

Productivity, Higher Education and Growth in Mexico: A Bi-Regional Input-Output Model

Josefina Callicó López

Evaristo Jaime González Robles¹

Abstract

The weak economic growth in Mexico, during the past twenty years, has only been compatible with low rates of open unemployment due to the growth of the informal economy and to the generation of low productivity jobs. However, the average level of schooling of the workers has been growing, as well as the proportion of those that have received college education. This seems to suggest that even the professionals will play in activities of low productivity and high levels of informality. In this paper, we discuss the results of a study on changes in the productivity of the professionals in the period 2000-2010 to Jalisco, a state of the region west of Mexico.

1. Introduction

For almost two decades Mexico has experienced a weak economic growth (in terms of GDP *per capita* growth that has been virtually zero) together with a relative price and exchange rate stability. This is a period of continuous recession where, however, there has been a still unfinished process of structural change. While activities such as agriculture and traditional industries, more integrated to the domestic economy and more labor-intensive, have fallen in absolute terms, modern industry, export-oriented, has been unable to lead economic growth.

Under these conditions, the structural unemployment has been a constant throughout this period. As is the case in countries with low levels of development, a significant part of the Mexican unemployment is absorbed by various types of informality, ranging from self-employment up to criminal activities, whose growth in recent years has been skyrocketing. Therefore, the unemployment rate has been maintained throughout the period less than seven percent.

¹ Universidad de Guadalajara, Mexico.

However, the proportion of the Mexican population with some kind of higher studies, though still low, has been growing the past few years. Under this context, we are faced with some questions that it's worth answering: what is the employment situation of these educated workers?, move to those who have less formal education in activities or take refuge in underemployment and small businesses that operate with low productivity? We believe that the answer is that this depends on many factors: the professions of these workers, the sectors where found employment, the region of the country in which they reside, the quality of the studies, the prestige of the educational institutions in which they studied, and so on.

In this work we present for Jalisco (a state of the Mexican republic with close to eight million inhabitants and the fourth for his contribution to national GDP) an exercise that gives answer to some of these questions. In this exercise we use the volume and the relevance of the information available. On the one hand, our research team built biregional input-output tables of Jalisco (Jalisco and rest of the country) for the years 2000 and 2010, including an estimate at constant prices. On the other hand, for those same years, the National Institute of Statistics and Geography (INEGI) published an extensive survey that is part of the population censuses, which provides extremely detailed information on employment, education, professions and income. Given the diverse backgrounds of these sources of information, it was necessary to harmonize the figures and achieve an acceptable level of consistency. Finally, we use the data, recently released by the INEGI, of the estimate of the total factor productivity (1993-2012).

We defined a biregional input-output model, based on the value added, to calculate productivity growth rates in these ten years. These results are part of a research study funded by the Secretariat of Public Education.

In the first section, we analyze briefly the information about the performance of the economy of Mexico and Jalisco in the medium term. In the second, we discuss the characteristics of our input-output tables for this region of Mexico and its method of calculation. In the third we talked about the situation of higher education in Jalisco. Finally, we discussed briefly the definition adopted of productivity and the overall results of the implementation of the model.

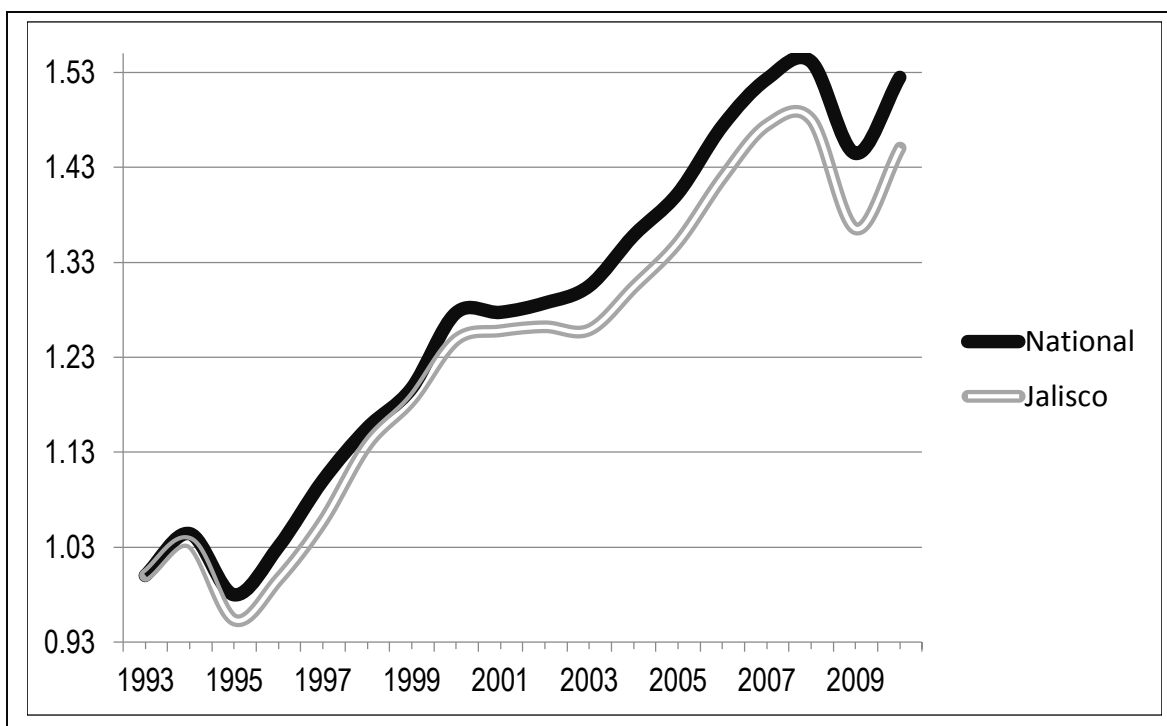
2. Jalisco in the Mexican Economy

Jalisco, in the national context, has a complex and diversified economy. In some productive branches, this State has been exercised a clear regional and national leadership, as in the case of agriculture, livestock, food and beverage production, the manufacture of footwear and in a wide variety of manufacturing and services. This obviously has resulted in a relatively integrated industry and in chains of production well established. This structure, however, has been evolving over the past few years. Trade openness, institutionalized with the signing of the NAFTA, suddenly transformed the national context in which the companies operated in Jalisco. Some productive branches could thrive under these new conditions; others, on the contrary, have stalled and, in some of them, there is a regress. Other developments have contributed to significantly change this outlook: the massive influx of international companies at the end of the nineties, specifically to the branch of electronic products; increasing competition from other emerging countries, particularly China, as producers of goods at low prices and as recipients of foreign direct investment; the withdrawal of the territory, during the present decade, of some foreign companies; recent and drastic changes in relative prices, national and international, of agricultural products and petroleum products. It is expected that all this has been extensively altered the structure of the economy of Jalisco; that is to say, that there has been a transformation in the relative importance of the branches, in the buying patterns of inputs (local, national and foreign) and selling products, in the conformation of the production chains and, in the end, on the potential effects of the growth of those branches on the employment and income.

While Jalisco, in general, has had an overall performance very close to the national and has suffered the same relapses in 1995 and 2009, in general can be seen from the graph that this State has been lagging way behind, gradually but progressively, with regard to the economy of the country. Being fair, would have to say that relative loss comes from the long term, since the early seventies. Taking into consideration that for those years, Jalisco was the third state at the national level, the loss of participation could have meant a greater national development if the States that have gained ground were the smallest or the most backward. In that case there would have been a redistribution that, on average, would have benefited the national population (the poorer regions would be least in relative terms). But that has not been as well. Most States that have won with this restructuring of the regional

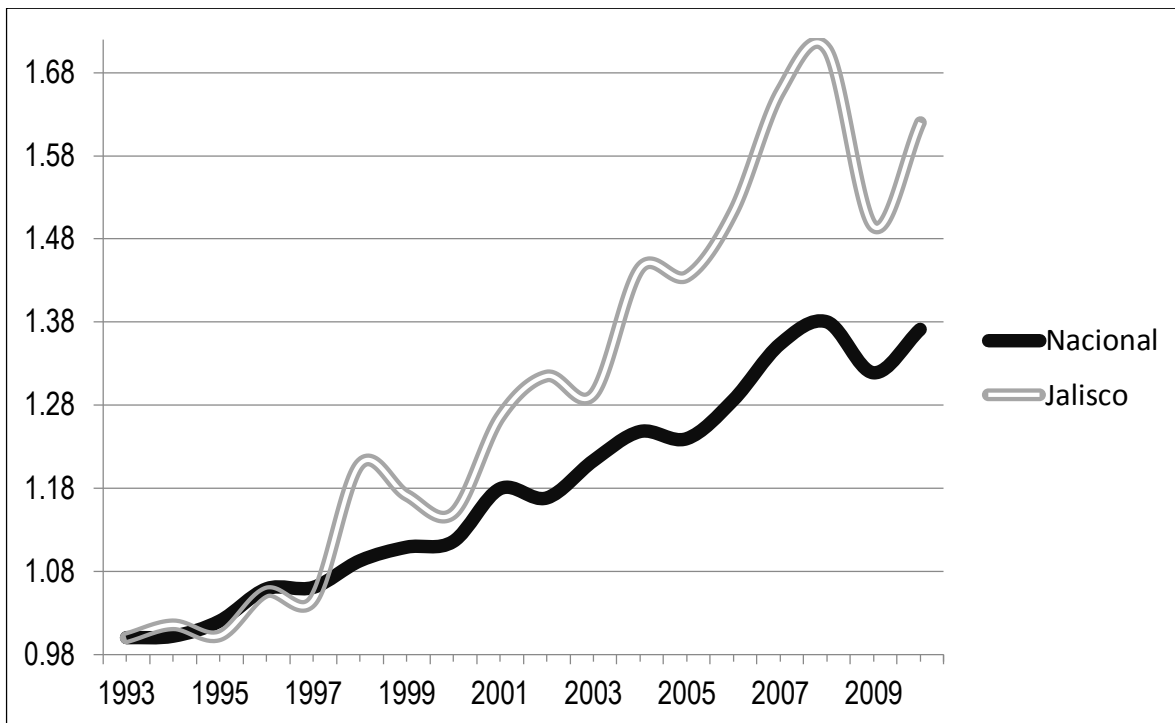
economy are those who already had high levels of development, such as Nuevo Leon, Mexico City and Querétaro.

Figure 1: Evolution of the GDP (1993-2011)



The reasons for this growing lag reside in the particular productive structure of Jalisco, where the more traditional sectors, which have been losing ground in the national context, here are strongly represented. During the second half of the nineties of the last century, the State Government gave definitive steps to change this situation, to modernize the productive apparatus and to convert to Jalisco in a receiving area of foreign direct investment. The most important instrument was the economic promotion conveniently reinforced by generous contributions, in kind and in infrastructure, agreed upon by the Council of Economic Promotion to facilitate the installation of foreign companies in sectors such as the electronics industry, the assembly of cars and car parts manufacturing. The result is that coexist, almost without any relationship, the traditional sectors with modern industry. The overall result is still negative for the state.

Figure 2: Evolution of the Agricultural Sector (1993-2011)

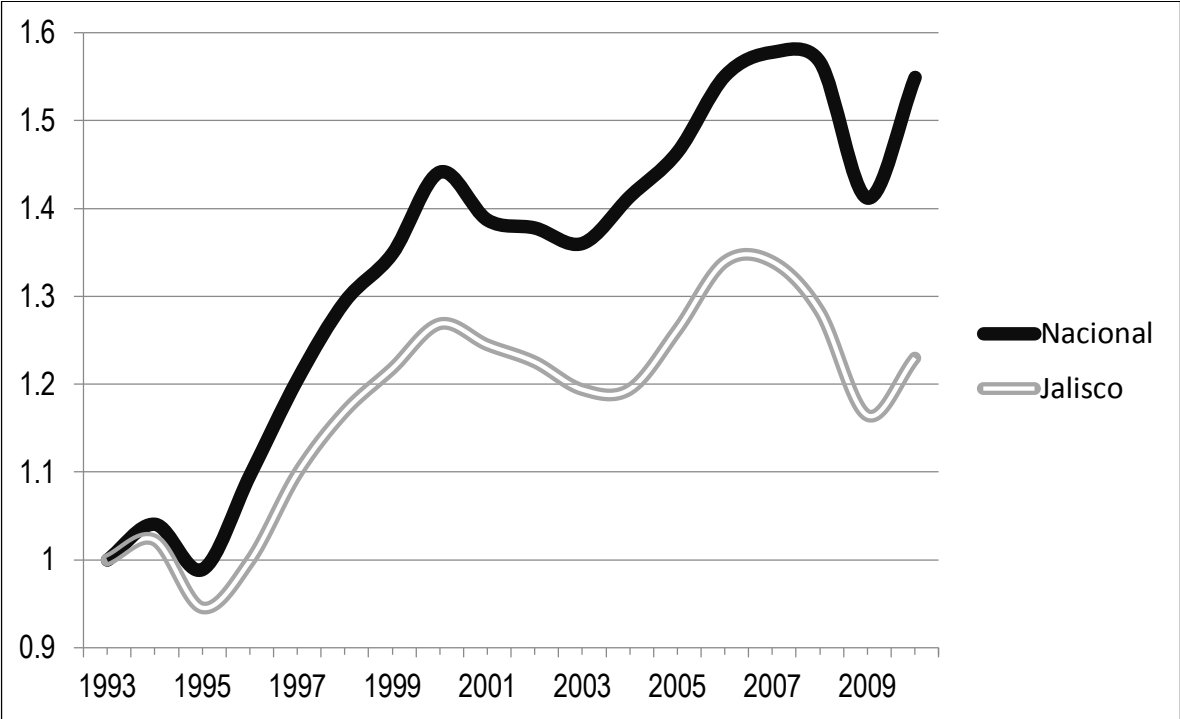


A completely different picture prevails with regard to the primary sector, which includes agriculture, livestock, forestry, hunting and fishing. Jalisco has traditionally been and is a leader in the production of primary products, in particular of some extremely important agricultural crops such as corn and sorghum, of some livestock species, such as cattle, pigs and poultry, and some livestock products, such as dairy products and egg. According to our calculations Jalisco step of generating 9.9 percent of national GDP primary in 1993 to generate the 11.7 percent in 2010. These high performance must be, for the most part, at the initiative of regional producers well organized. The example most commonly mentioned is the very modern and efficient producers of egg in the Altos de Jalisco.

The manufacturing industry, the key sector for national development in the past few decades and that has received special attention on the part of the last three conservative governments that there has been in Jalisco, has had, in general a poor performance in this federal entity in the period considered, as can be seen in the graph. In spite of this, Jalisco remains a remarkable industrial producer that provides 7.9 percent of the national production (data of 2010) and that you have a dense industrial fabric where produce goods

of virtually all industrial branches, with the almost unique exception of the Petrochemistry because for the good of our ecosystems Pemex (the state monopoly on production and distribution of oil and its derivatives) has decided to not install here refining plants to oil. In several industries Jalisco brings more than six percent of the national production. Of course, that these branches have not evolved evenly in the period.

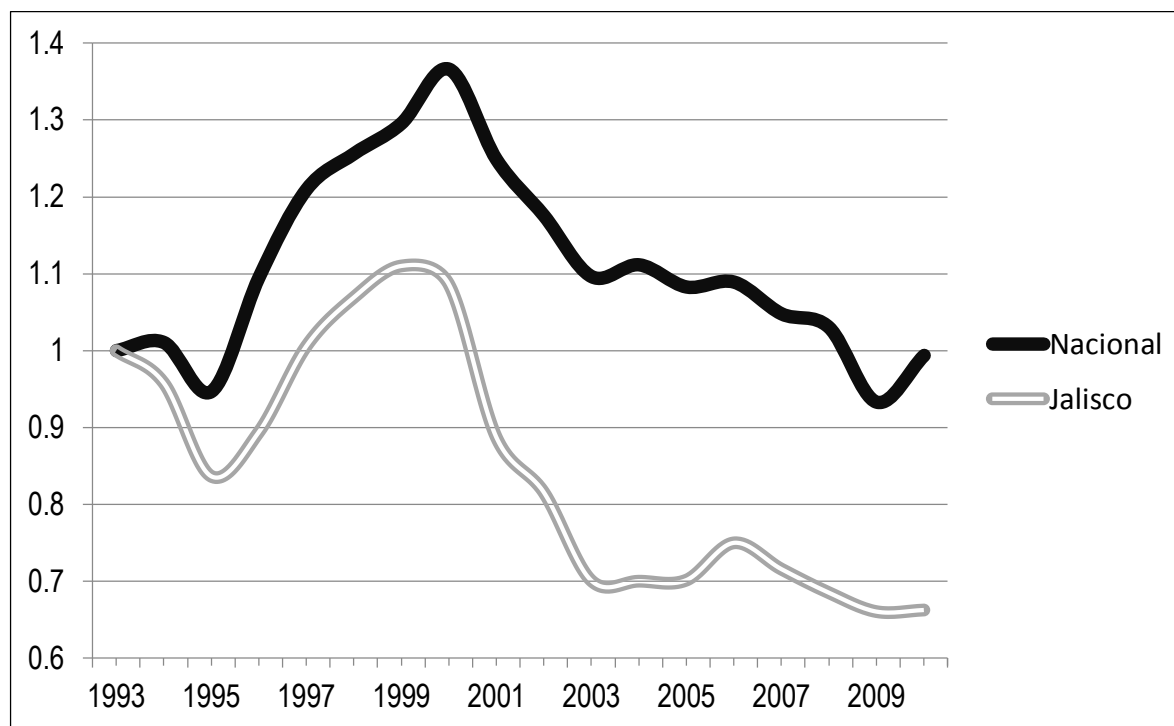
Figure 3: Evolution of the GDP of the Manufacturing Industry



Jalisco is also a major producer of food and drinks. The industries of edible oils, dairy, sugar, food for animals, beer and spirits are some that have national importance. Others have succeeded in penetrating foreign markets, such as the industry of the sweet. Others, such as the manufacture of tequila, have become the brand image of this State. In several of them is present, although not always in a dominant position, foreign direct investment. In addition, in these subsectors relatively successful, this sector is also composed of small and medium-sized enterprises which produce bread or *tortillas*, whose behavior is often associated with the growth of the population (in particular of the urban population). The evolution of this industry in Jalisco is very similar to that of the entire country. In general, the growth in food production is above the growth of the economy as a

whole. During the whole period Jalisco contributed with more than eleven percent to the national GDP, which constitutes a remarkable participation.

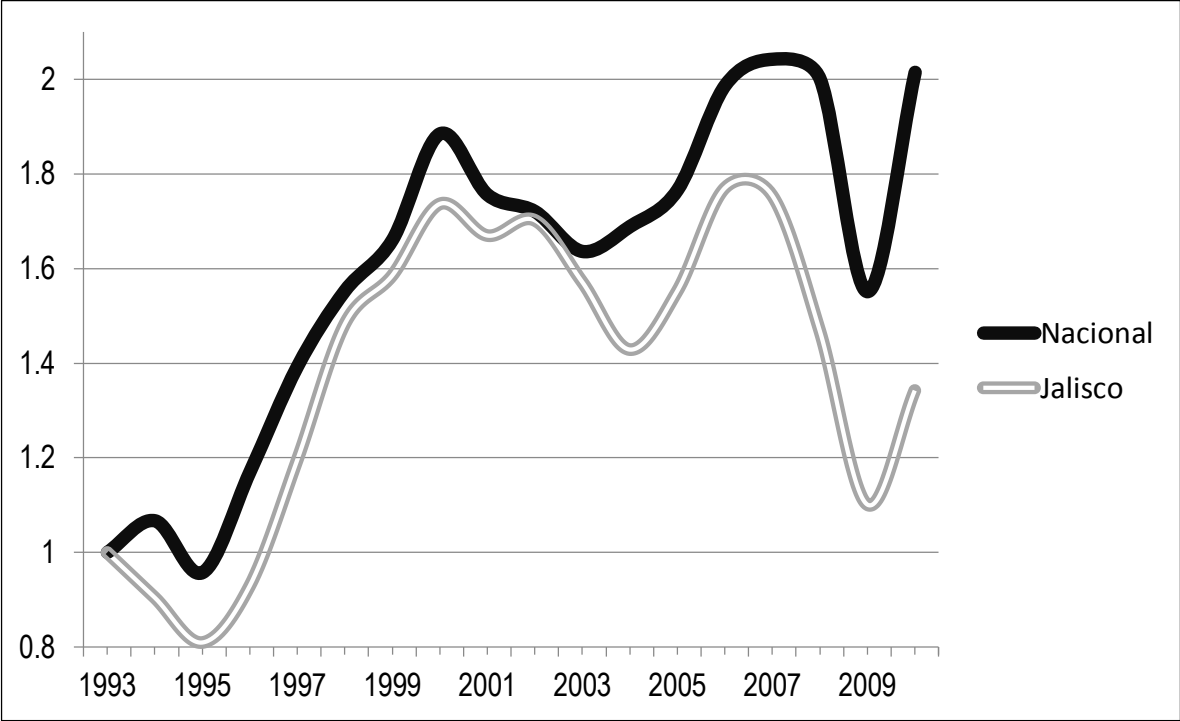
Figure 4: Evolution of the textile, clothing and footwear industries



The textile, clothing and footwear sector is the most representative of the traditional industry in our country. To the extent that the economy was protected by barriers to the importation of manufactured goods, companies in this sector, in general small and medium enterprises, which probably began as workshops, had the conditions to thrive even at higher rates than those of population, urbanization and income. As it comes to industries that have already reached maturity in its development cycle, its technology is widely available and the competition is, in general terms, through the sales prices. Trade openness, undertaken since the late eighties, but implemented after 1995 when the protection of a national currency undervalued disappeared, affected the national industry as a whole, but this was one of the sectors that experienced its effects immediately and rapidly initiated a process of decadence. Despite the stratospheric countervailing duties to footwear and clothing from China, the companies of the footwear and clothing continued with difficulties during the first the first decade of the century. Now, when these taxes have been repealed, it is anticipated that the situation will worsen. Can be seen in the graph that the situation is

particularly damaging to Jalisco. At the end of the period the GDP of Jalisco was less than 70 percent of what the generated in 1993.

Figure 5: Evolution of the GDP of Machinery and Equipment



In the field of machinery and equipment are present some of the industries that have received greater support of the past state governments: the electronics industry, the assembly of automobiles and the industry of automotive parts. These industries came to our state in the second half of the nineties through the installation of transnational corporations. The production is intended, in varying proportions to the export. As can be seen in the graphic, it seems to be that the medium-term results have been relatively disappointing, because the local industry of Jalisco de Machinery and Equipment has been much less dynamic than the national average. Some of the large companies that came with great publicity for our state already emigrated to countries where labor is cheaper, though generally another great assembling company uses facility unoccupied. It has also been frequent that the large transnational corporations prefer be installed in other regions of the country. For example, Honda, the Japanese automotive company, installed a large assembly plant in Jalisco in the mid-nineties, but its second plant will be installed this time in the

state of Guanajuato to take advantage of the large network of auto parts companies that are suppliers of the General Motors plant in the city of Silao.

Finally we will review the performance of the furniture industry in Jalisco. The National Institute of Statistics, Geography and Informatics (INEGI) broke down in this sector, for the first time, in the National Accounts with 2003 base. It was therefore not possible to construct a series of this sector for the whole period. However, available data only for 2003-2010, clearly show that this is a really important sector in the state of Jalisco, because not only the evolution of the GDP is favorable to this State, but also their contribution to the national total has grown to be placed in more than 18 percent in 2010. It is clear that the furniture areas of Jalisco, as the La Cienega de Chapala, where they have prospered national companies that work closely together, have given good results.

This quick review of the performance of the economy of Jalisco, from the GDP series state and national, leads us to some very general conclusions. In the first place, if measures are not applied to support effectively the sector of clothing and footwear, it seems that soon it will disappear completely. Secondly, Jalisco has been and remains a State with a high degree of specialization in agricultural production and in agro-industries related with it. Thirdly, despite the ongoing efforts of the past governments, the machinery and equipment industry has not succeeded in establishing itself as a key sector that promotes the growth of the state's economy. Finally, the traditional sectors, such as the furniture industry, conveniently supported and organized, can become very promising poles of growth. It remains to study in detail the structure of production that has led this evolution and, given current conditions (local, national and global), if such a structure is viable and sustainable in the medium term.

3. The Input-Output Table of Jalisco

Since the beginning of the nineties, in the absence of statistical instruments minimally reliable to be used in the analysis of the regional economy or for purposes of evaluation of public policies, we, a group of economists from the University of Guadalajara undertook the task of building this statistical tool for the region where we play professionally.

Predictably, a crucial decision was the choice of the method of estimation. Everyone knows

that the construction of Regional input-output table must overcome the formidable obstacle to quantify the interregional trade in goods and services. In the absence of formal boundaries between regions, when the cargo trucks pass freely between the territories of the same country (states or provinces), there are no administrative records to quantify accurately the value of exchanges of goods. We don't know, and there are no official figures, how many tonnes of corn sell Jalisco to the rest of the country. We can do overall estimates on internal consumption in the state, the shopping for example of yellow corn from the United States, exports and finally, as a balance, sales to the rest of the Mexican Republic. With some effort and field work we could make reasonable estimates. But the corn is a relatively homogeneous goods, which facilitates the work of quantification. For other products are very heterogeneous as clothing, footwear, household appliances, direct estimates are extremely complex and costly. Taking into consideration that we need to calculate the value of all trade between Jalisco and the rest of the country, the costs in time and money to make this complete estimate makes it impractical.

When we formed our research team, we began, as is natural, to explore the various methods of estimating regional arrays. One of them was rejected immediately, because of its glaring disadvantages. This is the method to estimate the I-O Table through the location quotients (LQ). A LQ is simply a ratio between the weight that has local production of a sector with respect to the local production of all sectors and the corresponding figure at the national level. For example, if the Agricultural Sector of Jalisco represents six percent of the total state production and the domestic agricultural industry represents four percent of the national total, its LQ is 1.5 ($6/4$). This method, in its most primitive version, believed that if a region is surplus in any sector ($LQ > 1$) would sell their surplus production in the rest of the country and not buy anything. In the deficit sectors ($LQ < 1$) the region would buy without selling. In the sectors balanced ($LQ = 1$) the region does not sell or buy. This is an absurd proposition. In fact, the cross-hauling is the generalized rule.

Since the seventies, there have been corrections to this method (for example, to take the cross location quotients or the relative size of the region), but they are nothing more than palliatives of its major flaw: the interregional trade, in this method, is a balance after meet the internal needs. Well now, then why, in spite of its shortcomings, this method is in these moments so often used? We believe that the reason for its popularity lies in its ease of

calculation. Without the need for a survey on the interregional trade, without investigating the mobility of goods and only having very general figures, this method is applicable, in its current formulation, such as a recipe. It is a method available to students without enough time or financial resources. In a few days results can be achieved.

On the contrary, our method faces immediately (and not as a balance) the problem of interregional trade. Our starting point is that not all the goods have the same mobility between the regions. Some services are completely immovable. Some goods are too heavy and too cheap to be transported, as certain construction materials. Therefore typically local materials are used in this industry. Other have institutional constraints, such as the killing of livestock where members of the local livestock organizations take precedence over external suppliers. On the other hand some goods are highly movable. It is therefore necessary to study, through a survey and analysis of secondary information, in the year of construction of the table, the trends of the mobility. The hypothesis of mobility guarantee greater accuracy in calculations. In addition, we need a national table updated to the year of the regional table. This is because we are looking for consistency between the data and that cell-by-cell state data are compatible with the national. We use the iterative method RAS to balance the table, including a third round of normalization in each iteration. The tables that we build are bi-regionals but they are not published in this way. Finally, the fact that we have built all our tables with the same method, allows us, in addition, to make comparisons over time.

4. Professionals in Jalisco

A part of our effort has been devoted to studying the complex relationship between the productive system and the system of higher education. Everyone knows that these are two systems that work with different dynamics, but who retain a certain degree of interrelationship. These links are inevitably unstable, because while the productive system may experience sudden changes of pace and direction, the educational system adapts with somewhat slow to those changes. This explains, in conjunction with other factors, that the market for skilled labor market is incomplete, and where governs the absence of relevant information. When a young woman decides to pursue a career that seems to assure her a

promising future, except in the case of certain traditional professions more or less perennial (such as medicine and law), is in fact running hardly calculable risk. In addition, the overall performance of the Mexican economy during the past few decades has been such that there has been a virtual stagnation and an extremely poor generation of productive employment.

The uncertainty, the under and over qualification of the workforce, the unemployment and the underemployment among professionals, the shortage of workers with specific training, the proliferation of private universities without quality offerings, are derived from these distortions in the labor market, compounded by the erratic course of the Mexican economy. In this context, this line of research has as main objective quantify, assess and make recommendations about the incompatibilities between the educational supply and the demand for qualified workers.

As an indicator of the demand for skilled workers we take the number of professionals who actually work in the productive system. The specialties of these workers and their distribution by productive sector seems to us that defined in general terms the trends in recruitment of professionals.

We are aware that one of the difficulties of this approach is that circumvents the problem of underemployment of labor: professionals who do not carry out activities related to their training, that are sub-paid, working in the informal sector or that ultimately are underemployed. Fortunately, it is possible to reach a statistical definition of productive work that reasonably overcome this problem. The procedure is to set limits on the variables relating to employment: income, weekly hours worked, benefits, functions performed, position at work, etc.

Given that our primary source of information are the microdata Census of Population of 2010, the possibilities to determine these limits are numerous, because they are more than fifteen variables that have to do with the conditions of the work. In this brief essay we have only one limitation: that the employees have worked at least 20 hours per week. We believe that with less hours per week we can hardly speak of formal and permanent work. This limit reduced in nearly forty percent of professionals said that having a job.

Of course that also by the side of education limits may be set to define what we mean by professional. We decided to proceed in the same way as did those who published

the results of the Census: we included in the definition to all those who have passed at least one full course in technical careers or professional (bachelor, masters or doctorate).

Finally, the micro-data allow a great breakdown of the data, since they provide information about 96 professional careers (including Theology) and about 179 productive sectors. This disaggregation is useful to know in detail the distribution of the professional careers in the productive system. However, there remains the question of whether the survey ensures statistical representation to these levels of detail. In any case, for expository purposes we have reduced the professional careers to 10 fields of knowledge and the productive activities to 28 groups that match the aggregation of the State GDP published. The following table summarizes the information about the professionals.

PROFESIONAL OF JALISCO (2010)						
FIELDS OF KNOWLEDGE	MEN		WOMEN		TOTAL	
	Persons	%	Persons	%	Persons	%
Education	16,294	4.70	41,102	16.90	57,396	9.74
Arts and Humanities	13,692	3.95	11,559	4.75	25,251	4.28
Social Sciences. Administration and Law	142,857	41.24	118,633	48.78	261,490	44.35
Natural Sciences, Exact Sciences and Computer Science	22,567	6.52	12,951	5.33	35,518	6.02
Engineering, Manufacturing, and Construction	102,687	29.65	12,191	5.01	114,878	19.48
Agronomy and Veterinary	13,832	3.99	2,050	0.84	15,882	2.69
Health Sciences	17,289	4.99	27,341	11.24	44,630	7.57
Services	3,353	0.97	8,168	3.36	11,521	1.95
Not specified	13,796	3.98	9,210	3.79	23,006	3.90
TOTAL	346,367	100.00	243,205	100.00	589,572	100.00

It is interesting to note the large concentration of professionals (44.35 percent), especially in the case of women (48.78 percent), in the careers of the field of Social Sciences, Business Administration and Law. In this category are the professional careers, beside of the legal profession, which is in high demand by the students, such as Business Administration and Public Accounting. On the other end we see that the professionals of the careers of Agronomy and Veterinary hardly represent the 2.69 percent of the total number of professionals of Jalisco in 2010. This is a remarkable fact if we take into account the fact that our State is the leading agricultural producer in Mexico and that rural producers claim that it is necessary to increase the professional from this type of experts.

It is also interesting to note that the number of engineers, especially those that specialize in industrial areas, is relatively small. In the aggregation adopted, the category of "Engineering, Manufacturing and Construction" comprises 19.48 percent of professionals by the overwhelming presence of Civil Engineers and Architects. The rest of engineering are under-represented. Finally, as expected, the feminine trends are clearly towards careers related to the Education, the Social Sciences and the Health, whereas men have greater representation on Engineering.

PROFESIONISTAS POR SECTOR DE ACTIVIDAD EN JALISCO (2010)					
SECTORS	TOTAL EMPLOYMENT	PROFESIONALS	GNP	EMPLOYMENT	PROFESIONALS
	Persons	Persons	%	%	%
AGRICULTURAL SECTOR	242,407	7,467	6.04	8.95	1.27
MINING	3,263	457	0.41	0.12	0.08
ELECTRICIDAD, GAS Y AGUAMINING ELECTRICITY, GAS AND WATER	12,041	3,938	0.79	0.44	0.67
CONSTRUCTION	250,530	26,340	5.41	9.25	4.47
INDUSTRY MANUFACTURING	508,228	77,380	21.56	18.77	13.12
COMMERCE	569,314	100,610	22.33	21.03	17.06
TRANSPORTS	93,793	13,428	6.51	3.46	2.28
OTHER SERVICES EXCEPT GOVERNMENT	897,473	308,835	34.8	33.15	52.38
GOVERNMENT	96,117	41,865	3.41	3.55	7.1
NOT SPECIFIED	34,166	9,252	NA	1.26	1.57
TOTAL	2,707,332	589,572	100	100	100

In this table, to facilitate the reading and interpretation, appears an aggregation to nine sectors, although the calculations we did in 28. Here again we introduced the restriction of only considering persons who worked in the reference week, for more than 20 hours. This is a contingent of more than 2.7 million people, of which, 21.8 percent have higher studies. It can be seen the great imbalance in the employment of professionals among the productive sectors. A fact immediately identifiable is that terciarization of the economy is represented with greater severity in the case of professionals: the services companies bring the 67.1 percent of the state GDP, absorbed 61.2 percent of the employment and hire the 78.8 percent of professionals. That is to say, four of every five professionals of Jalisco works in any services company. At the opposite end, the

agricultural sector that occupies a large proportion of workers (nine percent) employ only 1.3 percent of professionals.

The following table includes some simple indicators of the degree of professionalization of the sectors.

INDICATORS OF PROFESSIONALS IN JALISCO (2010)				
SECTOR	Percentage of professionals in the total number of employees	Distribución de los Profesionistas entre Campos del Conocimiento		
		Social Sciences. Administration and Law	Engineering, Manufacturing, and Construction	Other fields of knowledge
AGRICULTURAL SECTOR	3.08	33.76	16.54	49.70
MINING	14.01	22.76	55.36	21.88
ELECTRICIDAD, GAS Y AGUAMINING ELECTRICITY, GAS AND WATER	32.7	39.94	33.75	26.31
CONSTRUCTION	10.51	19.04	69.74	11.22
INDUSTRY MANUFACTURING	15.23	37.28	40.01	22.71
COMMERCE	17.67	56.41	17.27	26.32
TRANSPORTS	14.32	56.53	22.33	21.14
OTHER SERVICES EXCEPT GOVERNMENT	34.41	40.94	12.00	47.06
GOVERNMENT	43.56	66.11	9.28	24.61
NOT SPECIFIED	27.08	53.76	15.5	30.74
TOTAL	21.78	44.35	19.48	36.17

Reviewing the table superficially, it is obvious the existence of large asymmetries in the concentration of professionals. In the agricultural sector professionals represent barely three percent of the total. In construction, manufacturing and transportation professionals are also relatively few compared with the total of employees. In contrast, the government nearly half are professionals.

In this table are the two fields of knowledge whose careers absorb more professionals. The field of Social Sciences, Business Administration and Law represents more than half of professionals who work in the Government, in the Commerce and the Transport. Even in the Agricultural Sector a third part of the professionals have a specialty belonging to this field of knowledge.

This large amount of information, that we have here presented very briefly, we can draw some conclusions. In the first place, there is an acute distortion in the specialization of

professionals in favor of the careers of the field of Social Sciences, Business Administration and Law. A more detailed examination could demonstrate that we are dealing with three large groups of careers: Public Accounting, Law and Business Administration and the careers associated (Business, International Business, Foreign Trade, Human Resources, Tourism, etc.).

Secondly, there is a marked imbalance between the ability of the sectors to generate qualified employment. Jalisco, which is a state leader in agricultural production, offers few jobs to the professionals whose training could be fully utilized in this sector. Even the manufacturing industry does not employ mostly engineers.

We can explore potential trends with these data. A question that is feasible to respond is: what would the effects of economic growth on the distortions defined above? For this we use the I-O Table of Jalisco. The procedure consists of simulating an increase autonomous of the Final demand (consumption, investment and exports) and investigate, through a model, the consequences on production and total employment and the recruitment of professionals. In this case, we will use the standard model of Leontief but in a bi-regional context. That is to say, we will consider not only the impact that receives the production of Jalisco by the increase in final demand, but also the effects that receives Jalisco also because it has stimulated the production of the rest of the country. In other words, we include all possible effects in a context in which our state is located in the national economy.

The results of the experiment will leave no room for doubt: the situation remains essentially the same: the potential changes in recruitment of professionals favor again to the careers related to the field of Social Sciences, Business Administration and Law. It seems that under the current structure of the economy of the State and the distribution of workers with higher education between the careers and between the productive sectors, the distortions that we mentioned tend to stay.

5. Professionals and productivity growth.

Several studies have provided evidence that the productivity in our country has stagnated since several decades ago. One of the most serious attempts to clarify this situation is the

job of the INEGI on total factor productivity (1990-2013). This study uses the methodology established by the OECD, which follows the original approach of Solow. The base year is 2008. The chosen factors are labor, capital, energy, materials and services. The following table summarizes the results.

Productivity growth in years elected (%)			
Years elected	Annual growth in production	Contribution of the factors to growth	Crecimiento de la productividad total
1991	5.40	4.24	1.16
2001	-1.12	1.38	-2.50
2013	1.39	2.05	0.65
Average 1991-2013	3.04	3.38	-0.33

As can be seen, in this model the productivity is measured as the difference between the results of the model and the actual data. It is clear that in the medium term, according to this research there has been a step backwards in the productivity of the Mexican economy. Research from INEGI is valuable because it provides of unpublished information for more than twenty years. The data are highly disaggregated and allows for a comparison in the long term, since the statistical series are presented in current and constant prices.

For our part, we use a simple model that also measured as a difference in the estimated data and the actual data in the Tables I-O for 2000 and 2010. The table of 2010 was also calculated in 2000 prices, in order that the data was comparable. The procedure was simple: calculate, with the basic model of Leontief, output per worker induced by the final demand. Immediately, we believe these data for 2010, but with the inverse of the Leontief 2000. The comparison between this estimate and the actual table provides an estimate of the growth in productivity. Finally, we incorporate the information professionals. The overall results are listed in the table below.

FIELDS OF KNOWLEDGE	Productivity growth 2000-210 (percentages)
Education	-3.82
Arts and Humanities	-2.52
Social Sciences. Administration and Low	-0.33
Natural Sciences, Exact Sciences and Computer Science	1.25
Engineering, Manufacturing, and Construction	1.15
Agronomy and Veterinary	3.02
Health Sciences	2.50
Services	-2.87
Not specified	0.25
TOTAL	-0.28

It can be seen that, in general, the productivity of the professionals tended, on average, to fall in the period. This indicates that, in good measure, the professionalization does not respond to needs of the productive apparatus but the aspirations of employees who are looking for better earnings. It also indicates that the underemployment is a widespread phenomenon even to those who hold a college diploma.