoma de México, México, D.F., p. 469.

Thirlwall. A. P. (1975). "A model of regional growth rate differences on Kaldorian lines" en *Oxford Economic Papers*, july, reproduced in *Macroeconomic issues from a Keynesian perspective*, selected essays of A. P. Thirlwall, vol. two., Ed. GB: Edward Elgar, 1997, 265-278.

UNCTAD (2013). *Global Value Chains and Development. Investment and Value Added Trade in the Global Economy*. Recuperado de: http://unctad.org/en/PublicationsLibrary/diae2013d1_en.pdf

UNCTAD (2015). *Tracing the value added in global value chains: Product-Level case studies in China*. In http://unctad.org/en/PublicationsLibrary/ditctncd2015d1_en.pdf

Velampy, T. (2011). Value added, productivity and performance of few selected companies in sri-lanka. *Indian Journal of Commerce & Management Studies* 2(6), 49-55.

Appendix

Cameron&Trivedi Test for Heteroskedasticity			
Source	Chi2	df	P
Heterokedasticity	14.34	8	0.0733
Skewness	15.46	3	0.0015
Kurtosis	1.86	1	0.1724
Total	31.66	12	0.0016

Table 2 Test for heteroskedasticity

Source: Elaborated by the authors using Stata 12

Breusch-Pagan Test for heteroskedasticity	
Ho: Constant Variance	
Chi2 (1)	= 348
Prob > chi2	0.0621

Table 2A Test for heterokedasticity

Source: Elaborated by the authors using Stata 12

Variable	VIF	1/VIF
Lpm	1.09	0.915501
Lpmg	1.09	0.915501
Mean VIF	1.09	

Table 3 Test for collineality

Source: Elaborated by the authors using Stata 12

Ramsey test of Specification	
Ho: model has no omitted variables	
F(3.75)	1.90
Prob > F	0.1364

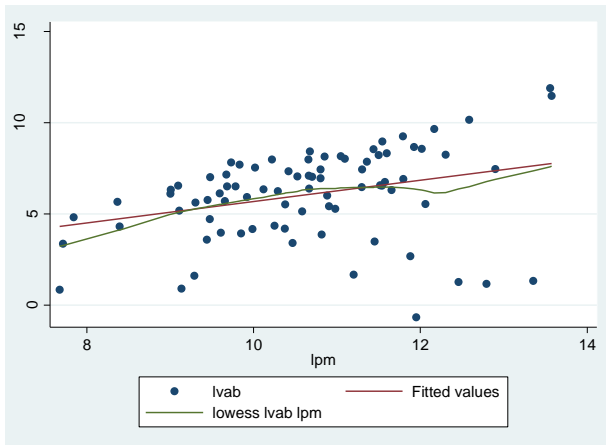
Table 4 Test for Specification

Source: Elaborated by the authors using Stata 12

Shapiro-Wilk w test for normal data					
Variable	obs	w	v	z	P>z
r		.94865	3.561	2.785	0.00268

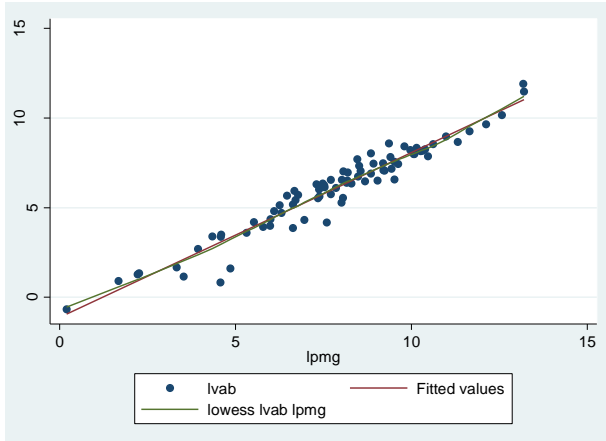
Table 5 Test for Normality

Source: Elaborated by the authors using Stata 12



Graphic 6 Test for linearity: Lvab-Lpm

Source: Elaborated by the authors using Stata 12



Graphic 7 for linearity: Lvab-Lpmg

Source: Elaborated by the authors using Stata 12