EFFECTS OF THE TRANSVERSAL INFLOW FDI ON ECONOMIC GROWTH AND PRODUCTIVITY. SPECIAL REFERENCE TO THE MEXICO CASE.

ABSTRACT

Multinational transversal service companies (communications, power, financial services) are a reality of the nineties. These companies are characterized by generation of an intermediate input aimed at practically the totality of an economy's sectors, reason why we have denominated the matter direct transversal investment. What we have analyzed is if inflow foreign direct investment in transversal services over economic growth and productivity is significantly higher to the effect caused by inflow foreign direct investment in manufacturing sector. Thus with this analysis we have verified that in the Mexico case, inflow foreign direct manufacturing investment has had a positive effect over productivity, however, contrary to that expected, entry of direct transversal investment has a negative impact over productivity.

Key words:

Direct Foreign Investment, Economic Growth, Productivity, Services.

INTRODUCTION

Multinational transversal services companies (communications, power, financial services) are a reality of the nineties. These companies are characterized by generation of an intermediate input aimed at practically the totality of an economy's sectors, reason why we have denominated the matter transversal foreign direct investment (FDI). It had been assumed that entry of direct investment would constitute a determining factor for economic growth, however, empiric evidence has made contradictory results manifest. Despite the fact that the works included in Blomström & Kooko's revisions (1998, 2003) and in Lim's (2001) appear to confirm this hypothesis, we also have evidence that contradicts it (Hanson 2001, Kumar 1996). Thus it is in view of this controversy that we have studied the structural factors that might determine the nature of the effect caused by entry of direct investment over economic growth and productivity. However, scarce attention has been paid to the effects that the strong entry of direct investment in service sectors is having over these realities. In this paper we are specifically analyzing if entry of direct investment in transversal services (financial, communications, transport and energy) has a greater impact over economic growth and productivity then the effect derived from inflow FDI in manufacturing sector.

We have chosen the economy of Mexico to verify the hypothesis that has been put forward, reason being that even if it is one of the least developed countries, it has however demonstrated that it has capacity to attract direct investment, specifically representing the second receiver of the same in Latin America. Also, as of the year 1985 Mexico decided to choose a development model based on opening up to foreign trade and liberalization of its economy. Said structural transformations along with privatizations have given rise to an important entry of FDI in the transversal sectors. Thus we have found that Mexico gathered together the adequate conditions to study the effect that entry of transversal and manufacturing FDI has over economic growth and productivity.

With the object of resolving endogeneity, simultaneity and non-stationary problems of the temporary series, Granger's causality analysis has been carried out, using the extended VAR model for the same. The results we have reached confirm that entry of direct investment in manufacturing sectors, during the 1986-2006 period, has had a positive impact over the Mexican economy's productivity. Contrary to that expected the effect of entry of direct transversal investment over productivity has not only been lower to manufacturing FDI, but has also proven to have a negative effect over productivity. Perhaps this negative result can be explained by the fact that entry of transversal FDI is basically concentrated in the financial sector (95%), which is a sector that is undergoing an in-depth process of transformation, structuring organizational facilities through the entry of great foreign banks.

This paper is structured into five parts. In the first place we have proceeded to justify the reasons by which entry of direct investment in transversal services in less developed countries should have a more pronounced effect over growth and productivity then entry of FDI in manufacturing sectors. In the second place we have briefly developed the endogenous growth model that is used in empiric contrasting. In the third place we have described the variables we have used and justified the verification tools employed, to then finally put forward the results and propose conclusions.

THEORETICAL JUSTIFICATION

The financial sector of an economy determines efficient transformation of savings into investment, generating the necessary confidence to reduce transaction costs, diversify the offer of products and manage the financial risks[1]. In like manner communications, and more specifically telecommunications, are essential as generators of savings in direct costs for the company, as a strategic coordination and corporate management tool, as an internal and external integration instrument of an economy and as a knowledge transmission network. The effects in the improvements of the transport systems and in energy costs are essential for competitiveness of

[1] Evidence on the impact of development of the financial system over economic growth is to be found in Pagano's paper (1993).

domestic companies and as advantages for localization. Therefore, inefficient production of transversal services constitutes an important barrier for economic growth. From which what emerges is that profits obtained from efficiency of these sectors must have a direct effect on economic growth.

From a sector point of view a gradual multinationalization process of the companies can be established. Thus, in a first stage (first globalization) companies in the primary and infrastructure sector (direct investment in search of natural resources) were multinationalized. Subsequently, as of the decade of the fifties, the manufacturing and service companies that were directly linked to the primary sector companies were multinationalized, to then give way in the nineties to public service multinational companies (communications, power, financial services). If the economic activity derived from direct investment abroad in financial services, power, transport and communications is more efficient than domestic investment, the latter has the characteristic of not only improving the quality of life of the consumers, but also of representing an intermediate input for the economic activity. Thus due to these circumstances we have denominated this type as "transversal" FDI.

Entry of direct investment has a direct effect over gross formation of the receiving economy's capital, however, its impact over economic growth and productivity is essentially due to its capacity to transfer technological knowledge and new management capacities. In this sense the revisions made by Blomström & Kokko (1998, 2003), Hanson (2001), Lipsey (2002), Mello (1989) & Kumar (1996) amongst others, put forward mechanisms for transfer of knowledge that can be articulated between the EMN and domestic companies. Empiric evidence reveals that the impact of entry of FDI over the growth of the less developed economies cannot be generalized, as in many cases it is even inferior to that expected. Also, analysis made at a micro-data level over the magnitude of the spillover associated to entry of FDI indicates that the same has only been identified in a few economies and for certain sectors[2].

[2] Studies at a country level, such as Mexico (Blomström & Persson 1983, Cuadros, Orts & Alguacil 2004, Jordaan 2005), Malaysia and Thailand (Chowdhury & Mavrotas 2006), China (Chen et al., 1995), Colombia (Kugler 2006), Morocco (Haddad & Harrison 1993), Indonesia (Takii 2005) verify that presence of multinational companies has a positive effect over productivity and/or economic growth. However, said results are not extendable to countries such as Brazil, Argentina (Cuadros, Orts & Alguacil 2004), Chile (Chowdhury & Mavrotas 2006) and Venezuela (Aitken & Harrison 1999). In like manner the analysis made by Hsiao & Hsiao (2006) over the effects of entry of FDI in a

The factors that determine the sign and intensity of entry of FDI over growth and/or productivity may correspond to macroeconomic or microeconomic natures. The first include the receiver country's infrastructure conditions, highlighting the economy's capacity for learning[3], the degree of institutional development, the level of transformation of the business culture and the commercial policy that is developed by the governments[4]. The second factors are associated to the type of activity that the EMN develops, the strategic function of the subsidiary, its relations with domestic companies and its workers and the competitive structure of the markets (Caves 1999, Kumar 1996).

Investment made by multinational companies in the formation of human capital constitutes a knowledge transfer mechanism. Efficiency of the channel depends on the economy's capacity for learning, on the implicit technological and organizational complexity of the activity developed by the subsidiary. Transversal services are characterized by their need for important immobilization of financial resources in the countries of destination, given that service is to be produced at the place of consumption. This reality implicitly involves overhead starting costs and, therefore, a vocation of permanence, apart from the fact that the provisioned services and the organizations that are implanted have certain levels of technological and organizational complexity involved. Thus, an effort in training and qualification that will favor generation of spillover through the job market is to be expected

The type of relationship that is held with the local suppliers and clients constitutes an essential element in the transmission of knowledge. Transversal services include the establishment of a close and long-lasting relationship with domestic companies (clients and suppliers). This reality will favor generation of spillover, given that this relationship facilitates adaptation of the products

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group of eight southeast Asian economies is not conclusive either. Likewise, works published by Fry (1993) and Hein (1992) for different samples of less developed countries, put on display scarce or nil impact of entry of FDI over economic growth

[3] Thus, Borensztein, Gregorio & Lee (1998) contrast that the positive effect of entry of direct investment over growth in those countries is determined by the country's metered capacity to learn, the same through the level of qualification of its human capital. Findlay's (1978) work presents a model that outlines the non-linear relationship between entry of FDI and productivity, conditioned by the economy's capacity to learn.

[4] Balasubramanyam et al (1996) make it manifest that spillover is greater in economies with policies for promotion of exports then in economies with import substitution policies.

to the client's needs, as well as possible transfer of technology (telecommunications sector) or good corporate practices (financial sector).

The outlined arguments do not suffice to propose that entry of FDI in the transversal service section can generate a differentiated effect over growth and productivity, although it does allow us to propose that the effect should be a positive one.

In Caves' work (1999) a differentiation is made between horizontal and vertical spillover. The first makes reference to improvements in the competitors' productivity in view of presence of the EMN. The second, of the vertical type, takes place when the suppliers and clients are the ones to benefit from externalization. Logically the EMN has incentives to avoid the first and enhance the second[5]. This is precisely the essential differentiating element that exists between transversal services and the manufacturing industry. Despite the fact that both can indeed generate transversal spillover, this given the number of sectors and companies with which it interacts, externalization must be far more intense in the entry of FDI in transversal services sectors.

Finally, the effects of entry of FDI are conditioned by the institutional framework and the competitive structure of the markets. A monopoly and/or inadequate regulation can avoid entry of FDI that generates externalization or that even has a negative effect over productivity and economic growth associated to it. If we take into account that transversal services are provided for regulated sectors, with a monopoly or oligopoly structure, then the competitive structure and institutional development will be the determining factor in the intensity and sign of the effect over the receiving economy (Mattoo et al. 2006), which would in itself constitute a distinctive element of this type of FDI as opposed to what the manufacturing sectors are doing.

Thus the economy of Mexico has been selected because, while being one of the least developed countries, it has demonstrated having more capacity to attract direct investment, specifically having become the second receiver of FDI in Latin America. A development model based on opening to foreign trade was chosen as of the year 1985, which has implicitly involved a process

[5] Kugler (2006), using a sample of Columbian companies, has verified that transfer of knowledge essentially takes place between the EMN and its suppliers.

of liberalization and privatization that has made a strong entry of FDI in the transversal services sectors possible. Although in the case of Mexico, empiric evidence that is available confirms that entry of direct investment has had a positive effect over economic growth (Cuadro, Orts & Alguacil 2004) and productivity (Jordaan 2005). However, we have no evidence available on the effects of entry of direct investment in the transversal services sectors.

THE MODEL

The theoretical model that is used is based on those proposed by Grossman & Helpman (1991), Barros & Sala-i-Martin (1995), Borensztein et al. (1998), Mello (1997, 1999), Ericsson & Irandoust (2001) and Asheghian (2004). Thus we part from the following production function.

$$Y = Ef(K, L, FDI) \quad (1)$$

In which Y is the real GDP, E represents the economic scope in which the variables that have an impact on the productivity of an economy are included, K is the physical capital allocation and FDI is the direct foreign investment entry stock. We have considered that capital is composed of the domestic capital (K_d) and foreign capital (K_f). While if H represents allocation of human capital and if we apply the Cobb-Douglass production function we then obtain that following:

$$Y = Ef(K, H) = EK_d^{\beta} H^{1-\beta} \quad (2)$$

In which β represents the domestic capital percentage. Human capital, H, depends on domestic and foreign capital. We have represented this dependency with a new Cobb-Douglas function:

$$H = \left(K_d K_f^{\lambda}\right)^{\eta} \quad (3)$$

In which λ and η represent the elasticity of marginal and temporary substitution between domestic and foreign capital. Thus as of equations (2) and (3) we obtain that following:

$$Y = EK_d^{\beta+\eta(1-\beta)} k_f^{\lambda\eta(1-\beta)} \quad (4)$$

If we suppose that foreign capital can be broken-down into FDI stock in the manufacturing sector $\left(K_{f-MANU}\right)$ and transversal services sector $\left(K_{f-TRANS}\right)$, then each one of them will have differentiated marginal substitution elasticity $\left(\lambda^{MANU}, \lambda^{TRANS}\right)$.

$$Y = EK_d^{\beta+\eta(1-\beta)} k_{f-MANU}^{\lambda^{MANU}\eta(1-\beta)} k_{f-TRANS}^{\lambda^{TRANS}\eta(1-\beta)} \quad (5)$$

And if we take these logarithms we obtain:

$$\ln Y = \ln E + \left[\beta + \eta(1-\beta)\right] \ln K_d + \lambda_{MANU}\eta(1-\beta) \ln k_{f-MANU} + \lambda_{TRANS}\eta(1-\beta) \ln k_{f-TRANS} \quad (6)$$

And if we derive equation (6) then we obtain:

$$\frac{1}{Y}\frac{dY}{dt} = \frac{1}{E}\frac{dE}{dt} + \left[\beta + \eta(1-\beta)\right]\frac{1}{K_d}\frac{dK_d}{dt} + \lambda_{MANU}\eta(1-\beta)\frac{1}{K_{f-MANU}}\frac{dK_{f-MANU}}{dt} + \lambda_{TRANS}\eta(1-\beta)\frac{1}{K_{f-TRANS}}\frac{dK_{f-TRANS}}{dt} \quad (7)$$

$$g_{GDP} = g_{TFP} + \left[\beta + \eta(1-\beta)\right] g_{KD} + \lambda_{MANU}\eta(1-\beta) g_{FDI(MANU)} + \lambda_{TRANS}\eta(1-\beta) g_{FDI(TRANS)} \quad (8)$$

With g_{GDP} representing economic growth, g_{TFP} growth in productivity and $g_{FDI(MANU)}, g_{FDI(TRANS)}$ representing the respective growth experienced in entry stock from direct investment in the manufacturing sector and transversal services sector, that is to say, FDI flows received in both types of sectors.

METHODOLOGY

Data corresponding to real growth of the GDP *(growth)* in the Mexican economy has been estimated as of the per capita GDP, the same determined in constant dollars at the 2006 rate offered by the Groningen Growth and Development Centre. We have used three measurements of the total-factor productivity *(TFP):*

a) *TFP1:* growth of the GDP ratio has been estimated (in constant dollars at the 2006 rate), divided by the number of worked hours, which is the estimate provided by the Groningen Growth and Development Centre.

b) *TFP2:* the approximation proposed by Mello (1999) has been used, representing the difference between growth of the GDP and the physical capital stock. Said stock has been calculated as of the gross formation of capital expressed in constant dollars at the 2006 rate, using the GDP deflator proposed by the Groningen Growth and Development Centre. A depreciation rate of 10% (Mello 1999) has also been taken into consideration.

c) *TFP3:* growth of the GDP ratio has been estimated (in constant dollars at the 2006 rate) and then divided by the number of workers, representing the estimate provided by the Groningen Growth and Development Centre.

Per capita direct investment entry flows (FDI) have been calculated as of the data offered by the UNCTAD (United Nations Conference on Trade and Development), while sector flows have been estimated with the data offered by the OCDE (Organization for Economic Co-operation and Development) and the Secretary for Economy through Mexico's Directorate General for Foreign Investment. The GDP deflator proposed by the Groningen Growth and Development Centre has been applied with the object of expressing the figures in real terms.

Entry of FDI can be an economic growth factor, although economic growth in turn constitutes a localization advantage. Apart from this, evolution of both realities is conditioned by the tendency of the international economy, which can generate spurious relations. It is with the object of avoiding endogeneity and simultaneity problems that we have estimated a VAR system to contrast causality relations.

When the variables of a regression are not stationary or when the traditional tests (F-test and Wald test) are not co-integrated in a Granger causality analysis they are not valid, given that distributions are not the usual ones (Zapata & Rambaldi, 1997). Thus the reason why regressions that incorporate integrated variables can make spurious relations manifest (Granger & Newbold 1974).

Selection of the VAR system requires analysis of the unit roots and co-integration, which can give rise to inadequate results. This can lead to selection of an incorrect model for contrasting of causality relations, to the point that a problem involving over-rejection of the non-causality nil hypothesis can arise (Giles & Mirza 1999). Hence, Toda & Yamamoto (1995), Dolado & Luketerpohl (1996) propose a methodology that can be applied independently of the model's integration or co-integration properties. A Modified Wald Test is used in this method, the same based on an extended VAR model, order of which is determined by the number of optimal system delays *(k)* and the maximum number of times that the variables are to be differentiated $(d_{\max})$.

The methodology used by Toda & Yamamoto (1995), Dolado & Luketerpohl (1996) and Yamada & Toda(1998) allow us to apply the Granger[6] causality test, using the following $VAR(k, d_{\max})$ system.

$$\begin{bmatrix} g_{GDP,t} \\ g_{FDI,t} \\ g_{TFP,t} \end{bmatrix} = B_0 + \sum_{i=1}^{k} \left(B_i \begin{bmatrix} g_{GDP,t-i} \\ g_{FDI,t-i} \\ g_{TFP,t-i} \end{bmatrix} \right) + \sum_{j=k+1}^{d_{\max}} \left(B_j \begin{bmatrix} g_{GDP,t-i} \\ g_{FDI,t-i} \\ g_{TFP,t-i} \end{bmatrix} \right) + \begin{bmatrix} \varepsilon_{GDP,t} \\ \varepsilon_{FDI,t} \\ \varepsilon_{TFP,t} \end{bmatrix} \quad (8)$$

In which B_0 is a 3x1 vector that collects the model's constants, B_i are the 3x3 matrixes that represent the coefficients and $vec(\varepsilon)$ is white noise.

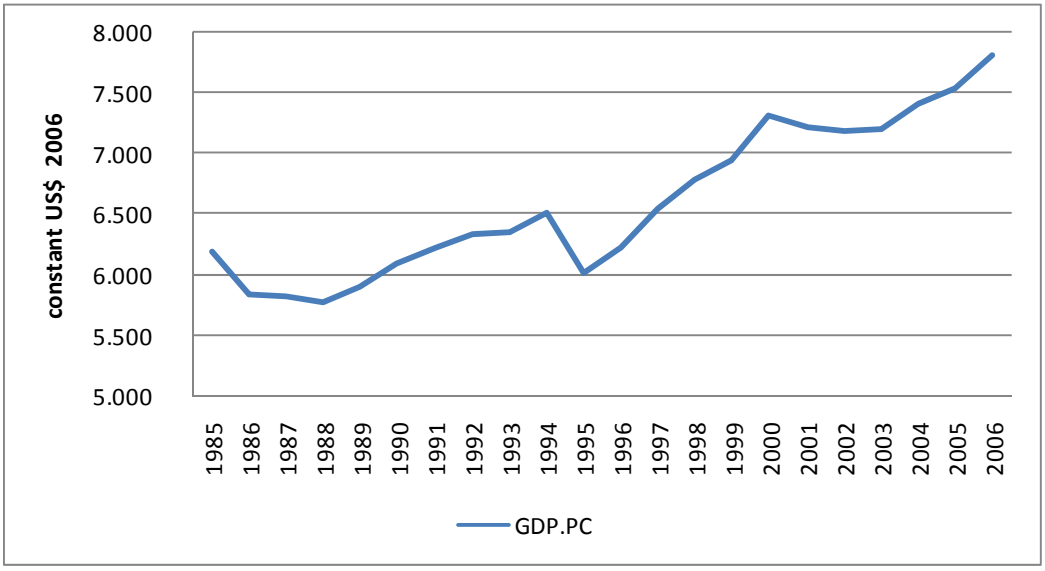
[6] Yamada & Toda (1998) have verified that said methodology is the most adequate when working with small samples.

We have put forward three VAR models for the causality analysis. In *Model I* economic growth is included, along with total-factor productivity (GDP / number of worked hours) and entry of IDE. In turn this model generates another three differentiated models; one for entry of total FDI, another for entry of FDI in the manufacturing sector and the third in the transversal services sector. In the case of *Model II* we have excluded productivity and economic growth in *Model III*. We are also developing another two additional models, one for each one of the proposed alternatives for metering of productivity.

RESULTS

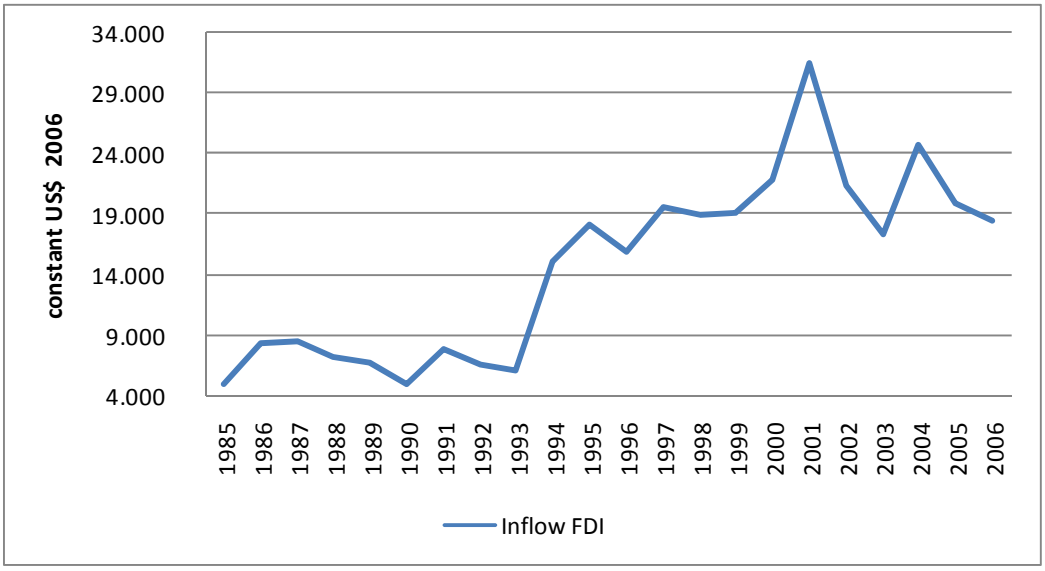
As of the year 1985 Mexico started a process of liberalization and opening of its economy to the foreign market, which culminated with the signing of NAFTA (North American Free Trade Agreement) in 1992. The proven economic growth since 1988, despite the momentary interruptions due to the 1994 and 2001 crises, is an examples of achievement (please see Figure 1). In like manner, as of the year 1992 an uninterrupted increase in FDI entry flows has been observed. Although more than 70% of the direct investment that was received was concentrated in the manufacturing sector, as of 1992 the transversal sectors start to acquire more importance, to the point of representing 20% of the total FDI received between 1986 and 2006. Also, despite the manufacturing sector maintaining a constant rate of FDI entry, flows in transversal services were heavily concentrated between the years 2000 and 2002. Apart from the fact that 87.3% of these have been destined to the financial sector (please see Figure 2 and Figure 3).

Figure 1: Evolution of the per capita GDP in Mexico in constant dollars at the 2006 rate.



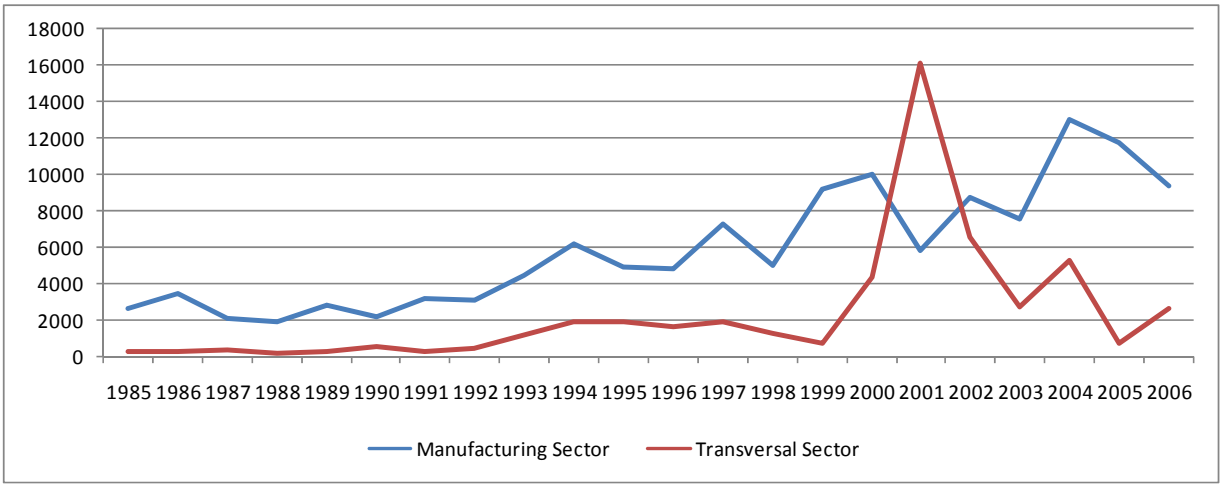
Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database.

Figure 2: Evolution of FDI entry flows in Mexico in constant dollars at the 2006 rate.



Source: UNCTAD and the GDP deflator estimated by the Groningen Growth and Development Centre.

Figure 3: Sector break-down of inflow FDI in Mexico in constant dollars at the 2006 rate.



Source: Secretary for Economy. Directorate General for Foreign Investment of Mexico, OCDE and the GDP deflator estimated by the Groningen Growth and Development Centre.

The first stage of analysis consists in determining the order of integration of the different variables that are incorporated in the model. Thus, for a period of time standing between 1986 and 2006, the Dickey-Fuller increased statistic evidences that all variables that are incorporated are I (1) (please see Table 1).

Table 1: Analysis of unit roots

	Augmented Dickey-Fulller Statistic		
	(1)	**(2)**	**(3)**
FDI Flows	-1.335***	-1.759***	1.979**
FDI Manufacturing	-0.591***	-3.988*	1.103***
FDI Transversal	-1.696***	-2.754***	0.371***
Growth	-2.879**	-3.252**	-2.519*
TFP1	-2.366**	-3.260**	-2.472*
TFP2	-3.656*	-3.607*	-3.816
TFP3	-3.578*	-3.909*	-3.760
First Difference			
ΔFDI flows	-5.980	-6.106	-4.050
ΔFDI Manufacturing	-5.164	-4.893	-4.371
ΔFDI Transversal	-4.086	-4.019	-4.057
Δ Growth	-5.531	-5.358	-5.652
Δ TFP1	-5.731	-5.571	-5.744
Δ TFP2	-4.706	-4.435	
Δ TFP3	-6.177	-5.960	

Notes: (1), (2) and (3) respectively correspond to the statistical model with constant, with constant and tendency and without any of the above.
* The nil hypothesis for a level of confidence of 99% is rejected, ** rejects the nil hypothesis for a level of confidence of 95%, **** rejects the nil hypothesis for a level of confidence of 90%.

Determining the optimal number of delays *(k)* constitutes one of the methodological problems that execution of the Granger causality test puts forward. In this sense, when work takes place with reduced Kukertpohl (1993) samples, use of the Schwarzt statistic is recommended. The results obtained are outlined in Annex I, Table 2, where it can be observed that the lack of freedom does not allow us to develop any of the models in which economic growth, productivity and entry of FDI are simultaneously included *(Model I).*

Given that the institutional factors practically impeded entry of FDI in the transversal services sectors until the year 1992, a temporary interval has been used, standing between 1992 and 2006, to analyze the effects of entry of transversal FDI. The lack of freedom has hindered us from executing the VAR models in which entry of manufacturing FDI and transversal FDI is simultaneously incorporated.

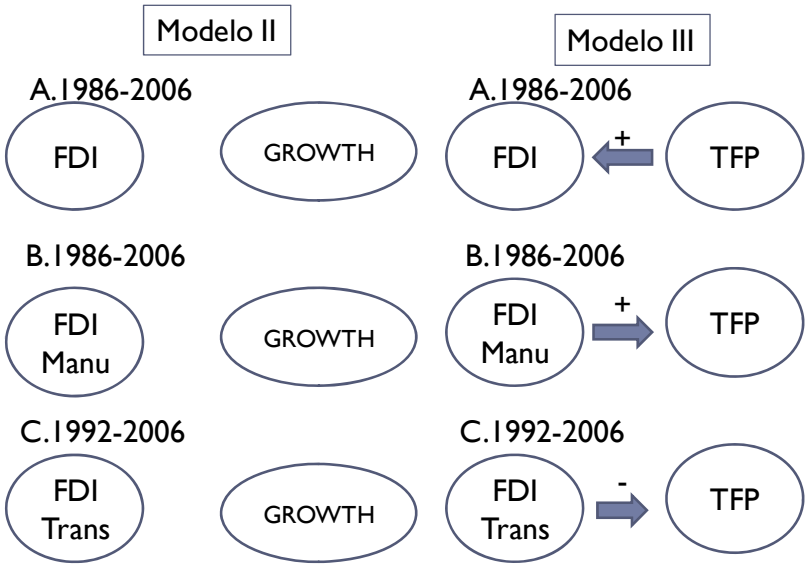
In the three type II models the causality relation between economic growth, entry of total FDI, entry of manufacturing FDI and entry of transversal FDI has been simultaneously analyzed. We have likewise carried out a Johansen co-integration test to verify if a long term relation exists between both non-stationary variables. Logically said relation must be confirmed with the causality test. Thus the following results have been obtained (please see Figure 4, Annex: Table 4, Table 8):

a) *Economic growth and entry of FDI:* the Johansen co-integration test confirms existence of at least one co-integration vector between economic growth and entry of FDI, which is coherent with the result obtained by Cuadro, Orts & Alguacil (2004) for a different time period and using four-monthly data. However, analysis of causality (*Model II. A*) does not allow confirming of the relation.
b) *Economic growth and entry of manufacturing FDI:* neither the co-integration test nor causality analysis makes the relation between economic growth and entry of FDI evident in the manufacturing sector.

c) *Economic growth and entry of transversal FDI:* analysis of causality does not allow confirmation of existence of the relation between economic growth and transversal FDI, which is made evident with the co-integration test.

The obtained results make it manifest that entry of FDI, both manufacturing FDI and transversal FDI, have scarce or nil impact over Mexico's economic growth.

Figure 4: Representation of the results obtained by means of Granger Causality analysis in an extended VAR model (Toda, Yamamoto Modified Wald Test)



Models III, IV and V and the Johansen co-integration test allow us to analyze the causality relation between different productivity measurements and entry of FDI. In this sense it is made evident that no statistically significant relation exists between entry of FDI and growth metering corresponding to the total-factor productivity proposed by Mello (1996) (TFP2), nor the approximate relation through the GDP / number of workers ratio (TFP3). There is likewise no evidence of a causality relation between these productivity measurements and entry of manufacturing and transversal FDI (please see Annex: Table 6, Table 7).

Analysis of the effects over the GDP / number of hours worked productivity measurement has made the following relations evident (please see Figure 4, Annex: Table 5, Table 8):

a) *Productivity and entry of FDI:* despite the fact that the hypothesis of existence of at least one co-integration vector between productivity and FDI entry being rejected, the extended VAR model makes it evident that productivity constitutes a localization advantage for entry of FDI in Mexico. This result confirms that the search for efficiency, fundamentally based on a lower cost of the work factor, constitutes a localization advantage offered by the Mexican economy, which is coherent with Love's & Lage-Hidalgo's works (2000) and with García-Herrero's & Santabárbara's (2007). .
b) *Productivity and entry of manufacturing FDI:* entry of manufacturing FDI has a positive effect over productivity, given that the co-integration test accepts the hypothesis of the existence of a long term relation between both realities and the extended VAR model confirms that entry of FDI in the manufacturing sector has a positive impact over growth of productivity. Said result is coherent with that presented by Jordaan (2006), which is based on a sampling of Mexican companies.
c) *Productivity and entry of transversal FDI:* the Johansen co-integration test confirms existence of a co-integration vector between both realities. Analysis of causality confirms this, making it evident that entry of transversal FDI has a negative impact over productivity, which is contrary to that expected. Also, the effect is lower than the effect caused by entry of manufacturing FDI.

It has been made evident that entry of manufacturing FDI has a positive effect over growth of the Mexican economy's productivity. However, contrary to that expected, entry of transversal FDI has a negative effect over productivity. The explanation for this result could be of an institutional nature. Thus it is appreciated that entry of FDI in the transversal services sector in Mexico is a recent reality, which is strongly concentrated in three years (2000-2002) and fundamentally destined to the financial section, which is immersed in an in-depth process of restructuring. Given that entry of foreign banking in the sector is structuring organization of said process, this could explain why the effects over productivity are negative.

CONCLUSIONS

We have also considered if entry of transversal FDI should have a differentiated effect over economic growth and productivity. Although transversal services and the manufacturing industry can generate vertical spillover (relations with suppliers and clients), it is to be expected that externalization derived from entry of transversal FDI should be more intense, this being because the number of sectors with which a multinational transversal services company interacts is far superior to that of a manufacturing EMN.

The economy of Mexico has been selected to verify if during the period standing between 1985 and 2006 the hypothesis that is put forward is actually verified. Thus it is with the object of resolving endogeneity, simultaneity and non-stationary problems of the temporary series that we have estimated an extended VAR system, which complements and corroborates the results of the co-integration analysis.

As a result of the analysis it can be appreciated that entry of both manufacturing FDI and transversal FDI has scarce or nil impact over Mexico's economic growth, which is contrary to the result obtained by Cuadro, Orts & Alguacil (2004).

Productivity profits have a positive impact over entry of FDI, confirming that the search for efficiency, fundamentally based on the lower cost of the work factor, constitutes a localization advantage that the Mexican economy offers, which is coherent with the works executed by Love & Lage-Hidalgo (2000) and García-Herrero & Santabárbara (2007).

Contribution to the paper resides in verification that entry of manufacturing FDI and transversal FDI has a differentiated effect over productivity. However, contrary to that expected, positive spillover generated by manufacturing FDI is more intense. Also, entry of transversal FDI has a negative effect over productivity.

Thus the institutional factor acquires special relevance when it comes time to explain this result. Entry of direct investment in the transversal services sectors in Mexico is fundamentally destined to the financial sector, which is immersed in an in-depth process of restructuring. Entry of foreign banking is structuring the organization of said process, which could explain that on a transitory

level entry of FDI generates a negative effect over productivity. Notwithstanding, this affirmation requires a specific analysis that can evaluate the microeconomic effects of entry of FDI in the Mexican financial sector, and the measure in which the institutional factors are actually moderating this relation.

The results that have been obtained partially confirm the central hypothesis of the paper, this because even though the effects of entry of transversal FDI are different to the effects of entry of manufacturing FDI, evidence has not confirmed that the first is more intense then the second. This result suggests that new double-direction work lines should be formulated, which on the one hand increases the number of countries under analysis, while on the other hand analyzing the nature of the institutional determining factors.

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ANNEX I

Table 2: Determinación del número óptimo de retardos mediante el estadístico de Schwarzt.

Own lags	**1**	**2**	**3**	**4**	**5**
	MODELO I				
A) GROWTH, TFP, FDI	-9,534	-8,925	-9,936		
B) GROWTH, TFP, FDI MANU	-9,171	-9,954	-9,988		
C) GROWTH, TFP, FDI TRANS	--	--	--		
	MODELO II				
A) GROWTH, FDI,	-3,035	-3,514	-3,153		
B) GROWTH,FDI,MANU	-3,793	-4,158	-3,940		
C)GROWTH,FDI,TRANS	-2,081	-1,618			
	MODELO III				
TFP1, FDI,	-3,405	-4,191	-3,788		
TFP1,FDI-MANU	-3,282	-4,081	-3,716		
TFP1,FDI-TRANS	-2,129	-3,066	-2,822		
	MODELO IV				
TFP, FDI,	-3,247	-3,278	-3,052		
TFP, FDI-MANU	-2,593	-3,051	-2,532		
TFP, FDI-TRANS	-2,299	-2,018			
	MODELO V				
TFP2, FDI,	-3,349	-3,510	-3,342		
TFP2, FDI-MANU	-2,476	-3,051	-3,066	-5,207	-7,619
TFP2, FDI-TRANS	-1,968	-2,063	-2,225		

Table 3: Outliers

	MODELO I
A) GROWTH, TFP, FDI	1994, 1995, 2000, 2005
B) GROWTH, TFP, FDI MANU	1994, 1995, 2000, 2005
C) GROWTH, TFP, FDI TRANS	--
	MODELO II
A) GROWTH, FDI,	1986, 1994, 1995, 2001
B) GROWTH,FDI.MANU	1986, 1995, 2001
C)GROWTH,FDI.TRANS	1995, 2001
	MODELO III
A)TFP1, FDI,	1986, 1994, 1995, 2000
B) TFP1,FDI-MANU	1986, 1995
C) TFP1,FDI-TRANS	1995, 2000, 2001,2005
	MODELO IV
A)TFP, FDI,	1994, 1995
B) TFP,FDI-MANU	1995, 2001
C) TFP,FDI-TRANS	1995, 2001
	MODELO V
A)TFP2, FDI,	1994, 1995, 1996, 2000, 2002
B) TFP2,FDI-MANU	1995, 1996, 2000, 2002
C) TFP2,FDI-TRANS	1995, 1996, 2000, 2001,2002

Table 4: Test for Granger Non-Causality applying the Toda and Yamamoto Modified Wald Test. Model II

	Causality Source			
Lags:2+1	FDI		GROWTH	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI			0,997	1,738
GROWTH	0,636	0,0029		
Lags: 2+1	FDI-MANU		GROWTH	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-MANU			2,539	2,429
GROWTH	0,881	0,0028		
Lags: 1+1	FDI-TRANS		GROWTH	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-TRANS			0,396	-4,337
GROWTH	1,968	-0,0055		

*, **, *** indicate significance levels at 10 per cent, 5 per cent, and 1 percent respectively.

Table 5: Test for Granger Non-Causality applying the Toda and Yamamoto Modified Wald Test. Model III.

	Causality Source			
Lags:2+1	FDI		TFP1	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI TFP1	0,856	0,0005	4,807***	3,230
Lags:2+1	FDI-MANU		TFP1	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-MANU TFP1	15,751*	0,004	2,651	2,769
Lags:2+1	FDI-TRANS		TFP1	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-TRANS TFP1	25,564*	-0,0081	3,993	6,981

*, **, *** indicate significance levels at 10 per cent, 5 per cent, and 1 percent respectively.

Table 6: Test for Granger Non-Causality applying the Toda and Yamamoto Modified Wald Test. Model IV.

	Causality Source			
Lags:2+1	FDI		TFP2	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI TFP2	3,135	-0,0118	3,185	5,595
Lags:2+1	FDI-MANU		TFP2	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-MANU TFP2	1,632	-0,0086	0,632	2,233
Lags:2+1	FDI-TRANS		TFP2	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-TRANS TFP2	2,038	-0,0064	0,258	-4,033

*, **, *** indicate significance levels at 10 per cent, 5 per cent, and 1 percent respectively.

Table 7: Test for Granger Non-Causality applying the Toda and Yamamoto Modified Wald Test. Model V

	Causality Source			
Lags:2+1	FDI		TFP3	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI			0,729	1,019
TFP3	0,303	0,0058		
Lags:2+1	FDI-MANU		TFP3	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-MANU	--	--	--	--
TFP	--	--	--	--
Lags:2+1	FDI-TRANS		TFP3	
	χ^2	$\sum coeff$	χ^2	$\sum coeff$
FDI-TRANS	--	--	--	--
TFP3	--	--	--	--

*, **, *** indicate significance levels at 10 per cent, 5 per cent, and 1 percent respectively.

Table 8: Johansen cointegración test.

$H_{0,r}$	Mod, 1	$\lambda(0,95)$	Mod, 2	$\lambda(0,95)$	Mod, 3	$\lambda(0,95)$
GROWTH, FDI						
λ_{max}						
0	32,636*	19,96	24,703	25,32	19,108*	18,17
1	12,147*	9,24	5,5799	12,25	0,0457	3,74
GROWTH, FDI-Manu						
λ_{max}						
0	33,513*	19,96	31,207*	25,32	31,035*	18,17
1	9,120	9,24	2,1019	12,25	2,1015	3,74
GROWTH, FDI-Trans						
λ_{max}						
0	32,342*	19,96	31,532*	25,32	27,235*	18,17
1	9,208	9,24	10,056	12,25	5,760*	3,74
TFP1, FDI						
λ_{max}						
0	19,790	19,96	22,552	25,32	18,399*	18,17
1	3,412	9,24	2,4603	12,25	0,018	3,74
TFP1, FDI-Manu						
λ_{max}						
0	25,165*	19,96	25,450*	25,32	24,842*	18,17
1	6,167	9,24	6,649	12,25	6,409*	3,74
TFP1, FDI-Trans						
λ_{max}						
0	32,514*	19,96	33,121*	25,32	22,361*	18,17
1	6,930	9,24	8,565	12,25	3,7762*	3,74

*, **, *** indicate significance levels at 10 per cent, 5 per cent, and 1 percent respectively.