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## Government regulations, external financing and economic performance: The case of Mexico

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Kiel Working Paper No. 345

Government Regulations, External Financing,  
and Economic Performance:

The Case of Mexico

by

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Government Regulations, External Financing and  
Economic Performance:

The Case of Mexico\*

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## I. Introduction\*

During the 1970s and early 1980s Mexico, like many other Latin American countries, relied to a large extent on foreign capital in financing public and private expenditures. While the annual inflow of debt was always larger than that of foreign direct investment (fdi), the relative importance of both types of capital varied substantially over the 1970-81 period. The ratio of debt over fdi inflows was as low as 2.6 in the 1970-74 period. It increased to 6.7 during the years 1975-77 and averaged 5.0 in 1978-81<sup>1</sup>. In the same three sub-periods, the real growth rate of gross domestic product dropped from an average of 6.8 per cent to 4.4 per cent before it increased again to 8.4 per cent. Hence, relatively good economic performance coincided with relatively large fdi inflows.

Both empirical observations, different capital structures and growth records, may in fact be interrelated. This hypothesis refers to a choice-theoretic model which analyses the international transfer of capital on the basis of an agent-principal approach (Lächler, 1985). It is shown that transfer negotiations between foreign lenders or investors (principals) and the authorities in the recipient country (agent) can result in a first-best "cooperative" or a second-best "non-cooperative" equilibrium. The impact of capital inflows on economic performance of the recipient country depends on which of both regimes is realized. In a non-cooperative situation, the borrower fails to precommit himself credibly to a certain investment behaviour. Under such conditions the choice between equity and debt finance may involve a risk-return trade-off between income stability and expected growth. Due to the risk sharing with foreign investors a higher proportion of equity inflows reduces the variability of the agent's domestic absorption. At the same time, incentives to generate domestic savings are supposed to be weaker than in the

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\* Comments of Peter Nunnenkamp are gratefully acknowledged.

<sup>1</sup> The data for the capital structure come from Table 2 and growth rates are taken from Anuario Estadístico published by the Secretaría de Programación y Presupuesto.

case of debt finance. Consequently, future growth prospects are diminished.

The non-cooperative case has been considered as typical for principal-agent relations in the recent past (Lächler, Nunnenkamp, 1987). However, the hypothesis on economic performance effects derived under such conditions seems to conflict with Mexico's favourable growth experience in periods with relatively large fdi inflows. The apparent contradiction may be due to government policies towards different types of capital inflows. Typically government interventions not only influence the total amount of capital inflows, but also its structural composition. Indirectly capital inflow regulations are thus likely to influence economic performance as well. Moreover, government interventions may have a direct impact on the growth effects of different capital inflows. Most importantly, the efficiency of investments financed through equity and debt inflows may be affected by regulations.

In the following, the predictions of the principal-agent model on the effects of different capital inflows on economic performance in Mexico are subjected to an empirical test. Section II outlines the choice-theoretic model and clarifies whether transfer negotiations yielded a cooperative or non-cooperative equilibrium in the case of Mexico. Section III analyses how Mexican policies affected the structure of capital inflows over the 1973-87 period and discusses the effects of regulations on the investment behaviour of the agent. In Section IV the impact of different types of capital inflows on key macroeconomic variables is tested empirically. The results are interpreted within the agent-principal framework. The final section provides some policy conclusions.

## II. Theoretical Framework

### 1. The Basic Model

The relationship between foreign financing and domestic savings and investment is the subject of a long debate in the literature

on development finance. Most empirical studies concluded that an additional Dollar of foreign capital increases total saving by less than one Dollar<sup>1</sup>. However, previous research focussed on distinguishing the effects of private versus public transfers and aid versus non-concessional external finance. Typically, the distinction between debt versus fdi inflows which figures prominently in the context of the following principal-agent model was not considered.

Hypotheses on the impact of different types of capital inflows on economic performance in Mexico can be derived from the following principal-agent framework. In the underlying model (Lächler 1985; Lächler, Nunnenkamp, 1987) the capital transfer between the lending or investor (principal) and the recipient country (agent) is typically characterized by an informational asymmetry: Once the money is transferred, the principal does not know which proportion the agent invests in income generating activities. He merely observes total output which is not only a function of realized investment but also of random variables. As the agent allocates the transferred resources between consumption and investment the following disincentive (moral hazard) problems arise:

- In the case of equity participation, the agent can be expected to invest a smaller share of domestic absorption compared to a situation where foreign resources would be available as a gift. Since the principal is entitled to a predetermined share of future output, the agent may improve his own welfare position by shifting domestic absorption to current consumption.
- In the case of debt finance the principal is entitled to a fixed sum of debt service payments. Relative to a gift-transfer the agent will choose riskier projects. This is because it is favourable for him to raise the variance of returns from investments in order to maximize his own welfare at the expense of the principal.

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<sup>1</sup> For an overview of empirical studies which measured the effects of foreign capital on domestic savings, domestic investment and economic growth, see Sharma (1983).

In both cases moral hazard of the agent threatens to reduce the expected gains of the principal. Assuming that principals behave rationally, they anticipate the agent's behaviour and modify the terms under which the transfer is made. The agent who receives foreign capital under these harder conditions is then forced to behave in a non-cooperative manner.

The aforementioned disincentive problems may be overcome, if the agent were able to precommit himself credibly to a certain investment behaviour. In such a cooperative environment the model hypothesizes that the investment response (I) to a transfer of foreign capital (T) obeys the following pattern:

$$(1) \quad \left. \frac{dI}{dT} \right|_{\text{AID}} \leq \left( \left. \frac{dI}{dT} \right|_{\text{Equity}}, \left. \frac{dI}{dT} \right|_{\text{DEBT}} \right), \text{ with } 0 \leq \left. \frac{dI}{dT} \right|_{\text{AID}} \leq 1$$

According to (1), the recipient country invests a relatively larger share if the transfer involves future repayment obligations. However, if the transfer negotiations result in a non-cooperative solution, the change in domestic investment after an increased equity inflow may be negative, while more external debt always leads to more investment. The capital inflows are expected to obey the following pattern:

$$(2) \quad \left. \frac{dI}{dT} \right|_{\text{Equity}} \leq \left. \frac{dI}{dT} \right|_{\text{Aid}} \leq \left. \frac{dI}{dT} \right|_{\text{Debt}} \quad \text{with } 0 \leq \left. \frac{dI}{dT} \right|_{\text{Aid}} \leq 1$$

According to the model the pattern of coefficient values - as given in (1) and (2) for investment - also holds for changes in economic growth and domestic savings (DS) in response to increased transfers. Real economic growth is assumed to be a stochastic function of investment. In the case of domestic savings the response to an aid inflow is bounded by  $-1 \leq \left. \frac{dDS}{dT} \right|_{\text{Aid}} \leq 0$ <sup>1</sup>.

## 2. The Transfer Negotiations in the Case of Mexico

The expected impact of capital inflows on the agent's economic performance differs according to the transfer regime. Hence, it

<sup>1</sup> This results from the definition of domestic savings which is  $DS = I - T$ .



is important to get an idea whether Mexico engaged in cooperative or non-cooperative relations with foreign suppliers of capital. It depends on the perception of the agent's investment behaviour by the principal, whether or not a cooperative equilibrium is achieved. The agent may signal that he is prepared to engage in cooperative relations. The model suggests that high investment ratios, the concentration of investments in low-risk projects, and successful mobilization of domestic savings may provide such signals. However, unless the institutional framework of transfer negotiations allows for a credible precommitment to a certain investment behaviour, the outcome of transfer negotiations ultimately depends on the principal's expectations on the agent's future economic course. The principal decides on the terms of the capital transfer. This in turn determines the type of equilibrium reached.

Ideally, the results of Mexico's transfer negotiations with foreign investors are thus to be assessed by evaluating the terms of fdi contracts. While this information is not available, it seems justified to conclude that Mexico reached a cooperative relationship with foreign investors. A positive and significant Pearson-correlation coefficient (0.89) between fdi inflows and the public investment ratio indicates that the Mexican government did not abstain from complementary investments over the 1970-85 period. Moreover, increases in public investment outlays cannot be attributed to reductions in private investment<sup>1</sup>. In other words Mexico behaved cooperatively over the whole period. If foreign investors would have supplied their investment capital at non-cooperative terms, Mexico would have been better off showing also a non-cooperative behaviour.

In contrast to fdi, non-cooperative relations are likely to persist in the case of debt finance. As concerns the riskiness of investments, Mexico's behaviour was not suited to achieve a co-

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<sup>1</sup> Over the 1970-85 period the Pearson-correlation coefficient between the public and the private investment ratio is positive (0.21).

operative equilibrium. In general, activities which generate foreign exchange and conform to the assumed comparative advantage of Mexico may be supposed to be the least risky for foreign principals<sup>1</sup>. Actually, however, debt was concentrated in rather inward-oriented sectors which accounted for 60 per cent of Mexican debt, but less than 30 per cent of exports in 1980. On the other hand, the manufacturing sector which received only 40 per cent of debt inflows generated nearly three quarters of total exports.

Within the manufacturing sector the importance of highly human-capital intensive industries is noteworthy. Measuring the importance of industries by their value added, six human-capital intensive industries accounted for 30 per cent of total value added in the manufacturing sector (Table A3). Human-capital intensive industries absorbed 84 per cent of private and more than 97 per cent of public foreign debt accruing to total manufacturing. Human-capital intensive industries do certainly not conform to Mexico's assumed comparative advantage. The relative poor export performance of highly human-capital intensive industries added to the riskiness for foreign lenders. In 1980 six human-capital intensive industries exported only 15.1 per cent of total manufacturing exports.

The relatively risky use of foreign credits in Mexico induced the principals to supply foreign debt finance at non-cooperative terms. Over the period 1977-81, interest rate spreads above LIBOR amounted to an average of 1.13 percentage points in the case of Mexico. The average spread for three indebted Asian developing countries<sup>1</sup> which experienced no serious debt problems was only 0.85 percentage points above LIBOR over the same period (Nunnenkamp, Junge, 1985, p. 57). Apparently, foreign creditors considered Mexico relatively more risky requiring a higher interest rate spread.

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<sup>1</sup> The availability of foreign exchange is a precondition for debt service payments. Investments which do not conform to Mexico's comparative advantage may well be profitable in the short-run. They are nevertheless fairly risky. Unexpected policy shifts may significantly reduce the profitability of such investments.

The non-cooperative behaviour of foreign lenders is also evident from the shift to short-term credits. The share of short-term credits in total foreign Mexican debt rose from 14 per cent in 1978 to 32 per cent in 1981. This indicates that commercial banks were concerned about Mexico's ability to repay. They preferred short-term commitments, because this gave them more flexibility to reduce their engagement if Mexico's prospects turned sour<sup>2</sup>. Moreover, the share of undisbursed commitments in total commitments decreased. Considering private lenders only, this ratio dropped from 13 per cent in 1978 to 2 per cent in 1982<sup>3</sup>. This points to a non-cooperative relationship as well: Foreign principals were worried about Mexico's credibility and did not guarantee Mexico access to future credits.

### III. Government Policies and Capital Inflows 1973-87

#### 1. The Relevance of the Regulative Framework

Mexico achieved a cooperative relationship in the case of fdi inflows but faced a non-cooperative situation in the case of debt finance. From the simultaneous existence of two different transfer regimes it can be concluded that both, debt and fdi inflows, should have a more favourable impact on investment than aid inflows. However, the relative influence of debt versus fdi is left indeterminate. Furthermore, the simultaneous existence of cooperative and non-cooperative relations conflicts with the model assumptions according to which capital inflows are perfectly fungible (Lächler, 1985). That is why government policies come into focus.

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<sup>1</sup> Malaysia, Rep. of Korea, Thailand.

<sup>2</sup> In a cooperative situation the credible commitment of the agent to invest the funds productively would make the shortening of maturities superfluous and even counterproductive.

<sup>3</sup> If public principals are included the reduction is less pronounced (17 per cent to 9 per cent). Apparently, public institutions are more willing to provide credit even if the agent behaves in a non-cooperative manner.

The government can limit the fungibility of capital inflows by regulations which influence the use and the efficiency of foreign capital inflows. The way the government determines the allocation of foreign capital inflows is likely to differ between the various types of external finance. The government agent can freely dispose of resources directly transferred to state agencies and directly determines the efficiency of foreign aid and public debt for example. In the case of private debt and foreign direct investment, the government's influence is less visible but may be of similar importance. Regulations may reduce the attractiveness of certain sectors for fdi and modify the incentives of the recipients of foreign capital as to how to use the resources transferred. The ranking of the economic effects is thus likely to be affected by the degree and nature of interventions concerning the transfer of foreign resources. Against this background, we proceed by evaluating government regulations which influenced capital inflows to Mexico in the 1973-87 period.

## 2. The Regulation of Capital Inflows

### a. Direct Foreign Investment

The "Law to Promote Mexican Investment and Regulate Foreign Investment" (LIE), which came into effect in May 1973, is still the most important piece of legislation affecting the inflow of fdi. Its impact on fdi inflows has, however, changed over time due to a more liberal application in recent years.

The LIE requires foreign investors to register their planned investments and seek for approval. The approving commission (CNIE) decides upon the proposal according to a catalogue of vague criteria. Among other things it is evaluated whether fdi projects displace Mexican companies which are working satisfactorily and whether they provide the Mexican economy with new technology. Annual payments of royalty and profit remittances are subject to foreign exchange availability and limited up to 15 per cent of the equity capital. The income tax on dividends to foreign residents may be prohibitive where no double taxation agree-

ments exist. In 1983 the tax rose from 21 to 55 per cent (Metra, 1985, p. 281).

The legislation also regulates the industries open to fdi and the degree of foreign equity participation in fdi projects. Economic activities being reserved exclusively for the Mexican state include petroleum exploration and refining as well as electric energy generation. As petroleum exploration and refining boomed in the 1970s, one of the fastest growing sectors was closed for fdi<sup>1</sup>. Industries such as the exploitation of timber resources, insurance and road transportation are restricted to enterprises wholly owned by Mexicans<sup>2</sup>. With respect to other industries the investment law generally requires all new fdi as well as the enlargement of existing foreign firms to be 51 per cent Mexican-owned. Hence, fdi is made less attractive for multinational firms which want to ensure tight control of their subsidiaries in order to implement their global strategy. Particularly multinationals employing advanced technologies can be expected to refrain from investments in Mexico or to transfer only "second-best" technologies.

Exceptions to the general 51/49 rule exist in both directions. On one hand, foreigners must not hold more than 40 per cent of firms producing automobile parts, for example. On the other hand, firms exporting at least 80 per cent of their production and being located at the border or in in-bond locations may be wholly owned by foreigners<sup>3</sup>. Small and medium-size foreign firms may also have

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<sup>1</sup> In the period 1977-81 petroleum exploration in real terms expanded by 25.1 per cent annually, while the real growth rate of the manufacturing sector - in which most fdi is concentrated - was 8.4 per cent.

<sup>2</sup> No foreign share holding is allowed in the nationalized banking institutions since 1982.

<sup>3</sup> According to the CNIE "maquiladora" investments are included in the data on fdi approvals. However, some doubts seem justified. In 1986 the number of establishments in the maquiladora industry increased by 198. Assuming that foreign and national firms grew at constant proportions from 1985 to 1986, 62 per cent or 123 were of foreign origin. However, the CNIE approved only 37 new enterprises and 20 new establishments in 1986 (CNIE, 1988a, p. 67). Hence, even if all new fdi were of the maquiladora type a difference of 66 has to be explained.

fully owned subsidiaries without going through the full approval procedure of the CNIE<sup>1</sup>. Furthermore, a foreign majority holding may be permitted on a case by case basis, if the fdi is in the national interest.

The legislative framework gives the authorities considerable scope to decide upon fdi inflows at their own discretion. This creates uncertainty for the applying firm and implies additional costs as the bargaining process with the CNIE binds financial and intellectual resources. Arbitrariness can not guarantee that the most productive foreign investments are realized, since the bargaining power of foreign investors does not necessarily coincide with efficient production. Similarly, investors which succeeded in circumventing the regulations need not to be the most efficient ones. Multinational firms tried to strengthen their position vis-à-vis their Mexican partners in various ways. Some American firms, for example, dispersed widely their Mexican equity participation over the stock market (acciones pulverizadas) (Sigmund, 1984, p. 255). Mexican dummy owners (prestanombres) were also frequently used to avoid an effective Mexican majority. This illegal practice is seldom checked and never punished. Within pyramid schemes (piramidación) foreign investors try to increase their influence by holding a minority participation in their Mexican partner (Geis, 1986, pp. 157-58)<sup>2</sup>.

The effects of Mexican policies on the sectoral distribution of fdi can be assessed by referring to available data for 1979. The importance of fdi across sectors was positively associated with

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<sup>1</sup> Small and medium-sized investors must not have a net worldwide turnover of more than US\$ 8 million, employ more than 500 persons internationally and 250 in Mexico. The sales in Mexico are not allowed to exceed a certain index and at least 35 per cent of the production has to be exported (CNIE, 1988b, pp. 77-80).

<sup>2</sup> Foreign development banks such as the Deutsche Entwicklungsgesellschaft can also be embraced. Since their contribution is regarded as being neutral, the foreign investor can avoid a Mexican majority without holding more than 49 per cent of the capital. However, the empirical relevance of development banks participating in joint ventures has so far remained negligible.

the level of nominal protection<sup>1</sup>. Import substitution policies created attractive investment opportunities within Mexico. However, this policy induced allocation of fdi did not lead to efficient investments from a macroeconomic perspective. Consequently, no significantly positive effects of fdi on economic growth in Mexico were to be expected. The relationship between fdi inflows and economic growth was further weakened by the approval procedures for fdi which served to limit competition among firms within Mexico. On one hand a possible crowding out of Mexican firms by foreign investors was avoided: Fdi was not permitted if similar activities were already performed by Mexican firms. On the other hand multinational firms having invested in Mexico could enjoy rents created by protection, since they were also protected from other foreign investors. In sum, possible efficiency gains from fdi were minimized. Neither were foreign investors forced to behave efficiently within Mexico nor could they exert competitive pressure on Mexican firms.

As with many other laws in Mexico, the content of the fdi legislation is substantially modified by its application. The CNIE initially followed a hard line applying the new fdi law strictly. However, as bureaucratic delays created backlogs of as much as seven months, the administration was reorganized in early 1978 by appointing a new executive secretary with far reaching responsibilities (Sigmund, 1984, p. 253). Thereafter, the CNIE was usually processing applications within 30 days and the ownership structure was handled more flexible. Mexicanization was no longer the principal aim. The restrictive legislation was rather used to influence the type of fdi being made (Geis, 1986, p. 66). Job creation, investment in priority areas and export promotion became most important.

Recently further changes occurred towards a more liberal application of the fdi legislation. In 1984 new general guidelines were published by the CNIE. Foreign majority participation was allowed in 34 priority industries (GTZ, 1988, pp. 45-46). Fur-

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<sup>1</sup> The results are derived from unpublished World Bank data.

thermore, the previously issued resolutions of the CNIE have been evaluated and revised (CNIE, 1988a, p. 51). The new system of resolutions was finally published in February 1988. Additional measures were taken and are planned for the future, in order to make the decision process of the CNIE more transparent and less susceptible to arbitrary judgements. A first step has been to install a data bank (SIPRE), which includes the previous decisions on fdi applications of approximately 1500 cases (CNIE, 1988b, pp. 109-113).

In the 1980s debt-equity swaps have played an important role in inducing fdi inflows into Mexico. Capitalization of private debt has been allowed since 1982 (Geis, 1986, p. 104). Until the end of 1985 a volume of US\$ 769 million was approved, accounting for 30 per cent of all fdi authorizations during that period (BIC, 1987, p. 51). In 1986 the authorities started a codified swap program embracing public debt. While the discount on public debt in the secondary market fluctuated between 40 and 50 per cent in the period June 1986 to September 1987 (Huss, 1988, p. 37), the redemption discount applied by the Secretaría de Hacienda depends on the type of investment. The discount varies between zero for the purchase of "paraestatales" and 25 per cent for investments, which do not provide specific benefits to the Mexican economy (for details see Table A4)<sup>2</sup>. The program is not open to nationals and the shares of the realized investments cannot be transferred to national investors within a 12-year holding period. Swaps executed amounted to US\$ 363 million in 1986 and to US\$ 1483 million in 1987 (Banco de México, 1988a, p. 50)<sup>2</sup>.

Foreign investors seem to have responded to the shift towards a more flexible and somewhat less bureaucratic treatment of fdi<sup>3</sup>.

<sup>1</sup> Assuming a 42 per cent discount in the secondary market, a 90 per cent redemption in pesos and subtracting fees, the net benefit to the investors turns out to be 33 per cent (BIC, 1987, p. 61).

<sup>2</sup> The swap scheme was suspended temporarily in February/March 1987 during Mexico's debt refinancing deal and once again in November 1987.

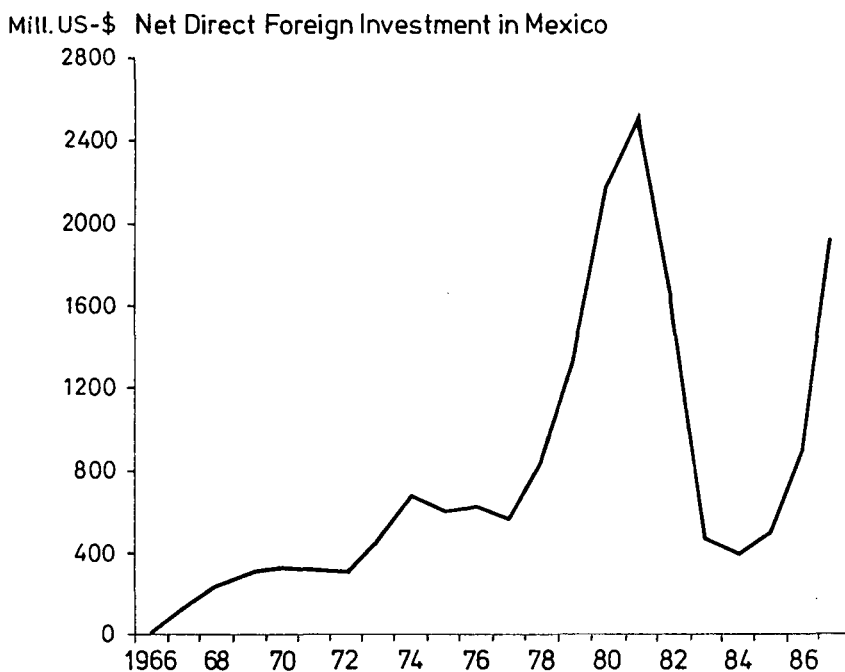
<sup>3</sup> For a more rigorous test of this hypothesis, see Appendix 1.



Over the period 1973-77 the inflow of fdi fluctuated around US\$ 620 million (Graph 1). From 1978 onwards, however, it increased steadily reaching US\$ 2541 million in 1981. The subsequent decline cannot be attributed to changes in the regulative environment, but rather to the uncertainty and economic recession caused by the Mexican debt crisis. The possibilities of capitalizing foreign debt and of swapping debt for equity played an important role in attracting new fdi after 1982. After dropping to US\$ 391 million in 1984, fdi inflows increased steadily to more than US\$ 1800 million in 1987.

All in all, Mexican government policies exerted a significant influence on fdi. Besides limiting the total volume of fdi inflows, the regulations permitted only those foreign investments which were complementary to Mexican investments. Consequently, a positive impact of fdi inflows on the investment ratio was to be expected. However, the approval procedures in combination with import substitution policies reduced the incentives for foreign investors to behave efficiently, thereby weakening the relationship between fdi and economic growth.

Graph 1 - Foreign Direct Investment in Mexico, 1966-87



Source: IMF, Balance of Payments Statistics, various issues.

## b. Debt Inflows

In the case of Mexico, the public sector, i.e. state agencies and public enterprises, accounted for two thirds to three fourth of Mexico's external debt. Indirectly, the government influenced private external borrowing as well. Due to the public sector's demand for domestic savings, private enterprises were crowded out in national financial markets. The effects on private external indebtedness are analyzed after the policy framework for public debt has been discussed.

### Public Debt

External borrowing of "paraestatal" firms and government agencies in Mexico was de facto not restricted before the 1982 crisis. While a law required the firms and agencies to obtain permission before contracting foreign debt, foreign credits were taken up freely in practice and ex post approval was given. Only since 1983 the inflow of public credit is strictly controlled.

With no entry barriers the inflow of public debt was mainly determined by the public deficit and the shortage in domestic funds. Both presidents, Echeverría (1970-76) and Lopez-Portillo (1976-82), pursued an expansionary fiscal policy (Carvounis, 1984, p. 101). Public sector revenues were, however, insufficient to finance these expenditures. Especially in the second half of the 1970s, public firms were short of financial funds as they were not allowed to increase their tariffs in an inflationary environment (Quijano, Antía, 1985, pp. 96-99). In addition, the current deficit of the federal government accounted on average for 4.5 per cent of GDP in the 1973-82 period, peaking at 10.9 per cent in 1982 (Table A5).

Public deficits absorbed a significant proportion of available domestic resources (Table A5) even when deficits were relatively low. This was because financial intermediation was reduced continuously. Broad money<sup>1</sup> as a percentage of GDP declined from 21.4

<sup>1</sup> Includes currency held by the public, private checking accounts in pesos and foreign currency, saving deposits, time deposits, various short-term certificates.

per cent in 1970 to 11.8 per cent in 1986. Consequently, the public sector resorted increasingly to external funds to cover its deficit. It increased its net external debt on average by more than US\$ 3 billion per annum over the 1973-1987 period (Table 1), so that total debt reached US\$ 103.5 billion in 1987 (Table 2). With falling oil prices in 1981 and the necessary cuts in public expenditures not being implemented, a record inflow of US\$ 19 billion, mainly short-term debt, was necessary to finance imports and reserves of the central bank (Kim, 1986, p. 3).

The external financing of current public expenditure is likely to have affected the economic performance effects of public debt inflows in the Mexican case. Debt inflows that were used to cover operating losses of inefficient public enterprises, for example, weakened the relationship between public debt inflows and Mexico's investment ratio. Particularly in 1976 and in 1981-83 public debt inflows were above the average (Table 1). However, the ratio of public investment to GDP was lower than in years with significantly lower public debt inflows (Table A5). Moreover, there is reason to suppose that even the share of public debt which was invested contributed only moderately to economic growth. In the 1975-81 period, almost 45 per cent of public debt inflows accrued to the state-owned oil company (PEMEX). PEMEX used the foreign funds for investments in fixed assets for oil exploration, exploitation and the like (Ortiz, Bueno, 1988)<sup>1</sup>. While the investments were profitable initially, asset expansion continued even when international interest rates rose and the probability of falling oil prices grew. PEMEX reached a critical situation in the years 1980/81, when sales and earnings became incompatible with the volumes of assets and debt having been accumulated. The overexpansion of PEMEX's capacity points to a significant misallocation of resources which affected economic growth prospects negatively.

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<sup>1</sup> In the late 1970s PEMEX did no longer invest most of the foreign funds, as the non-oil public sector used PEMEX increasingly as a conduit for external borrowing (Luke, 1988, p. 63).

Table 1 - The Structure of Capital Inflows into Mexico, 1970-87  
(Mill. US-Dollar)

	1970-72	1973-75	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
(1) Annual Change in Total Debt	802	4071	5814	3614	4079	5667	11985	28673	9683	8773	625	532	1058	3066
(2) - Public	401	3067	5165	3481	3352	3493	4055	19148	6769	6829	2819	2702	3271	6056
(3) - Private	401	1004	649	133	726	2175	7929	9525	2914	1944	-2194	-2170	-2213	-2990
(4) Direct Investment	304	582	628	556	829	1335	2184	2541	1644	456	391	502	895	1892
(1)/(4)	2.6	7.0	9.3	6.5	4.9	4.2	5.5	11.3	5.9	19.2	1.6	1.1	1.2	1.6
(3)/(4)	1.3	1.7	1.0	0.2	0.9	1.6	3.6	3.7	1.8	4.3	n.a.	n.a.	n.a.	n.a.

Source: Banco de México (1988b); IMF, Balance of Payments Statistics, various issues; Quijano, Antía (1985); p. 111; Secretaría de Hacienda (1988); own calculations.

Table 2 - Public and Private External Debt in Mexico, 1970-87

	1970-72	1973-75	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Total Debt (Mill. US\$)	6809	14896	25724	29338	33417	39084	51069	79742	89425	98198	98823	99355	100413	103479
Thereof:														
- Public	67.9	70.1	75.5	78.1	78.6	76.1	66.2	66.4	66.8	67.8	70.2	72.5	75.0	78.7
- Private	32.1	29.9	24.5	21.9	21.4	23.9	33.8	33.6	33.2	32.2	29.8	27.5	25.0	21.3
Thereof:														
- Banks	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	36.1	44.3	32.3	34.8	35.9	35.4	35.6	40.6
- Firms and Individuals	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	63.9	55.7	67.7	65.2	64.1	64.6	64.4	59.4

Source: See Table 1; own calculations.

Notwithstanding its inefficient use Mexico could satisfy its demand for public external debt due to the proximity to the United States and the oil boom. Under Lopez-Portillo, Mexico expanded its oil production enormously. The earnings from oil exports and the amount of oil reserves facilitated Mexico's access to credits from multinational banks, including credits from smaller American banks. The banks obviously did not evaluate the efficiency of the projects to be financed. Instead almost any public borrower was thought to be creditworthy and no obligations as how to use the credits were made.

According to some authors (Casar, Ros, 1988) public external debt and domestic disintermediation are a reflection of the "international recycling" of Mexican flight capital. Depending on estimation procedures Mexican assets in foreign countries, mainly the US, increased from US\$ 5 billion in 1975 to US\$ 42 - 70 billion in 1985 (Casar, Ros, 1988, p. 18). This flight money was then relent by international banks to the Mexican public sector.

### Private Debt

Until 1978 the inflows of private debt were rather low (Table 1)<sup>1</sup>. However, following the implementation of the Global Plan for Development in 1979, the private sector contracted some US\$ 20 billion of new foreign debt over the next three years, thereby tripling total private external debt outstanding. Since 1984 the private sector repayed each year foreign credits worth more than US\$ 2 billion annually. The repayment has been facilitated by the 1983 introduction of an exchange insurance program called FICORCA

<sup>1</sup> It seems that in the beginning of the seventies mainly foreign enterprises operating in Mexico had access to foreign credits: they accounted for 89 per cent of the net external debt inflow to private firms in 1970-1973 (Quijano, Antía, 1985, p. 114). While in 1974-75 both types of firms took advantage of the lower financing costs in the US (Table 3), in 1976 following the devaluation only multinational enterprises imported further credits.

(Fideicomiso para la Cobertura de Riesgos Cambiarios)<sup>1</sup>. Small firms repayed their credits directly. Large enterprises capitalized part of their foreign debt and, especially in 1987, swapped it for foreign equity participation<sup>2</sup>.

In the whole period under consideration (1970-87) the access of the private sector to foreign financing has never been regulated. This is also documented by the fact that private foreign debt had not even been registered systematically before 1982<sup>3</sup>. Rather than restricting the entry of private foreign debt, the government encouraged the inflow mainly via the crowding out of private enterprises in the domestic financial market and its interest and exchange rate policies.

The increasing absorption of domestic financial resources by the public sector implied that private firms had to finance their investments abroad. This explains why the private investment ratio hardly increased in the late 1970s, in spite of massive debt inflows: The inflow of foreign debt to the private sector increased by 2.5 percentage points of GDP from 1979 to 1980-81 while the private investment ratio augmented by less than one percentage point. To the larger part, foreign finance was substituted for domestic finance.

The scarcity of domestic funds did not induce private firms to refrain from investments, because foreign credits were artifici-

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<sup>1</sup> Private debt covered by FICORCA reached some US\$ 11.5 billion. Basically FICORCA requires that the debt had to be contracted prior to December 20th, 1982 and is long-term (or restructured into long-term). FICORCA then swaps the Dollar-obligation into a loan denominated in Pesos with the same maturity. However, in an inflationary economy overquick amortization of the real value of the credit may strain the participating firms. Therefore, the repayment schedule is constructed to keep the real value of the repayments constant (Zedillo, 1983).

<sup>2</sup> In 1986 Mexico tried to restructure the majority of its private debt including a relending obligation for the international banks over the next 20 years. The latter institutions reacted quickly by offering Mexican private debtors substantial discounts for early repayments. This led to substantial capital outflows (Banco de México, 1988a, pp. 49-50).

<sup>3</sup> The data has, therefore, to be interpreted with care.

ally cheapened. During the years 1970-75 Mexico maintained a fixed exchange rate and domestic lending rates were significantly higher than in the United States (Table 3). After the 1976 devaluation Mexico again sustained a relative stable exchange rate. Domestic interest rates were kept at relatively high levels to avoid further disintermediation, so that the interest rate differential again favoured the import of foreign debt. In addition, the Banco de México offered private debtors an exchange insurance program<sup>1</sup>. However, up to 1982 the private sector rarely used the exchange insurance program, as the central bank was perceived of being able to support the exchange rate endlessly. Hence, even as late as 1982 with the devaluation pending, only 10 per cent of total private debt was covered.

The effects of Mexican exchange and interest rate policies were twofold. They encouraged the private sector to borrow abroad but discouraged the efficient use of the borrowed funds. Real interest rates on loans in US-Dollar were negative for Mexican borrowers during most of the years in the 1972-1984 period (Table 3), so that the incentives to use the foreign credits for income generating activities were reduced. By assuming the exchange risk, the public sector released private debtors from making costly provisions for exchange rate changes and from investing in activities which generate foreign exchange.

The shift towards external debt finance was also facilitated by the concentration in the industrial sector. Foreign banks prefer to deal with one large "grupo" than with hundreds of small firms. In 1981 ten Mexican "grupos" accounted for 34.4 per cent of total private foreign debt outstanding. The largest one, ALFA, contracted 11 per cent of total private foreign debt (Quijano, Antía, 1985, p. 129)<sup>2</sup>. Efficiency, however, need not to be positively associated with economic size. Hence, the advantage of large firms in contracting foreign debt may not have led to an efficient allocation of foreign credits among Mexican private firms.

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<sup>1</sup> The program started with a back-to-back (credit-deposit) system and after a few months also swaps could be performed.

<sup>2</sup> Recently ALFA swapped debt worth 920 million US-dollar into a 45 per cent equity stake (BIC, 1987, p. 53).

Table 3 - Borrowing Costs for Mexican Firms in Mexico and the US, 1970-84

	Nominal Interest Mexico <sup>a</sup>	Rate in US <sup>b</sup>	Difference	Rate of In- flation <sup>c</sup> in Mexico
	(1)	(2)	(1) - (2)	
1970	14.3	7.4	4.4	4.7
1971	13.8	5.7	8.1	5.1
1972	12.9	5.3	7.6	5.5
1973	13.3	8.0	5.3	21.3
1974	14.4	10.8	3.6	20.7
1975	15.1	7.9	7.3	11.2
1976	14.9	70.5	-55.6	27.2
1977	17.1	21.7	-4.6	20.7
1978	18.2	9.0	9.2	16.2
1979	19.9	13.1	6.6	20.0
1980	28.1	17.6	10.5	29.8
1981	36.6	34.1	2.5	28.7
1982	46.0	322.5	-276.5	98.8
1983	63.0	74.2	-11.2	80.8
1984	54.7	49.9	4.8	59.2

<sup>a</sup>Lending rate for 1978-84; as no lending rates are available before 1978, the average difference between lending and deposit rates over the years 1978-80 has been added to the deposit rates for 1970-77. - <sup>b</sup>Prime rate corrected for the ex-post devaluation of the Peso against the US-Dollars. - <sup>c</sup>Annual change in the consumer price index.

Source: Banco de México, unpublished material; IMF (1987); own calculations.



#### IV. The Structure of External Financing and Economic Performance

From the preceding analysis of government policies towards capital inflows it can be concluded that the Mexican authorities strongly influenced the amount, the structure and the efficiency of capital inflows. The government's absorption of domestic savings induced private enterprises to refer to foreign capital markets. Public enterprises financed operating deficits externally. It is thus to be expected that the impact of debt inflows on overall investment and growth remained limited. With respect to fdi inflows the regulations tried to avoid a possible crowding out of Mexican investors. However, fdi policies discouraged an efficient use of foreign capital and were thus likely to have weakened the impact on economic growth. In the following hypotheses on the impact of capital inflows on economic performance in Mexico are subjected to an empirical test.

##### 1. Specification of Hypotheses

Using yearly observations for the 1967-86 period, the following equation was estimated:

$$(3) \quad X = a_0 + a_1 \text{ FDI} + a_2 \text{ AID} + a_3 \text{ DEBT}$$

The endogenous variables being explained in separate regressions were the investment ratio (I/GDP), the domestic savings ratio (DS/GDP), and real annual growth of GDP (GR). The set of explanatory variables included foreign direct investment flows into Mexico (FDI), aid, and total debt inflows. The exogenous variables were expressed as a percentage of GDP.

According to the theoretical framework outlined above, a non-cooperative equilibrium in the case of debt and a cooperative solution for fdi inflows require the following pattern of the estimated coefficients.

$$(4) \quad a_2 \leq a_3, \quad a_1$$

In addition, individual coefficients should satisfy the following constraints:

- (5) a)  $-1 \leq a_2 \leq 0$  when the endogenous variable is DS/GDP,  
 b)  $0 \leq a_2 \leq 1$  when the endogenous variable is I/GDP,  
 c)  $a_2 \geq 0$  when the endogenous variable is GR,  
 d)  $a_3 \geq 0$  when the endogenous variable is I/GDP or GR.

Multiple regression analysis was used to reveal whether these constraints have to be rejected. Alternatively, F-tests were employed to test the competing hypothesis that different types of capital inflows have no statistically different impact on the endogenous variables:

(6)  $a_1 = a_2 = a_3.$

The importance of discriminating among capital inflows was evaluated by making pair-wise comparisons:

- (7) a)  $a_1 = a_2$   
 b)  $a_1 = a_3$   
 c)  $a_2 = a_3$

Further tests were performed by differentiating between different types of debt inflows. First, it was hypothesized that the impact of debt inflows depends on the type of the capital recipient. Private agents were expected to use credits more productively than the government sector. Private debt (DEBT-Pr) should, therefore, have a larger impact on investment and growth than public debt (DEBT-Gv). At the same time a possible substitution effect between domestic savings and debt inflows would be relatively smaller in the case of private debt. The estimated equation was then:

$$(8) \quad X = b_0 + b_1 \text{ FDI} + b_2 \text{ AID} + b_3 \text{ DEBT-Gv} + b_4 \text{ DEBT-Pr.}$$

With respect to individual coefficients the following constraints were expected to hold:

$$(9) \quad b_2 \leq b_1, \quad b_3, \quad b_4; \quad \text{and} \quad b_3 \leq b_4.$$

The restriction (9) embodied both, the test of the two regimes ( $b_2 \leq b_1, b_2, b_3$ ) and the distinction of private versus public debt ( $b_3 \leq b_4$ ). The complete restriction as well as pair-wise comparisons of coefficients were tested by applying F-tests.

The influence of debt inflows could also depend on the type of lender, especially whether credits were provided by official sources (DEBT-Mu) or private lenders (DEBT-Ba). Typically, credits from official sources were concessionary. Lower than market interest rates reduced future repayment obligations. This could have weakened the incentive to use debt efficiently.

$$(10) \quad X = c_0 + c_1 \text{ FDI} + c_2 \text{ AID} + c_3 \text{ DEBT-Mu} + c_4 \text{ DEBT-Ba.}$$

The coefficients were expected to obey the following pattern:

$$(11) \quad c_2 \leq c_1, \quad c_3, \quad c_4 \quad \text{and} \quad c_3 \leq c_4.$$

## 2. The Data Base and Methodological Remarks

The main data sources are balance of payments statistics, national external debt statistics and the national accounts. A detailed description of variables and data sources is presented in Appendix 2. Most of the data cover the 1967-86 period. Hence, the recent changes in Mexican fdi regulations were only partly incorporated in the empirical analysis, since observations for 1987 and 1988 were not available. The disaggregation of debt according to the type of creditor does not exist in the case of non-guaranteed private debt, while in the case of public and publicly guaranteed debt it is only available for the years 1970-86.

All estimations were initially performed using the ordinary-least-squares technique. As the results were affected by the presence of first-order autocorrelation of the residuals, a maximum-likelihood procedure was applied to correct for autocorrelation.

Two-period-moving averages were used for the capital inflow variables. This is mainly because the impact of capital inflows on economic performance is unlikely to be fully realized in the year when inflows are reported. A lagged impact is most likely when economic growth is the dependent variable. Capital inflows which influence current investment are supposed to affect economic growth in the next period when output-increasing effects of investment materialize. Hence, capital inflows were lagged one period in the case of the growth equation.

### 3. Empirical Results

The values of the coefficients obtained from estimating equation (3) for the 1967-86 period are given in Table 4. Due to the insignificance of most of the capital inflow variables, the hypotheses concerning the relative size of the coefficients can neither be confirmed nor rejected. Similarly, the overall fit of the equations is relatively low. This can be attributed to multicollinearity and neglected explaining variables. Both factors require to reformulate the equation specification:

- A Pearson-correlation coefficient of 0.72 between FDI and DEBT indicates a relatively high multicollinearity. The undesirable consequence is that the variances of the estimated parameters of the collinear variables are relatively large. Statistically insignificant coefficients are thus to be expected. The collinearity among both variables is substantially reduced, if the estimation period is shortened to 1967-81<sup>1</sup>. This is a reasonable procedure, since from 1982 onwards the scarcity of foreign finance contrasts sharply with the situation in the preceding period.

<sup>1</sup> For the period 1967-81 period the Pearson-correlation coefficient is only 0.51.

Table 4 - Impact of Capital Inflows on Investment, Savings and Growth in Mexico, 1967-86

Endogenous variable	$a_0$	FDI $a_1$	AID $a_2$	DEBT $a_3$	$\bar{R}^2$	D.W.
I/GDP	0.20*** (0.02)	3.76 (2.85)	-59.03** (25.99)	0.02 (0.32)	0.62	1.66
$GR_{t+1}$	0.08 (0.06)	7.02 (6.71)	-96.94 (93.88)	-1.10* (0.53)	0.33	1.45
DS/GDP	0.16*** (0.02)	-5.09 (3.30)	27.39 (40.17)	0.21 (0.32)	0.19	1.88

Standard errors in parentheses. - \*Significant at the 10 per cent level. \*\*Significant at the 5 per cent level. \*\*\*Significant at the 1 per cent level.

Source: Banco de México (1988b); IMF, Balance of Payments Statistics, various issues; OECD, Geographical Distribution of Financial Flows to Developing Countries, various issues; Quijano, Antía (1985); Secretaría de Hacienda (1988); Secretaría de Programación y Presupuesto, Anuario Estadístico, various issues; own calculations.

- As concerns missing explanatory variables, the growing importance of oil exploration was particularly relevant for economic performance of Mexico during the estimation period. This factor may not be readily incorporated into the underlying model. Moreover, a comprehensive extension of the equation specification is not warranted due to the limited number of observations. Hence, a trend variable is included as a proxy to capture the effects of neglected variables.

The reestimation of (3) along the aforementioned lines yields the results shown in Table 5. The overall fit of all equations improves considerably though the economic growth equation has a lower explanatory power than the other two. The relative size of the coefficients follow the hypothesized pattern in all equations. The coefficients for FDI( $a_1$ ) and DEBT( $a_3$ ) are larger than the coefficient for AID inflows ( $a_2$ ).

Table 5 - Impact of Capital Inflows on Investment, Savings and Growth in Mexico, 1967-81

Endogenous variable	$a_0$	FDI $a_1$	AID $a_2$	DEBT $a_3$	TREND $a_4$	$\bar{R}^2$	D.W.
I/GDP	0.13*** (0.01)	8.69*** (1.38)	-68.15** (24.44)	-0.08 (0.14)	$0.33 \times 10^{-2}$ *** ( $0.61 \times 10^{-3}$ )	0.87	2.45
GR <sub>t+1</sub>	0.09*** (0.02)	-2.69 (2.23)	-7.12 (31.35)	-1.38*** (0.20)	$0.55 \times 10^{-2}$ *** ( $0.79 \times 10^{-3}$ )	0.73	2.69
DS/GDP	0.08*** (0.01)	4.77*** (1.11)	-6.45 (19.61)	-0.32*** (0.11)	$0.39 \times 10^{-2}$ *** ( $0.49 \times 10^{-3}$ )	0.86	2.50

Standard errors in parentheses. - \*\*Significant at the 5 per cent level. \*\*\*Significant at the 1 per cent level.

Source: See Table 4; own calculations.

The relatively lower fit of the growth equation is not surprising, since the underlying model predicts the effects on investment and domestic savings in the first place. The relationship with real economic growth relies on the assumption that growth is a function of lagged investment. In the case of Mexico, however, this relationship is less obvious. The Pearson-correlation coefficient between growth and the lagged investment ratio is -0.11 over the estimation period. This is a consequence of Mexican development policies. The protection from foreign competition and the regulative framework which reduced competitive pressures further allowed firms in Mexico to realize individually profitable investments, though they hardly contributed to the economic growth of the country.

These policies can also reconcile the differing effects of fdi on the investment ratio and the economic growth rate. The positive influence of fdi on overall investment indicates that government regulations successfully avoided a crowding-out of domestic investors. However, more foreign direct investment did not lead to higher economic growth, since the approval procedures for fdi and import substitution policies reduced the incentive for foreign investors to behave efficiently.

Government policies figure prominently in explaining the negative and statistically significant coefficient for debt inflows in the growth and savings equation as well. The former result conflicts with the model constraint 5d, which implies a positive coefficient for debt inflows in the first two equations<sup>1</sup>. The easy access to foreign credits in Mexico and their low costs impaired the incentives to accumulate domestic savings and to use the funds productively. External credits were raised to cover operating losses and to finance consumption expenditures. This is also documented by the fact that debt inflows had no positive impact on the investment ratio.

Comparisons of coefficient values within individual equations are of limited value, since in each equation the coefficient for at least one capital inflow variable remains insignificant. The alternative hypothesis according to which economic performance effects are the same for different types of capital inflows may be tested instead. The equations of Table 5 were reestimated including the restrictions (5) and (6). The results were then compared to the unrestricted estimates in Table 5 using a standard F-test procedure. Most notably, the hypothesis that all capital inflows have the same impact is rejected in all equations but the growth equation (Table 6). Equity between any pair of coefficients is also denied if I/GDP is the endogenous variable. In the savings equation, the hypothesis postulating equal coefficients between debt and fdi inflows is rejected.

In the next step total debt inflows are disaggregated into credits accruing to the private and to the public sector. The results in Table 7 show that the distinction did not improve the overall fit of the regressions significantly. With respect to size and statistical significance of the coefficients the main results of Table 5 still hold. The coefficients for both types of debt inflows are negative and statistically significant if the endoge-

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<sup>1</sup> Restriction 5b is also rejected, since the coefficient for the AID-variable is negative and statistically significant in the investment equation.

Table 6 - Constraints Tests

Endogeneous variable	$a_1 = a_2 = a_3$	$a_1 = a_2$	$a_1 = a_3$	$a_2 = a_3$
I/GDP	F(2,9) = 20.27*	F(1,9) = 9.65*	F(1,9) = 38.31*	F(1,9) = 7.79*
GR <sub>t+1</sub>	F(2,8) = 0.23	F(1,8) = 0.02	F(1,8) = 0.36	F(1,8) = 0.09
DS/GDP	F(2,9) = 10.22*	F(1,9) = 0.32	F(1,9) = 19.98*	F(1,9) = 0.10

Estimated Equation:  $X = a_0 + a_1 \text{ FDI} + a_2 \text{ AID} + a_3 \text{ DEBT} + a_4 \text{ TREND}$ . - A \* indicates that the restriction is rejected at the 5 per cent level of significance.

Source: See Table 4, own calculations.

Table 7 - The Debtor Structure and Economic Performance in Mexico, 1967-81

Endogenous variable	$b_0$	FDI $b_1$	AID $b_2$	DEBT-Gv $b_3$	DEBT-Pr $b_4$	TREND $b_5$	$\bar{R}^2$	D.W.
I/GDP	0.15*** (0.02)	6.24** (2.19)	-68.91** (23.20)	-0.18 (0.15)	0.33 (0.32)	$0.32 \times 10^{-2}$ *** ( $0.58 \times 10^{-3}$ )	0.89	2.69
GR	0.08*** (0.03)	-1.36 (3.07)	-5.37 (31.79)	-1.34*** (0.21)	-1.74** (0.56)	$0.55 \times 10^{-2}$ *** ( $0.80 \times 10^{-3}$ )	0.71	2.88
DS/GDP	0.06*** (0.01)	7.14*** (1.52)	-4.57 (16.20)	-0.24** 0.10	-0.72** 0.23	$0.40 \times 10^{-2}$ *** ( $0.39 \times 10^{-3}$ )	0.89	2.46

Standard errors in parentheses. - \*\*Significant at the 5 per cent level. \*\*\*Significant at the 1 per cent level.

Source: See Table 4; own calculations.



nous variable is GR or DS/GDP. The hypothesis of a more favourable impact of private debt inflows ( $b_4 \geq b_3$ ) has to be rejected. Most notably, private borrowers appear to have used foreign debt as a substitute for domestic savings to a larger extent than public borrowers<sup>1</sup>. According to the constraint tests presented in Table A6, however, the hypothesis of equal coefficients for private and public debt inflows is accepted for all three endogenous variables. Hence, the impact of both debt inflows on economic performance is not different in a statistically significant sense. As concerns debt inflows, the model assumption holds that the government agent determines the effects of both public and private debt.

The estimation period has to be modified when evaluating the different effects of debt provided by private and public creditors. Since data on the type of creditor is not available before 1970, a shortening of the period to 1970-1981 would not leave enough observations. Thus, the estimation period is extended to 1970-1986. This does not cause severe problems of multicollinearity, as the disaggregation of debt inflows reduces the collinearity with fdi inflows<sup>2</sup>. The results of estimating equations (10) are reported in Table 8.

The hypothesis that debt from private sources (DEBT-Ba) has a more favourable impact on economic performance than debt from official sources (DEBT-Mu) can neither be confirmed nor rejected. In each equation only one type of debt inflow is statistically significant. Alternatively, an F-test can be used to analyse whether the coefficients for both types of debt inflows are different in a statistically significant way. While the negative coefficient for debt inflows from private sources in the investment equation is unexpected, the F-test reveals that no statistically significant difference exists between both types of

<sup>1</sup> The insignificant estimates in the investment equation make a comparison not meaningful.

<sup>2</sup> Over the period 1970-86 the Pearson-correlation coefficients between FDI-inflows and debt from official and from private sources equal -0.07 and 0.41 respectively.

Table 8 - The Creditor Structure and Economic Performance in Mexico, 1970-86

Endogenous variable	$c_0$	FDI $c_1$	AID $c_2$	DEBT-Mu $c_3$	DEBT-Ba $c_4$	TREND $c_5$	$\bar{R}^2$	D.W.
I/GDP	0.15*** (0.01)	10.23*** (1.47)	-151.72*** (33.22)	0.50 (2.19)	-0.60** (0.19)	$0.40 \times 10^{-2}$ *** $(0.62 \times 10^{-3})$	0.86	2.17
$GR_{t+1}^a$	0.24*** (0.04)	-4.12 (4.06)	48.76 (96.20)	-39.38*** (10.29)	1.28 (0.73)	$-0.57 \times 10^{-2}$ *** $(0.17 \times 10^{-2})$	0.70	2.46
DS/GDP	0.12*** (0.02)	0.30 (1.48)	31.71 (32.66)	-12.21*** (2.70)	0.23 (0.22)	$0.35 \times 10^{-2}$ *** $(0.60 \times 10^{-3})$	0.77	2.48

Standard errors in parentheses. - \*\*Significant at the 5 per cent level. \*\*\*Significant at the 1 per cent level.

Source: See Table 4; own calculations.

debt inflows (Table A7). The negative influence of debt from official sources on economic growth and domestic savings is not surprising. The grant element included in these credits has obviously further reduced the incentives to use the resources productively. For the latter two equations the importance of distinguishing debt inflows from different sources is reflected in the constraint tests: Restricting both debt inflows to equal coefficients is rejected for the growth and savings equation. Finally, the hypothesis that all capital inflows have the same influence is rejected for all three endogenous variables.

## V. Summary and Conclusions

The empirical analysis of Mexico's economic performance in response to different capital inflows clearly points to the importance of distinguishing between debt and equity inflows. Fdi inflows had a positive impact on the savings and investment ratio. The investment response to debt inflows was weak, while even a negative and statistically significant relationship was found between domestic savings and debt inflows.

The analysis of the Mexican case also reveals some weaknesses of the underlying principal-agent model as presented in Chapter II. In particular, the assumption that different capital inflows are perfectly fungible does not seem to be warranted in the case of Mexico. Government regulations discriminated between debt and equity inflows. While debt inflows were completely unregulated until 1982, regulations restricted the total inflow of fdi and its allocation within the Mexican economy. Specifically, fdi was not permitted in the growing oil industry so that its growth had to be financed by external debt. Government policies induced foreign principals to engage in different transfer regimes for debt and equity inflows.

The regulative framework is also important in explaining the impact of debt and equity inflows on investment and growth. Fdi regulations and general development policies avoided a crowding-out of domestic investors by foreign firms, but limited competition in Mexico and thus did not lead to efficient investments. The impact of fdi on economic growth remained insignificant. The easy access to foreign funds induced public and private borrowers to spend the funds for inefficient investments, capital flight and consumption. The socialization of exchange rate risks, artificially low interest rates for Dollar-credits and the renewed access to foreign credits supported inefficient uses.

Several conclusions emerge from these findings for future Mexican policies. Since the amount of fdi inflows responds positively to a more liberal regulative environment, the recently begun deregulation should be continued. The impact of these policy changes on economic performance in Mexico has not been captured by the empirical analysis. It can, however, be supposed that a larger volume of fdi will contribute to economic growth in Mexico only if other policies are revised as well. In particular, competition should be allowed between foreign and domestic firms in order to reduce inefficiencies. Moreover, the recent reduction in the level of import protection should be continued and intensified<sup>1</sup>. The pressure exerted by foreign competitors forces multinational as well as domestic firms operating in Mexico to rationalize production in order to restore or strengthen international competitiveness.

While at present no voluntary bank lending is available for Mexico, the results stress the importance of changes in the Mexican exchange rate policy. A floating rate regime seems best suited to avoid an overvaluation of the Peso and artificially low costs of foreign credits. Exchange risk insurances should not be costless. Particularly external borrowing of the public sector should be evaluated more closely ex ante. Economic reforms encouraging a more efficient use of external debt are most important in order to overcome the disincentive effects inherent in non-cooperative situations. The institutional framework of international capital transfers is not conducive to a credible precommitment of agents to a certain investment behaviour (Nunnenkamp, 1988; Stüven, 1988). It depends on the principals' expectations on the future economic course of the agent whether or not they set cooperative terms for capital transfers. Mexico can influence these expectations by economic reforms which make a productive and less risky use of foreign debt more likely. Again import liberalization and increasing competitive pressures figure prominently. Furthermore,

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<sup>1</sup> In 1987 the maximum tariff rate was reduced to 20 per cent, import licenses were no longer required for many items, and official minimum prices for imports were abolished (IMF, 1988).

a reduction in public deficits is required by cutting public consumption and inefficient investment projects.

Finally, the empirical analysis suggests that the effects of the institutional framework on the relationship between economic performance and capital inflows should be incorporated in the principal-agent model. This may be achieved by accounting for the existence of different agents within the capital recipient country and their relations with each other. The predictive power of the model could be improved, since the incentive structure as how to use foreign funds differs between the government, private debtors and private investors.

Appendix 1

## Impact of Government Policies on Fdi inflows

The discussion of policies towards fdi in Mexico indicated that government-imposed restrictions influenced fdi inflows into Mexico. Host country incentives and disincentives are not the only determinants of fdi flows<sup>1</sup>. Especially market size, business risk and expected profitability influence the locational decision of multinational enterprises as well. Nevertheless, a recent survey among US-based multinationals engaged in Latin American revealed that "the rules of the game" were an important determinant in their investment decision<sup>2</sup>. Specifically, an improvement in the regulative environment was said to have a strong influence on future investment decisions.

A simple model was constructed in order to test the hypothesis that changes in the fdi legislation and its application influenced inflows of fdi. As concerns the supply of fdi, it was assumed that multinational enterprises based their investment decision mainly on expected profits. Expected profitability of investing in Mexico was proxied by the real growth of gross domestic product ( $GR_{t-1}$ ) of the preceding period. Hence, adaptive expectations were assumed. Lagging GR avoided problems of simultaneity, since the current economic growth could be influenced by current fdi inflows<sup>3</sup>. Demand factors were represented by Mexico's attitude towards fdi. More liberal regulations were assumed to indicate Mexico's desire to attract additional fdi inflows. Changes in the regulative environment were measured by an index (REG). Increasing values of REG were assigned to fdi liberalization such as a more flexible handling of fdi applications and the introduction of debt-equity swaps (see Table A2). Finally, it had

<sup>1</sup> On the relevance of home and host country incentives see also Agarwal (1986).

<sup>2</sup> See the 1986 survey of the Council of the Americas quoted in Dahlmann (1987).

<sup>3</sup> See Section IV.1 of this paper.

to be considered that investments are usually long-term commitments which may require continuous fdi inflows in consecutive periods. According to this rationale lagged fdi inflows were expected to explain current fdi inflows. The estimated equation was then:

$$(12) \quad FDI_t = a_0 + a_1 GR_{t-1} + a_2 REG + a_3 FDI_{t-1}.$$

Equation (12) was estimated with annual observations for the 1973-87 period using the ordinary-least-squares technique. Since the regression included the lagged dependent variable, the Durbin-Watson d-test for autocorrelation was inappropriate. Instead Durbin's h-test was calculated. The critical value at the 5 per cent level is 1.96. The results are given in Table A1.

Table A1 - Impact of Government Regulations on Fdi Inflows into Mexico, 1973-87<sup>a</sup>

Endogeneous variable	$a_0$	$GR_{t-1}$ $a_1$	REG $a_2$	$FDI_{t-1}$ $a_3$	$\bar{R}^2$	Durbin's h
$FDI_t$	-482.2 (476.8)	72.4* (39.6)	321.7* (161.7)	0.53** (0.21)	0.50	1.74

<sup>a</sup>Standard errors in parentheses. \*Significant at the 10 per cent level. \*\*Significant at the 5 per cent level.

Source: Banco de México (1988a). IMF, Balance of Payments Statistics, various issues; Secretaría de Programación y Presupuesto, Anuario Estadístico, various issues; own calculations.

The overall fit of the equation is reasonable; the hypothesis that there is no positive first-order autocorrelation cannot be rejected at the 5 per cent level. The empirical results confirm the expected relationships. An increase in the overall real growth rate affects the inflow of fdi positively. Similarly, foreign direct investments are obviously long-term commitments so that the fdi inflows of the preceding period trigger a certain

volume of current fdi inflows. An improvement in the regulative environment increases the inflow of fdi. Although the construction of the regulation index involves arbitrary judgements, it seems safe to conclude that a further liberalization of the fdi legislation in Mexico would attract new investments.

Table A2 - Regulation of Foreign Direct Investment in Mexico, 1973-87

Year	Regulation-Index	Change in Regulation
1973	1.0	Promulgation of LIE (Law to Promote Mexican and Regulate Foreign Investment)
1974	1.0	
1975	1.0	
1976	1.0	
1977	1.0	
1978	2.0	Reorganisation and simplification of approval procedure; more flexible application of LIE thereafter
1979	2.0	
1980	2.0	
1981	2.0	
1982	2.5	Debt capitalization allowed
1983	2.5	
1984	3.0	Majority investments in priority sectors possible
1985	3.0	
1986	4.0	Official debt-equity swaps introduced in June
1987	4.5	Debt-equity swaps intensified

Source: Own compilation.



Appendix 2

## Definition of Variables

The Balance of Payments Statistics published by the International Monetary Fund were the source for inflows of foreign direct investment:

FDI: FDI inflows consist of foreign direct investments in Mexico. The fdi data do not include credits, which multinational enterprises extend to their subsidiaries. These credits are included in debt inflows.

Three sources were used to derive a series of public and publicly guaranteed and non-guaranteed private debt inflows: Banco de México (1988c); Quijano, Antía (1985); Secretaría de Hacienda y Crédito Público (1988):

DEBT-Pr: Annual change in private, non-guaranteed debt outstanding.

DEBT-Gv: Annual change in public and publicly guaranteed debt outstanding.

DEBT: Sum of DEBT-Pr and DEBT-Gv.

Public sector debt inflows according to the type of creditor are taken from the World Debt Tables published by the World Bank:

DEBT-Mu: Consists of net flows of public and publicly guaranteed debt from official sources such as multilateral and bilateral agencies, the International Bank for Reconstruction and Development and IDA.

DEBT-Ba: Net debt inflows from private sources include public and publicly guaranteed credits from suppliers and financial markets and private, non-guaranteed debt (DEBT-Pr).

The Geographical Distribution of Financial Flows to Developing Countries issued by the OECD was used for the aid variable:

AID: Consists of grants only.

In the estimations all exogenous variables are expressed as a share of gross domestic product.

The values for the endogenous variables come from two sources. For the period 1967-69 the data were taken from Banco de México, Producto Interno Bruto y Gasto. Thereafter the information is

derived from Secretaría de Programación y Presupuesto de Divisas,  
Anuario Estadístico:

GDP: Gross domestic product at current market prices.

I: Gross fixed capital formation.

DS: Domestic savings.

GR: Annual growth rate of real GDP.

Table A3 - Value Added, Debt and Exports in Selected Manufacturing Industries (in per cent of total)

ISIC	Industry	Value Added <sup>a</sup> ø1979-83	Exports (1980)	ISIC	Debt <sup>b</sup> (1980)	
					Private	Public
Highly Labour Intensive						
322	Clothing	2.9	0.4	320	1.4	0.04
323	Leather Prods., Ex Footwear	0.9	0.2			
324	Footwear	1.9	0.1			
332	Furniture	1.7	2.1	330	0.3	0.0
390	Other Manufactures	1.8	1.7	390	0.6	1.4
Highly Capital Intensive						
311/ 312	Food Manufacturing	16.1	9.0	310	8.1	28.3
351	Industrial Chemicals	5.7	1.8	350	28.6	43.1
369	Nonmetal Mineral Prods.	3.4	0.6	360	7.2	0.1
371	Basic Iron Steel Inds.	4.8	2.1	370	15.4	18.4
372	Nonferrous Metal Inds.	1.2	8.0			
Low Human-Capital Intensive						
322	Clothing	2.9	0.4	320	1.4	0.04
323	Leather Prods., Ex Footwear	0.9	0.2			
324	Footwear	1.9	0.1			
390	Other Manufactures	1.8	1.7	390	0.6	1.4
Highly Human-Capital Intensive						
313	Beverage Industries	6.5	0.9	310	8.1	28.3
351	Industrial Chemicals	5.7	1.8	350	28.6	43.1
352	Other Chemicals	5.5	1.5			
371	Basic Iron, Steel Prods.	4.8	2.1	370	15.4	18.4
372	Nonferrous Metal Inds.	1.2	8.0			
384	Transport Equip.	6.5	0.8	380	32.0	7.3

<sup>a</sup>In per cent of total value added in manufacturing.

<sup>b</sup>In per cent of total foreign private (public) debt in the manufacturing sectors.

Source: Banco de México (1988b); UNCTAD (1987); United Nations (1983); World Bank (1988); own calculations.

Table A4 - Redemption Discounts for Debt-equity Swaps in Mexico

Category	Purpose of Investment	Discount of face value (in per cent)
0	Buying state owned companies	0
1	Companies whose production derived from the new investment will be exported to at least 80 per cent; purchase of 100 per cent foreign owned local firms; small and medium businesses	5
2	New businesses and expansion of existing ones with new technology; operations in priority sectors generating foreign exchange and/or employment; new production of which at least 50 per cent is exported; investing in majority foreign-controlled local companies	8
3	Operations of which at least 30 per cent is destined for export; introduction of state of the art technology; purchase of local firms with foreign minority ownership	12
4	20 per cent of production is exported; purchase of firms with balance-of-payments problems; intermediate technology	13
5	Reduction of liabilities with national suppliers; improving a negative balance-of-payments situation	14
6	Generate no foreign exchange; partial prepayment of FICORCA or national credit institution obligation in Pesos	15
7	Full prepayment of FICORCA <sup>a</sup> or national credit institution obligation	16
8	No special benefit to Mexican economy	25

<sup>a</sup>Exchange insurance program (Fideicomiso para la Cobertura de Riesgos Cambiarios).

Source: BIC (1987), pp. 56-57.

Table A5 - Absorption of Domestic Financial Resources by the Government and the Private Sector, 1970-86 (per cent)

	Absorption of Financial Resources by			Current deficit of the Federal Government (in per cent of GDP)	Public investment (in per cent of GDP)	
	Private Sector (Including paraestatal firms)	Sector (Excluding paraestatal firms)	"Paraestatales" Government			
1970	75.8	n.a.	n.a.	24.2	1.0	6.6
1971	76.4	n.a.	n.a.	23.6	0.0	4.6
1972	66.9	n.a.	n.a.	33.1	1.8	6.1
1973	63.5	n.a.	n.a.	36.5	2.0	7.5
1974	60.9	n.a.	n.a.	39.1	2.0	7.6
1975	60.0	n.a.	n.a.	40.0	2.8	9.0
1976	57.5	n.a.	n.a.	42.5	3.4	8.2
1977	57.6	n.a.	n.a.	42.4 <sup>b</sup>	2.0	7.8
1978	60.2	41.3	21.3	37.3 <sup>b</sup>	1.7	9.5
1979	62.6 <sup>a</sup>	42.5	20.1	37.4	2.1	10.2
1980	64.7	46.2	18.5	35.2	1.5	10.9
1981	60.5	43.8	16.7	39.6	5.3	11.7
1982	47.3	26.7	20.6	52.7	10.9	10.3
1983	47.6	27.3	20.3	52.4	7.7	7.6
1984	53.6	32.9	20.7	46.4	6.5	7.1
1985	47.6	29.9	17.7	52.3	7.2	7.0
1986	42.6	25.5	17.1	57.4	n.a.	6.1

<sup>a</sup>Break in the available time series. - <sup>b</sup>Since 1978 the resources lent in rediscounting operations are added to the amounts of direct credit granted by the banks.

Source: Banco de México, Informal Anual, various issues; Secretaría de Programación y Presupuesto de Divisas, Anuario Estadístico, various issues.

Table A6 - Constraint Tests: Government versus Private Debtors

Endogenous variable	$b_1 = b_2 = b_3 = b_4$	$b_1 = b_2$	$b_1 = b_3$	$b_1 = b_4$	$b_2 = b_3$	$b_2 = b_4$	$b_3 = b_4$
I/GDP	F(3,8)= 15.72*	F(1,8)= 10.24*	F(1,8)= 8.84*	F(3,8)= 5.82*	F(1,8)= 8.82*	F(1,8)= 8.94*	F(1,8)= 1.94
GR <sub>t+1</sub>	F(3,7)= 0.31	F(1,7)= 0.02	F(1,7)= 0.56x10 <sup>-4</sup>	F(1,7)= 0.01	F(1,7)= 0.02	F(1,7)= 0.01	F(1,7)= 0.47
DS/GDP	F(3,8)= 11.87*	F(1,8)= 0.51	F(1,8)= 24.21*	F(1,8)= 21.21*	F(1,8)= 0.07	F(1,8)= 0.06	F(1,8)= 3.68

Estimated equation:  $X = b_0 + b_1 \text{ FDI} + b_2 \text{ AID} + b_3 \text{ DEBT-Gv} + b_4 \text{ DEBT-Pr} + b_5 \text{ TREND}$ . - A \* indicates that the restriction is rejected at the 5 per cent level of significance.

Source: See Table 4; own calculations.

Table A7 - Constraint Tests: Official versus Private Creditors

Endogenous variable	$c_1 = c_2 = c_3 = c_4$	$c_1 = c_2$	$c_1 = c_3$	$c_1 = c_4$	$c_2 = c_3$	$c_2 = c_4$	$c_3 = c_4$
I/GDP	F(3,10)= 19.18*	F(1,10)= 23.35*	F(1,10)= 12.87*	F(3,8)= 45.21*	F(1,10)= 19.57*	F(1,10)= 20.88*	F(1,10)= 0.24
GR <sub>t+1</sub>	F(3,9)= 6.70*	F(1,9)= 0.29	F(1,9)= 13.04*	F(1,9)= 1.37	F(1,9)= 0.37	F(1,9)= 0.25	F(1,9)= 14.04*
DS/GDP	F(3,9)= 7.47*	F(1,9)= 0.91	F(1,9)= 19.78*	F(1,9)= 0.18x10 <sup>-2</sup>	F(1,9)= 1.68	F(1,9)= 0.94	F(1,9)= 19.29*

Estimated equation:  $X = c_0 + c_1 \text{ FDI} + c_2 \text{ AID} + c_3 \text{ DEBT-Mu} + c_4 \text{ DEBT-Ba} + c_5 \text{ TREND}$ . - A \* indicates that the restriction is rejected at the 5 per cent level of significance.

Source: See Table 4; own calculations.

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