An economic growth model, institutions, economic integration and foreign direct investment of Mexico with the United States

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Resumen: México y Estados Unidos son más que vecinos, son socios comerciales con economías sumamente integradas. En la última década el comercio entre ambos países casi se ha triplicado llegando a ser cercano a los 230,000 millones de dólares a principios de 2004. Actualmente, México es el segundo socio comercial más importante de Estados Unidos y éste es el socio comercial más importante de México. El estudio se enfoca en el crecimiento económico regional y cómo es afectado por la Inversión Extranjera Directa (IED), el comercio y apertura comercial de Estados Unidos y México, y el efecto de la frontera norte. Finalmente, se muestra que México y Estados Unidos tienen una relación económica de integración de largo plazo al considerar el producto de las dos naciones.
Palabras clave: crecimiento económico, instituciones, integración económica e Inversión Extranjera Directa.

Abstract: Mexico and the United States are more than neighbours; they are also commercial partners whose economies are extremely integrated. During the last decade, commercial trade between the United States and Mexico almost tripled, getting to be near 230,000 million dollars at the beginning of 2004. Mexico is the second most important commercial trade partner to the United States and the United States is the most important commercial trade partner for Mexico. The present study focuses in the regional economic growth of Mexico and how it is affected by foreign direct investment, trade and commercial opening with the United States, considering the effect of the Northern Border States of Mexico. Finally, the empirical analysis of production for Mexico and the United States shows characteristics of long-term economic integration.
Key words: economic growth, economic integration, institutions and Foreign Direct Investment.

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1. Introduction

Mexico's economic political strategy of commercial aperture, supported by the economic theory and the experience, seems to be transformed in an improvement in the economy growth and also, to the extent that the economic disincentives associated with economic policies highly distorted and when improving the functioning of the institutions, is a significant dynamization of the economic activity. From there the importance of the study of the factors these economic policies lines can have over the objectives of growth economic policy in the long term throughout Mexico, and especially in the north border of the country.

With the set of the NAFTA in 1994, almost ten years ago, the largest free commerce zone of the world. This includes 406 millions of people who produce more than 11.4 billion dollars in assets and services. This makes the North America zone the largest free commerce zone in the world with close to one third of the international GDP. The total commerce among the countries of the NAFTA has increased in more than 200%, moving from 288.5 mmd (millions of dollars) in 1993 to almost 626 mmd in 2003.

Currently, Mexico is the second commercial associate of the United States, after our associate Canada. The Mexican exports to the United States increase 342% during the 10 first years, from 42.85 mmd in 1993 to 146.80 mdd in 2003.

In Mexico, the exporting sector is the main employment generator. This can be observed when considering that one out of every five people in Mexico are employed in this sector, whereas almost half of the 3.5 millions of new employments generated in Mexico between 1995 and 2000 was the result of the NAFTA and the exports increment. Employment in the exporting sector pays 37% more than the jobs in the manufacturing sector.

The present study checks the conceptual and theoretical of the regional growth, FDI and economic integration Mexico and the United States. It is analyzed the commercial aperture process since the NAFTA and its relation with the economic growth. In Mexico, the commercial aperture is increasing since the 1980's. Since 1994, the NAFTA is the main axis that fosters the expansion of the commerce, the FDI and the economic growth in Mexico.

The study measures the effectiveness of the commercial aperture, in particular of the NAFTA, to promote the international commerce and the impact of the commerce in the economic growth with a dummy variable for the states of the country's northern border.

2. Integration of Mexico with the United States

Since the creation of the NAFTA in 1994, the North American region is seen as one of the most integrated regions of the world. The regional closeness of the NAFTA partners is a factor that increases the dynamic performance of North America regarding the economic growth. For 2000, a third part of the total commerce of the region is performed by the members of the NAFTA. Similarly, the NAFTA has leading an increment in the commercial flows between Mexico, Canada and the United States. During the last seven years, the commerce of Mexico with its treaty partners has been triplicate, being now close to $275 billions of US dollars for 2000.

For year 2000, the trilateral commerce of the NAFTA reaches the 659 billion dollars; this is 128.2% more than for 1993. Since 1994, the commerce between the country members of the NAFTA increases to annual average rates of 11.8%, whereas the world's annual rate was of 7%.

Table 1. Trilateral commerce of the NAFTA (billions of dollars)

	1993	1994	1995	1996	1997	1998	1999	2000
Trilateral commerce	301.1	352.1	391.6	435.2	495.2	527.9	588.8	659.2
Mexico-USA	85.2	104.3	115.5	140.5	167.9	187.8	215	263.5
Mexico-Canada	4.1	4.9	5.3	6.2	7.0	7.4	9.3	12.1

Sources: Banco de México and Instituto Nacional de Estadística, Geografía e Informática (INEGI).

The commerce opportunities of Mexico and Canada in the NAFTA have increased noticeably in the last years. Mexico has become the Canada's fourth most important commercial partner; whereas the bilateral commerce with Canada is triplicate reaching almost 12 billion dollars in 2000. Mexico is one of the most important destinations for the Canadian products as it is its third most relevant exports market.

The NAFTA region has created new investment and commerce opportunities for the three countries enterprises. Currently, 50% of the foreign direct investment in the NAFTA region is intra-regional. For Mexico, the United States is the main source of foreign direct investment. From 1994 to 2000, the American enterprises invest more than 40.3 billion dollars, whereas Canada invests approximately 2.8 billion dollars.

On the other hand, the researchers of the northern border recognize the importance of the gross domestic product (GDP) of the northern border in the National Product and the asymmetry between the product of the border regions of Mexico and the United States. In 1994, the US GDP was about 18 times higher than that of Mexico. In the regional border sphere, the San Diego County in 1996 had a gross regional product almost 14 times higher than that of the Tijuana municipality. Even if the asymmetry of Mexico and the United States is less patent in the border regions, the inequalities are not less relevant. In national terms, the GDP of the northern border region represents more than 20% of the national total, so that the economic magnitude of the states of the northern Mexico's border can be observed.

Despite the economic asymmetry between the north and the rest of the country, same as in the north and south of the border, the border economy of Mexico and the United States has had a great dynamism due to the development axes sectors such as the manufacturing industry, the commerce and the tourism. The development of the manufacturing industry in the Mexican border cities fostered the creation of employments and promoted the industry's growth rhythm and of the regional product with economic expansion and contraction periods. On the other hand, the economic asymmetry of Mexico and the United States at country level is much higher than at border level.

In per capita GDP terms, the United States reached a per capita GDP of 35,060 dollars in 2002, whereas Mexico only had a per capita GDP of 5,910 dollars in the same year, according to data of the World Bank in the World Bank Development Report 2004.

In the last decades, the remittances have become a very important foreign exchange flow for most of the underdeveloped and exporters of work force nations. In many underdeveloped countries, remittances are one of the main aspects in the current transferences of their payment scales. For Mexico, as the amount of remittances in 2002 was of 9,815 millions of dollars. During 2003 this figure raised to 13, 266 millions of dollars, which meant an increment of 35.2% according to figures from CONAPO and the Bank of Mexico (2004). The amount of the remittances in 2003 overcame the estimated entrance of resources to Mexico by the concept of FDI and the income by the international travellers. The remittances were the equivalent to 79% of the value of the crude oil, 71% of the commercial surplus of the manufacturer sector and approximately 2.2 percentage points of the Mexican GDP of the year.

Table 2. Indicators for the GDP between Mexico and the United States (2002-2003)

	United States	Mexico
Nominal GDP 2003	10,987,900 mdd	637,200 mdd
Per capita GDP 2002	35,060 dollars in 2002	5,910 dollars in 2002

Sources: INEGI, Bureau of Economic Analysis, CIA World Factbook 2003, U.S. Census Bureau 2003 and World Bank, World Development Report 2004.

The border between the United States and Mexico is the most transited and economically integrated of the whole word. During 2002, 193, 181, 314 people entered the US from Mexico through the 25 official entrance ports of the border. Another characteristic of the integration is that the Mexican and American governments work together to strengthen the security along the border between the two countries. The two of them collaborate

in environmental, economic and of safety programs in their correspondent border area.

The bilateral commerce with the United States represents 71% of the total commerce of Mexico in 2005. The 87% of the Mexican exports go to the US, whereas it receives 55% of the imports. The integration reached until 2005, with 11 years validity of the NAFTA explains these results. The commercial flows grew 211.6% between 1993 and 2004. The exports of Mexico increased 285% in that same period, which generated a favourable commercial scale in the last years. Oil is the Mexico's principal exportation product of, with a participation of 9% in 2004.

Table 3. Comparative economic indicators of Mexico with the US (2004)

	United States		Mexico		(Reason)
Territory (Thousands of km^2)	9,629.1		1,964.4		0.20
Population (millions of inhabitants)	290.8		104.7		0.36
GDP. World position	1		10		
Real GDP (percentual variation %)	4.3		3.3		
Per capita GDP (dls.)	39,970.7		6,377		0.16
GDP (md)	12,601,000		783,494		0.062
Inflation (%)	4.3		3.05		0.71
Exchange rate (currency/USD)	1.0		10.7		10.7
Unemployment (% EAP)	5.0		3.6		0.72
Total commerce (md)	1,887,983		313,679		0.17
Total commerce (% of the GDP)	19.5		57.0		2.9
Current account (% GDP)	-6.2		0.0		
Foreign Direct Investment FDI (md)	24,768		3,252.6		
Total external debt (% GDP)	65.3		11.7		0.18
Life expectancy (years)	77.3		74.0		0.95
Population density (h/km^2)	30.8		53.3		1.64
Population growth (%)	0.9		1.4		1.55
Human development rate, HDR (Position)	8		53		
Main commercial associates	Exports	Imports	Exports	Exports	
First	Canada	Canada	United States	United States	
Second	Mexico	China	Canada	China	
Third	Japan	Mexico	Spain	Japan	

Sources: INEGI, Secretaría de Hacienda y Crédito Público (SHCP), Secretaría de Economía, Banco de México, FMI, CEPAL, Bureau of Census, Departament of Commerce, Department of Labor, Federal Reserve, United Nations and World Bank.

Following in importance the cars, televisions, vehicles for the transportation of people, car seats spare parts, units for digital processes, harnesses, that altogether represents 18.5% of the exportations to the United States. The imports show a more disperse composition with products as plastic manufactures, natural gas, electric connection devices, integrated circuits, iron or steel manufactures, vehicles, engines, boxes, cages and similar items, and parts for automobiles. The comparative economic indicators show us that the economic foundations of Mexico are getting closer to those from the United States in terms of the GDP percentage variation terms, inflation and life expectancy.

The foreign direct investment of the United States to Mexico reached 97, 817.4 millions of dollars between January 1994 and June 2005. The amount represents 62.5% of the total FDI. This shows that the United States is in the first position among the countries that in that period did some FDI in Mexico. By September 2005 there was a registration of 17, 952 societies with American participation in their social capital, this is, 53.5% of the total of societies with participation of foreign direct investment registered in Mexico (33, 575). The enterprises with American investment are mainly dedicated to services activities (43.7%), the manufacturing industry (28.9%) and commerce (20.4%), and are mainly located in the Federal District and states from the border, such as Baja California and Nuevo Leon.

The American accumulated FDI is equivalent to 62.4% of the total FDI destined to Mexico between January 1994 and September 2005.

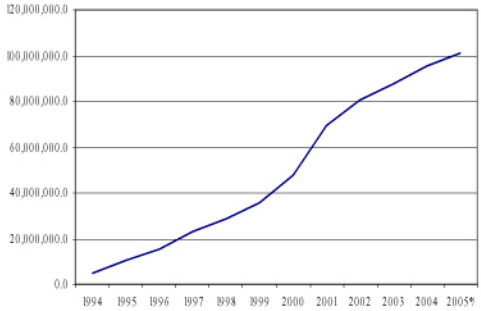
The favorable scenario for the FDI has allowed the growth of the Mexican economy since the beginning of the NAFTA. This is important to understand the impact of the treaty since the exports and the foreign investment have become in one of the most dynamic segments of the economy since the end of the 80's, as it is reflected by their relatively high and increasing participation in the GDP. It is important to mention that the FDI in the states of the northern border is very relevant.

Graphic 1

American investment in Mexico (1994-1995). In thousands of dollars

Year	Annual	Accumulated
1994	4,982,993.8	4,982,993.8
1995	5,494,088.5	10,477,082.4
1996	5,278,314.6	15,755,397.0
1997	7,392,410.1	23,147,807.1
1998	5,494,480.6	28,642,287.7
1999	7,192,547.7	35,834,835.4
2000	12,207,788.2	48,042,623.7
2001	21,469,738.6	69,512,362.3
2002	11,294,771.8	80,807,134.2
2003	7,067,077.4	87,874,211.5
2004	7,613,991.5	95,488,203.0
2005*/	5,908,618.2	101,396,821.2

*/ By September 2005.



Source: Secretaría de Economía.

By 2004, the total FDI in the northern border States represented 18.7% of the total FDI at a national level. When observing the American FDI from 1999 to 2005, according to the geographical regional destination, this was mainly directed to the federative entities of the Federal District, Baja California, Nuevo Leon and Chihuahua.

Table 5. Regional geographical destination of the American investment from 1999 to 2005		Amount (thousand of dollars)	Part. %
1.	Distrito Federal	43,925,985.1	60.4
2.	Baja California	5,670,670.8	7.8
3.	Nuevo León	4,778,490.3	6.6
4.	Chihuahua	4,597,027.1	6.3
5.	Tamaulipas	2,355,831.8	3.2
6.	Jalisco	1,970,006.1	2.7
7.	Estado de México	1,719,623.9	2.4
8.	Sonora	1,238,412.0	1.7
9.	Coahuila	1,035,707.0	1.4
10.	Guanajuato	1,015,998.8	1.4
11.	Puebla	983,527.4	1.4
12.	Baja California Sur	828,355.6	1.1
	Others	2,634,897.6	3.6
	Total	72,754,533.5	100.0

Table 4.

Foreign Direct Investment by federative entity from 1995 to 2004 in millions of dollars

Table 4. Foreign Direct Investment by federative entity from 1995 to 2004 in millions of dollars										
STATES	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
	8,345.	7,836.	12,199	8,359.	13,336	16,909	27,720	15,325	11,663	16,115
TOTAL	0	3	.7	3	.9	.6	.8	.2	.6	.1
North	**2,440.**	**1,906.**	**4,110.**	**2,667.**	**4,080.**	**5,518.**	**4,205.**	**3,595.**	**2,992.**	**3,013.**
border	**5**	**7**	**4**	**5**	**2**	**5**	**8**	**5**	**1**	**6**
Aguascalientes	27.1	34.8	18.1	69.1	91.2	82.6	103.4	-12.5	20.2	28.7
Baja California	538.1	427.6	677.7	726.0	1,167. 0	971.7	839.4	916.3	682.2	918.3
Baja California Sur	20.9	34.6	42.4	46.7	99.1	80.6	154.1	235.9	101.8	122.1
Campeche	0.5	0.0	1.8	0.1	4.6	11.4	-21.4	55.0	11.1	10.6
Coahuila	120.4	147.6	114.4	134.6	213.4	293.3	177.7	188.6	110.6	128.1
Colima	3.0	4.0	3.5	4.1	4.2	9.5	1.3	6.7	11.9	6.3
Chiapas	0.4	1.0	0.4	0.4	4.3	2.2	-0.9	2.2	1.4	3.2
Chihuahua	528.7	534.3	503.8	620.0	603.8	1,074. 8	740.1	608.5	710.5	708.4
Distrito Federal	4,483. 0	4,776. 7	6,740. 8	4,017. 5	6,008. 2	8,192. 2	20,335 .9	9,501. 5	7,016. 8	11,051 .7
Durango	40.5	20.2	41.6	45.3	15.6	5.0	43.5	69.4	9.1	8.6
Guanajuato	6.3	9.8	41.0	7.1	136.8	71.8	221.2	129.7	214.4	26.6
Guerrero	45.2	9.6	2.4	4.2	32.4	10.4	21.7	15.4	15.7	13.0
Hidalgo	48.3	60.2	2.4	0.7	0.7	-22.0	76.5	4.9	-0.5	0.6
Jalisco	114.4	185.6	202.3	361.5	523.4	1,144. 0	498.2	218.0	225.3	401.5
Estado de México	607.9	407.9	290.3	747.0	1,392. 4	434.6	769.2	687.3	410.9	672.2
Michoacán	48.8	1.2	4.0	4.3	6.3	28.3	5.8	8.1	4.8	-7.4
Morelos	67.6	51.2	27.4	60.8	147.9	65.9	18.5	5.3	47.1	142.4
Nayarit	2.0	3.6	7.6	6.0	27.5	44.4	37.8	18.0	89.3	30.5

Among ten entities of Mexico that received most of the FDI that came from the United States, are the six states of the northern border.

3. Empirical integration, commerce and growth model for the Mexican economy

In this part of the study the relative importance of the commerce in Mexico by regions to induce the growth are analyzed and discussed. The NAFTA creates the commerce institutions that norm the relation among the three countries of North American. As it can be observed in the previous sections, there is an extensive empirical and theoretical literature related to the impact of the commerce in the economic growth. The results are ambiguous, but mainly demonstrate a positive correlation between the free commerce and the growth, as Edwards (1992), Barro and Sala-i-Martin (1995) and Sachs and Warner (1995) mention. There is also a literature that explains the channels through which the free trade leads to a much more accelerated growth level as Grossman and Helpman (1989) and Romer (1990). Similarly, there is a literature that represents much more explicitly the institutional change effect in the development and the economic growth as in Campos and Nugent (1998). In the case of Mexico, Lusting (1998) relates the impact of the structural adjustments in the Mexican economic growth. On the other hand, Hanson (2000) examines if the economic integration of Mexico with the United States is influencing the decisions of having economic activities in the United States of close to the Mexican northern border. Hanson (2000) finds that the growth of the manufacturing sector for the exportation in Mexico can explain a proportion of the growth in the manufacturing employment in the cities of the Mexican northern border. This suggests that the NAFTA contributes to the formation of the regional production centres throughput the mentioned border.

The establishment of the NAFTA agreement among Mexico, Canada and the Unite States has been an important mechanism to foster the development of the Mexican economy. We can use an empirical analysis to study the transcendence of the commerce in the promotion of the regional economic growth. The different theoretical approaches have motivated the author to think in the possibility of a number of effects of the external

possibilities that are presented in the institutions, general education and other variables such as the degree of aperture of the economic regions. To identity the existence and fragment of the externalities in the institutions (by means of indexes that measure their effectiveness), the education and the degree of aperture presents difficulties in the practice, and even in the methodologies and data used in the few empirical studies of this kind are difficult to obtain.

According to Mankiw et al. (1992) and Barro and Sala-i-Martin (1995) methodology, and following the study by Díaz-Bautista (2001), the standard neoclassic model of economic growth is derived for the production function with constant returns to scale taking to inputs (the capital and the work). The production[1] in any t point is given by:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} \left(A(t)L(t)\right)^{1-\alpha-\beta} \qquad [1]$$

The variables from the right of the equation in the time (hereinafter the variables with points will be representative of this description)[2] are written by:

[1] Where Y, K, H, and L are production, physical capital, human capital ad workers, respectively; a is the partial elasticity of the production regarding the capital; β is the partial elasticity of the production in respect to the human capital and $A(t)$ is the economic and technologica efficiency level. It can be assumed that thsi efficiency level: $A(t)$ has two components: the economic efficiency I (t), which depends on the institutions and economic policies such as the commercial aperture, and the level of technological progess $\Omega(t)$. So, it can be written as a lineal logaritimical fucntion of the institutional variables, IED and of commercial economic policies, as $\Omega(t)$ increases at a $g(t)$ rate.

[2] As in the natural growth literature k=K/L, h= H/L, and y = Y/L, that show the reason capital-work, production of human capital and production by average worker, respectively; s_k and s_h are the investment rate in physical and human capital respectively, and d is the depreciation rate. we infer decreasing returns in reproductible factors ($a+\beta < 1$).

$$\dot{k}(t) = s_k(t)A(t)^{1-\alpha-\beta}k(t)^{\alpha}h(t)^{\beta} - (n(t)+d)k(t)$$
$$\dot{h}(t) = s_h(t)A(t)^{1-\alpha-\beta}k(t)^{\alpha}h(t)^{\beta} - (n(t)+d)h(t)$$
$$A(t) = I(t)\Omega(t)$$
$$\ln I(t) = p_0 + \sum_j p_j \ln V_j(t) \qquad [2]$$
$$\dot{\Omega}(t) = g(t)\Omega(t)$$
$$\dot{L}(t) = n(t)L(t)$$

Under the supposition of decreasing returns in reproducible factors, the equations' system is solved to obtain the values of stable state of k* and h* defined by:

$$\ln k^*(t) = \ln A(t) + \frac{1-\beta}{1-\alpha-\beta}\ln s_k(t) + \frac{\beta}{1-\alpha-\beta}\ln s_h(t) - \frac{1}{1-\alpha-\beta}\ln(g(t)+n(t)+d)$$
$$\ln h^*(t) = \ln A(t) + \frac{\alpha}{1-\alpha-\beta}\ln s_k(t) + \frac{1-\alpha}{1-\alpha-\beta}\ln s_h(t) - \frac{1}{1-\alpha-\beta}\ln(g(t)+n(t)+d)$$

[3]

Substituting these two equations in the production function and taking their logarithms we obtain the expression for the production's stable state in its intensive form[3]. The production's stable state in its intensive form can be described as:

$$\ln y^*(t) = \ln\Omega(t) + p_0 + \sum_j p_j \ln V_j(t) + \frac{\alpha}{1-\alpha}\ln s_k(t) + \frac{\beta}{1-\alpha}\ln h^*(t) - \frac{\alpha}{1-\alpha}\ln(g(t)+n(t)+d)$$

[4]

[3] The latter can be expressed whether as a function of s_h (investment in human capital) and the other variables or as fucntion of h^* (the stock of human capital pf the stable state

[4] We know that ψ is fucntion of (a,β) and $n+g+d$.

However, the stock's stable state of the human capital is not observed. As shown, the expression for h* as function of the human real capital1 is:

$$\ln h^*(t) = \ln h(t) + \frac{1-\psi}{\psi}\Delta \ln(h(t)/A(t)) \qquad [5]$$

Equation [4] could be a valid specification in the empirical analysis among states, only if these were in their correspondent stable states or if its deviations are independent and identically distributed. If the growth rates include dynamics outside the stable state, then these transitive dynamics will have to be explicitly modelled. A lineal approximation of these dynamics, similar to that of Mankiw et al. (1992), can be expressed as:

Where $\lambda = (1-\alpha-\beta)(g(t)+n(t)+d)$ [6]

Including the short term dynamics to the equation [6] we have:

$$\Delta \ln y(t) = a_0 - \phi \ln y(t-1) + a_1 \ln s_k(t) + a_2 \ln h(t) - a_3 n(t) + a_4 t + \sum_j a_{j+4} \ln V_j + b_1 \Delta \ln s_k(t) + b_2 \Delta \ln h(t) + b_3 \Delta \ln n(t) + \sum_j b_{j+4} \Delta \ln V_j + \varepsilon(t) \qquad [7]$$

Equation [7] represents the generic functional form empirically estimated in the present study, including the institutional variable and that of the commercial aperture.[5] The estimation of the stable state coefficients, as

[5] Where 1n $\Delta y(t)$ is the change in the logarithm of the income per capita, ln $y(t-1)$ is the logarithm of income in the period t-1, s_k (t) represents the rate of investment in capital, ln $h(t)$ is the logarithm 7 the average human capital; $n(t)$ is the growth of the population, t is a period of time, Vj includes the institutional variables. FDI and of commercial apertur, the changes in variables are reflected in $\Delta 1 \ln s_k(t)$ $\Delta 1 \ln h(t)$, $\Delta 1 \ln n(t)$, $\Sigma j \Delta 1 \ln Vj$ and $\varepsilon(t)$ is the error term.

well as the parameters of the production functions, can be obtained by the coefficients estimated in this equation when comparing them to the lineal approximation equation.

Equation [7] is important because the relation between the economic growth and the institutions can be analyzed through a proxy variable of the institutions and the commercial aperture. Next is done an econometric analysis of economic growth by states of transversal cut and in the time, which is conditioned and controlled with the level of human capital the index of commercial aperture and the population growth using generalized square minimums and instrumental variables.

The empirical variables by state used in the study are built as follows. The growth is the percentage growth of the per capita GDP weighted over the 1994-2001 period, in which the NAFTA has been valid. The initial production is the per capita GDP in 1994 and the final period of study for 2001 that comes from the estimations of INEGI in their reports and in the web page of the organism. The population is given for year 2001, in thousands of people. The information on the production and the population were obtained from the INEGI statistics, whereas the information on the aperture indexes is calculated by the sum of the imports plus the exports over the state's product. For the human capital a proxy is used, using the 15-years-of age or more population's average degree of education in 2001, with statistics available in the SEP and from the INEGI in their web pages. The institutional variable is the bureaucracy index in the formalities within the institution at a national level, by federal entity. The index uses a scale that goes from 0 to 100, where the lower the index is, there is less bureaucracy during the formalities. In the index is shown that Mexico City id the entity with the highest bureaucracy and Colima the one with the lowest corruption in institutional terms of bureaucratic formalities. The variable that shows the degree of commercial aperture by state for 2000 was obtained from the data base by state through the INEGI and from the Economic Development Ministries in each entity in millions of dollars. The variable of border is a dummy variable for the states that are considered from the Mexican northern border with the United States. Finally, the FDI is measured by the foreign investment performed by federative entity in millions of dollars, proportioned

by the General Direction of Foreign Investment of the Ministry of Economy. The growth equation by state to estimate empirically will be the following:

$\Delta 1n\ y(t) = \beta 0 + \beta 1$ initial per capita GDP $+ \beta 2$ human capital $+ \beta 3$ commercial aperture $+ \beta 4$ institutional variable $+ \beta 4$ north border variable $+ \beta 5$ population $+ \beta 6$ IED $+ \varepsilon$

The empirical analysis presents a result of a positive and statistically significant among the commercial aperture degree and the FDI by state and the economic growth rate for the period while the NAFTA has been working. A regression of generalized square minimums is done where the explicative variables are the income at level, the regional aperture index, the FDI and other main variables that, according to the neoclassic growth model, determine the stationary state of the different regional economies, as the population and an indicator of the level of human capital. In other words, the structural variables, besides gathering the habitual explicative variables, also incorporate a variable of economic policy, as is the index of regional economic aperture. Regarding the results of this regression two aspects are highlighted: in the first place, the known result of growth is obtained once a series of explicative variables of the stationary state of each state economy is added. Therefore, it is suggested the need of incorporating some additional explicative variables of the stationary state, and it can be concluded that the empirical evidence analyzed supports the idea that the application of aperture policies as the NAFTA contribute positively to the economic growth in the long term. The variable of border states is not statistically significant

Table 6. Regressions of MCG of regional economic growth considering the commercial aperture and the DFI from 1994 to 2001.
Dependent variable: state income growth rate in Mexico

Method: Generalized Least Squares with instrumental variables

Variable	Coefficient	Error Std.	t-Stat	
C	-25.68	149.19	-0.172	
LN INCOME LEVEL	58.45	348.57	0.167	
COMMERCIAL APERTURE	23.21	7.9543	2.918*	
POPULATION	0.0008	0.0007	1.173	
HUMAN CAPITAL	0.666	21.030	0.031	
NORTH BORDER	-9.524	6.6260	1.437	
INSTITUTIONS	-1.398	1.6510	2.148*	
DFI	5.473	6.8443	2.654*	
Square R	0.513			
Adj. Square R	0.396	S.D. dep. var		9.31
Prob(F-stat)	0.003			

* Statistically significant at a 5% level.

showing that the effects of the NAFTA in the economic growth are at the national level for the period under study.

Finally, in order of evaluating the statistic relation between the Mexico's and the United States' GDPs and to prove the existence of a long term stable relation, a co-integration test is performed, which corresponds to the Johansen proposal for the period from 1980 to 2003 with quarterly data.

Table 7. Co-integration test of the GDP series of the United States and Mexico (1980.1-2003.4)

Number of co-integration equations	Eigen Value	Trace statistics	Critical value at 5%	Critical value at 1%
Trace test				
0	0.468	32.03*	15.41	20.04
1	0.009	0.432	3.76	6.65
Eigen Valor Test				
0	0.468	31.597*	14.07	18.63
1	0.009	0.432	3.76	6.65

* Indicates the existence of a co-integration equation of 5 or 1%.

The test considers a delay period, which was determined by means of the Shwarz statistic.

The results show that the series share a common trend. The econometric evidence indicates that the economies from Mexico and the United States

behave very similarly, in both the short as well that in the long term, which reveals an elevated level of economic integration throughout time.

4. Conclusions

The theory and the empirical evidence in Mexico seems to suggest that the variables of FDI and commercial and institutional apertures play a central role to explain the existence of economic growth after the signing of the NAFTA, due to the effect of the growth rate, and indirectly, through its possible repercussion over the other variables as the institutions and the human capital. These variables also play a fundamental role when explaining the regional economic growth in the national context in the 1994-2001 period. It can be mentioned that the empirical evidence supports the thesis that an economic policy, by means of an aperture process as the NAFTA, is encouraging in terms of promoting the economic growth. The NAFTA helped the Mexican economy to have a faster and accelerated recovery since 1996. The degree of commercial aperture from the signing of the NAFTA has promoted positively the regional growth not only in the northern border, but also in the rest of the country. It is necessary to think again and reflect deeply the economic growth idea in the northern border, going further the terms that the market and the commercial aperture applies, and try to incorporate institutional factors; since, as it has been shown empirically, besides the commercial aperture, the institutions have had a positive effect at national level since the signing of the NAFTA. The market of the northern border can be understood as a self-organizing system, but autonomous and at the same time dependent of the whole country; from there that the border economy cannot be considered as a close entity in commercial terms. Finally, the effect of a determined growth model in the northern border is not simply limited to increasing or decreasing the regional income or increasing the commerce, due to the fact that in the application of a commercial policy between nations, as the NAFTA, adjustments and disarrangements are generated exponentially in all the countries and regions, that imply a process that has to consider other factors as the environment and the assignation of resources among the different social groups.

The NAFTA was set on January 1st, 1994, which started the progressive

elimination of virtually all the restrictions in the commerce flows and investment among the United States, Mexico and Canada in 10 years for the 1994-2004 period (with some more sensible restrictions eliminated in a 15-year period). The effects of the NAFTA for the United States are positive but little noticeable. Nonetheless, the NAFTA has increased the exports from Mexico to the United States and the imports from the US to Mexico, each year in larger quantities. These increments are small, and therefore, their effects on employment are also small. Finally, the increment of the commerce as a result of the NAFTA for the US has been positive and increases its GDP moderately; whereas the effect on the Mexican GDP has also been positive, but of a moderate magnitude. However, the effect of the commerce represents a much larger increment of the GDP percentage for the Mexican economy than the American economy. In the last years, the governments from Mexico and the United States have put into practice initiatives that look for the prosperity and safety of the region.

The bi-national initiative "Society for the Prosperity" wants to facilitate the Mexican community in the United States in the economic development of their origin places in Mexico through the remittances, as well as with projects for the development of infrastructure and dwelling, support to the PYMES and academic exchange. Among the commitments established in the Alliance for the Safety and Prosperity in North America adopted in March 2005 we can mention as important objectives: to increase the productivity, to promote the sector cooperation, to reduce the imports-exports transaction costs, to increment the economic growth and to rake care of the environment and the alimentary safety. Among the actions that have been defined are: to improve the origin rules and the technical norms; to promote the competitiveness in the steel and automotive sectors; to cooperate in the field of land, maritime and aerial transports, as well as to increment the energetic economic cooperation.

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