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NAFTA AND INDUSTRIAL EFFICIENCY IN BAJA CALIFORNIA

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Abstract

The figures before and after the North America Free Trade Agreement between Canada, Mexico and United States, suggest the intensification of the North region economic dynamics, particularly in the sates of Baja California. This paper attempts to determine whether the state's extraordinary growth has been led by efficiency improvement or just by factor growth as a consequence of Free Trade and Foreign Direct Investment. The paper finds empirical evidence in both ways.

INTRODUCTION

The North American Free Trade Agreement (NAFTA) between U.S, Canada and Mexico has highlighted the geographic advantage of the states inserted in the northern region of Mexico, over the rest of the country and other regions of the world. In fact, the extraordinary tariff reduction provided by the agreement has expanded trade significantly and encouraged the arrival of large amounts of Foreign Direct Investment (FDI) lured by the NAFTA benefits (Fed-Dallas, 1999). It has been stated that the amount of trade and investment dynamic in the region has been much higher than it would be if the agreement had not been established (Fed-Dallas, 2000). The benefits have been specially captured by the manufacturing sector, particularly the maquiladora industry, whose employment and investment appropriate a significant share over the total figures, becoming the diver of Mexican border economy (Clements, et al, 2002).

The figures before and after NAFTA confirm the intensification of the North region dynamics, particularly in the sates of Baja California (B.C.) and Chihuahua. These states have experienced per capital GDP average growth rate of 3% and 3.5% respectively during 1993-2000 period (Ocegueda and Plascencia, 2004), well above the national average. However, there are still the issues whether the region's extraordinary growth has been led by efficiency improvements or just by factor growth as a consequence of FDI; and whether it has been companied with welfare improvements. This paper deals mainly with the first issue, although some comments on the second issue are made in the concluding section.

Some works have been concerned with the efficiency gains and its contribution to the economic growth in Northern region of Mexico in the context of outward-oriented policies. Gonzalez-Arechiga & Ramirez(1989) established some background on this issue by suggesting that the northern region has grown as a consequence of productivity improvements and not only by inputs growth. Although this work was done before NAFTA was signed, the findings support the hypothesis suggesting the existence of efficiency improvements after policies of export-orientation. More recently, De Leon (1999) and Fuentes and Fuentes (2002) have come with opposing results to each other. The former work suggests that the northern region has suffered negative productivity change during the period 1975-1998 and that the region's dynamic growth has been consequence of factors growth. In response to this finding, the later work states that the northern region has experienced positive growth in productivity during the same period as a result of the trade programs achieved by the government, which supports the results reported in Gonzalez-Arechiga and Ramirez (1989).

In this paper, our work is to find evidence favoring one of these opposing results by using the post-NAFTA experience of the state of B.C., a state that has been subjected to the foreign concurrence since the establishment of the Free Trade Zone program. The paper attempts to determine the changes in the productivity structure and whether growth has been determined by factors growth or by efficiency improvement as consequence of the reinforcement of the outward-looking profile of the state economy after 1994. The experiment is applied to all industries in aggregation and at industry level through estimating productivity functions with the inclusion of fixed temporal and industrial effects and slope variations using LSDV method.

The empirical work suggests that the state's extraordinary growth has been detonated by factors growth, as well as, by efficiency improvement; and that growth is taking place with a declining capital-labor ratio and higher efficiency, as the economy has better access to cheaper and more efficient capital and intermediary inputs as consequence of FDI and free trade.

INDUSTRIAL PERFORMANCE IN B.C.

The state of BC has grown at an average rate of 5% after 1993 and has consolidated as a manufacturing and service economy (Table 1). The declining economic dynamism in the Commerce, Restaurants and Hotels (6) has been compensated by the extraordinary growth of 9.1% and 9% experienced by the Manufacturing Industry (3) and the Transportation, Trucking, Storing and Communications sector (7) respectively. Both constitute the highest growing sectors over the 90's. Such a trend resulted in a change in the economic structure in favor of these sectors (3 and 7) whose share of the state's GDP has grown from 17.70% and 9.06% in 1993, to 22.27% and 11.33% respectively in 1999. Although sector 6 has not grown significantly over the past years, it still is very important as share of GDP with 21.57% in 1999, just bellow as compared to the 1993 figure. Other important economic activities in terms of GDP share are the Financial Services (8) and the Professional, Personal and Communal services (9). They have experienced different dynamics over the 90's. Whereas sector 8 has grown above average and has increased their share in the GDP as compared to 1993, sector 9 has declined in terms of GDP and experienced the lowest growth rate over the period (1.5%).

The service activities represented by sectors 6, 7, 8 and 9 accounts for almost 70% of the B.C. economy. Adding up the manufacturing sector (3), then more than 92% of the B.C. economy would be represented. The average growth rate of the 4 service branches is 4.65% just below the GDP growth rate in the economy as whole. Excluding the high growing sector 7 from such a group, the remaining 3 branches would report a growth rate of 3.2%, significantly below that of GDP. The figures suggest, not only the intensification of the industrialization process in the economy, but also its outward-oriented nature as the sectors involved in such activities show more vigorous growth than those domestically oriented. Sectors 3 and 7 constitute additional evidence supporting this trend. The manufacturing sector gathers most of the FDI in the form of maquiladora industry and has the highest growth rate. On the other, Transportation and Trucking, Storing and Communications (7), is the only service industry growing above average. In fact, this sector is growing at the same rate as that of manufacturing, associated to outward-oriented activities.

No sector in the economy is comparable to the dynamism of the manufacturing sector, whose most of its 9 branches, with the exception of 31, 33, and 36, are growing well above the economy as a whole. If these low-growing manufacturing branches are removed, the remaining 6 subsectors average an impressive rate of almost 11%. Above that rate, textile industries (32) the metal products, machinery and equipment (38), and chemical products (35) have grown at 15.3%, 12.6% and 11.6% annually up to 1999 respectively. Manufacturing is overwhelmingly influenced by the export-oriented maquiladora industry, located primarily in the 38 branch, contributing with more than 50% of the sector's output. Far behind branch 38, the Food products branch (31) contributes with almost 20% of the manufacturing sector. The rest of the sector's production is attributed to the remaining 7 subsectors. Not surprisingly, the low-growing subsectors are those whose dynamics are inward-oriented.

In this section we have established that the last decade dynamics has fortified the manufacturing activities, especially those pertaining to sub-sector 38, whereas the commerce and service activities, which traditionally were the most important, have reduced their importance in the economic structure. It has been found that the most dynamic sectors, the higher growing ones, are outward oriented whereas the less vigorous ones are associated to the domestic economic activity.

CONCEPT AND METHODOLOGY

This work attempts to estimate fixed individual and time effects, as well as marginal productivity changes, over industries in Baja California in order to determine efficiency differentials and structural changes in productivity derived from outward-oriented polices. We proceed by clarifying some concepts used through the paper.

Productivity and Efficiency

Two sources of productivity growth have been recognized after the two pioneering works due to Solow (1957) and Arrow (1962): capital formation, basically the augmentation of the stock of capital by unit of labor (K/L); and leaning-by-doing, which may take place with the same K/L ratio. Both factors are detonated by innovation (R&D), adoption of new technology, improving the existing technologies or by experience in the productive processes (Jovanovic and Yaw Nyarco, 1995). The productivity effects from both shocks are illustrated on graph 1. A change in the capital-labor ratio causes a movement along the productivity curve (Y/L). If the variation is positive, more capital by unit of labor increases the labor productivity as suggested by the upward-sloping shape of the productivity curve. On the other hand, effects from events associated to learning and other factors shift the productivity curve. At firm and industry level, factors such as the quality of management and the skills at using all kind of tools, machine and equipment shift the productivity curve. Externally, the same effects are derived from the reliability and quality of the input supply, transportation and communication facilities, institutional factors, the rate of tariff protection and the degree of internal competition (Clague, 1970). These factors shift upward the productivity curve from (Y/L) to (Y/L') in figure 1. This means that an invariant level of capital-labor ratio generates higher level of productivity. This is nothing but an increase in the intercept of the (Y/L) curve.

Efficiency is seen in the context of comparative-static analysis. An upward shift in the productivity function as the one shown on Figure 1 is regarded as an efficiency improvement, whereas the opposite case occurs when the shift is downward from (Y/L)' to (Y/L).

The degree of efficiency may change the productivity structure in a different way. Figure

1 depicted a case where the increased efficiency enlarges total factor productivity, but the marginal impact on the productivity from additional increases in the capital-labor ratio remains unmodified. Figure 2 represents a case in which the marginal impact of changes in the capital-labor ratio on the productivity increases. This is represented by a slope change of the productivity curve. The new curve (Y/L'') is steeper than the original curve, so the changes in (K/L) have larger impacts on (Y/L). It can be proved that such changes are associated to improvements of the marginal productivity of capital (MPC).
The results derived from graphs 1 and 2 suggest that productivity gains may be caused by movement along the Y/L curve through increments of the capital-labor ratio. They also may be attributed to increases in the MPC, which is nothing but an increase of the slope of the (Y/L) curve. The third way to increase productivity takes place through improvement of total factor efficiency (TFP), a shift of the (Y/L) curve intercept. From this, two important results may be derived: gains in productivity may exist even under a declining capital-labor ratio and losses of productivity may exist with an increasing capital-labor ratio. These results depend on how the intercept and slope of the productivity curve behave over time, that is, on the evolution of TFP and MPC.

The Model

Determining whether the efficiency and the productivity structure of BC economy changed as a consequence of NAFTA, requires testing econometrically the occurrence of similar effects to those in figures 1 and 2. Hence, we proceed with the model to estimate the changes in the intercepts and the slopes of the productivity curve across industries and time periods. Start with the C-D production function in 1.

1) $Q = AK^{b1}L^{b2}$,

In equation 1, Q stands for output and A is the efficiency parameter capturing the part of production independent of capital (K) and labor (L). This may be regarded also as TFP. Parameters b_1 and b_2 are the capital and labor elasticities of Q respectively. Assuming constant returns to scale by restricting $(b_1 + b_2)$ to add up to one, such parameters may represent the share of Q attributed to capital and labor. However, such a specification presents complications as data on physical units is unavailable at industry level. Thus, it is necessary to modify function 1 slightly as to fit the data available at industrial level for the Baja California economy. Thus, the equation 2 is introduced,

2) $Y_{it} = \alpha(K_{it})^{\beta 1} (L_{it})^{\beta 2}$,

where Y_{it}, K_{it} y L_{it} represent the value added, the value of fixed assets and the number of workers in the sector or subsector (i) in period (t) respectively. The selection of the right *proxis* for capital and labor usually brings some controversy. In our work, we stick to some previous studies for developing countries using these *proxies* in the absence of meaningful information about units of capital and labor (Ahluwalia, 1987; Ghosh and Neogi, 1993). Parameters α, β_1 and β_2 represent the efficiency parameter as A in equation 1 or TFP, and β_1 and β_2 are the shares of K_{it} and L_{it} in Y_{it} respectively, or the elasticity of production with respect K and L. Hence, the production function is transformed into a function of value added where firms in industries invest resources on capital and labor in order to increase profits (Y_{it}). The paper will deal with industries where data is available, using the official industrial classification according to table 2, which was obtained from the B.C Economic Census for the years (t) 1985, 1988, 1993 and 1998 issued by the official source (INEGI).

Equation 2 is set into linear form in order to be estimated using the method Least Squares Dummy Variable (LSDV) (equation 3).

3) $\text{Ln } Y_{it} = \alpha + \beta_1 \ln(K_{it}) + \beta_2 \ln(L_{it})$

Equation 3 can be arranged as in equation 4 to include fixed individual and temporal effects. These effects are included to account for the possibility of differential intercepts across industries and time periods.

$$4)\quad \text{Ln } Y_{it} = \Sigma^{n}_{i=1}\ \alpha_{1i}\ D_i + \Sigma^{T}_{t=1}\ \alpha_{2t} D_t + \beta_1 \ln(K_{it}) + \beta_2 \ln(L_{it}),$$

In equation 4, the term $\Sigma^{n}_{i=1}\ \alpha_{1i}\ D_i$ is the summation of the individual effects, where D_i is a matrix of dummies representing industries or group of industries whose data is available and α_{1i} is the set of associated parameters. The term $\Sigma^{T}_{t=1}\ D_t$ in equation 4 represents the fixed temporal effects related to periods pre-NAFTA (P) including the Census years 1985, 1988, 1993, and NAFTA (N), corresponding to the census year 1998. The term α_{2t} is the vector of associated parameters. In order to analyze efficiency differences and productivity changes across industries and across periods, the model on equation 4 is arranged as to represent the value added generated by unit of labor $(Y/L)_{it}$ (Equation 5).

$$5)\quad \text{Ln } (Y/L)_{it} = \Sigma^{n}_{i=1}\ \alpha_{1i}\ D_i + \Sigma^{T}_{t=1}\ \alpha_{2t} D_t + \beta_1 \ln(K_{it}) + \beta_2 \ln(L_{it}) - \ln(L_{it})$$

Assuming constant returns to scale on 5, which is equivalent to assuming $\beta_1+\beta_2=1$, or $\beta_2=1-\beta_1$, equation transforms into equation 6.

$$6)\quad \text{Ln } (Y/L)_{it} = \Sigma^{n}_{i=1}\ \alpha_{1i}\ D_i + \Sigma^{T}_{t=1}\ \alpha_{2t} D_t + \beta_1 \ln(K/L)_{it}$$

where $\beta_1$is the elasticity of productivity $(Y/L)_{it}$ with respect the capital-labor ratio $(K/L)_{it}$. As it can be seen from the production function in equation 2, β_1 is nothing else but the elasticity of production with respect capital. It is easy to proof from equation 2 that the elasticity β_1 is closely associated to MPC. Thus, changes in β_1 may be interpreted as both, changes in the MPC or as changes in the marginal impact on productivity (Y/L) derived from changes in the capital-labor ratio.
Equation 6 enables to conduct a variety of hypothesis regarding the industrial and time fixed effects by using F-tests and specifying restrictions on the parameters associated to the terms $\Sigma^{n}_{i=2}\ \alpha_{1i}\ D_i$ and $\Sigma^{T}_{t=1}\ \alpha_{2t} D_t$. Additionally, tests regarding the slope β_1 for sectors and time periods can be conducted by placing restrictions on $\Sigma^{n}_{i=1}\ D_i$ and $\Sigma^{T}_{t=1}\ D_t$ and eliminating the fixed effects as in equation 7 and 8.

$$7)\quad \text{Ln } (Y/L)_{it} = \alpha + \beta_{1t}\ [\ \Sigma^{T}_{t=1}\ D_t\ ]\ \ln(K/L)_{it}$$

$$8)\quad \text{Ln } (Y/L)_{it} = \alpha + \beta_{1ti}\ [\Sigma^{n}_{i=1}\ D_i\ \Sigma^{T}_{t=1}\ D_t\ ]\ \ln(K/L)_{it}$$

Equation 7 allows to test for slope differences by period t where β_{1t} is the parameter β_1 corresponding period t for all sectors, whereas equation 8 permits to follow the slopes by industry over time, where β_{1ti} is the parameter β_1 for industry i in period t.
The empirical work assumes the periods pre (P) and post NAFTA (N), so T=2 and t=P,N. P correspond to the census years 1985, 1988 and 1993, whereas N to that of 1998. It assumes two ways of grouping industries as well. First, it is assumed n to be 4 and each group (i) to be associated to the sectors mining (i=1), manufacturing (i=2), commerce, restaurants and hotels (i=3) and the rest of the industries (4,5,8 and 9) are grouped as i=4. Secondly, it assumed that n=6, that is, each industry whose data is available is represented. Thus, sectors 2,3,4,5,6,8 and 9 are included, where 8 and 9 are grouped together.

THE EMPIRICAL EVIDENCE

Proceed with the empirical results observed from the estimation of equations 6 and 7. These are exhibited in the econometric appendix at the end, for n=4 and n=6 when restrictions or no restrictions are imposed. All the set of parameters are listed on the top and the regressions are numerated in the first column. The statistics t and F, and the R^2 are reported as well. Tables 3 and 4 exhibit the set of hypothesis tests. Table 3 reports the hypothesis tests for fixed individual (industrial) and time effects based upon the econometric results reported in the appendix. Tests 1-7 and 8-15 regard industrial effects when assuming n=4 and n=6 respectively. Tests 16 and 17 consider the time effects for n=4 and n=6.

The hypothesis of equal intercepts (1 and 8) is rejected in both cases suggesting the existence of TFP differential across industries. Tests 2-5 and 9-14 were performed in order to determine the intercept location of the different industries with respect the rest of the economy. In the first case, the manufacturing sector (3) and commerce, restaurants and hotels (6) share a similar intercepts, while the rest of the sectors are bellow these sectors in terms of TFP. This is shown by tests 3 and 4 where the equality of intercepts of the sector with respect the economy average is accepted. The same results are reported when n is allowed to take the value 6, with the addition of sector 5, whose intercept lies on the economy average.

So far, it has been tested that sectors 3 and 6 lie above the rest for the sectors in terms of productivity. However, there still may be differences between both sectors. Test 15 accepts the hypothesis of equality of intercepts between sector 3 and 6 at 5% but rejects at 10%. This may indicate the existence of slight differences in terms of TFP among these important sectors. Up to now, using the information from regressions 1-5 and the preceding tests, we have established the superiority of these two sectors which are to be followed over time as other sectors will.

The time effects are considered in tests 16 and 17. The hypothesis of equality of intercepts from one period (P) to the other (N) is rejected in both cases. What this finding suggests is an upward shift of the productivity curve after NAFTA as illustrated on figure 1. Such a shift represents an increase of the productivity at each capital-labor ratio, a shift apparently driven by one of the most important sectors (3 and 6). We can check this by following these industries before and after NAFTA using regressions 7 and 8 in the econometric appendix. The t-test and the parameter size in regression 7 suggest that sector 3 experienced a positive shift of the intercept. Oppose to sector 3, sector 6's intercept seem to have remained unmodified after NAFTA as suggested by regression 8 where the NAFTA dummy is not significant. The other important sectors in terms of GDP share are 8 and 9 which, as suggested by regression 9, did not experience any improvement in TFP. Hence, the productivity shift in the entire economy seems to be originated in the dynamics of sector 3.

In addition to changes in the TFP as illustrated in figure 1, it is possible to test for slope changes as illustrated on figure 2. Slope variations in the productivity curve may be interpreted as changes in the MPC. The estimates for equation 7 are located in the partition regression 10 in the appendix. The regression shows a substantial slope increase after NAFTA. This finding may be confirmed by Wald Test 1 in table 4, rejecting the hypothesis of equal slopes between periods P and N. The estimates for equation 8 are shown in the partition regressions 20 and 21 for the relevant industries at each period P and N for both cases (n=4,n=6). The most important industries in terms of GDP share are considered. This will provide information about the sectors in the economy driving the structural change in the productivity patterns after NAFTA. The groups 2, 3 and 4 are considered when n=4, whereas for n=6, sectors 3, 6, and 89.

The experiment corresponding to n=4 suggests that the manufacturing industry (i=2) and the group of industries (i=4) improved their MPC after NAFTA. This can be seen by looking at the increasing slopes of these specific industries and the Wald tests 2 and 4 in table 4, supporting the results at a 10% level of statistical significance. Test 3 suggests that there is not statistical evidence of MPC improvements in Commerce (3), although the parameter increased over time. Less robust but consistent results are obtained when n takes the value 6 when dealing with disaggregated industries. The corresponding tests are 5, 6 and 7. These tests all accept the hypothesis of equal intercept. However, the rejection probability for commerce (0.80) is much higher than it is for the other two groups (0.13 and 0.18).

In sum, the econometric results suggests that manufacturing (3) and, in general, the service industries (8,9) and the group of industries compounded by industries 4,5,8 and 9 improved either TFP and MPC after NAFTA. Sector 3 improved both, whereas the rest improved only MPC. According to the size of the parameters in the regressions, the gains in MPC were lower in sector 3 than they are in the rest of the industries or groups. Commerce improved neither TFP nor MPC with 5 0r 10% statistical significance.

EXPLAINING B.C. GROWTH AFTER NAFTA

The B.C. economy experienced an annual average growth rate of 5.0% in the period 1993-1999. Put in a different way, output in the state grew 72% from 1993 to 1998 as suggested by table 5. The most dynamic sectors growing above the economy average were 1, 3, 7 and 8. Sector 3 has an overwhelming superiority with respect the rest. The econometric analysis from the preceding section combined with the analysis on the evolution of the value added, capital and labor presented in table 5, suggest that the extraordinary growth of the manufacturing sector after NAFTA is due to growth of inputs and efficiency improvements. The stock of capital and the amount of labor employed grew significantly during the period due to important flows of FDI: 56 and 73% respectively. The lower growth of capital with respect labor caused a reduction of the capital labor ratio which, *cetiris paribus*, would have lowered productivity and the growth potential. However, in spite of the lessening of the capital intensity in the sector, productivity grew during the period as suggested by a simple subtraction operation between the output and labor growth. Therefore, the factor explaining the sector's 9% average annual growth rate during the period (84% from 1993 to 1988) is not only the factors growth but efficiency. Thus, the reduction in the capital-labor ratio in the period was compensated by a higher overall efficiency, as well as, by an improvement of the marginal efficiency of capital.

Sectors 4, 5, 8, and 9 considered together seem to have experienced high efficiency improvement during the period as well. This may have been detonated by the efficiency gains in sector 8, which has been growing above the economy average and has an important GDP share. This group of sectors experienced a reduction of investment and the sharpest reduction of the capital-labor ratio as the capital investment felt significantly over the period. In spite of suffering the sharpest reduction in K and K/L, this group had a significant increment in productivity which is explained by the improvement of the efficiency of capital (MPC), as the econometric results suggest.

Sector 6 experienced the lowest growth during the period, but the highest productivity improvement. This partially contradicts the econometric results suggesting the statistical insignificance of a MPC increase, although the parameter in fact increased from one period to another. This ambiguity may be caused by the reduced number of observations for the sector. Thus, there is still the possibility of a positive change in MPC that, together with the less reduction of the capital-labor ratio with respect the rest of the sectors, may explain the productivity increase. The efficiency improvement in the sector did not lead to a high rate of growth in output: the sector grew only 3.1% over the period, far bellow the economy average. The poor dynamic of the sector may be explained by the low level of investment during the period (see table 5). This sector has limited capability of investment absorption as its dynamics is inward-oriented and depends largely upon population growth, as opposed to the higher growing outward-oriented sectors absorbing larger amounts of investment.

CONCLUSIONS

The paper attempted to determine the changes in the productivity structure and the evolution of efficiency as a consequence of the reinforcement of the outward-looking profile of the state economy after 1994. In general, we tried to determine whether the extraordinary growth in the state was detonated by the dynamics of investment materialized in more capital and labor inputs (factors growth), or by efficiency improvements. We found evidence in both ways: growth in the sate was detonated by factors growth and by efficiency improvements. The efficiency improvements occurred mainly in the manufacturing sector and the service industries. Commerce also experienced considerable efficiency gains, although the statistical significance was weaker. Efficiency improvements were measured as increments in TFP and MPC: Manufacturing experienced improvements of both, whereas the rest of the sectors, especially services, experienced increments in their MPC. Efficiency improvement after NAFTA contributed with the elevation of the overall productivity in the economy, in spite of the systematic reduction in the capital-labor ratio. Therefore, B.C. pos-NAFTA growth is taking place with less capital relative to labor and higher efficiency, as the economy benefits from more propitious access to cheaper and better capital as consequence of free trade and FDI.

Our results support the traditional hypothesis suggesting that efficiency expansion exists as the economy strengthens its outward-oriented profile through trade liberalization policies, and harmonize with the findings of Fuentes and Fuentes (2002), and Gonzalez-Arechiga and Ramirez (1989). However, whether the economy is or not more efficient is more relevant if social gains also materialized, which still is not clear. Countries pursue free-trade policies not only for efficiency reasons, but because of the welfare impacts that the theory predicts. However, not much work regarding the welfare impact of those efficiency gains has been made. In a recent publication, Mungaray and Cabrera (2003) have analyzed the impact of productivity and specialization over salaries in Baja California. They have found the disconnection of both with respect salaries, implying that the industrial specialization of B.C economy and trade liberalization has limited effects on welfare. This result has policy implications. First, changes in the institutional framework regulating the states responsibilities on their economies should be intensified as to allow greater autonomy in their economic policies. Second, the state industrial policy should consider the encouragement of the numerous small firms through the application of policy instruments as to create and fortify the productive linkages among domestic industries or between domestic and global industries (Ramirez and Mungaray, 2004). In the long run, this source of transformations can make the outward-oriented profile of the economy and the industrial specialization of B.C. toward maquiladora industries to provide a better appropriation of the efficiency gains and productivity for local industries as to increase remunerations and social welfare.

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ECONOMETRIC APPENDIX

Table # 1
Percentage Structure and Growth of BC

Sector/Subsector	1993	1994	1995	1996	1997	1998	1999	Growth 1993-99
GDP State	100	100	100	100	100	100	100	5.0
(1)Agriculture, floriculture, and fisheries	3.68	3.3	4.29	3.98	3.92	4.11	3.7	5.1
(2) Mining	0.24	0.27	0.32	0.28	0.23	0.24	0.21	2.4
(3) Manufacturing	17.70	18.13	19.14	20.70	20.75	21.43	22.27	9.1
(31) Food Products	3.73	3.39	3.62	3.44	3.14	3.15	3.23	2.5
(32) Textiles	0.59	0.61	0.72	0.79	0.89	0.91	1.03	15.3
(33) Wood and its Products	1.27	1.24	1.17	1.27	1.11	1.06	1.15	3.3
(34) Publishers	0.54	0.55	0.52	0.57	0.59	0.61	0.63	7.7
(35)Chemical Products, oil derivatives and plastics.	0.86	0.82	1.07	1.14	1.12	1.22	1.24	11.6
(36) Non Metallic Minerals	1.38	1.58	1.41	1.59	1.36	1.24	1.19	2.4
(37) Basic Metal Industries	0.13	0.14	0.12	0.14	0.15	0.16	0.16	8.0
(38) Metal Products, Machinery and equipment	7.50	7.97	8.46	9.5	10.17	10.92	11.41	12.6
(39) Other Manufacturing industries	1.68	1.83	2.06	2.26	2.23	2.15	2.22	10.0
(4) Construction	4.65	4.70	3.57	4.15	4.10	3.64	4.04	2.6
(5) Electricity, gas and water	3.02	2.97	2.88	2.90	2.88	3.22	2.96	4.7
(6)Commerce, Restaurant and Hotels	23.99	25.02	21.29	21.96	23.96	23.36	21.57	3.1
(7) Transportation and Trucking, Storing and Communications	9.06	9.62	10.11	9.98	10.58	10.55	11.33	9.0
(8) Financial Services	17.52	17.43	19.21	17.96	16.27	17.16	17.64	5.1
(9) Professional Services	22.31	20.73	21.66	20.06	18.61	18.01	18.18	1.5

Source: INEGI

Table # 2
Available Information

Sector Classification	Sector	Data
1	Agriculture, floriculture, and fisheries	NA
2	Mining	Available
3 (31-39)	Manufacturing	Available
4	Construction	Available
5	Electricity, Water and Gas	Available
6	Commerce, Restaurants and Hotels	Available
7	Transportation and Trucking , Storing and Communications	NA
8	Financial Services	Available
9	Professional Services	Available

Source: INEGI

Table # 3
F-Test, Individual and Time Fixed Effects for n=4 and n=6

Num	Null Hypothesis	F	Prob.	Result
	Industrial Effects			
n=4				
1	$\alpha_{11}= \alpha_{12}=\alpha_{13}= \alpha_{14}$	8.51	0.00	Rejected
2	$\alpha_{11}= \alpha_{1}$	15.6	0.00	Rejected
3	$\alpha_{12}= \alpha_{1}$	0.90	0.36	Accepted
4	$\alpha_{13}= \alpha_{1}$	0.5	0.50	Accepted
5	$\alpha_{14}= \alpha_{1}$	16	0.00	Rejected
6	$\alpha_{12}= \alpha_{13}$	3.25	0.08	Accepted (Rejected at 10%)
7	$\alpha_{11}= \alpha_{14}$	1.20	0.30	Accepted
n=6				
8	$\alpha_{12}=\alpha_{13}= \alpha_{14}=\alpha_{15}= \alpha_{16}=\alpha_{1,89}$	8.29	0.00	Rejected
9	$\alpha_{12}=\alpha_{1}$	15.6	0.00	Rejected
10	$\alpha_{13}=\alpha_{1}$	0.90	0.36	Accepted
11	$\alpha_{14}=\alpha_{1}$	21	0.00	Rejected
12	$\alpha_{15}=\alpha_{1}$	1.15	0.30	Accepted
13	$\alpha_{16}=\alpha_{1}$	0.50	0.50	Accepted
14	$\alpha_{1,89}=\alpha_{1}$	4.08	0.00	Rejected
15**	$\alpha_{13}=\alpha_{16}$	3.25	0.08	Accepted (Rejected at 10%)
	Time Effects			
n=4				
16	$\alpha_{2P}=\alpha_{2N}$	10.56	0.00	Rejected
n=6				
17	$\alpha_{2P}=\alpha_{2N}$	8.14	0.00	Rejected

When n=4, i=1, 2, 3, 4. 1=mining (2), 2=manufacturing (3), 3=commerce, restaurants and hotels (6), and 4=rest of the industries except 1 and 7 (4,5,8,9).

When n=6, i= 2, 3, 4, 5, 6, 8 and 9. Each i corresponds to the industrial classification shown in table 1 and 2. There is not data available for sectors 1 and 7.

**Tests 6 and 15 are the same.

Table # 4 Wald Test for Slopes					
Num	**Restrictions Ho**	**Regression Used**	**F**	**Prob.**	**Results**
	By Period				
1	$\beta_{1P}= \beta_{1N}$	9	10.19	0.00	Rejected
	By Relevant Industry				
	n=4				
2	$\beta_{1P,2}= \beta_{1N,2}$	19	2.85	0.10	Accepted (Rejected at 10%)
3	$\beta_{1P,3}= \beta_{1N,3}$	19	0.03	0.89	Accepted
4	$\beta_{1P,4}= \beta_{1N,4}$	19	2.91	0.095	Accepted (Rejected at 10%)
	n=6				
5	$\beta_{1P,3}= \beta_{1N,3}$	20	2.37	0.13	Accepted (rejected at 13%)
6	$\beta_{1P,6}= \beta_{1N,6}$	20	0.07	0.80	Accepted
7	$\beta_{1P,89}= \beta_{1N,89}$	20	2.20	0,18	Accepted (Rejected at18%)

In the Tests for n=4, 2=manufacturing sector, 3=commerce, and 4=the rest of the sectors excluding 1,2, and 7.

In the Tests for n=6, 3=manufacturing sector, 6=commerce, and 89=sectors 8 and 9 are considered together. Sectors 1,2,4,5,7 are excluded

Table #5 PRODUCTION FACTORS AND GROWTH IN BC												
Sector	**1993**				**1998**				**Growth (%) 1993-1998**			
	Y	**K**	**L**	**K/L (1000)**	**Y**	**K**	**L**	**K/L (1000)**	**Y**	**K**	**L**	**K/L**
3	4448.8	4042	142983	28.269	8191.6	6311.6	248458	25.40	84.13	56.15	73.77	-10.14
6	3401.1	1732.1	84891	20.404	5352.4	2046.6	106441	19.23	57.37	18.16	25.39	-5.76
4,5,8,9	2550.4	17137.3	85142	201.279	4408.1	8996.2	133124	67.58	72.84	-47.51	56.36	-66.43
Total	10400.3	22911.4	313016	73.196	17952.1	17354.4	488023	35.56	72.61	-24.25	55.91	-51.42

*Million pesos,1993=100
Y,K and L are the Value Added, Value of Fixed Assets and the Number Workers.
K/L is expressed as the value of capital for every 1000 workers.
Source: INEGI, Censos Económicos , 1994, 1999.

Figure 1

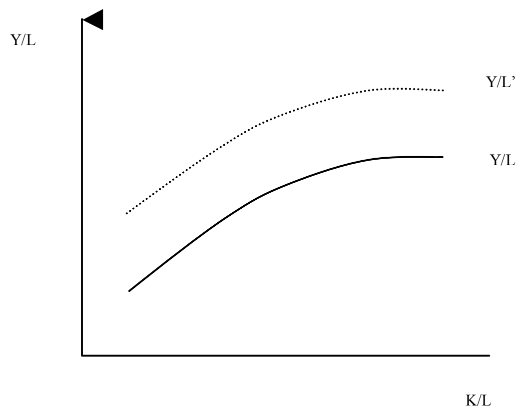
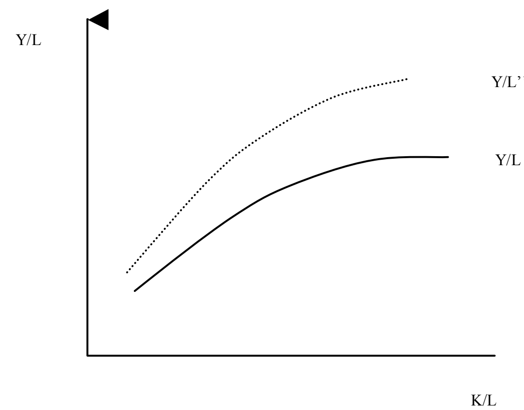


Figure 2



Appendix 1

Appendix 1
Econometric Results (n=4)

Num	α	α_{11}	α_{12}	α_{13}	α_{14}	$\alpha_{2,P}$	$\alpha_{2,N}$	β_1	β_{1P}	β_{1N}	R^2	F
1		-0.71 (-1.53)	0.89 (4.52)	1.72 (3.65)	-0.14 (0.40)			0.72 (13.0)			0.82	
2	0.86 (3.93)	-1.5 (-2.84)						0.68 (11.1)			0.75	
3	0.17 (0.54)		0.72 (2.41)					0.71 (11.05)			0.74	
4	0.7 (3.08)			1.13 (2.07)				0.68 (10.56)			0.74	
5	0.83 (3.8)				0.96 (-2.6)			0.71 (11.18)			0.75	
6		-0.52 (-1.09)	0.83 (2.89)	1.69 (3.31)	Dropped	0.08 (0.25)	1.07 (2.18)	0.67 (10.70)			0.86	
7	0.46 (1.36)		0.44 (1.5)				0.96 (2.26)	0.63 (8.76)			0.77	
8	0.71 (3.09)			0.60 (1.4)			0.52 (0.50)	0.67 (10.4)			0.73	
9	0.84 (3.84)				-1.11 (-2.84)		1.1 (1.15)	0.71 (10)			0.77	
10	0.94 (4.29)								0.54 (7.10)	0.78 (11.5)	0.76	69
11	0.77 (3.29)							0.69 (10.23)			0.70	

The parameters α_{11}, α_{12}, α_{13}, and α_{14}, are associated to sectors 2, 3, 6 and the pool of 4, 5 and 8, 9 respectively.

The number in parenthesis is the T-statistic.

Regressions: 1 unrestricted, 2-5 industrial fixed effects, 6 time fixed effects, 7-8 time fixed effects by relevant industry or group (2 & 3), 9 slope change by period, 10-11 slope change by period and industry (group), 12 restricted regression.