The ‘New Regionalism’ and Foreign Direct Investment: The Case of Mexico

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Abstract

The recent increase in foreign capital flows into developing countries has coincided with a new wave of regional trade agreements involving both developed and developing countries. This paper investigates the effect of the North American Free Trade Agreement (NAFTA), a prime example of this new regionalism, on foreign direct investment in Mexico. Using data from the Mexican Ministry for Trade and Industrial Development (SECOFI), the major finding is that NAFTA has raised investment from the partner countries, the United States and Canada, but not from the rest of the world. The increasing use of outsourcing and a commitment effect conveyed by the agreement are candidate explanations for a change in investors' sensitivity to the determinants of foreign direct investment.

1 Introduction

During the last decade, foreign direct investment (FDI) from developed into developing countries has risen substantially, yet most investment flows have been into just a handful of countries in Asia, Eastern Europe, and Latin America. A second recent phenomenon is the renewed interest in regional economic integration. New integration schemes have appeared everywhere, from the enlargement of the European Union and its many trade and association agreements to the revival of the Association of South East Asian Nations (ASEAN), to Mercosur and the North American Free Trade Agreement (NAFTA) in the Americas. A major feature of this "new regionalism" (Ethier, 1998) is that it often combines a small, developing country with one or more large developed countries. It has been suggested that developing countries use these agreements primarily as a means to attract more foreign investment (Ethier, 1998; Tornell and Esquivel, 1997). The simultaneous occurrence of increased investment flows and this new type of regional integration lends support to this hypothesis.

At the time of Mexico's pursuit of a trade agreement with the United States, which resulted in the formation of NAFTA in January of 1994, much of the debate in the United States focused on trade and employment effects. Mexico's major concern, however, was to increase foreign investment, particularly in the form of FDI (Tornell and Esquivel, 1997). Casual examination of the time series of FDI flows into Mexico suggests that the country was indeed successful. There is a considerable upward jump in 1994 and a consistently higher level of FDI afterwards (see figure 1). This paper investigates the determinants of FDI in Mexico with an emphasis on the role of NAFTA. The main question is whether indeed NAFTA can be credited with making Mexico more attractive for FDI or whether changes in other determinants of FDI, such as GDP, exchange rates or factor prices can account for the observed increase in investment. A secondary question is whether NAFTA has a differential effect on investment from partner countries in the agreement versus the rest of the world.

The answers to these questions have important policy implications. If developing countries succeed in attracting foreign investment by integrating closely with developed countries, then such integration schemes should be actively pursued in order to encourage growth and development.[1] If partner country investment is affected proportionally more than investment from the rest of the world, then the choice of partner becomes crucial.

In theory, the effect of economic integration on FDI is ambiguous. If trade and investment are substitutes (as with horizontal multinational firms), a decrease in trade costs should reduce FDI (the tariff-jumping argument), while the improved market access to the U.S. afforded by NAFTA would encourage this type of FDI (the export platform argument).[2] Much of direct investment in developing countries is based on differences in relative endowments, absent international factor price equalization, and is thus undertaken by vertical multinationals, in which case trade and FDI are complements.[3]

Additionally, an economic integration agreement can function as a commitment device, thereby increasing investment (Tornell and Esquivel, 1997; Ethier, 1998). The commitment value arises as integration agreements bind future regimes to reforms undertaken and acts beyond any effects due to specific provisions of the agreement or other determinants. Thus it alleviates the well-known time inconsistency problem whereby countries have an incentive to impose a higher tax rate (or even expropriate foreign investors) ex post although they had committed to national treatment of investors ex ante. Fernandez-Arias and Spiegel (1998) show that a trade accord allows a country to sustain a higher level of investment than without it. Waldkirch (2002) points out that this affects partner country investment more than non-partner country FDI because increased trade among partners alters the threat point and thus permits sustenance of a higher level of FDI.

Given the ongoing intense discussion about the effects of NAFTA, analyzing its impact is important in its own right. To date, there have been very few such empirical studies, none that formally analyze the effect on FDI in Mexico. Blomström and Kokko (1997), in a purely descriptive analysis, attribute increased FDI in Mexico largely to increases from non-NAFTA countries. Other empirical studies on the effect of NAFTA have focused on its impact on trade flows or employment (e.g. Krueger, 2000; Coughlin and Wall, 2000; Ojeda et al., 2000). Analyzing the impact on investment rather than trade is imperative not only because this was a major Mexican motive for pursuing this agreement, but also because many pre-NAFTA studies predicted that most of the welfare benefits for Mexico would result from increased capital inflows.[4]

Using data from SECOFI, the Mexican Secretariat of Commerce and Industrial Development, the focus of the present study is on foreign direct investment rather than portfolio investment since the former, due to its illiquid and less volatile nature, is a better indicator of changes in the long-term investor assessment of a country's potential and is more likely to have a significant impact on growth and development in the host country.[5] The empirical specification allows testing of both the hypothesis that economic integration in North America had a significant impact on FDI in Mexico and that any impact be different for partner country versus third-country investment.

The major finding is that NAFTA has had a significantly positive effect on FDI in Mexico, due almost entirely to raising investment from the United States and Canada. Had NAFTA not been formed, FDI from these countries would have been as much as 45 percent lower since 1994. The effect on countries outside of the agreement, in contrast, is small at best. For all countries, NAFTA has changed investors' sensitivity to the determinants of FDI. This could be indicative of a commitment effect, but also, in the case of factor prices, result from the increased importance of international vertical specialization. The results suggest that developing countries can significantly increase their attractiveness to foreign investors by entering into agreements that share NAFTA's major features. In particular, a large and geographically close developed partner country helps maximize the FDI creating effect of economic integration.

The next section describes foreign direct investment in Mexico and in relation to other Latin American countries. The estimation is guided by a model of the determinants of FDI, which is outlined in section 3. The empirical specification and econometric issues are discussed in section 4. Section 5 contains a description of the data and the empirical results. Section 6 concludes.

2 FDI in Mexico and Latin America

Figure 1 shows the evolution of inward FDI in Mexico from 1980 through the third quarter of 1999; data are quarterly in millions of U.S. dollars. For most of the 1980s, investment flows exhibit large variation, for example around the time of Mexico's financial crisis in the early 1980s, but do not increase much over time. They do increase noticeably in the late 1980s and then a large and sustained increase occurs with the inception of NAFTA. During the last decade, other Latin American countries, in particular Argentina, Brazil and Chile, have experienced large increases in all types of capital flows in general, and FDI in particular, as well.

The first substantial increase in FDI in the late 1980s and early 1990s coincided with a major overhaul of Mexico's investment laws in 1989. Many obstacles to foreign investors, such as licensing requirements and restrictions pertaining to majority ownership, were removed. This change reversed Mexico's long-standing policy of reserving ownership in many sectors to Mexican nationals or the Mexican state and encouraging foreign investment only in sectors that were deemed crucial to the pursuit of import substitution policies.[6] At the same time, and earlier than in many other countries in the region, substantial privatizations occurred. By 1994, the number of state-owned enterprises had decreased to only 80, down from 1155. However, foreign investors participated in this sale only to a small degree. FDI from privatization constituted only 7.9 percent of total FDI between 1990 and 1995 (Franko, 1999: 158-61). Yet, during the first half of the 1990s, Mexico was the major recipient of FDI in Latin America. Brazil subsequently surpassed Mexico in that role, mainly because Brazil's major privatizations occurred in the second half of the 1990s. Lately, greenfield investment and acquisitions of local firms have dominated in Mexico. In 1997, 62 percent of FDI consisted of international investors acquiring local firms. Recent large acquisitions include several banks, beverage and tobacco companies (CEPAL, 1999).

Between 1994 and 1998 the manufacturing sector received the bulk of foreign investment, about 60 percent. Within manufacturing, most investment is concentrated in the machinery and equipment sector, most notably the automotive, electronics and electrical equipment industries. The food, beverages and tobacco sectors have also received substantial amounts. The financial sector has seen increasing investment in the wake of the peso crisis, which forced many banks to accept foreign capital in order to boost their capitalization (CEPAL, 1999). Measured in terms of sales, the top five companies in 2000 were (in that order) DaimlerChrysler, General Motors, Volkswagen, Ford and WalMart (CEPAL, 2001).

Table 1 presents inflows of direct investment for 1980 through 1998 by source country. The United States has been the most important source country both before and after 1994. Sizable flows have also originated in European Union countries and Japan. The table also shows that the share of North American investment in Mexico has decreased since 1994, even though Canada's share alone has increased. The U.S. share has fallen from over 80 percent in the early 1980s to about 60 percent since NAFTA took effect. This is why some (e.g. Blomström and Kokko, 1997) have claimed that NAFTA has led to an increase in FDI mainly from non-partner countries. However, the effects of NAFTA must be disentangled from the effects of other determinants of FDI in econometric analysis in order to discern what independent effect, if any, NAFTA has had. To this end, the following section lays out a model of FDI and integration that serves as the basis for the empirical analysis.

3 The Determinants of Foreign Direct Investment

This section builds a model of the determinants of FDI from a multinational firm's perspective, taking into account the host country's compliance problem regarding national treatment of foreign investment.[7] Since the objective is to assess the effects of an FTA between Mexico on the one hand and the United States (and Canada) on the other hand, attention is confined to a few cases relevant to this scenario. FDI may be used instead of exports to jump the tariff barrier in which case an FTA would reduce investment. If one of the FTA countries (Mexico) is used as an export platform to serve the market of the other country (the U.S.), reducing trade barriers increases the incentive to do so, hence FDI. This is also true for a vertically integrated firm if the final good is exported. A subtlety in this case is that if an intermediate good is produced domestically, domestic factor prices and FDI are negatively correlated as an increase drives up the cost of inputs. In the horizontal case, on the other hand, higher domestic factor prices encourage substituting foreign for domestic production.

The host country faces a standard time inconsistency problem with respect to aggregate foreign investment. Ex ante, the government announces that it will tax foreign investors at the same rate as domestic ones. Ex post, it may have an incentive to deviate and fully tax (expropriate) foreign firms. This acts as an additional constraint if the sum of foreign firms' desired investment exceeds the maximum level of aggregate FDI a country can credibly commit to. Moreover, economic integration can affect the maximum sustainable level of FDI, as shown, e.g., by Fernandez-Arias (1998) and Waldkirch (2002).

There are three countries and two time periods. Two of the countries, denoted u ("United States") and m ("Mexico"), are potentially members of an FTA. Denote the third country, which is not part of an FTA, e ("Europe"). Attention is confined to cases in which FDI is undertaken in one of the FTA countries, without loss of generality assumed to be m. Hence the multinational firm's home country is either u or e. The production side is limited in the sense that production is assumed to take place either in the home country of the multinational or abroad in m.[8]

Capital used in production abroad is called foreign direct investment. It is purchased abroad, but financed at home. In the first period, capital investments are undertaken, in the second production takes place and profits are realized. Numbered subscripts refer to the respective time periods. The firm is uncertain about second period prices. Except for the firm's output price, relative prices in each country are held constant. Real profits in the multinationals' domestic currency are given by:

$$\begin{aligned} \pi_{\text{real},2} &= R_1^{h,s}\theta^{h,s}P^s\left[Q^h+Q^m\right]-\left[W_1^hL^h+P_{K,1}^hK^h(1+\rho)\right]\left(1+t^{s,h}\right) \\ &\quad -\left[\theta^{h,m}W_1^mL^m+P_{K,1}^mK^m(1+\rho)\right]R_1^{h,m}\left(1+t^{s,m}\right) \end{aligned} \tag{1}$$

where R is the real exchange rate, Q output, P the output price, P_K the price of capital, ρ is the domestic real interest rate, W the wage rate, L and K are labor and capital, respectively, and t is an ad-valorem tariff which is levied on the import price. A superscript h stands for the home country of the multinational firm and s stands for the country in which output is sold. Thus, $R_1^{h,s}=1$ if output is sold at home, $t^{s,m}=0$ if output is sold in m. The first term in (1) is the revenue term. The cost terms consist of domestic and foreign labor costs and the respective costs of capital, expressed as the second-period liability.[9] $\theta=R_2/R_1$ denotes the proportional change in the real exchange rate from the first to the second period. Note that all uncertainty is embodied in θ since all other variables are expressed in (known) period one values.

A risk-neutral firm maximizes expected profits and chooses the levels of foreign and domestically employed labor and capital: $\max_{\left(L^h,L^m,K^h,K^m\right)} E(\pi)$. Let $Q^h=Q^h\left(L^h,K^h\right)$ and $Q^m=Q^m\left(L^m,K^m\right)$ be the respective production functions for domestically and foreign produced output. The multinational is assumed to have some market power, hence faces a downward sloping demand curve, so that price is a function of the sum of outputs, $P^s\left(Q^h + Q^m\right)$.

Now consider a multinational from u selling in m, either by exporting or producing locally (direct investment). The first-order conditions are (time subscripts omitted):

$$Q_{L^u} = \frac{W^u}{R^{u,m}E(\theta^{u,m})} \cdot \frac{(1+t^{m,u})}{P^m\left(1-\frac{1}{\eta^m}\right)} \tag{L^u}$$

$$Q_{K^u} = \frac{P_K^u(1+\rho)}{R^{u,m}E(\theta^{u,m})} \cdot \frac{(1+t^{m,u})}{P^m\left(1-\frac{1}{\eta^m}\right)} \tag{K^u}$$

$$Q_{L^m} = W^m \cdot \frac{1}{P^m\left(1-\frac{1}{\eta^m}\right)} \tag{L^m}$$

$$Q_{K^m} = \frac{P_K^m(1+\rho)}{E(\theta^{u,m})} \cdot \frac{1}{P^m\left(1-\frac{1}{\eta^m}\right)} \tag{K^m}$$

where subscripts on Q denote derivatives and η^m is the foreign price elasticity of demand. The signs of the correlation between foreign investment K^m and the exogenous variables are obtained via comparative statics involving all four first-order conditions. For example, an increase in domestic factor prices (W^u and P_K^u) increases foreign investment since cheaper foreign production is substituted for more expensive domestic one. A rise in the real exchange rate R reduces the costs of domestic relative to foreign labor and capital, leading to increased export and less foreign production. The effect of expected changes in the real exchange rate, $E(\theta^{u,m})$, is ambiguous. An increase lowers the cost of foreign capital, thus tending to increase foreign investment, but it also makes exporting more attractive, which increases Q^u and thus lowers P^m, depressing foreign investment.

A reduction in $t^{m,u}$ as a result of an FTA makes production at home and exporting the resulting output more attractive. This result is the well-known tariff-jumping argument, where FDI is used instead of exports in order to jump the tariff barrier. As the barrier decreases, the incentive for such tariff-jumping decreases, leading to less foreign investment.

Next consider a multinational from a third country (e) that intends to sell in one of the FTA countries (u). Assume that the firm either exports domestically produced output or uses the other

FTA country (m) as an export platform. An example would be a German automaker exporting Volkswagens produced in Germany or Mexico to the U.S. Now, the first-order conditions are:

$$Q_{L^e} = \frac{W^e}{R^{e,u}E\left(\theta^{e,u}\right)} \cdot \frac{1+t^{u,e}}{P^u\left(1-\frac{1}{\eta^u}\right)} \tag{L^e}$$

$$Q_{K^e} = \frac{P_K^e(1+\rho)}{R^{e,u}E\left(\theta^{e,u}\right)} \cdot \frac{1+t^{u,e}}{P^u\left(1-\frac{1}{\eta^u}\right)} \tag{K^e}$$

$$Q_{L^m} = \frac{R^{e,m}E(\theta^{e,m})W^m}{R^{e,u}E\left(\theta^{e,u}\right)} \cdot \frac{1+t^{u,m}}{P^u\left(1-\frac{1}{\eta^u}\right)} \tag{L^m}$$

$$Q_{K^m} = \frac{R^{e,m}P_K^m(1+\rho)}{R^{e,u}E\left(\theta^{e,u}\right)} \cdot \frac{1+t^{u,m}}{P^u\left(1-\frac{1}{\eta^u}\right)} \tag{K^m}$$

where η^u is the price elasticity of demand in u. The effects of changes in factor prices, the real interest rate and the real exchange rate between the home country (e) and the foreign production country (m) are unchanged. The effect of a reduction in tariffs $t^{u,m}$ as a result of an FTA is the opposite of the previous case, because their removal reduces the price of imports from m, hence increasing the incentive for foreign production. Note that this investment creating effect of an FTA also applies to multinationals from the partner country in the agreement (u) that produce in m in order to serve the home market.

Since we observe substantial cross-border vertical specialization, a variation of the model considers a vertical multinational. Assume that assembly of the final good, which is sold in the home market, takes place abroad, using an intermediate good that is produced at home. Real profits are then given by:

$$\pi_{real,2} = R_1^{h,m}\theta^{h,m}P^hQ^m - \ D(Q^m) - (1+t^{h,m})\left[\theta^{h,m}W_1^mL^m - P_{K,1}^mK^m(1+i)\right] \tag{2}$$

where D is a constant returns to scale cost function for an intermediate good imported from the home country and used in fixed proportion in Q^m production. The tariff $t^{h,m}$ is imposed only on the value added part of production.[10]

First-order conditions for foreign labor and capital are then given by:

$$Q_{L^m} = R^{h,m} E(\theta^{h,m}) W^m \cdot \frac{(1+t^{h,m})}{P^h\left(1-\frac{1}{\eta^h}\right)-D'} \tag{L^m}$$

$$Q_{K^m} = R^{h,m} P_K^m (1+\rho) \cdot \frac{(1+t^{h,m})}{P^h\left(1-\frac{1}{\eta^h}\right)-D'} \tag{K^m}$$

where D' is the marginal cost function. A reduction in the tariff $t^{h,m}$ will increase FDI since, as before, trade and investment are complements.[11] In contrast to the horizontal case, however, the correlation between domestic factor prices and foreign investment is negative. To see this, note that the domestic wage and price of capital work through the intermediate good, where $\frac{\partial D'}{\partial W^h}, \frac{\partial D'}{\partial P_K^h} > 0$, which follows from the assumptions regarding D. This difference allows us to gauge the relative importance of horizontal and vertical multinationals in the empirical analysis below.

Individual firms' desired levels of FDI implied by the above conditions are potentially subject to an aggregate constraint due to the host country's time inconsistency problem with respect to national treatment of foreign firms. Providing a full analysis of this problem is beyond the scope of this paper. We want to show, however, that economic integration raises the level of sustainable FDI from partner countries, but not necessarily from non-partners.[12]

Consider the problem of a country where domestic firms produce Q^d and foreign firms produce Q^m, which is taxed at rate τ. All output is exported. The country's current period value function under compliance with national treatment in each future period can be written as $V^{com} = \left(P^{com}\left(Q^d + \tau Q^m\right)\right)/(1-\beta)$, where β is the discount rate and P^{com} the price of output. The superscript *com* indicates values under compliance. More will be said below about this price. The value function of a period in which non-compliance occurs can be written as $V^{noc} = P^{com}\left(Q^d + Q^m\right) + (\beta/(1-\beta)) P^{noc} Q^d$. Note that non-compliance means that foreign output is fully taxed in the current period and thus there is zero FDI (and foreign output) in future periods. The superscript *noc* indicates values under non-compliance. In order to ensure compliance, $V^{com} \geq V^{noc}$ is needed.

If this condition is binding, the amount of foreign investment that can be sustained is implicitly defined by the following condition:

$$P^{com}\left(\beta Q^d + (\tau + \beta - 1)\, Q^m\right) - \beta P^{noc} Q^d = 0 \tag{3}$$

A sufficient condition for a finite solution is that the sum of the discount and the tax rate is less than one. An FTA will affect the relevant price level, so by adding the appropriate subscript, (3) gives the maximum level of FDI with and without an FTA. Since Q_{K^m} is positive, it is straightforward to show that the level of K^m increases (decreases) when moving from a regime with no FTA to one with an FTA if and only if

$$P^{com}_{FTA} > (<)\, P^{com}_{no\ FTA} \bullet \frac{P^{noc}_{FTA}}{P^{noc}_{no\ FTA}}$$

If output is exported to a partner country, $P^{com}_{FTA} > P^{com}_{no\ FTA}$, as the FTA raises the terms of trade. Now consider two cases. If m does not provide national treatment for firms based in the partner country, the FTA will be cancelled, and thus $P^{noc}_{FTA} = P^{noc}_{no\ FTA}$. Unambiguously, the FTA results in a higher sustainable level of FDI, which can be viewed as a positive commitment effect conveyed by the agreement. However, if m does not provide national treatment for firms based in non-partner countries, the FTA need not be affected and Q^d continues to be exported to the partner country tariff-free. In that case, $P^{noc}_{FTA} > P^{noc}_{no\ FTA}$ and $P^{com}_{FTA} >$ or $< P^{com}_{no\ FTA} \bullet \frac{P^{noc}_{FTA}}{P^{noc}_{no\ FTA}}$. The sustainable level of foreign investment of this type may or may not increase.

In summary, the theory predicts that FDI stocks are significantly affected when a country enters a free trade agreement. The direction of this effect is not clear a priori because while a reduction in $t^{u,m}$, u's tariffs, will increase FDI (the export platform argument), a reduction in $t^{m,u}$, m's tariffs, will decrease FDI in m (due to the lowered incentive to jump the tariff barrier). Moreover, investment from partner countries may react differently to the conclusion of an FTA than investment from non-member countries, in part because the maximum sustainable aggregate level of FDI is affected differently. This effect is reinforced if FDI from one source is dominated by horizontal multinationals and FDI from the other by vertical multinationals due to the differing effects of source country factor prices on FDI by these two types of investors. The latter also suggests that the regime change brought about by the conclusion of an FTA may interact with changes in the determinants of FDI.

4 The Empirical Specification

The model suggests the following reduced form function of the desired stock of foreign capital:

$$K^m = f\left(Y, Y^m, W, W^m, P_K, P_K^m, \rho, R, E(\theta), t^{m,u}, t^{u,m}, t^{other}\right) \tag{4}$$

where K^m is the stock of direct investment and Y and Y^m domestic and foreign income, respectively, which enter through the demand functions. Non-superscribed factor prices and the real interest rate refer to the multinational's home country (the source country of FDI). The real exchange rate and the expected change in the real exchange rate refer to the rate between m and the source country of investment.[13] For estimation purposes, the above relationship is assumed to be linear in levels.[14] The various cases considered in the model of the previous section illustrate that some of the regressors may have a positive or a negative sign: source country factor prices, the interest rate, and expected changes in the real exchange rate. The expected signs of incomes (+), the real exchange rate between the home country of the multinational and the host country of FDI (−) and host country factor prices (−) are unambiguous.

Since exchange risk faced by the firm, $E(\theta)$, is unobserved, an appropriate proxy must be selected. If purchasing power parity holds, the real exchange rate should be stable over time and hence should be negatively correlated with its lagged value. A measure of $E(\theta)$ consistent with this "stabilizing expectations" hypothesis (Cushman, 1985) is the inverse of past changes in the real exchange rate, which is going to be used here. Other possibilities include the variance of the spot exchange rate around its predicted trend (proposed by Thursby and Thursby, 1987) or the standard deviation of the real exchange rate, but these turn out to be statistically insignificant.[15]

Only changes in tariffs between the FTA countries (i.e. $t^{m,u}$ and $t^{u,m}$) are considered, while other tariff rates are assumed constant. Tariff rates vary widely over industries and products, while there is not much variation from year to year. Aggregating these rates into one macroeconomic rate is problematic. Moreover, focusing exclusively on tariff rates neglects changes in non-tariff barriers and institutional changes that make trading more or less costly, for example a reduction in paperwork by removing licensing requirements. The empirical specification therefore includes a NAFTA dummy to indicate a change of regime that reduces tariff and non-tariff barriers and changes the institutional arrangement. The sign of this dummy would be negative if the reduced incentive to jump the tariff barrier is NAFTA's primary effect. If, on the other hand, export platform and commitment effect considerations dominate, a positive sign is expected.

The data are in the form of a panel with t time periods and c source countries, and are potentially censored in both directions. In addition, the coefficients on the regressors may not be the same across countries or over time. Specifically, they may differ before and after the implementation of NAFTA as well as between (future) NAFTA countries[16] and other investor countries. The remainder of this section discusses the econometric issues arising from this data structure.

Allowing for country- and time-specific effects, the model can be written as

$$K^*_{ct} = \alpha_c + \delta_t + \beta x_{ct} + \zeta x_t + \varepsilon_{ct} \tag{5}$$

where K^*_{ct} is desired investment from (source) country c in time t, x_{ct} are explanatory variables that vary over both c and t, x_t are variables that vary along the time- but not the country dimension, α_c measures country-specific, δ_t time-specific effects and ε_{ct} is an iid error term. The country-invariant variables in this model are the pull-factors of FDI, i.e. features characterizing the Mexican economy that vary year by year such as GDP or wages.

In order to test the hypothesis that there are significant differences between the time period preceding NAFTA and the time since and between NAFTA and non-NAFTA countries, δ_t is treated as a time-period effect (by inserting a dummy that takes on the value 1 for 1994 and later, and 0 for the time before 1994) and α_c is treated as a country group effect (by inserting a dummy which is 1 for NAFTA countries, and 0 for non-NAFTA countries). This constrains the intercepts to be equal within country groups and time periods. The coefficients on the group dummies show how much of FDI since the formation of NAFTA or from the U.S. and Canada over the entire sample period remains unexplained after controlling for the observable determinants of FDI. This is similar to the inclusion of regional dummies in a gravity type model of trade flows to check for the existence of natural trading blocs (as, e.g., in Frankel, Stein and Wei, 1995).

However, there is no reason that a change in regime (and a possible commitment effect) should only result in a different intercept. The model of the previous section suggests that it is equally plausible that the magnitude of the coefficients on the determinants of FDI changes. Hence, β may vary across countries and time:

$$\beta = \gamma_0 + \gamma_1 d_c + \gamma_2 d_t + \gamma_3 d_c d_t \tag{6}$$

where d_c is the NAFTA country dummy and d_t denotes the NAFTA time dummy. Substituting (6) into (5) yields

$$K^*_{ct} = \gamma_0 x_{ct} + \gamma_1 d_c x_{ct} + \gamma_2 d_t x_{ct} + \gamma_3 d_c d_t x_{ct} + \zeta x_t + \varepsilon_{ct} \tag{7}$$

where x_{ct} now includes a vector of 1's (the constant).

When estimating (7), the marginal effect of an explanatory variable is

$$\frac{\partial K^*_{ct}}{\partial x_{ct}} = \gamma_0 + \gamma_1 d_c + \gamma_2 d_t + \gamma_3 d_c d_t$$

where γ_0 indicates the effect of x on K for non-NAFTA countries before 1994, $\gamma_0 + \gamma_1$ the effect for (future) NAFTA countries before 1994, $\gamma_0 + \gamma_2$ the effect for non-NAFTA countries after 1994 and $\gamma_0 + \gamma_1 + \gamma_2 + \gamma_3$ the effect of x on K for NAFTA countries after 1994. A test for the joint significance of $\gamma_2 + \gamma_3$ shows whether NAFTA countries differ before and after 1994 whereas the coefficient γ_2 alone shows whether non-NAFTA countries differ before and after 1994. A test for the joint significance of $\gamma_1 + \gamma_3$ shows whether NAFTA countries are significantly different from non-NAFTA countries after 1994 whereas the coefficient γ_1 alone shows whether NAFTA- and non-NAFTA countries differed before 1994 already (with respect to the effect of x on K). Expanding these tests to include all regressors shows whether these differences are overall significant.

Another consideration that must be taken into account in the estimation is that the dependent variable is truncated. FDI stocks are constrained to be nonnegative, whereas desired stocks may be negative. Specifically, let K^* be a latent variable signifying the amount of the desired foreign investment stock. We observe $K = K^*$ if $K^* \geq 0$ and $K = 0$ if $K^* < 0$, where K are actual stocks. To address this issue, a tobit model is estimated.

If the compliance constraint for a country is binding, there is also an upper limit for aggregate FDI. Econometrically, this introduces right-censoring of the data, i.e. the desired foreign capital stock exceeds the actually observed one. Specifically, we observe $K = K^*$ if $K^* \leq K^s$ and $K = K^s$ if $K^* > K^s$, where K^s is the maximum sustainable level of FDI.

Given the panel nature of the data, one must also check the appropriateness of pooling the data. Thus, a random effects model was estimated since this allows the parameters ζ on the source-country invariant regressors to be identified and allows the inclusion of country group and time period dummies. However, the random effects were estimated to be zero for any specification and the panel model was always rejected in favor of the pooled specification.

5 Empirical Analysis

5.1 The Data

FDI data come from SECOFI, the Mexican Secretariat of Commerce and Industrial Development and cover the years from 1980 through 1998. This is where the data originate. Data reported by the Banco de Mexico (the Mexican central bank), the IMF and the OECD are all based on this source. The data are annual and identify the source country of investment. Eleven countries are distinguished with a twelfth category for "other countries". The countries used in this study include those listed in table 1 plus France, Italy and Spain. The Czech Republic and Switzerland had to be excluded from the sample due to the unavailability of several of the control variables. On average over the sample period, FDI inflows into Mexico from these nine countries account for 87.2 percent of total FDI inflows.

There are some well-known problems with the way FDI data are measured. FDI flows as reported in the balance of payments statistics do not account for increases in the value of existing foreign-controlled assets. Discrepancies between recorded outflows and inflows among countries arise since some are routed through financial centers such as the Cayman Islands, the Bahamas, or Panama.

A potential problem for the present study is that SECOFI announced that it would change its method for calculating FDI data in 1995. In that year, SECOFI and the Banco de Mexico started to conduct a monthly survey to determine the amount of within-company transfers, which were not included in the official figures before then. On the other hand, the amount of reinvested earnings, which was also to be added, was not actually included until 1999, one year beyond the end of the sample period of this study. However, while there might have been a tendency to underestimate FDI, there has also been a problem with overestimating investment flows. Investments in some industries have to be approved by the national commission on foreign investment (Comisión Nacional de Inversiones Extranjeras). All approved investment projects were counted as investment before the change, yet not all of the approved projects ended up being realized. So while the magnitude of the over- and underestimation is unknown and one must bear in mind that the numbers are not strictly comparable, known bias runs in both directions. In any case, these are the best FDI numbers available for Mexico. For further details on the data used, refer to the data appendix.

5.2 NAFTA's Impact on FDI

This section estimates the empirical model outlined in section 4 and examines the effects of NAFTA on investment from different source countries as well as the differences among these countries both before and after the formation of NAFTA. All results obtain from estimating a pooled tobit model with heteroscedasticity consistent standard errors. The sample period is 1980 through 1998.[17]

Regression (1) in table 2 constrains all coefficients to be the same across source countries and years, but allows intercepts to differ. The only way to discern the effect of NAFTA is from the intercept dummies. They show by how much FDI is above (or below) what can be explained by its determinants. The NAFTA time dummy ("NAFTA years") indicates that $2.5 billion of the increased foreign capital stock in Mexico remains unexplained, which is about 50 percent. In addition, close to $8 billion of U.S. and Canadian FDI remains unexplained for the entire sample period (as shown by the coefficient on the NAFTA country dummy), which is about 63 percent of the average difference between NAFTA- and non-NAFTA countries. However, this specification cannot tell us anything beyond the fact that some fraction of the increase in FDI in Mexico since NAFTA was formed remains unexplained and that FDI from the U.S. and Canada over the sample period is considerably higher than what can be explained by its determinants.[18] Moreover, if slopes differ across countries and time periods, results constraining them to be the same may be biased.

Hence, in column (2) all coefficients are allowed to vary across both time periods and country groups. A set of χ^2 tests (not reported) reject equality of slopes across years and countries for all interacted regressors. Of the three host-country regressors, wages and the price of capital have the expected sign, though only the latter is significant, whereas Mexican GDP is significantly negative (though small). The coefficients on the interacted regressors per se tell us little about the effect of NAFTA. However, the coefficients on the determinants of FDI can be recovered from the results in table 2 separately for the time before and since NAFTA was formed as well as for NAFTA- and non-NAFTA countries. These results are reported in table 3.

Notice first that the joint tests of all coefficients show that NAFTA has had an effect both on investment from the U.S. and Canada and from the rest of the world. Also, partner countries in the agreement differ from other countries in how they react to the determinants of FDI, both before and since NAFTA was enacted. The remainder of this section discusses in more detail where these differences arise and their quantitative effect.

To assess the quantitative importance of the NAFTA-effect, the level of FDI had NAFTA not been enacted can be estimated by setting the NAFTA period dummy equal to zero. The results are shown on the bottom of table 3. On average from 1994 through 1998, FDI from the U.S. and Canada would have been 42 percent lower without NAFTA than it actually was. Given that almost two thirds of all FDI during this time period was from these two countries, this is substantial. For all other countries, the effect of NAFTA is practically nil. This result is consistent with the idea that the agreement conveys a commitment effect with respect to partner FDI, but not necessarily non-partner FDI. An examination of the coefficients on the individual regressors, given on the top of table 3, sheds further light on this difference.

Generally, the coefficients for NAFTA countries are larger than for non-NAFTA countries. More importantly, all but wages are significantly different before and since the formation of NAFTA for the U.S. and Canada. For all other countries only wages, the price of capital and the expected change in the real exchange rate differ. The results of formal tests for the significance of these differences are shown in a sub-panel below the estimated coefficients. The first two rows show whether there is a difference between the time before and after 1994 for NAFTA countries (first row) and non-NAFTA countries (second row). The third and fourth row for each coefficient show whether NAFTA countries are significantly different after and before 1994, respectively.

Source country GDP is significantly positive, as expected, for all countries and time periods, but the coefficient is much larger for NAFTA countries. This is consistent with the observation that a significant amount of FDI is undertaken in export industries. The (export) market size effect is larger for the U.S. and Canada, and has increased since NAFTA's inception. The real exchange rate enters significantly positive, except for NAFTA countries before 1994. This is the opposite of the expected sign from the model. The real interest rate and the expected change in the real exchange rate, whose signs are theoretically ambiguous, change signs across time periods and countries. Some of these signs are not even robust across different specifications. However, the positive sign on the real exchange rate is robust. It might be due to the high level of aggregation which masks some of the large swings it exhibits or long periods of essentially fixed exchange rates, capital and other controls on financial transactions. The positive correlation between FDI and the real exchange rate is also consistent with the argument that the peso should appreciate in real terms if Mexican productivity has been increasing as a result of capital inflows.[19]

Recall that the predicted sign of source country factor prices depends on which type of investment is considered. For final good producers (horizontal multinationals) higher factor prices at home tend to depress domestic investment and induce the firm to substitute towards foreign investment. For vertical multinationals, an increase in source country factor prices raises the cost of the intermediate good which tends to decrease supply of the final good, hence foreign investment.

Only wages for non-NAFTA countries after 1994 and the price of capital for these countries before 1994 have a positive sign. For NAFTA countries, all factor prices enter negatively and the effect in each case is larger than that for non-NAFTA countries. This result is consistent with the increasing importance of vertical multinationals as more foreign operations, particularly in developing countries such as Mexico, are used for outsourcing labor-intensive parts of the production process. The larger coefficient for NAFTA countries is also consistent with the much greater importance of Maquiladora production for U.S. firms, in contrast to firms from the rest of the world.

However, the change in the magnitude of other coefficients, in particular GDP, cannot be explained this way. These changes instead could be evidence of the commitment effect. As a result, innovations in factors that encourage FDI now have a larger effect.

5.3 Sensitivity Analysis

The basic specification has ignored the possibility that the sum of firms' desired investment exceeds the level of sustainable investment. As argued above, if such a constraint is binding, FDI is also right-censored. The amount of investment that Mexico can sustain each year with respect to any country is unknown. Thus, in the extreme one might want to assume that the constraint is binding for all countries in all years. In that case, however, observed capital stocks contain no information about desired capital stocks and estimation yields no sensible results. The analysis in section 3 showed that an FTA may not raise the level of sustainable FDI for countries that do not participate, while it will do so for partner countries. Thus, it is assumed that the constraint on aggregate FDI is binding in all years for the non-NAFTA country with the highest capital stock, but in only three years for the United States: 1988, right before unilateral reforms, 1993, right before NAFTA went into effect, and 1998, the last year of the sample period. To conserve space, only the results for non-interacted regressors are shown in table 4, whereas table 5 presents the coefficients for the different time periods and country groups, the results of the joint tests and the estimated quantitative NAFTA effect. As can be seen, the basic results hold up well. NAFTA still raises FDI from the U.S. and Canada, but not from other countries. The magnitude and significance level of most individual coefficients are unchanged, with the exception of non-NAFTA country wages after 1994, which lose their significance.

Another specification aims to address the mixed findings with respect to source country factor prices. Perhaps firms care directly about relative factor prices rather than factor prices in each country separately. Equation (4) thus includes relative factor prices. These are defined as Mexican relative to source country ones. Hence, a negative sign is expected for horizontal multinationals, while the sign is ambiguous for vertical multinationals. A negative sign obtains for all countries and factor prices before 1994 except for wages in non-NAFTA countries (see table 6). Wages are significantly positive for NAFTA countries after 1994, while the relative price of capital enters positively for all countries after 1994. This indicates that concern for relative rather than absolute factor prices may be important, yet again we cannot reject the possibility that increased international vertical specialization is an important contributor to rising FDI in Mexico, particularly from the U.S. and Canada.

Other results are very similar to the basic specification. Overall, NAFTA makes a significant difference and again, FDI from the U.S. and Canada would have been about 45 percent lower had NAFTA not been enacted. The effect of NAFTA on FDI from countries outside of North America is now estimated to be somewhat larger (an increase of 14 percent in FDI from these countries due to NAFTA). This is because generally the estimates for the U.S. and Canada are more precise than those for other countries, which is probably due to the greater heterogeneity among those countries that a simple country group dummy cannot capture.

Regression (5) again enters source and host country factor prices separately, but lags GDPs and the real exchange rate. Since the dependent variable is investment, one might be concerned about simultaneity when entering current period incomes and exchange rates. However, this is more likely to be a problem when using total investment rather than foreign direct investment, which constitutes only a fraction of domestic investment in Mexico. Moreover, source country incomes are unlikely to be affected as well. The results in tables 4 and 7 confirm that simultaneity is not an issue as virtually all results are unchanged. NAFTA matters, again with most of its positive effect stemming from increased FDI from the U.S. and Canada. One small difference is that now FDI from all other countries is estimated to be lower since 1994 compared to the non-NAFTA scenario.

All results so far have been based on the hypothesis that a regime change occurred when NAFTA went into effect. Yet it could have occurred earlier, either due to an "announcement" effect before the formal implementation of NAFTA (which could be observed in Portugal and Spain prior to their accession to the European Community) or as a result of earlier investment reforms. While we cannot disentangle the effects of earlier reforms from the effect of NAFTA after 1994, by replacing the NAFTA dummy in all interactions with a reform dummy starting in 1989 we can see the combined effect of the two. The results in table 8 show that again, FDI from the U.S. and Canada would have been much lower without reforms and the trade agreement, while investment from the rest of the world is little affected.

6 Conclusion

This paper investigated whether a developing country can use economic integration with a large developed country as a means to attract more foreign direct investment with a case study of the determinants of FDI in Mexico. The North American Free Trade Agreement is a prime example of the new type of regionalism that combines developing and developed countries. NAFTA has had an impact on inward FDI in Mexico, which has been large with respect to the partner countries in the agreement, the United States and Canada, while investment from elsewhere has been largely unaffected. Moreover, NAFTA has changed how investors react to the fundamental determinants of FDI, income, the real exchange rate, interest rates and factor prices.

The implications of these findings are both encouraging and should be treated as a reason for caution. On the one hand, economic integration appears to be a successful means for a developing country to attract more foreign investment in the form of FDI. On the other hand, most of this investment comes from the partner countries in the agreement. The rise in investment might not occur if these partner countries were not in close geographic proximity as is the case with the U.S. and Mexico. Hence, recent integration efforts by developing countries with developed countries that they do not directly border (including Mexico's agreement with the European Union) may fail to result in increased FDI. The result that investment from the U.S. and Canada was significantly different from third-country investment even before NAFTA was formed lends support to this contention.

There are several explanations for the change in investors' sensitivity with respect to the determinants of FDI. It could be the result of increased investor confidence that implemented reforms have become increasingly difficult to reverse, suggesting that regional integration does confer a commitment value to the developing partner country. A complementary explanation is increasing international vertical specialization. This hypothesis is supported by the changing impact found with respect to home country factor prices, which is what a model of vertical versus horizontal multinationals predicts. Another result emerging from the analysis is that host country variables play only a minor role in explaining FDI in Mexico, which is in line with other research that has found that often "push"-factors appear to be more important in explaining international capital flows than "pull"-factors (e.g. Fernandez-Arias, 1996).

The results of this study suggest that there is a role for regional economic integration as a means for developing countries to attract more FDI. Since NAFTA has only been in effect for a few years, the availability of more years of data and recent improvements in data quality should allow more definite assessments in the future. Future work should also investigate whether, if any, changes have occurred with respect to the sectoral composition of foreign investment, for which data with greater industry detail is needed. Finally, detailed firm level data would allow us to further investigate the notion of the changing importance of vertical versus horizontal multinationals in Mexican investment.

Notes:

[1] The notion that foreign investment is key to the development process goes back at least as far as Rosenstein-Rodan (1943). For a recent formal argument see Murphy et al. (1989). On the empirical side, Borensztein, De Gregorio and Lee (1998) find that FDI flows from industrial to developing countries contribute relatively more to growth than domestic investment. In a case study of Venezuela, Aitken and Harrison (1999) find that the evidence is mixed and that joint ventures seem to entirely capture the gains from foreign investment.

[2] However, in a free trade area such as NAFTA, unlike a customs union, rules of origin must be observed. These can be quite stringent, as is the case in automobiles and textiles.

[3] See Helpman (1984) for a model of vertical and Markusen (1984) for a model of horizontal multinationals, and Markusen et al. (1996) for a unified treatment.

[4] See the collection by Francois and Shiells (1994), but also Stern et al. (1992) and Brown, Deardorff and Stern (1992) for an overview. Assuming that NAFTA will raise capital inflows and/or investor confidence in Mexico leads up to a fourfold increase in the welfare effects.

[5] Empirically, Sarno and Taylor (1999) find that FDI inflows are of a largely permanent nature, while most other types of capital inflows are of a temporary nature.

[6] Multinational corporations were welcomed as providers of technology. In 1970, their share exceeded 50 percent in the transportation equipment, electrical machinery and chemical industries (Franko, 1999: 62).

[7] The basic model extends Cushman (1985) by adding a third country and considering trade barriers among all countries.

[8] It is straightforward to relax this assumption, but it would unnecessarily complicate the analysis. See the comments below on the potential impact of this restriction on the empirical analysis.

[9] Capital is assumed exhausted after one period of use. Allowing liquidation of capital goods does

not alter the qualitative conclusions of the model.

[10] This is consistent with how investment in the Mexican Maquiladora industry was treated. The portion of the output exported to the United States that had previously been imported from there is tariff-free (under provision 9802 of the Harmonized System code).

[11] For non-partner country (e) vertical multinationals who might import the intermediate good from their home countries (but sell in u), the tariff would be applied to the total customs value of the final good. However, if local content requirements are met, they still qualify for reduced (or zero) tariffs under the FTA and then the qualitative conclusions are unaltered.

[12] The following formal argument is based on Fernandez-Arias and Spiegel (1998).

[13] In some cases, more than one real exchange rate may matter for FDI. Since in a three-country model one exchange rate can always be expressed as a function of the other two, the second exchange rate is taken to be the one between the two countries that form the FTA, which is invariant across all other countries within a time period and hence gets absorbed in a time-specific effect. In the absence of such a control, omission of this factor does not affect the results only if it is uncorrelated with other observables that affect FDI.

[14] This need not be the case. For example, option-based models of irreversible investment under uncertainty potentially imply significant nonlinearities in the underlying investment process. See Carruth, Dickerson and Henley (2000) for details. Allowing slope coefficients to vary across both time and countries allows for some nonlinearities (see below).

[15] Given that the selected proxy measures $E(\theta)$ with error, coefficient estimates may be biased and inconsistent depending on the severity of the measurement error. However, McCallum (1972) and Wickens (1972) show that the degree of inconsistency is worse if the proxy is omitted due to omitted variable bias, even if measurement error is large.

[16] For simplicity, "NAFTA countries" always refers to the U.S. and Canada, both before and since

the agreement takes effect. "Non-NAFTA countries" refers to all other countries in the sample.

[17]The dependent variable is the foreign capital stock, as implied by the model. Froot and Stein (1991), Dewenter (1995) and Goldberg and Klein (1997) use flows, whereas Brenton, di Mauro and Lücke (1999) use stocks. Froot and Stein use flows relative to GNP whereas Dewenter uses FDI relative to total private investment. Often, the choice is dictated by the unavailability of stock data, which is not a problem here.

[18] Of course, the NAFTA period dummy potentially captures the effect of other post-NAFTA events that are not explicitly controlled for. For example, Mexico also joined the OECD in 1994, which may have influenced FDI. Hence, one should be careful in ascribing all effects found here solely to NAFTA. However, other events such as the Mexican peso crisis of 1994/1995 are controlled for in the sense that it led to a real depreciation of the peso and a fall in GDP in 1995, both of which are included in the regressions.

[19] This also implies that the real exchange rate may be endogenous, an issue which is addressed below.

Data Appendix

Source countries of FDI in the sample: United States, Canada, United Kingdom, Germany, Japan, Spain, France, Italy, and the Netherlands.

FDI stocks and flows: from SECOFI, in millions of U.S. dollars, deflated by U.S. producer price index (PPI), from *International Financial Statistics (IFS).*

GDP: real GDP in billions of U.S. dollars, from *IFS*.

Real exchange rate: nominal price of foreign exchange (dollars, mark, yen, etc. per peso) • Mexican price level / foreign price level using the consumer price index and the end-of-period market exchange rate converted to an index with base year 1980. Results are virtually unchanged when using the GDP deflator or other exchange rates. Annual values are averages of monthly values.

Real interest rate: $(1+i)/(1+\pi)$, where i is the nominal interest rate (taken to be the federal funds rate from *IFS*) and π the inflation rate constructed from the GDP deflator. Using the treasury bill rate or the 10-year government yield leaves results virtually unchanged.

Wages: Index (base year 1991) of real total compensation per employee, from the OECD economic outlook database. Using an index of real labor costs instead does not significantly alter the results. They do differ somewhat, however, when using an index of hourly earnings in manufacturing. This narrower index was not selected because even though most FDI takes place in manufacturing, a sizable amount goes into other sectors. Moreover, firms are likely to consider total labor cost, including benefits which vary considerably across countries, when making investment decisions.

Real price of capital: Following Cushman (1985) this is the ratio of the business investment deflator and the GDP deflator, both taken from the OECD economic outlook database.

Expected change in the real exchange rate: Month-by-month changes in the real exchange rate (θ) are averaged to arrive at annual values. The annual value of $E(\theta)$ then is one over the previous year's value of θ.

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Table 1: Foreign Direct Investment into Mexico, selected countries, in mill. $

Year(s)	Total	U.S.	Canada	UK	Germany	Japan	Netherlands
1980-84 (avg.)	1,212.7	751.1	17.1	38.1	123.9	88.0	0.0
1985-89 (avg.)	2,737.4	1,651.6	33.2	280.8	108.5	103.8	53.2
1990-93 (avg.)	3,946.9	2,462.5	73.2	201.2	142.3	88.7	104.3
1994	10,545.5	4,867.3	740.5	593.4	307.5	631.0	746.6
1995	8,177.3	5,350.9	168.9	213.8	548.5	155.7	742.6
1996	7,543.7	5,094.3	491.7	74.5	196.2	139.3	479.9
1997	11,604.1	7,141.0	220.9	1,833.7	480.0	350.4	272.4
1998	7,268.1	4,751.7	162.7	161.1	137.7	96.6	1,045.8

Source: SECOFI (http://dgcnesyp.inegi.gob.mx/BDINE/K10/K10.HTM)

Table 2: Basic Tobit Regressions

Dependent Variable: Stock of FDI	(1)		(2)	
	Coefficient	s.e.	Coefficient	s.e.
GDP source country	4.35	0.427	0.648	0.153
Real Exchange Rate	146.1	24.2	40.4	9.13
Real Interest Rate source country	8,142	18,746	-12,885	5,601
Wages source country	-153	65.2	-33.0	24.8
Price of Capital source country	-13,365	5,141	4,649	2,130
E(change real exchange rate)	19,943	5,847	16,948	6,175
GDP Mexico	-0.004	0.021	-0.012	0.007
Wages Mexico	-70.0	43.6	-21.0	18.6
Price of Capital Mexico	4,483	4,845	-2,840	1,615
NAFTA country	7,877	1,420	218,142	67,658
NAFTA years	2,434	1,462	3,288	34,542
NAFTA country $*$ NAFTA years			-102,753	79,573
GDP $*$ NAFTA country			3.17	0.283
GDP $*$ NAFTA years			0.319	0.287
GDP $*$ country $*$ years			0.802	0.374
Exchange Rate $*$ NAFTA country			-26.6	41.9
Exchange Rate $*$ NAFTA years			12.6	14.1
Exchange Rate $*$ country $*$ years			164.5	41.3
Interest Rate $*$ NAFTA country			-83,448	25,361
Interest Rate $*$ NAFTA years			3,519	30,189
Interest Rate $*$ country $*$ years			178,043	39,955
Wages $*$ NAFTA country			-553.4	302.3
Wages $*$ NAFTA years			161.0	66.3
Wages $*$ country $*$ years			-400.5	335.7
Price of Capital $*$ NAFTA country			-13,527	7,954
Price of Capital $*$ NAFTA years			-9,840	5,697
Price of Capital $*$ country $*$ years			-190,681	11,233
Exchange rate change $*$ NAFTA country			-60,793	27,038
Exchange rate change $*$ NAFTA years			-16,072	6,320
Exchange rate change $*$ country $*$ years			137,258	26,334
Log likelihood	-1,596		-1,403	
χ^2	294		2,969,000	
Probability $> \chi^2$	0.00		0.00	
Number of observations	171		171	

Notes: Regressions include a constant and a time trend (not reported); s.e.: robust standard error.

Table 3: The Effect of NAFTA - Basic Specification (2)

	GDP		Real Exchange Rate		Real Interest Rate	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	3.82	0.00	13.9	0.76	-96,333	0.00
NAFTA country after 1994	4.94	0.00	191	0.00	85,229	0.00
non-NAFTA country before 1994	0.648	0.00	40.4	0.00	-12,885	0.02
non-NAFTA country after 1994	0.966	0.00	53.0	0.00	-9,366	0.74

	Wages		Price of Capital		Expected Exch. Rate Change	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	-586.3	0.05	-8,879	0.30	-43,845	0.11
NAFTA country after 1994	-825.8	0.00	-209,400	0.00	77,341	0.00
non-NAFTA country before 1994	-33.0	0.18	4,649	0.03	16,948	0.01
non-NAFTA country after 1994	128.0	0.04	-5,192	0.32	876.5	0.48

Differences before/after 1994 and NAFTA/non-NAFTA countries	GDP	Real Exchange Rate	Real Interest Rate	Wages
	p-value	p-value	p-value	p-value
Before/after 1994, NAFTA country	0.00	0.00	0.00	0.45
Before/after 1994, non-NAFTA country	0.27	0.37	0.91	0.02
Country differences after 1994	0.00	0.00	0.00	0.00
Country differences before 1994	0.00	0.53	0.00	0.07

	Price of Capital	Expected Exch. Rate Change	Joint tests (all coefficients)	
	p-value	p-value	χ^2	p-value
Before/after 1994, NAFTA country	0.00	0.00	1,220	0.00
Before/after 1994, non-NAFTA country	0.08	0.01	16.9	0.02
Country differences after 1994	0.00	0.00	9,655	0.00
Country differences before 1994	0.09	0.03	390	0.00

Estimated NAFTA effect	Estimated FDI / Actual FDI
FDI from NAFTA countries without NAFTA (1994-1998)	0.58
FDI from non-NAFTA countries without NAFTA (1994-1998)	1.01

Notes: The top half shows coefficients and p-values (derived from χ^2 tests) for the independent variables in regression (2) from table 2 for the two time periods and country groups. The middle part shows the results of χ^2 tests for the significance of coefficient differences between the pre-NAFTA and NAFTA period and between NAFTA and non-NAFTA countries. The bottom part shows estimated FDI had NAFTA not been enacted relative to actual FDI.

Table 4: Sensitivity Analysis - Selected Coefficients

Regression	(3)	(4)	(5)	(6)
GDP Mexico	-0.013	-0.015		-0.002
	(0.008)	(0.006)		(0.005)
GDP Mexico (-1)			-0.008	
			(0.006)	
Wages Mexico	-24.3		-22.3	-4.90
	(21.6)		(18.4)	(18.1)
Price of Capital Mexico	-2,796		-2531	586.7
	(1,838)		(1,348)	(1,836)
NAFTA country	217,338	164,294	214,595	30,339
	(69,577)	(37,173)	(55,383)	(34,652)
NAFTA years	12,782	2,561	6,608	14,431
(6): Reform & NAFTA years	(42,076)	(33,356)	(27,062)	(16,668)
NAFTA country $*$ NAFTA years	-111,304	-297,103	-30,020	-130,682
(6): Reform & NAFTA years	(87,580)	(62,094)	(69,074)	(102,645)
Log likelihood	-1,250	-1,386	-1,402	-1,418
χ^2	1,127,749	208,358	410,405	5,776
Probability $> \chi^2$	0.00	0.00	0.00	0.00
Number of obs.	171	171	171	171

Notes: Regressions differ from the base case (2) as follows:
Regression (3): FDI is right-censored for selected countries and years
Regression (4): Relative factor prices
Regression (5): Lagged GDP and lagged real exchange rate
Regression (6): Time dummy starts in 1989 and includes both reforms and NAFTA
Robust standard errors in parentheses. Regressions include all interaction terms, a constant and a time trend (not reported).

Table 5: The Effect of NAFTA - Right-Censored FDI (3)

	GDP		Real Exchange Rate		Real Interest Rate	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	3.81	0.00	17.9	0.70	-99,331	0.00
NAFTA country after 1994	4.71	0.00	264.1	0.00	69,914	0.00
non-NAFTA country before 1994	0.758	0.00	47.9	0.00	-15,910	0.02
non-NAFTA country after 1994	1.07	0.00	65.0	0.00	-10,258	0.76

	Wages		Price of Capital		Expected Exch. Rate Change	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	-528.4	0.09	-8,187	0.36	-44,982	0.11
NAFTA country after 1994	-833.4	0.00	-239,235	0.00	119,274	0.00
non-NAFTA country before 1994	-3.31	0.92	4,493	0.06	18,421	0.02
non-NAFTA country after 1994	76.5	0.37	-8,234	0.21	1,195	0.41

Differences before/after 1994 and NAFTA/non-NAFTA countries	GDP	Real Exchange Rate	Real Interest Rate	Wages
	p-value	p-value	p-value	p-value
Before/after 1994, NAFTA country	0.00	0.00	0.00	0.38
Before/after 1994, non-NAFTA country	0.36	0.38	0.88	0.38
Country differences after 1994	0.00	0.00	0.03	0.00
Country differences before 1994	0.00	0.49	0.00	0.10

	Price of Capital	Expected Exch. Rate Change	Joint tests (all coefficients)	
	p-value	p-value	χ^2	p-value
Before/after 1994, NAFTA country	0.00	0.00	755.9	0.00
Before/after 1994, non-NAFTA country	0.07	0.03	11.31	0.13
Country differences after 1994	0.00	0.00	2,541	0.00
Country differences before 1994	0.13	0.03	253.7	0.00

Estimated NAFTA effect	Estimated FDI / Actual FDI
FDI from NAFTA countries without NAFTA (1994-1998)	0.59
FDI from non-NAFTA countries without NAFTA (1994-1998)	1.05

Notes: Coefficients, p-values, tests for coefficient differences and the estimated NAFTA effect from regression (3), table 4. See the table 3 notes for a detailed explanation.

Table 6: The Effect of NAFTA - Relative Factor Prices (4)

	GDP		Real Exchange Rate		Real Interest Rate	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	3.86	0.00	14.1	0.79	-112,489	0.00
NAFTA country after 1994	5.62	0.00	503.4	0.00	-12,448	0.73
non-NAFTA country before 1994	0.691	0.00	27.7	0.00	-6,184	0.11
non-NAFTA country after 1994	1.24	0.00	95.2	0.00	-11,772	0.71

	Relative Wages		Relative Price of Capital		Expected Exch. Rate Change	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	-14,709	0.00	-19,122	0.00	-19,973	0.67
NAFTA country after 1994	122,706	0.00	150,423	0.00	-197,754	0.00
non-NAFTA country before 1994	966.8	0.36	-1,721	0.12	7,513	0.11
non-NAFTA country after 1994	-1,349	0.71	4,902	0.13	-1,460	0.34

Differences before/after 1994 and NAFTA/non-NAFTA countries	GDP	Real Exchange Rate	Real Interest Rate	Rel. Wages
	p-value	p-value	p-value	p-value
Before/after 1994, NAFTA country	0.00	0.00	0.02	0.00
Before/after 1994, non-NAFTA country	0.11	0.00	0.86	0.53
Country differences after 1994	0.00	0.00	0.99	0.00
Country differences before 1994	0.00	0.79	0.00	0.00

	Rel. Price of Capital	Expected Exch. Rate Change	Joint tests (all coefficients)	
	p-value	p-value	χ^2	p-value
Before/after 1994, NAFTA country	0.00	0.00	1,645	0.00
Before/after 1994, non-NAFTA country	0.05	0.07	13.3	0.07
Country differences after 1994	0.00	0.00	1,366	0.00
Country differences before 1994	0.00	0.48	562.3	0.00

Estimated NAFTA effect	Estimated FDI / Actual FDI
FDI from NAFTA countries without NAFTA (1994-1998)	0.55
FDI from non-NAFTA countries without NAFTA (1994-1998)	0.86

Notes: Coefficients, p-values, tests for coefficient differences and the estimated NAFTA effect from regression (4), table 4. See the table 3 notes for a detailed explanation.

Table 7: The Effect of NAFTA - Lagged GDPs and Real Exchange Rate (5)

	GDP (-1)		Real Exchange Rate (-1)		Real Interest Rate	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	3.92	0.00	-27.4	0.34	-106,220	0.00
NAFTA country after 1994	5.16	0.00	90.4	0.00	94,851	0.00
non-NAFTA country before 1994	0.722	0.00	33.8	0.00	-11,119	0.09
non-NAFTA country after 1994	0.732	0.00	43.0	0.00	-20,444	0.31

	Wages		Price of Capital		Expected Exch. Rate Change	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1994	-573.3	0.04	-7,919	0.34	-39,887	0.02
NAFTA country after 1994	-860.8	0.00	-194,146	0.00	-18,846	0.10
non-NAFTA country before 1994	-25.6	0.29	3,431	0.07	5,565	0.31
non-NAFTA country after 1994	121.6	0.07	-5,233	0.34	72.4	0.95

Differences before/after 1994 and NAFTA/non-NAFTA countries	GDP (-1)	Real Exchange Rate (-1)	Real Interest Rate	Wages
	p-value	p-value	p-value	p-value
Before/after 1994, NAFTA country	0.00	0.00	0.00	0.35
Before/after 1994, non-NAFTA country	0.97	0.41	0.67	0.04
Country differences after 1994	0.00	0.00	0.00	0.00
Country differences before 1994	0.00	0.00	0.00	0.06

	Price of Capital	Expected Exch. Rate Change	Joint tests (all coefficients)	
	p-value	p-value	χ^2	p-value
Before/after 1994, NAFTA country	0.00	0.25	2,265	0.00
Before/after 1994, non-NAFTA country	0.13	0.30	11.1	0.13
Country differences after 1994	0.00	0.09	5,581	0.00
Country differences before 1994	0.15	0.01	434.3	0.00

Estimated NAFTA effect	Estimated FDI / Actual FDI
FDI from NAFTA countries without NAFTA (1994-1998)	0.57
FDI from non-NAFTA countries without NAFTA (1994-1998)	1.13

Notes: Coefficients, p-values, tests for coefficient differences and the estimated NAFTA effect from regression (5), table 4. See the table 3 notes for a detailed explanation.

Table 8: The Effect of Reforms & NAFTA (6)

	GDP		Real Exchange Rate		Real Interest Rate	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1989	3.32	0.00	-84.9	0.01	-31,461	0.03
NAFTA country after 1989	5.82	0.00	-87.3	0.30	183,000	0.00
non-NAFTA country before 1989	1.17	0.00	32.0	0.00	-5,724	0.16
non-NAFTA country after 1989	0.643	0.00	27.0	0.00	-7,371	0.49

	Wages		Price of Capital		Expected Exch. Rate Change	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
NAFTA country before 1989	480.4	0.02	20,195	0.00	-50,985	0.02
NAFTA country after 1989	137.8	0.74	-90,755	0.00	-7,590	0.91
non-NAFTA country before 1989	12.0	0.43	2,001	0.13	13,279	0.11
non-NAFTA country after 1989	56.0	0.15	-2,045	0.59	919.4	0.24

Differences before/after 1989 and NAFTA/non-NAFTA countries	GDP	Real Exchange Rate	Real Interest Rate	Wages
	p-value	p-value	p-value	p-value
Before/after 1989, NAFTA country	0.00	0.98	0.00	0.46
Before/after 1989, non-NAFTA country	0.03	0.69	0.89	0.27
Country differences after 1989	0.00	0.18	0.00	0.84
Country differences before 1989	0.00	0.00	0.09	0.02

	Price of Capital	Expected Exch. Rate Change	Joint tests (all coefficients)	
	p-value	p-value	χ^2	p-value
Before/after 1989, NAFTA country	0.00	0.55	332.5	0.00
Before/after 1989, non-NAFTA country	0.29	0.14	12.4	0.09
Country differences after 1989	0.00	0.90	1,916	0.00
Country differences before 1989	0.00	0.01	106.2	0.00

Estimated combined effect from Reforms & NAFTA	Estimated FDI / Actual FDI
FDI from NAFTA countries without Reforms & NAFTA (1989-1998)	0.48
FDI from non-NAFTA countries without Reforms & NAFTA (1989-1998)	1.15

Notes: Coefficients, p-values, tests for coefficient differences and the estimated NAFTA effect from regression (6), table 4. See the table 3 notes for a detailed explanation.

Figure 1: FDI inflows into Mexico, quarterly in mill. U.S. dollars