A dynamic analysis of some instruments of fiscal, monetary and commercial policy in Mexico

Belem Vasquez, Ph.D[1]
Monterrey, Mexico

We analyse the influence of government intervention through the application of monetary, fiscal and commercial policies to achieve national goals of economic development. In specific, we investigate how government policies affect the economic relationships between GDP, Foreign Direct Investment (FDI), exports, capital accumulation, productivity, interest rates and human capital (period 1980 to 2002). The empirical analysis was developed with a dynamic model of simultaneous equations. Dynamic multipliers were also calculated to identify the instruments with the strongest potential to accelerate or decelerate growth.

Among the most important results, the estimates indicate that instruments related to fiscal policy like public expenditure and investment in infrastructure seem to affect capital accumulation positively, attract more FDI and improve human capital development. Regarding monetary policy, inflation was found to generate a strong acceleration effect on the interest rate, this shows that any policy to target inflation will affect important variables such as the interest rate and FDI. Trade reforms introduced in 1986 produced more positive changes in economic growth than those introduced in 1994 with NAFTA.

1. Introduction

In this study, we analyse the effects of fiscal and monetary policies applied by the Mexican government to achieve economic development and promote trade and foreign investment. The influence of government interve.0ntion is considered through three types of policy: monetary, fiscal and commercial policy. In the 1980s, the Mexican government still had a strong intervention on all sorts of ambits, from owing public enterprises to controlling prices and exchange rate fluctuations. Although it has eventually reduced its role in the economy, it is important to evaluate the positive and negative consequences of public intervention in the economy.

In the literature there are studies that have found that policies favouring public investment in infrastructure and liberalisation have positive multiplier effects on FDI (Blomstrom et al., 2000) and output growth (Bende-Nabende et al., 1998). It is recognised that government intervention may deepen macroeconomic problems; at least in the Mexican

[1] Belem I. Vásquez is a Researcher and Profesor at *El Colegio de la Frontera Norte*, Técnicos 277, Col. Tecnológico, Monterrey, NL. 64700, Mexico. Email: belem@colef.mx

case, it has been noted that economic crises in 1976 and 1982 were the result of excessive public spending, while the crisis in 1994 was attributed to the mismanagement of monetary policy (Lusting, 1999).

In this study we try to identify in which way government policies and trade reforms have altered the links between growth, FDI, exports, growth, capital accumulation, productivity and human capital. Also we investigate the dynamic impact of policy changes and identify the instruments with the strongest potential to accelerate or decelerate growth. The questions we seek to answer are: what type of economic policies might be conductive to improved performance of FDI, exports, output, relative wages, labour and capital accumulation? Has trade liberalisation in general, and NAFTA in specific, had any significant effect on output growth, exports and FDI? What adjustments in monetary base, public spending, inflation and exchange rate have the potential to stimulate the economy? And, which endogenous variables are more responsive to monetary policy changes and which are more responsive to fiscal policy changes?

The document contains seven sections including the introduction. Section 2 contains a brief background on the fiscal and monetary policies used as mechanisms of economic development in Mexico. Section 3 presents the econometric method. Section 4 contains the analysis of the estimates. In Section 5, we present an analysis of policy changes and their impact through dynamic multipliers. Finally in Section 6, we conclude.

2. Fiscal and monetary policies in Mexico: 1980-2002

For most part of the 20th Century, the Mexican government applied an Import Substitution (IS) strategy where the fiscal policy was prioritised as an instrument of economic development over monetary policy. In this period, an expansionary policy via public spending was the main instruments to stimulate growth. As a consequence, it led to excessive public spending without equivalent tax revenues. At the beginning of the 1980s fiscal deficit became a major concern. In 1986, the large public deficit (16% as a share of GDP) contributed to push up real interest rates (20-25% on average) and inflation (80%), and subsequently created difficulties for private firms that required financial resources. The fiscal deficit reached its highest level in 1987, a little more than 20 billion dollars (in real terms).

To cope with economic crises and encourage productive investment there was an attempt to implement a program to attain macroeconomic stability and to introduce a fiscal reform. In December 1987, President De la Madrid (1982-1988) launched an inflation-combating economic pact[2] to promote external competition as a way to restrict domestic price growth. It was known as *Pacto de Solidaridad Economica* (Economic Solidarity Pact.) and was the first of subsequent economic pacts that were used as guidelines to reduce inflation mainly through an austerity policy. The final macroeconomic targets were the reduction of inflation and stimulus of output growth. The intermediate targets were fiscal constraints, the control of the nominal exchange rate, the control of general wages, the liberalisation of public sector prices, the acceleration of trade openness and the privatisation of some public enterprises.

President Carlos Salinas (1988-1994) continued with the fiscal and monetary reforms started by former President De la Madrid. Once liberalisation was introduced and plans for joining NAFTA were considered, stability in prices and reduction of government intervention became the main objectives of his government. From 1988-1993, another economic pact was signed, known as *Pacto para la Estabilidad y Crecimiento Economico*[3]. One of the results was the reduction of real wages growth, which only experienced a rise of 4.2% in relation to 1988. Then a third economic pact was introduced for the period 1993-1994, *Pacto para la Estabilidad, la Competitividad y el Empleo* [4] to continue with restrictive policies to control prices growth. It was evident that the deterioration of real wages was one of the social costs of these corrective measures and as such it reduced human capital development.

As part of the *Pacto de Solidaridad Economica* (in 1987), monetary and credit policies became restrictive. Control of prices was one of the main priorities of the government due to high rates of inflation experienced in the 1980s. The reduction of inflation was seen as a means to bring back economic stability and reduce income deterioration. The Central Bank used mechanisms of credit and money policies and exchange rate intervention to reduce money supply and therefore avoid prices escalation (Dussel, 2000).

After devaluation in 1994, Mexico faced two challenges: to adjust the macroeconomic variables to refinance short-term debt in dollars and to lower inflation. Consequently, the

[2] An economic pact was an agreement signed by the government, entrepreneurs, agriculture representatives and labour unions to control prices and public spending.
[3] Pact for Stability and Economic Growth
[4] Pact for Stability, Competitiveness and Employment

main objective of monetary policy became the reduction of inflation. In the 1990s, instead of fixing a short-run interest rate and manipulating the exchange rate, the Bank of Mexico decided to use a monetary instrument to reduce money supply, these instruments were known as "*cortos*"[5]. The point of introducing *cortos* was to create negative accumulated balances in commercial banks, so in this way to reduce money supply. The empirical evidence suggests that there is not always a clear relationship between the monetary base and inflation growth, for that reason some analysts recommend not to use it as an instrument to target inflation (Martinez, Sanchez & Werner, 2001). The application of monetary *cortos* kept inflation expectations down and restored the lack of equilibrium in the exchange rate.

For twenty years until 1976, the exchange rate remained fixed as 12 pesos per dollar. After that, the exchange rate experienced the greatest depreciation during the economic crisis of 1982, being the reasons high public spending and high deficit in the current account. Then the currency devalued 267% in nominal terms. In 1987, during the first economic pact, the monetary policy fixed the exchange rate to reduce inflation, using it as a nominal anchor. The negative impact on the Balance of Payments made it necessary to introduce a regimen of floatation band in 1989. The fluctuation of the exchange rate was restricted to controlled fluctuations of 12% and the parity was set according to the supply and demand. In practice, the Central Bank intervened on numerous occasions to keep the floatation to no more than its maximum limit. International reserves were unable to support the peso at such devaluation margin, the real exchange rate indicated that more than 12% devaluation was required.

Under these conditions, in 1994 the peso became overvalued. Monetary authorities thought that capital flight was a transitory event due to the assassination of Presidential candidate Luis Colosio and other social conflicts. However the authorities refused to modify the monetary policy (Salinas, 2000). Eventually, at the end of 1994, the exchange rate depreciated 72%. Since then, the exchange rate regime has fluctuated freely. The Bank of Mexico does not intervene in the foreign exchange market except for operations carried out under the options mechanism.

Studies such as that of Iscan (1997) have shown that monetary policy on the exchange rate may be conductive to increased capital accumulation and export growth. This is because as long as the monetary policy maintains an undervalued real exchange rate, exports and capital accumulation show significant positive correlations with economic growth. Findings

[5] In Spanish "cortos" comes from the verb "cortar" ("to cut" in English). In this context, the term refers to the action of cutting or reducing money supply.

like this highlight the possibility that it might be through monetary policy and not directly through export promotion and FDI that it is possible to foster output growth and labour productivity. For this reason, it is important to identify instruments that have positive impact on exports and FDI and therefore a potential positive impact on the economy as a whole.

In classical economic theory, production can only be expanded by increasing one or both of the production factors, labour or capital. In this theory it is assumed the existence of decreasing returns to scale; an assumption that implies that subsequent increases of output cannot be attributed to inputs' growth. Later on, the endogenous growth theory developed a framework where the effects of FDI, human capital and technology transfer on output growth can also be considered as explanatory variables. Romer (1986) introduced the idea that investment in knowledge creates increasing returns to capital accumulation because knowledge becomes a public domain after a while.

According to Grossman and Helpmann (1991) a country can benefit from international trade because exchange of goods and services gives access to a large market, access to accumulated knowledge and stimulates innovation in products and techniques. In such environment, growth rates are expected to be higher because technical knowledge moves freely through international trade and foreign investment. In this context, we hypothesise that foreign investment affects economic growth positively by improving the productivity of physical resources. Romer (1986) also pointed out the important role of human capital as a source of increasing returns. In this study, it is assumed that new plants are on average technologically more developed than domestic plants in the same industry. The production processes used by those plants are expected to expose workers to new and different management techniques and *know-how*. In this sense, not only are these firms more likely to increase the demand for skilled labour but also to improve efficiency.

Some empirical studies show that among the most important determinants of FDI in host developing countries are the membership to a free trade region (Bende-Nabende et al., 2001), differentials in real wages (Blomstrom et al., 1997 and Love et al., 2000), human capital (Borensztein et al., 1998) and local competition (Bromstrom et al., 1994). Based on the empirical studies, there is an indication that it is convenient to explain FDI in terms of relative wages between Mexico and the US, output growth and human capital. The analysis of FDI in Mexico also indicates that most of this investment has a strong participation in the export sector and most of this investment comes from her main trade partner, the US. Additionally,

the provision of infrastructure (roads, telecommunications, energy, industrial parks, etc.) by the government is also considered as positive determinant of FDI.

Regarding the explanation of labour productivity, some empirical studies in Mexico have shown that FDI, government expenditure and domestic private investment are positive determinants (Ramirez, 2000). Additionally to these variables, we have included the potential effect human capital and technology transfer. Under the postulates of classical economy, productivity is posited as dependant on output (GDP). The endogenous growth theory predicts that trade will have a positive effect on output growth through rises in capital accumulation. According to Baldwin (1992) trade liberalisation has a dynamic effect on output because it raises the rate of return and this induces more capital accumulation. In this context, we want to determine how openness has affected capital accumulation in Mexico and on output growth. We expect that foreign capitals, technology transfers, public spending, the provision of infrastructure and productivity, all are likely to improve returns to capital and therefore stimulate its accumulation.

3. Modelling economic policies

In the model specification that follows we tried to include the relevant variables and functional relationships in order to identify how monetary and fiscal policies have improved economic growth and determine the links between GDP, FDI, exports, capital accumulation, productivity, interest rates and human capital in this context. Additionally, the model is designed to investigate the dynamic multiplier effects of policy changes, so we can measure the impact-response on the endogenous variables.

Considering the objectives and the review of the macroeconomic history in the period 1980 to 2002, we identified some policy variables more frequently used by the government. For example, to measure the impact of monetary policy intervention we consider the exchange rate, monetary base and prices control (inflation). To measure the impact of fiscal policy, the instruments are public expenditure in social services, infrastructure and tax revenues as a percentage of GDP (a proxy of taxes). The effect of trade reforms has been added as two dummy variables, one for liberalisation in 1986 with the entry to the GATT and the other for the effect of joining NAFTA in 1994. In the literature there is not a consensus about how to capture trade liberalisation (Edwards 1997), sometimes it is measured as the

share of trade to GDP, the growth of exports or a dummy variable. In the case of Mexico, it was clear that joining the GATT in 1986 reduced tariff and quotas considerably and promoted trade to a great extent. The proportion of import goods subjected to import licences reduced from 100% in 1982 to 19.7% in 1987, which was a very significant reduction at that time. The average trade tariff also decreased from 27% in 1982 to 10% in 1987 (Flores, 1998).

Later, NAFTA boosted exports and FDI and somehow consolidated the liberalisation process. Assessment of NAFTA has shown that between the three countries in this region, flows of commodities, capital and services have increased dramatically. For example, exports to the US almost doubled from $75 to $130 billion dollars in the period 1996-2001 and FDI in Mexico increased from $3 to more than $14 billions dollars in the same period (Weinstein, 2004). For this reason, we use dummy variables to take in consideration the effect of commercial policy.

Table 1 contains a list of exogenous and policy related variables that are potential determinants of GDP, human capital, exports, FDI, productivity, capital accumulation and the interest rate. All series are measured in quarterly frequency (from 1980:1 to 2002:4). For a more detailed description of variables and sources of information, see Table A1 in the appendix.

|Equation 1 describes output growth (GDP) as a function of FDI, exports, capital accumulation, human capital and labour productivity. All the variables are expected to have a positive effect on GDP. Plus the dummy accounts for the impact of liberalisation (D_{86}) and NAFTA (D_{94}). Logically, our hypothesis is that thanks to a more open economy and trade agreements, GDP growth has improved. Equation 2 explains FDI as a function of GDP, exports, human capital, real relative wages (RWAGES), the real exchange rate (RER), infrastructure (INF_SA) and the world economy (proxied by the US's GDP)[6]. All effects are expected to be positive, except relative wages, for which there is an inverse relationship, lower relative real wages in the host country are likely to attract more FDI. FDI includes the additional impact of liberalisation and NAFTA, a positive effect is expected. This equation also includes the potential negative effect of rises in the interest rate and in taxes imposed by the government.

[6] The reason to consider US's GDP as a proxy of the world economy is based on the relative importance of Mexican exports to that country, which represent more than 80%, and the share of foreign investment from the US, which represents between 50% and 70%.

Table 1. Endogenous, exogenous variables and expected linkage.

		Equations						
Endogenous variables:	Notation	1 GDP	2 FDI	3 EX	4 HC	5 PRO	6 CA	7 IR
Gross Domestic Product	GDP		√	√	√	√	√	√
Foreign Direct Investment	FDI	√		√	√	√	√	
Export goods	EX	√	√					
Capital accumulation	CA	√		√	√	√		
Human Capital	HC	√	√			√		
Labour Productivity	PRO	√		√	√		√	
Interest rate	IR		√				√	
Exogenous variables:								
Technological Transfer	TT				√	√	√	
Relative Wages	RWAGE		√	√				
World output	US		√	√				
Population	POP				√		√	
Fiscal policy variables:								
Government expenditure	GE_SA				√	√	√	
Infrastructure	INF_SA		√		√		√	
Tax Revenues	TX		√				√	
Monetary policy variables:								
Real exchange rate	RER		√	√			√	
Monetary Base (MB)	MB							√
Inflation	INFL						√	√
Trade policy variables:								
Liberalisation	D_{86}	√	√	√				
NAFTA	D_{94}	√	√	√				

In Equation 3, exports (EX) are posited to depend potentially on GDP, FDI, capital accumulation, labour productivity, relative wages, exchange rate and the world economy. It is expected that exports will respond positively to changes in these variables; except to relative wages because rises in real wages may raise export production costs. In the same way, we hypothesise that exports are dependent on the economic growth of Mexico's main trade partner. We expect that a growing US economy will increase its demand for imports (Mexican exports). The real exchange rate accounts for how exports react to peso devaluation, a positive link is expected. The dummy measures if there has been a significant difference in exports due to the deregulation of trade barriers.

Equation 4 (human capital) is specified as positively dependent on FDI, capital accumulation, labour productivity, technological transfer (TT), government expenditure (GE_SA), infrastructure and GDP per capita (GDP/POP). All the coefficients are expected to have positive signs. Among the most strong determinants, we expect to find technological transfer if it creates positive externalities and GDP per capita since part of an individual's

education depends on his or her disposable income to finance his/her education and training. Equation 5 (labour productivity) is specified to be a positive function of GDP, FDI, capital accumulation, human capital, technological transfer and government expenditure. Higher levels of technology and FDI may facilitate the introduction of capital intensive processes and training that raise the efficiency of the labour force.

Equation 6 (capital accumulation) is a positive function of FDI, labour productivity, technological transfer, GDP per capita, government expenditure, infrastructure and a negative function of the real exchange rate. The latter assumption implies that currency depreciation will affect capital accumulation negatively. This equation also measures the effect of changes in the interest rate, which in some way will impact on the country's capacity to invest in productive processes. Inflation accounts for the impact of peso's deterioration. A proxy for the effect of taxes on income and profits was added, in this case measured as tax revenues as a share of GDP (TX/GDP). We assume that a rise in tax collection is closely related to higher taxes or tax payment enforcement. It is expected that positive changes in these variables will create lower returns on capital and therefore will have a negative effect.

Finally, equation 7 is the equation for the interest rate (IR), this is determined endogenously by the system since there is no evidence of deliberate attempts by the Central Bank to fix it. The interest rate posited to be a function of GDP, monetary base and inflation.

4. Econometric methodology: simultaneous equations model and dynamic multipliers

In the standard regression model: $y = X\beta + \varepsilon$, it is assumed that the errors are uncorrelated with the exogenous variables (X), i.e. that the conditional expectation of ε given X is equal to zero. A violation of this assumption implies that the estimates are biased. In equations where the error terms are correlated with the right-hand side variables, the parameter estimates by OLS will be biased and inconsistent. A solution to this problem requires a method of simultaneous equations model to take endogeneity in consideration. In this method, the estimates of the structural model are not estimated directly but obtained from the reduced form equations using instrumental variables. The instrumental variables are regressed against all the exogenous variables. This procedure guarantees uncorrelated instrumental variables with the error term but correlated with the explanatory variables. In matrix form (Maddala (2001) and Greene (2003)), the structural model is:

$$\Gamma y_t + Bx_t = \varepsilon_t \qquad (8)$$

Where y_t and x_t are vectors of endogenous and exogenous variables and Γ and B are matrices of coefficients of the endogenous and exogenous variables, respectively. ε_t is a vector of error terms. The solution is the reduced form equation:

$y_t = -\Gamma^{-1}Bx_t - \Gamma^{-1}\varepsilon_t$ or simplifying,

$$y_t = \Pi x_t + v_t \qquad (9)$$

where $\Pi = -\Gamma^{-1}B$ and $v_t = -\Gamma^{-1}\varepsilon_t$.

In matrix form:

$$y_t = \begin{bmatrix} \pi_{11} & \pi_{12} & \dots & \pi_{1K} \\ \pi_{21} & \pi_{22} & \dots & \pi_{2K} \\ \vdots & \vdots & \vdots & \vdots \\ \pi_{M1} & \pi_{M2} & \dots & \pi_{MK} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_K \end{bmatrix} + \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_M \end{bmatrix}$$

$$y_t = (Mx1)$$
$$\Pi = (MxK)$$
$$x_t = (Kx1)$$
$$v_t = (Mx1)$$

M=number of endogenous variables and *K*=number of exogenous variables. In this system, it is assumed that that the errors have zero mean, are independent and have a common covariance; $E(\varepsilon_t) = 0$ and $E(\varepsilon_t \varepsilon_{t'}) = \Sigma$. The solution of the reduced form requires Γ to be a non-singular matrix, and the identification of each equation in the system.

We are interested in the dynamic form of this model because some variables are likely to have lagged effects on the endogenous variables. Since this is the case, the system specification changes slightly to allow for lagged endogenous and exogenous variables. The structural specification (8) changes to:

$$\Gamma y + Bx + \Phi y_{t-1} = \varepsilon \qquad (10)$$

Where, **y** is a vector of endogenous variables times the number of lags that appear in current and lagged form. **x** is a vector of exogenous variables times the number of lags that appear in current and lagged form. y_{t-1} is a vector of lagged endogenous variables times the number of lags. ε is a vector of disturbances independently, identically distributed with mean 0 and covariance matrix Ω. Expressing (10) in its reduced form:

$$y = \Pi x + \Delta y_{t-1} + v \qquad (11)$$

where: $\Pi = -\Gamma^{-1}B$, $\Delta = -\Gamma^{-1}\Phi$ and $v = -\Gamma^{-1}\varepsilon$

Lagged variables are now considered as predetermined and therefore are part of the instrumental variables. The assumptions of this model state that there is no multicollinearity and the stability condition is satisfied, i.e. the roots of the characteristic polynomial lie inside the unit circle, $|\Delta - \lambda I| = 0$. I is an identity matrix.

To calculate the dynamic multipliers, it is necessary to build the final form (from 11) described by Theil and Boot (1962), which implies the elimination of lagged endogenous variables from the reduced form equation. This is achieved by lagging this equation one period and substituting y_{t-1} with the result. By doing this, we obtain:

$$y = \Pi x + \Delta(\Pi x_{t-1} + \Delta y_{t-2})$$

Simplifying:

$$y = \Pi x + \Delta\Pi x_{t-1} + \Delta^2 y_{t-2} \qquad (12)$$

We can continue in the same way to eliminate y_{t-2} from this expression and so on. If the matrix Δ^t converges to a zero matrix ($\lim_{t\to\infty} \Delta^t = 0$)[7], then the final form of the system is equal to:

$$y = \Pi x + \Delta\Pi x_{t-1} + ... + \Delta^r \Pi x_{t-r} \qquad (13)$$

From the final form we can obtain the impact, interim and total multipliers, from the leading submatrices: Π contains the impact multipliers. They represent the response of the endogenous variables to changes that occur in the first period. $\Delta\Pi$, $\Delta^2\Pi$, …, $\Delta^r\Pi$ contain the interim multipliers for the 2nd, 3rd,…, up to r periods. The total multipliers cumulative effects are given by the elements of the matrix $(I - \Delta)^{-1}\Pi$. They describe the accumulated impact of an exogenous change from *t* time to infinity.

The system of equations (1) to (7) required a method of estimation that took in consideration endogeneity in the right-hand side of the equations. This method requires transforming the structural system to its reduced form. The representation of the structural system in the companion form is:

$$\Gamma y + A + Bx + \Phi y_{t-1} = \varepsilon \qquad (14)$$

In matrix form:

[7] This will occur provided the latent roots of Δ are all less than 1 in absolute value.

$$\begin{bmatrix} \Gamma_t & 0 & 0 & 0 & \dots & 0 \\ 0 & I & 0 & 0 & \dots & 0 \\ 0 & 0 & I & 0 & \cdots & 0 \\ 0 & 0 & 0 & I & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \dots & I \end{bmatrix} \begin{bmatrix} y_t \\ y_{t-1} \\ y_{t-2} \\ y_{t-3} \\ \vdots \\ y_{t-p-1} \end{bmatrix} + \begin{bmatrix} A_t \\ 0 \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix} + \begin{bmatrix} \beta_0 & \beta_1 & \beta_2 & \beta_3 & \dots & \beta_{np} \\ 0 & 0 & 0 & 0 & \dots & 0 \\ 0 & 0 & 0 & 0 & \dots & 0 \\ 0 & 0 & 0 & 0 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \dots & 0 \end{bmatrix} \begin{bmatrix} x_t \\ x_{t-1} \\ x_{t-2} \\ x_{t-3} \\ \\ \vdots \\ x_{t-p} \end{bmatrix} +$$

$$\begin{bmatrix} \Phi_1 & \Phi_2 & \Phi_3 & \Phi_4 & \dots & \Phi_{np} \\ I & 0 & 0 & 0 & \dots & 0 \\ 0 & I & 0 & 0 & \dots & 0 \\ 0 & 0 & I & 0 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \dots & 0 \end{bmatrix} \begin{bmatrix} y_{t-1} \\ y_{t-2} \\ y_{t-3} \\ y_{t-4} \\ \vdots \\ y_{t-p} \end{bmatrix} = \begin{bmatrix} \varepsilon_t \\ 0 \\ 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

Where: Γ_t , β_{np} , Φ_{np}, are matrices of coefficients, I is an identity matrix and O is a null matrix. Γ_t , I and Φ_{np} are matrices of order (7x6) and β_{np} are (7x12) matrices. A_t and ε_t are vectors of constants and errors respectively. y_t and x_t are vectors of endogenous and exogenous variables, in our case these vectors are:

$$y_t^{'} = [\, LGDP_t, LFDI_t, LEX_t, LHC_t, LPRO_t, LCA_t, LIR_t \,]$$

$$x_t^{'} = [LTT_t, LRWAGES_t, LUS_t, LPOP_t, LGE\_SA_t, LINF\_SA, LTX_t, LRER_t, LINFL_t, LMB_t, D_{86}, D_{94}]$$

Where, LGDP, is the log of GDP; LFDI, is the log of FDI; LEX, is the log of exports; LHC, is the log of human capital; LPRO, is the log of labour productivity; LCA, is the log of capital accumulation and, LIR is the log of the interest rate. LTT, is the log of technological transfer, LWAGES, The log of relative wages; LRER, is the log of real exchange rate; LGE_SA, is the log of government expenditure; LUS, is the log of the world economy; LMB, is the log of monetary base; LINF_SA, is the log of Infrastructure; LTX, is the log of tax revenues; LPOP, is the log of population; LINFL, is the log of inflation; D_{86}, is a dummy variable for liberalisation and, D_{94} is a dummy variable for NAFTA. Most of the series were transformed to natural logs to reduce the variance.

The finding that most macroeconomic time series data may contain a unit root has spurred the development of the theory of non-stationary time series analysis. So to make valid statistical inference and meaningful policy analysis, it is important to address the time

series properties of the variables and avoid the problems of spurious relationships. Augmented Dickey-Fuller and Phillips-Perron tests of unit root were applied to the variables, the results are in Table 2[8].

Table 2. ADF Unit root tests

Variables	In levels		In first differences	
	Constant	Constant and a trend	Constant	Constant and a trend
LGDP		-1.664		-7.788*
LFDI		-2.613		-6.703*
LEX		-1.602		-5.955*
LCA		-3.229		-4.795*
LRER	-3.077**		-7.677*	
LGE_SA	-2.528		-9.907*	
LHC	1.183		-3.231**	
LINF_SA		-3.344		-10.829*
LPRO		-1.762		-10.200*
LRWAGES	-2.019		-6.504*	
LTT		-3.311		-3.882**
LUS		-2.563		-3.9101**
LPOP		-0.368		-11.222*
LMB	-1.951		-10.226*	
LINFL	-2.373		-5.677*	
LIR		-2.856		-7.983*
LTX		-2.141		-8.141*

Notes: Mackinnon (1996) critical values for rejection of hypothesis of a unit root
* Denotes significance at 1% level
** Denotes significance at 5% level

The results in Table 1 reveal that all the variables are integrated of order one I(1), as a consequence the system has to be estimated in first differences. LRER was found to be non stationary in levels under the P-P test.

The procedure to estimate the equations and the multiplier effects was the following: first, an unrestricted system with a maximum of six lags was estimated, residual tests on this system showed satisfactory results. Then only statistically significant coefficients were retained to estimate a restricted system (the purpose was to improve the standard errors). This

[8] Similar results were obtained when we employed Phillip-Perron approach.

system was found to be mathematical stable as all the roots of the characteristic polynomial (Γ) were less than one in absolute value. The structural residuals were tested for serial correlation, normality and independent and identical distribution (i.i.d.)[9].

One of the reasons to apply a method of estimation is that it takes in consideration the endogeneity of some variable. Hausman's test for weak exogeneity is a way to find if this is the case (Hausman, 1978). Our results showed that F-statistics and Chi squares exceeded the critical values[10], leading to the non-rejection of the null hypothesis of weak exogeneity. This is probably caused by the large number of predetermine variables in the test regressions, which provided fitted values not statistically different from zero. According to this, there is no simultaneity bias and the system can either be estimated equation by equation with OLS or as a system with 3SLS. The results only confirm that there is no misspecification biased and therefore complies with one of the recommendations of the Cowles Commission (Christ, 1994).

Identification of the system was carried out to know if estimates of the structural parameters can be obtained and whether or not these parameters are unique. The first is the order condition and the second is the rank condition of identification. According to the order condition of identification[11], all the equations in the system are overidentified. Again the existence of many predetermined variables makes it possible to find a large number of possible solutions. On the other hand, the rank condition of identification guarantees that the solution that we find is unique[12]. To check if that condition was achieved, the system was normalised with respect to the endogenous variables and a coefficient matrix was constructed with the excluded endogenous and predetermined variables in the equation. The condition states that there be at least one (6x6) non-singular sub-matrix in every equation (i.e. the determinant must not be zero). The calculations showed that there is at least one determinant in the sub-matrices of each equation.

In summary, besides satisfactory stability condition and residual tests, the system of equations also complies with the Cowles econometric recommendations such as the solution

[9] Results are available upon request.
[10] Idem.
[11] The order condition states that the number of exogenous variables excluded from an equation (K-k) must be at least as large as the number of endogenous variables included in that equation less 1, (m-1). K is the number of predetermined variables in the system plus any constant, k is the number of predetermined variables in the equation and m is the number of endogenous variables in the equation.
[12] This condition states that an equation is identifiable if the rank of the coefficient matrix with the excluded endogenous and predetermined variables in the equation is equal to the total number of endogenous variables minus one.

of the identification problem and passes the misspecification error test (Hausman's test). Since the series are I(1), they were used in first differences and so they appear in the results presented in Table A2 in the appendix.

5. Results

The estimations of the simultaneous equations through the method of Three Stage Least Squares revealed that capital accumulation, productivity and FDI are statistically significant determinants of GDP, although this time human capital was not significant. According to the estimations, the entry to GATT has improved GDP positively, while NAFTA has induced a reduction. Although we accounted for trade reforms that could explain better the influence of exports on GDP, this was not the case. After more than ten years, some assert that NAFTA has favoured intra-regional trade at the expense of intra-regional FDI (Rugman, 2004). For example, in 2000, intra-regional trade was 55% versus a declining 18.2% of intra-regional FDI. The reason seems to be that activities in which there are still restrictions (for instance services) tend to attract FDI as an alternative way to compete in another market. This situation is evident in the economic relationship between the US and Canada, however statistical evidence shows that under NAFTA, FDI from the US to Mexico has increased relatively more compared to Canada. This could explain why FDI explains positive changes in GDP. More than a trade partner, for the US, Mexico represents a platform to invest and produce export goods at competitive prices for the international market.

The determinants of FDI were exports, relative wages and the exchange rate. When the interest rate was added to this equation, a significant negative effect was found (-0.19). Although most of this investment is financed with resources from its origin country, the significant effect indicates that the link to the money market in Mexico is relevant and any rise in the interest rate affects FDI negatively. Additionally, commercial policies that led to liberalisation and NAFTA created two different effects in foreign investment. Despite both dummies being statistically significant, the response to liberalisation was negative. Different factors could be attributed to this outcome, and they are not necessarily linked to trade liberalisation. First it would not be until 1993 when significant reforms to the law regulating foreign investment were introduced. Second, before the crisis in 1994, most of foreign investment went to the stock market. Third, the US economy (the main source of foreign flows to Mexico) was experiencing a period of moderate growth.

On the contrary, NAFTA shows a positive effect on FDI, so even though NAFTA represented an important stimulus for foreign investors, the same year of its operation, Mexico also experienced an economic crisis (in 1994). We can see this effect by analysing the coefficients of inflation and real exchange rate. For example, devaluation had an immediate and positive lagged effect in FDI. In some way, it is an indication that fluctuations of the exchange rate against the Mexican currency are a strong positive determinant of FDI. To a foreign investor, devaluation translates in relatively cheap production costs and also improves his terms of trade. Another explanatory variable of FDI was public spending in infrastructure (measured by DLINF) which shows a significant positive lagged impact. We can say that a fiscal policy that promotes public investment in roads, services, means of communication, etc. has become an important element to facilitate foreign investment and eventually international trade. Other studies support this finding in the sense that host countries characteristics such as competitiveness of the market, openness to imports and technical capability of local firms are being taking in consideration by foreign investors (Blomstrom and Globerman, 2000). The estimations also revealed a strong lagged influence of the world economy (DUS_{t-1}), meaning that a positive US economy has contributed to increase foreign investment in Mexico (its quantitative impact was 4.48). According to these estimates, FDI reacts positively to both, the host country conditions and the state of the world economy.

Estimations for exports equation confirmed that Mexican exports are strongly dependent on the state of the US economy (the coefficient was 5.10). In the same way, currency depreciation stimulates exports as they become more competitive in the international market; however lagged effects of the exchange rate fluctuations show that this positive effect does not last for long. Eventually, the lagged effect of peso depreciation reduces exports because prices of other goods will tend to adjust to devaluation. Lagged effects of productivity gains also induce positive changes in exports (1.159), in fact this was the second most important determinant of exports. On the other hand, trade reforms have mixing results. For example both GATT and NAFTA coefficients were statistically significant, but only GATT with a positive effect on exports (0.093). It is evident that trade has benefited from reductions and eliminations of tariffs, but tariff reductions in 1986 were relatively more intense compared to those in NAFTA. This difference could be translated in exports' positive response to liberalisation in 1986 versus the negative response to NAFTA.

A fiscal policy based on government spending on human resources does seem to improve human capital. Although public investment in infrastructure is also important, the estimations do not show a significant effect. We can observe that labour productivity (lagged four periods) and FDI (lagged five periods) are significant determinants of human capital. Equally in the case of labour productivity, we can confirm that GDP and human capital favour positive changes in productivity.

Findings in the equation of DLCA reveal that the exchange rate appreciation, technology transfer, GDP per capita and investment in infrastructure enhance the accumulation of capital. Other variables related to fiscal policy do not indicate that they induce significant changes in capital accumulation. This outcome is very important for the system, since capital accumulation is also an explicative variable of GDP, exports and productivity for instance. According to these results, any deliberate action to alter taxes, the interest rates or price would have little effect on a wider range of economic variables. However, in general we can see that those variables related to fiscal policy like public expenditure and infrastructure do seem to affect some of the endogenous variables. For example, in the specific case of capital accumulation, spending in infrastructure confirms the important role of the government's provision of roads, means of communications, services, etc. that facilitate investment and improve FDI and exports. Finally, the equation that represents the interest rate showed that changes in this variable can be explained by current and lagged changes in GDP and inflation. Coefficients of both explicative variables provide mixing results about their negative and positive effects. No conclusive evidence can be extracted from the estimations.

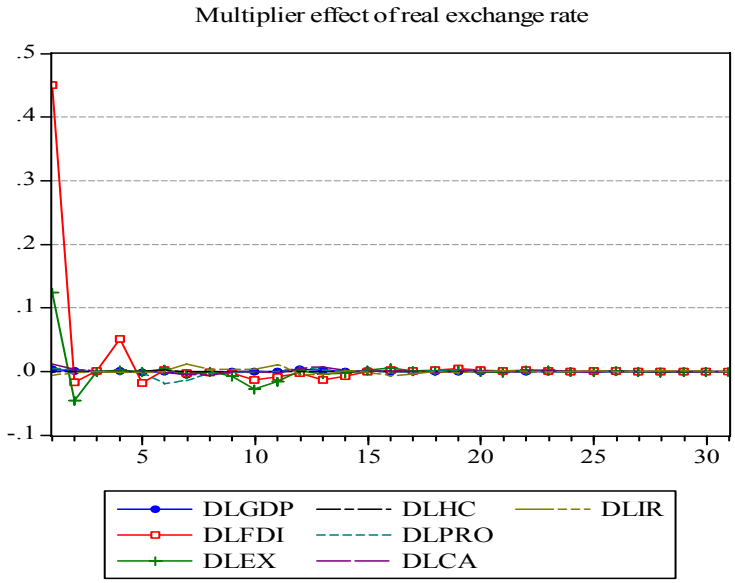
Considering that the 3SLS estimations were carried out using series in first differences, the multiplier should be interpreted as the acceleration on the endogenous variable as a result of a unit change in a change in the exogenous variable. The signs indicate whether there was an acceleration (positive) or deceleration effect (negative). The results from the estimated interim and total multipliers were calculated for a period of 30 quarters (our data are in quarterly frequency). We only present graphically the multipliers effects of the exchange rate, the monetary base, inflation and tax revenues which are some of the policy related variables.

As was mentioned previously, the analysis of dynamic multipliers is a tool that allows measuring how a unit change in an exogenous variable accelerates or decelerates changes in

the endogenous variable. Under this method, we can observe how changes in instruments of fiscal and monetary policy and inflation will affect key economic variables. The purpose of carrying out this analysis is to investigate the dynamic impact of changes in government policies and identify the instruments with the strongest potential to accelerate or decelerate growth, exports, capital accumulation, labour productivity, human capital and interest rates.

Figure 1 shows the multiplier DLRER (i.e. real exchange rate) and its impact on the eight endogenous variables. Graphically we can only observed responses that were quantitatively stronger. For example, a unit change in peso depreciation accelerates changes in FDI and exports immediately. Although currency depreciation stimulates export production because they become internationally more competitive it rapidly adjusts to the long-run equilibrium. In the case, of FDI, its acceleration effect prevails longer, until the four periods after the initial shock.

Figure 1

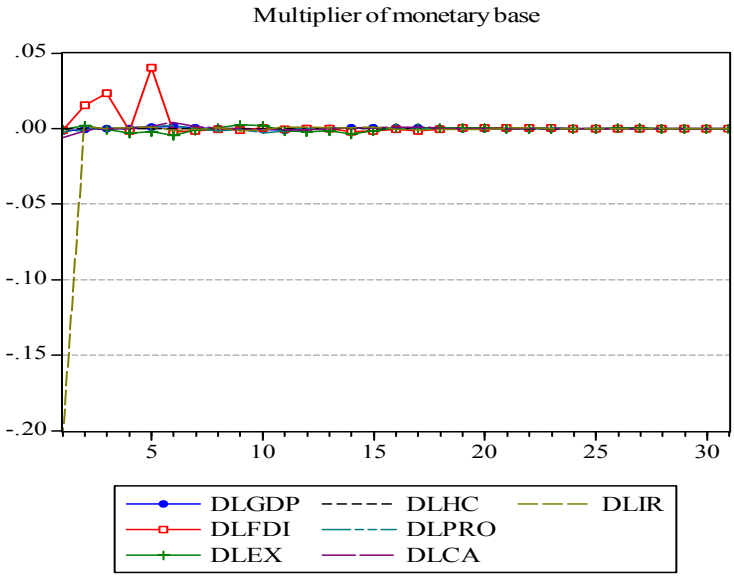


The multiplier effect on other variables was negligible, which indicates that monetary policies designed to manipulate or intervene in the exchange rate market will tend to affect FDI and exports with more intensity.

The manipulation of the monetary base was an instrument with a strong impact on the interest rate as can be seen in Figure 2. This multiplier effect supports the affirmation that an expansionary monetary policy tends to decelerate changes in the interest rates (the negative sign shows a reduction). As a consequence, this has the potential to create a positive effect on

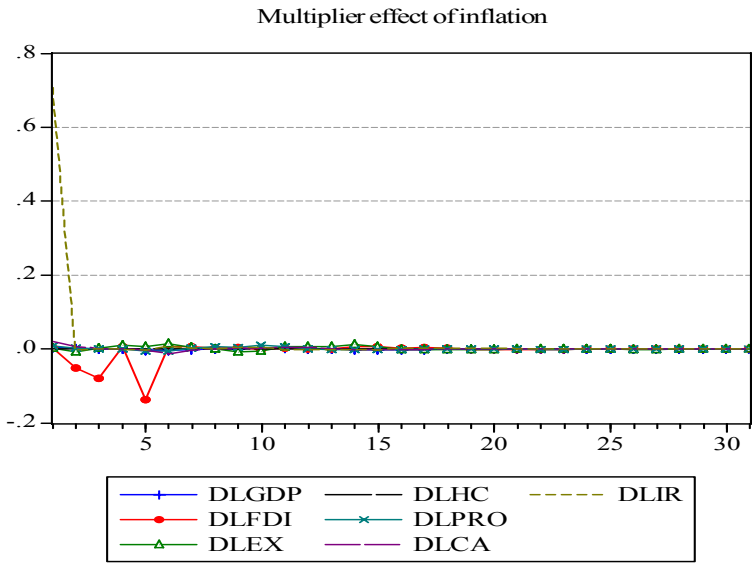
the rest of the economy, since the interest rate is an explicative variable of FDI. In fact, we can observe that an expansion in the monetary base accelerates FDI growth by 0.02% in the third period and 0.04% in the fifth period. This positive relationship could be an indication that the effect of a unit change in the monetary base may occur through its effect on the interest rate.

Figure 2



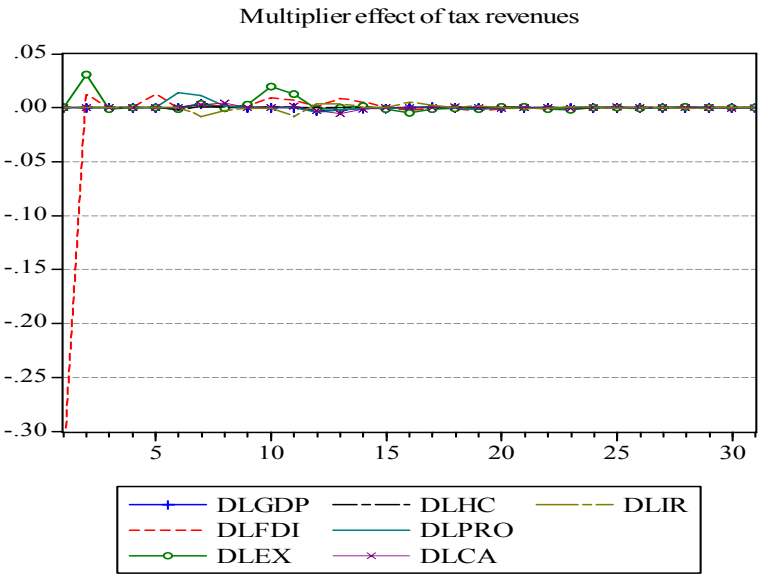
Inflation has been a target variable for most part of the period of analysis. Although efforts by the Mexican government to reduce prices growth have been successful (through economic pacts and a restrictive fiscal policy), during periods of high levels of inflation, the interest rate has increased. The multiplier effect of a change in DLINF has an immediate acceleration effect on the interest rate that overshadows the graphical reaction of other endogenous variables (see Figure 3). Considering that the interest rate is an important determinant of FDI, again we see that rises in inflation will lead to create a deceleration effect in FDI. If we take in consideration that FDI is a determinant of GDP, human capital, exports and productivity then the negative consequences of inflation on the interest rate are evident and explain why monetary policy targeted inflation in the 1980s and 1990s, becoming one of the most important macroeconomic goals.

Figure 3



Finally, the multiplier effect of tax revenues –which was used partially as a proxy to measure the potential impact of taxes on the economy- shows that a unit change (an increase) in DLTX decelerates FDI growth right away (see Figure 4). Relatively speaking this reduction is very strong (equal to -0.33%) in relation to other variables, for example GDP and capital accumulation also reduce their growth rate but this is very low and not immediate (-0.00017

Figure 4



and -0.00014 respectively). It confirms that –other things constant- higher taxes slow down investment and reduce growth, it makes operation costs in Mexico higher and any possible

returns will be relatively lower. However, the multiplier effect of tax revenues also shows that it does not prevail for long. Unusually, exports show an acceleration response as a result of higher taxes. One possible explanation is that some of tax revenues could be using to increase public investment that favours export production and in general facilitates transactions.

Calculations of the cumulative multipliers (the sum of all dynamic multipliers of the exogenous variable on a particular endogenous variable) present a clearer picture of the long-run effects. In general, it is noted that the strongest multiplier effect on DLFDI and DLEX is from the world economy (DLUS). Both variables experienced positive cumulative accelerations equal to 3.45 and 4.41 respectively (see Table 3). The initial hypothesis about how FDI and exports respond to the world economy is confirmed.

Table 3. Cumulative long-run multipliers.

Multiplier effect of:	**Endogenous variables**						
	DLGDP	DLFDI	DLEX	DLHC	DLPRO	DLCA	DLIR
DLTT	0.0966	0.1473	-0.0467	0.0025	0.1061	0.5196	-0.4021
DWAGES	-0.0033	0.8213	-0.8025	0.0002	-0.0582	-0.0024	0.0137
DLRER	0.0008	0.4328	0.0365	0.0006	-0.0272	0.0112	-0.0031
DLGE	0.0024	0.0045	-0.0002	0.0005	0.0031	0.0123	-0.0101
DLUS	-0.0138	3.4547	4.4120	0.0008	-0.2446	-0.0101	0.0576
DLMB	-0.0007	0.0673	-0.0135	-0.0001	-0.0054	-0.0025	-0.2077
DLINF	-0.0070	-0.0129	0.0005	-0.0013	-0.0089	-0.0353	0.0291
DLTX	0.0012	-0.2909	0.0580	-0.0001	0.0206	0.0009	-0.0049
DLPOP	-0.2314	-0.4285	0.0164	-0.0431	-0.2957	-1.1708	0.9635
DLINFL	0.0025	-0.2294	0.0462	0.0002	0.0185	0.0087	0.7079
D_{86} (Liberalisation)	0.0113	0.0680	0.1131	0.0017	0.0158	0.0152	-0.0470
D_{94} (NAFTA)	-0.0015	-0.0126	-0.0621	-0.0002	-0.0019	-0.0020	0.0062

Another relevant cumulative effect was from relative wages (DLWAGES), its negative sign and magnitude indicate that disparities of real wages between the US and Mexico stimulate export production. Although this response was expected, it is surprising to find that quantitatively both exports and FDI react more to the world economy than to specific economic policies designed to improve their performance.

The long run multipliers of the monetary base indicate that a unit change in a change in this variable has a negative effect on the interest rate because more money in the economy

directly increases inflation and then leads to lower interest rate. As a result, FDI also shows a positive cumulative effect due to unit changes in DLMB and a negative cumulative effect due to DLINFL, which is understandable since the interest rate is an explicative variable of FDI.

Regarding the cumulative effect of commercial policy, it is clear that trade reforms that led to liberalisation in 1986 had a positive long run effect in the economy; we can verify this by the long run multiplier effect on GDP, exports, FDI, human capital, etc. This can be seen by the positive sign (except for interest rates which decelerated as a consequence). On the other hand, the cumulative multiplier effect from NAFTA not only is quantitatively smaller but also negative for most of the variables.

6. Conclusions

In general, we found that the instruments of fiscal policy (government expenditure and investment in infrastructure) are more likely to create significant direct and indirect effects in the system. FDI has created positive spillovers through its effect in human capital and GDP, which coincides with other studies that found positive FDI's positive spillovers to the Mexican industry (Blomstrom, 1986). Deregulation in 1993 was a major event that represented the beginning of a very dynamic sector in the economy. According to the estimations, domestic determinants of foreign flows were the provision of infrastructure, the existence of an export market and the traditional attractors for a developing country such as the difference of real relative wages and exchange rate fluctuations.

The multiplier effect due to inflation accelerated the interest rate significantly. The evidence suggests that targeting inflation is a macroeconomic strategy that has the potential to reduce the acceleration created on interest rate and therefore reduce the negative impact that could cause on other variables that are affected by changes in the cost of money. Obviously, being this a simultaneous system, higher interest rates will tend to reduce FDI and therefore will have repercussions on those variables that contain FDI as an explanatory variable (for example GDP and human capital). We could say that any economic policy conductive to reducing inflation will have the capacity to stimulate the economy. Finally, exports and FDI were the most sensitive variables to a unit change in a change in tax revenues and the real exchange rate, while the interest rate was the most sensitive variable to a shock in inflation and the monetary base.

Trade reforms introduced in 1986 produced positive changes in exports and GDP, which can be observed in the long run multipliers, in some way it is an indication that most of the economic variables considered in this analysis reacted positively to liberalisation. However this was not always the case for NAFTA. A possible explanation is that reforms introduced when Mexico joined GATT represented a strong structural change in the economy. At that time, reductions in trade barriers, quotas and import licences were relatively more intense that the subsequent reductions due to NAFTA.

Appendix

Table A1. Description of variables

GDP: Gross Domestic Product	The series was deflated by an implicit index price, 1993=100 and then transformed to USD.
FDI: Foreign Direct Investment	The series was deflated by an implicit price index and converted USD. A moving average (4) was calculated to reduce the fluctuations.
EX: Export goods	The series was originally in dollars, so it was deflated by an export price index. It does include maquiladora's exports but excludes oil.
HC: Human Capital	Students enrolled in secondary school, preparatory and technical schools. Series was interpolated from annual to quarterly data.
LPRO: Labour productivity index	Labour productivity in the manufactures. GDP in manufactures was divided by the number of remunerated workers in the same industry. An exchange rate from 1993 was used to transform the series in dollars and then an index was obtained.
CA: Capital accumulation	Gross fixed capital formation. From 1980 to 1993 series was interpolated to quarterly data. The series was deflated and converted to USD.
TT: Technology Transfer	Imports of machinery and equipment by public and private sectors. The series was interpolated from 1980 to 1992. An exchange rate from 1993 was used to transform the series in dollars
RER: Real Exchange Rate	It is equal to the US´s CPI divided by Mexico´s CPI and then multiplied by a nominal exchange rate -peso per dollar.
GE_SA: Public spending	Public spending in hospitals, education, research, housing services, job centres, etc. The series was interpolated from annual to quarterly data from 1980 to 2002.
INF_SA: Infrastructure	Public investment in industrial resources (energy, electricity, gas iron and steel industry) and means of communication (roads, railway, telecommunications, airways, etc.). The series was interpolated from annual to quarterly data from 1980 to 2002. It was seasonally adjusted.
RWAGES: Relative real wages.	Real relative wages between Mexico and the USA in the manufacturing industry. To calculate this series, we used remunerations per worker in the manufacturing industry in real terms.
US: World Economy	US's Gross Domestic Product in real terms.
POP: Population	Population

Table A1. Continued.

MB: Monetary Base	Amount of domestic currency in circulation such as banknotes and coins plus bank reserves. It was converted to million dollars, constant prices. The series was seasonally adjusted.
IR: Interest Rate	Nominal interest rate paid on a six-month deposit.
TX: Tax Revenues	Total amount of tax revenues (on income, good and services, exports, imports, etc) collected by the government. In million dollars, constant prices. It was seasonally adjusted due to the original series being in average accumulated flows.
INFL: Inflation	It is the quarterly annual growth rate of consumer price index (CPI), (1993=100), in percentage.
D_{86}: Liberalisation	Dummy variable for liberalisation, D_{86}=0 if year < 1986 and D_{86} =1 if year >1985. The year of reference is 1986, when Mexico joined the General Agreement on Tariffs and Trade (GATT).
D_{94} :NAFTA	Dummy variable, D_{94}=0 if year < 1994 and D_{94}=1 if year >1993. This trade agreement with the US and Canada is effective since January 1st, 1994.

Sources of information: Sistema de Cuentas Nacionales, INEGI. International Financial Statistics, International Monetary Fund, several issues. Indicadores Económicos y Financieros, Bank of Mexico. Estadísticas Históricas de México, Tomo I and II, 1999. INEGI. Estadísticas de la Educación, Edición 2002. INEGI. 1er Informe de Gobierno, Miguel de la Madrid, 1983. Villareal, Rene (1997). 4to. Informe de Gobierno, José López Portillo, 1980. El Ingreso y el Gasto Publico en México, 2003. Bureau of Economic Analysis, US. Department of Commerce. Bureau of Labor Statistics. Employment Cost Index, Wages and salaries only.

Table A2. Results of the 3SLS estimations.

Dependent variable: DLGDP

	Coefficient	Std. Error
DLCA	0.148*	0.015
DLPRO	0.285*	0.033
DLFDI(-5)	0.012***	0.007
DLCA(-3)	0.058*	0.018
DLCA(-4)	-0.069*	0.015
DLPRO(-6)	-0.062**	0.029
D_{86}	0.005*	0.001
D_{94}	-0.001	0.002
AR(1)	-0.194**	0.098
R-squared		0.668
Adjusted R-squared		0.633
S.E. of regression		0.010

Dependent variable: DLFDI

	Coefficient	Std. Error
DLEX	0.382**	0.152
DWAGES	1.461*	0.543
DLRER	0.403**	0.173
DLTX-DLGDP	-0.339	0.245
DLEX(-3)	0.407*	0.140
DWAGES(-6)	0.599***	0.340
DLRER(-1)	-0.341***	0.200
DLRER(-2)	0.776*	0.213
DLRER(-4)	0.623*	0.157
DLRER(-5)	0.541*	0.160
DUS(-1)	4.489**	1.745
DLIR(-1)	-0.071	0.083
DLIR(-2)	-0.114	0.070
DLIR(-4)	-0.192**	0.077
DLINF(-1)	0.180***	0.103
DLINF(-2)	0.401*	0.104
DLINF(-3)	0.156	0.104
DLINF(-4)	0.552*	0.114
D_{86}	-0.043**	0.018
D_{94}	0.039*	0.014
AR(1)	-0.126	0.100
AR(2)	-0.288*	0.099
AR(3)	-0.376*	0.097
AR(4)	-0.543*	0.108
R-squared		0.575
Adjusted R-squared		0.404
S.E. of regression		0.121

Dependent variable: DLEX

	Coefficient	Std. Error
C	-0.068**	0.024
DLGDP	0.957	0.585
DLCA	-0.116	0.193
DWAGES	-0.639**	0.288
DLRER	0.122	0.090
DUS	5.100*	1.264
DLFDI(-1)	-0.092**	0.048
DLCA(-1)	-0.377*	0.142
DLCA(-2)	-0.052	0.143
DLPRO(-3)	0.329	0.245
DLPRO(-4)	1.159*	0.241
DWAGES(-1)	-0.487***	0.264
DWAGES(-3)	-0.315	0.244
DLRER(-1)	0.254**	0.098
DLRER(-2)	-0.197***	0.108
DLRER(-4)	-0.266*	0.086
DUS(-3)	-1.043	1.076
DUS(-6)	1.801***	1.072
D_{86}	0.093*	0.021
D_{94}	-0.060*	0.013
AR(1)	0.064	0.111
AR(2)	-0.257**	0.108
R-squared		0.493
Adjusted R-squared		0.318
S.E. of regression		0.067

* Denotes 1% level of significance, ** denotes 5% level of significance and *** denotes 10 % level of significance.

Table A2. Continued.

Dependent variable: DLHC

	Coefficient	Std. Error
C	0.010*	0.002
DLCA	0.025*	0.009
DLTT	-0.015*	0.005
DLFDI(-5)	0.005*	0.001
DLFDI(-6)	-0.002	0.002
DLCA(-1)	0.013	0.008
DLCA(-2)	0.001	0.004
DLCA(-4)	-0.016*	0.005
DLCA(-5)	-0.006	0.005
DLPRO(-1)	0.002	0.008
DLPRO(-2)	0.011	0.008
DLPRO(-3)	0.008	0.008
DLPRO(-4)	0.022*	0.008
DLTT(-1)	-0.011**	0.005
DLGE(-4)	0.002*	0.001
DLGE(-5)	0.000	0.001
DLINF(-3)	0.000	0.002
DLINF(-4)	-0.001	0.002
DLINF(-5)	0.002	0.002
D(LGDP-DLPOP)(-5)	0.044*	0.015
AR(1)	0.879*	0.041
R-squared		0.891
Adjusted R-squared		0.856
S.E. of regression		0.002

Dependent variable: DLPRO

	Coefficient	Std. Error
C	-0.013*	0.005
DLGDP	1.429*	0.178
DLHC	1.021**	0.480
DLGDP(-6)	0.358**	0.155
DLFDI(-5)	-0.047**	0.019
DLFDI(-6)	-0.017	0.018
DLCA(-3)	-0.115**	0.049
DLGE(-3)	0.001	0.009
DLGE(-4)	0.012	0.009
AR(1)	-0.018	0.101
R-squared		0.398
Adjusted R-squared		0.325
S.E. of regression		0.026

Dependent variable: DLCA

	Coefficient	Std. Error
C	0.012*	0.003
DLIR	0.022	0.021
DLTT	0.389*	0.044
DLRER	0.009	0.035
DLGE	0.009	0.009
DLINF	-0.026	0.023
D(LGDP-LPOP)	0.859*	0.233
DLPRO(-5)	0.094	0.110
DLPRO(-6)	-0.131	0.108
DLTT(-1)	-0.069***	0.040
DLTT(-4)	0.147*	0.000
DLTT(-5)	-0.065**	0.023
DLRER(-1)	-0.144*	0.056
DLGE(-3)	0.000	0.009
DLGE(-4)	-0.013	0.010
D(LGDP-LPOP)(-1)	0.883*	0.206
D(LGDP-LPOP)(-2)	-0.317	0.200
D(LTX-LGDP)(-3)	-0.004	0.060
DLIR(-4)	-0.003	0.018
DLIR(-5)	-0.010	0.016
DLINFL(-1)	0.004	0.022
DLINF(-1)	-0.009	0.027
DLINF(-2)	0.041	0.027
DLINF(-3)	0.060**	0.029
AR(1)	-0.111	0.107
AR(2)	-0.283*	0.103
R-squared		0.895
Adjusted R-squared		0.837
S.E. of regression		0.024

* Denotes 1% level of significance, ** denotes 5% level of significance and *** denotes 10 % level of significance.

Dependent variable: DLIR

	Coefficient	Std. Error
DLGDP	-2.151**	1.001
DLMB	-0.211	0.212
DLINFL	0.718*	0.109
DLGDP(-4)	-2.012**	0.903
DLINFL(-1)	-0.504*	0.131
DLMB(-1)	0.061	0.217
DLMB(-2)	0.297	0.213
DLINFL(-2)	0.014	0.105
AR(1)	0.121	0.100
AR(2)	-0.253*	0.103
R-squared		0.456
Adjusted R-squared		0.390
S.E. of regression		0.151

Denotes 1% level of significance, ** denotes 5% level of significance and *** denotes 10 % level of significance.

References

BALDWIN, R., (1992). Measurable Dynamic Gains from Trade. *Journal of Political Economy*, (100), 162-174.

BENDE-NABENDE, A., FORD, J. (1998). FDI, Policy Adjustment and Endogenous Growth: Multiplier Effects from a Small Dynamic Model for Taiwan, 1959-1995*, World Development,* 26 (7), 1315-1330.

BENDE-NABENDE, A.; FORD, J. AND SLATER, J., (2001). FDI, Regional Economic Integration and Endogenous Growth: Some Evidence from Southeast Asia. *Pacific Economic Review*, 6, 383-399.

BLOMSTROM, M., (1986). Foreign Investment and Productive Efficiency: The Case of Mexico. *The Journal of Industrial Economics*, 35 (1), 97-110.

BLOMSTROM, M., KOKKO, A. AND ZEJAN, M., (1994). Host Country Competition, Labour Skills, and Technology Transfer by Multinationals. *Weltwirtschaftliches Archiv*, Band 130, p. 521-533.

BLOMSTROM, M., AND KOKKO, A., (1997). Regional Integration and Foreign Direct Investment. A Conceptual Framework and Three Cases, Policy Research Working Paper 1750. International Economics Department, The World Bank.

BLOMSTROM, M. AND GLOBERMAN, S. (2000). *The Determinants of Host Country Spilloevers from Foreign Direct Investment*, CEPR Discussion Papers, No. 2350.

BORENSZTEIN, E.; DE GREGORIO, J. AND JONG-WHA, L., (1995). How does Foreign Direct Investment Affect Economic Growth?. *NBER* Working Paper 5057.

CHRIS, C., (1994). The Cowles Commission's Contributions to Econometrics at Chicago, 1939-1955. *Journal of Economic Literature*, XXXII, 30-59.

DUSSEL PETERS, E. (2000). Polarizing Mexico. The Impact of Liberalization Strategy, Ed. Rienner.

EDWARDS, S., (1997). Trade Policy, Growth and Income Distribution. *The American Economic Review*, 87 (2), 205-210.

FLORES QUIROGA, A., (1998). *Proteccionismo Versus Librecambio*. Fondo de Cultura Económica, México.

GREENE, W., (2003). *Econometric Analysis.* Fifth Edition, Prentice Hall.

GROSSMAN, G. AND HELPMANN, E., (1991). *Innovation and Growth in the Global Economy*. Chapter 9, The MIT Press.

HAUSMAN, J., (1978). Specification Tests in Econometrics. *Econometrica*, 46, 1251-1271.

ISCAN, T., (1997). Contributions of Exports to Growth, Mexico 1970-1990: Capital Accumulation or Labour Productivity Growth?. *Economía Mexicana Nueva Época,* VI (1), 5-31.

LOVE, J. AND LAGE-HIDALGO, F., (2000). Analysing the Determinant of US Direct Investment in Mexico. *Applied Economics*, 32, 1259-1267.

LUSTING, N., (1999). Mexico, de Crisis en Crisis, in *Mexico Transicion Economica y Comercio Exterior*, CFE and BANCOMEXT.

MADDALA, G. S., (2001). *Introduction to Econometrics*. Third Edition, Wiley.

RAMIREZ, M., (2000). Foreign Direct Investment in Mexico: A Cointegration Analysis. *The Journal of Development Studies*, 37 (1), 138-162.

ROMER, P., (1986). Increasing Returns and Long Run Growth. *The Journal of Political Economy*, 94 (5), 1002-1037.

RUGMAN, A. (2004) North American Intra-Regional Trade and Foreign Direct Investment in Rugman, A. (Ed), *North American Economic and Financial Integration*, Elsevier.

SALINAS, R., (2000). La Economía Mexicana 1969-1999 [on line]. El Cato. Available from: www.elcato.org/ecomex_salinas.htm [Accessed November 23, 2001].

THEIL, H. AND BOOT, J.C.G., (1962). The Final Form of Econometric Equation Systems. *Review of the International Statistical Institute*, 30 (2), 136-152.