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INNOVATION AND FOREIGN TECHNOLOGY IN MEXICO´S INDUSTRIAL DEVELOPMENT

Introduction

Recent studies on the economics of technological change at OECD countries are increasingly applying systems analysis. One particular area where systems tools have become main-stream applications is the analysis of innovation, competitiveness and long term industrial performance.

The analysis of National Innovation Systems (NIS) puts forward the increasing role of knowledge inputs in the competitive development of modern industrial societies. The definition of the system involves two major steps: first, the identification of the key actors that compose the system of innovation (institutions, firms, individuals); and second, their modes of interaction in the use and creation of knowledge leading to the integration of the system, including measures of relative economic and innovative performance.

Our challenge in this paper is to apply the NIS approach to the understanding of recent performance of the Mexican industry, giving particular attention to the influence of foreign technology in shaping industrial performance. One more specific task is to document the importance of foreign technology to the dynamics of the innovation system in Mexico. Foreign direct investment (foreign firms) are probably the most important and direct channel for industrial foreign technology, though other important sources contributing to the innovation system include the transfer of technology and technology incorporated into imports of capital goods, intermediate inputs and components.

The complexity of the task derives from the need to adjust the basic NIS scheme devised for other OECD countries, as to capture the dynamics of interacting among the actors of the Mexican NIS. The adjustment relies largely on the application of the "cluster approach" to distinguish innovating firms and industries; and also to distinguish foreign firms from other firms, given the predominant role of foreign firms and foreign technology in Mexican industry.

The paper deals with the innovation system and technology flows in Mexican industry. The first part begins with a conceptual introduction to the NIS as the relation between institutions, competences and performance in the context of industrial clusters. The second part introduces and contextualizes the particular NIS and technology flows in Mexican industry. This involves defining the main Mexican industrial and technology clusters, the importance of foreign firms and foreign technology. A third section treats in more detail the measure of competences in the Mexican NIS, estimating knowledge flows, the extent of collaborations and the resulting diffusion of technological capabilities. The final section estimates the results of recent performance, both economically and technologically. A few conclusions are added at the end.

The NIS and Technology Flows in Mexican Industry

a) NIS and technology flows: a conceptual introduction

Systemic approaches are giving new insights into innovative and economic performance in the OECD countries. Now the interactions among the actors involved in technology development are seen as important as investments in R&D. And they are increasingly acknowledged as the key to translating the inputs into outputs. The study of NIS directs attention to the linkages or web of interaction within the overall innovation system (OECD 1997, p.3).

The concept of NIS rests on the premise that understanding the linkages among the actors involved in innovation is key to improving technology performance (OECD 1997, p.9). Even if there is no single accepted definition of the NIS, what is important is that all writers on the subject have conferred a crucial role to the web of interactions or the system[1].

One point of departure to devise the macro Mexican NIS is through the mapping of the three sets of informations resulting from the observation of the web of interactions: institutions - competences - performances (Cimoli 1997, p.7), where competences are the crucial and most difficult inputs to estimate. Competences derive from the interactions put into exercise among the institutions and actors in the system, and competences also define the limits of given performances, both technological and economic performances. Competences may be frequently expressed in the flows of knowledge between domestic institutions and actors. And these measures are more likely of relevance when applied to specific clusters of dense interrelationships.

If attention is focused within the industrial sectors, the dynamics of interactions giving raise to competences can be approached by applying "cluster" analysis to the taxonomy of innovating sectors (Pavitt 1984). The "cluster approach" will be used to analyze knowledge flows in recognition of the close interaction expected to occur between certain types of firms and industries[2]. In this chapter we use it to

[1] The definitions by Freeman, Lundvall, Nelson and Metcalffe, all reproduced in OECD 1997, p.10, include repeatedly the notions of network of institutions, interactions, development and diffusion of new technologies.

[2] The cluster approach is here extended to knowledge flows, while keeping the basic elements of Porter's diamond (1990). The essence of Porter's analysis is that nations (or subsystems) succeed in clusters of industries connected through vertical and horizontal relationships. Perhaps the Dutch proposal to apply the cluster concept as a "reduced scale model" offers a more practical insight into the crucial flows of knowledge and institutions. In their definition, "a cluster can be characterised as a network of firms and knowledge producing agents, linked to each other in a value added production chain. The firms and knowledge institutions are economically and technologically interdependent and share and diffuse technology and other forms of knowledge" (Theo J. A. Roelandt, et.al., p.1)

under control of national firms (including Conglomerates and minority foreign participations).

Secondly, for each of these groups of industries we may further relate foreign technology to their predominant market orientation, i.e. distinguishing for each cluster firms and industries oriented to exports and firms and industries participating mainly in the domestic market. As an illustration, we anticipate some export oriented (maquiladora type) foreign firms in the science based industry of computers and in the scale intensive autoparts industry, firms that due to their market orientation will appear even more detached from domestic interactions than other firms in their respective sectors.

Thirdly, we adopt Pavitt`s taxonomy to relate industries to each other. The industrial system is the web of interactions between the four types of innovating industries: science based, specialized suppliers, scale intensive and natural resource /traditional sectors, as in Figure A adapted from Guerrieri (1993). We added to his original network the distinction between foreign firms and national firms and the market orientation of certain key industries.The interaction of the four types of industries in Mexico is less complete than what the hypothetical original Figure suggested, a result strongly influenced by the practices of foreign firms. The most important change to portray the interaction of Mexican industries is the very limited action of domestic specialized suppliers and science based industries. Most equipment and instruments in Mexico are imported, a behaviour influenced by foreign firms and also followed by national firms.

b.2. The importance of foreign firms and foreign technology for the NIS

In this section we first show the evolution of foreign investment and then the role of foreign technology. The analysis of foreign investment will document four main trends: the raise of investment in the stock market (cartera) in contrast to moderate increases in direct investment (FDI), the declining importance of manufacturing vis-a-vis services (finance, trading, real estate) in FDI, the concentration of FDI in certain manufacture sectors, and the influence of some very large projects in the FDI figures for each year. Two of these new trends are of particular relevance for their impact on the Mexican innovation system: sectors others than manufacturing, particularly in services, attract an important share of new FDI; and within manufacturing, large foreign firms (as much as some very large national firms) reduce the extent of industrial processing and increase imported content in order to improve their international competitiveness for exports and for sales at home. Along these new trends, foreign technology remains the main source of technology, as will be shown below.

Foreign investment has been growing very significantly during this decade, from US$5.0 Million in 1990 to US$15.6 in 1993. And though it collapsed during most of

distinguish both groups of firms (by contrasting foreign and national firms) and industries (the four types of innovating sectors according to Pavitt).

The interactions defining specific clusters may evolve around key technologies, shared knowledge or skills, or producer- supplier relationships (OECD 1997, p.34). Accordingly, patterns of knowledge flows can differ markedly from cluster to cluster, and knowledge flows may also differ while they follow the industrialization pattern evolving through the emergence of new industries with different characteristics[3]. Some of this we aim to illustrate for Mexico.

b) NIS and flows in Mexican industry

b.1 Definition of the Mexican industrial and technology clusters

Our particular application of cluster analysis to the development of Mexican industry involves three steps or adaptations. First, we focus separately to foreign firms (as a separate cluster) and their use of foreign technology as to estimate their influence in the development (or constraints to the development) of Mexican competences and performances. We assume that in order to analize entry flows of foreign knowledge is convenient to follow the Dutch proposal to treat clusters as a Reduced Scale NIS model. According to the OECD TEP-Report (1992) the NIS concept gains substance at the industry level or intermediate levels of the production structure. Thus the attention will fall in the foreign and national groups of firms and industries separately. For one thing, different economic activities ask for different forms of knowledge transfer mechanisms and information exchange. In sum, we will distinguish the two main carriers of foreign technology into Mexico: 1) the cluster of foreign firms or group of sectors[4] dominated by foreign firms (subsidiaries and Joint Ventures), and 2) the cluster of firms or group of industries

[3] Cimoli and Della Giusta (1997, p.23) argue that industrialization, in general, evolves in three stages following the emergence of sectors as in Pavitt's taxonomy. Here we will show that for the Mexican case foreign technology has impeded the completion of the second stage. For these authors, the second stage occurs after the first easy import substituting phase where technology is mostly confined to acquire equipment and their adaptation. The second stage sees the emergence of scale intensive industries spreading new technological efforts and technological synergies which eventually lead to the development of formal R&D activities. This kind of innovation activities have not taken place at a significant degree in Mexico, since foreign technology remains the main source of technology.

[4] We have to be precise with respect to the concept of cluster. Here we are using it rather loosely as a synonimous to distinguish the set or group of foreign firms (essentially MNEs) and the set or group of national firms, each as important industrial actors that may act and perform differently. It is argueable that these two sets of firms show more similarities than differences, and thus will not resist a neat definition of cluster as "the set of innovative efforts (and technological activities) from which it is possible to identify a vector of economic performance and predict the interplay between them" (Cimoli, 1997, p.12). If similarities prevail it still may be due to the influence of one group (ie. the leading MNEs) over the structure of each industry, conditioning the behaviour of the other; thus, for our concern with technology policy it remains important to treat the two clusters separately.

1994 and 1995, the ratio of foreign investment to GDP increased from less than 1% during the early 1980s to around 4% in the 1990s (Table 1). The largest share of this increase is investment in the stock market, whereas direct investment (FDI) has reported also some good, even if more moderate, increases (Table 2).

Probably more important for our concern with innovation is to note the declining importance of manufacturing in FDI. Since 1988 FDI in services becomes more important than in manufactures, which involved the expansion of foreign corporations in banking and finance, retail and wholesale trading, hotel chains, commercial centers and other major real estate investments (Table 3 and 4). The same trend is projected to remain till the year 2000 (Table 5), even if the reliability of this kind of forecasting may be questioned after the sharp decline of FDI since the end of 1994.

More than half of total FDI is still of US origin, though the proportion in the stock of FDI has declined from 69% in 1980 to 61.2% in 1995 (Tables 6 and 7). We have been able to follow in some detail US FDI in Mexico thanks to the US Department of Commerce statistics produced in the Survey of Current Business: the same trend as above shows in the decline of US FDI in manufactures which represented 75.5% of total US FDI in 1990 and declined to 63.1% in 1995, along the raise of US FDI in wholesale trade, finance and other industries (Table 8). And within manufactures, the same Table shows there is also a change in the composition of US FDI in favour of the food industry (in general less inclined to export) and decreasing substantially in chemicals and transport equipment (so far undisputed leaders of the export surge). This change in the composition of US FDI (and more likely of other FDI as suggested in the trend for total FDI) may help to anticipate larger increases in imports than in exports associated to FDI, an issue to be extended below[5].

The distinctive role that we have assumed for foreign firms in this study was based on three premises put into test on industrial dynamism, their access to advanced technology sources and their contribution to technological capabilities. Only the first two premises are comfortably supported by our findings: a) foreign firms are the most dynamic agents in the response of Mexican industry to the international competitive pressures of the last decade; b) foreign firms privilege foreign sources of advanced technology, but at the same time deprieve the national industrial and innovation systems of the full benefits of domestic interactions[6]; and c) contrarily to

[5] The evidence was quite clear during the 1990s: trade between US and Mexico of US companies was growing faster the imports side than the exports side (Table 9).

[6] Porter's diamond is useful in this respect to represent the importance of industrial interactions domestically in the development of related industries. In a broader sense, MNEs industrial and trade strategies provoke additional beneficial spillover effects of the technology policies in their home countries (say the US), but also limit the outcome of technology policies of other countries (as expected for Mexico) (Cimoli and Della Giusta 1997, p.32)

our expected premise, foreign firms do not contribute more than national firms to the acquisition and local development of advanced technology and technological capabilities. Given the leading position of most foreign firms, national firms in the same industries tend to imitate them.

To prove that foreign firms are most dynamic in adjusting to recent competitive pressures there is substantial evidence in three respects related to production growth, exports and domestic integration. Let us extend each separately.

a) Foreign firms increase their participation in manufactures output to 28.5% in 1993. They now account for a majority of the scarce science base and specialized suppliers production: in precise numbers, 64.2% of science based industrial output and 43.2% of the specialized suppliers output (Table 10). But in the other more traditional type of industries their participation remained moderate.

b) Exports growth is observed in the same sectors where FF have larger presence. All industries experience high rates of export growth; but again science based and specialized suppliers where maquila and temporary exports are most important show the highest annual rates: 170.0% and 96.3% during 1988-93 (Table 11).

c) On the basis of recent surveys, foreign firms achieve better export performance (larger export ratios) but also reduce domestic content on a larger scale than domestic firms. The net result on the balance of trade is much less than what the export ratios indicate, but more important is to consider the implications of increased imports for the innovation system. These results deserve to be extended.

Foreign firms have adopted larger imports content in order to attain international competitiveness, a move seen for both export oriented and domestic market oriented foreign firms[7] (Table 12). There we can observe that in 1991 export ratios of foreign and national firms exporters are similar and very high (at more than 70% weighted averages for both) a result that partly contradicts our first premise above. But what is most important is that the difference in import ratios of these two groups of firms is indeed considerable: 70% the FF and 19.1% the NF[8]. This difference may have to do with the relative industrial specialization of each type of firm, but is clear that national firms are exporting closer to the logic of natural domestic advantages, whereas foreign firms exports pertain to an international industrial strategy of lesser contribution to Mexico both in foreign exchange and in the

[7] Export and import ratios are significantly correlated for foreign firms (0.67 coefficient in Table 12). On a more general estimate, Table 11 also shows that imports growth follows very closely the exports growth in the four types of industry.

[8] If maquiladoras are separated from other exporters the results for 1991 remain essentially the same for non-maquiladora exporters: 58.3% the average import ratio for foreign firms and 13.0% for national firms (Table 13). A finest comparison for these two groups of FF and NF exporters is based on applying Pavitt's categories to the firms, as in Table 14: import ratios of FF are substantially and significantly larger in all four types of industries.

interactions with material suppliers[9]. The trend to use larger proportions of imported materials has also become a general practice of importance: an increase close to 4 percentage points from 1989 to 1991, as observed for all firms in Table 16.

It is also reasonable to expect from foreign firms to privilege foreign sources of technology, even if in this practice they deprieve the Mexican innovation system of the externalities in learning and other benefits from interactions between local industries and producers of technology. The evidence collected by Conacyt (Conacyt 1997, "Indicadores .. 1996", p.52-4) shows a disproportionately large reliance on foreign technology acquisitions over national sources of technology[10], a practice common to both, FF and NF. Table 17 shows that the external deficit of the technology balance of payments of FF amounted to US$16.7 million dollars in 1993, while the NF deficit was US$7.0 million dollars. The contribution of technology operations within the country (i.e. FF and NF contracting with local technology suppliers) shown in the same Table only amounts to US$1.9 for each group of firms. Domestic technology operations (the sum of both income and expenditures) are only 18.8% of total technology transactions (Table 18), while foreign technology spending represented 95.3% of total spending in the firms surveyed. These results are highly associated to operations of subsidiaries of MNEs, including a few Mexican firms and their foreign affiliates (Conacyt 1997, p.53).

The importance of foreign technology for the innovation system of Mexican industry is still founded in the leading role played by foreign firms and imports of technology ever since the beginning of Mexican industrial development. For the most recent industrial phase related to freer trade and deregulation, foreign technology and foreign investment were again expected to be the main industrial carriers. However, the results shown up to this point in respect of the industrial and trade performance of foreign firms do not indicate that they should be given high priority if we are concerned with innovation objectives.

Another piece of evidence points in the same direction. Estimates for the period 1988-93 show that FF did not invest in fixed assets at the same pace as did the NF: the participation of FF in total fixed assets decreased from 29% to 24% in 1993. Taking the two effects together, that is increased imports content and lesser fixed investment, it is feasible to suggest that FF have contributed to Mexican industrial competitiveness adjusting domestic operations to minor integration and

[9] The international restructuring of FF involves close balancing of trade flows, even when this is NOT necessarily occurring at present in the form of intrafirm trade. Last US estimates of intrafirm trade show that it only accounts for 26.3% of US trade with Mexico in 1992 (Table 15).

[10] The coverage ratio of Mexico's technological balance of payments in comparison to other OECD countries is most revealing: Mexico has one of the lowest ratios around 20%, i.e. expenditures on royalties are five times larger than incomes (Conacyt 1997, p.161).

lesser industrial processing. This also shows in reducing capital intensity. Both FF and NF have reduced capital intensity per employee, but the reduction in FF was more significant (Table 19).

In the next section we will further measure the contribution of foreign firms to R&D and technology transfer to conclude that they do not contribute substantially more than national firms to the acquisition and development of advanced technology in any significant degree, even if the elements of technology contracted seem to have changed in form in recent years: the increasing importance of foreign patents accounting for about 40% the technological balance of payments in 1993 (Table 20) doubles their importance as compared to the years before 1979 when they were included in about 20% of technology transfer contracts (Unger 1985).[11]

b.3. Competences in the NIS: knowledge flows, collaborations and diffusion.

The importance of developing competences (or capabilities) can be ascertained in close similarity to understanding the crucial role of conduct/strategy usually ignored in the structure - performance analysis of traditional industrial organisation. The development of competences, much as the assumption of successful conduct-strategic management in competition analysis, has been taken for granted as an implicit result to follow from any kind of industrial development that takes place. However, their spontaneous development, in Mexico as in many other countries, is far from evident; the less so if foreign technology precludes the development of many local competences. That is why we need to take the analysis on gestation or inhibition of the specific competences, up-front in the analysis of the Mexican NIS.

To this end we use the scheme in Cimoli (figure B, 1997) linking the NIS, competences and performance. The vector of competences aims to describe more explicitly, the connecting role of the competences between the Institutional matrix containing the agents of the NIS and the performance measures of the country or locality under analysis[12]. We can identify there competences of very different kinds: educationals, training, R&D related and investment related competences. The two latter are closer to the subject of study of this chapter; they include mainly FDI and imports of capital goods, and should also involve R&D collaborations, technology transfer and other imports. And in the same straightforward sense anticipated there (op.cit., p.10), we expect to explain a good deal of the performance of Mexican

[11] The major change is the increasing importance of foreign patents that account for 38.5% of the FF technological balance of payments in 1993 (Table 20). Before 1979, patents were included in merely 24% of all FF contracts and 20% of all NF contracts, far behind the importance of know-how, technical assistance and trade marks (Unger 1985, p.106-7).

[12] The tool is far from complete as Cimoli recognizes (1997, p.7), but is helpful to keep under perspective the complex challenge involved in completing the definition and measures of the components and their links.

industry in following the interplay between (((a poorly developed subset of)))) foreign firms and foreign technology institutions and practices - the NIS - (((scarce))) foreign technology related competences - and the resulting (((non-integrated))) industrial performance.

The recent state-of-the-art review of the OECD on research about NIS addresses, even if somehow indirectly, the measure of technical competences in four categories or types of knowledge flows: collaborative industry activities, technology diffusion, public/private research linkages, and personnel mobility. The two latter are approached in extense in other chapters of the Mexican study. For this paper on the role of foreign technology, is the first two that we deal with in some detail as they estimate most of the kinds of R&D and investment related competences introduced earlier.

Technical collaboration among enterprises as well as their more informal interactions have come up-front as one of the most important knowledge flows in OECD economies. R&D collaborations between firms and strategic technical alliances are growing rapidly in most of those countries, but there are no reasons of principle to expect the same of foreign firms in Mexico, giving that there is also growing evidence about large MNEs keeping most of their technological activity at home. Other informal linkages and contacts are important, including relationships among users and producers whereby knowledge and know-how are transferred, but their contribution to innovative capacity within Mexico is not evident, even if it is difficult to measure. We may trace the existence of these linkages through cluster analysis and firm surveys (OECD 1997, p.15-6), and this is what we will explore to the best of available evidence in existing Mexican surveys.

In contemporary Mexico, as in most newly-industrializing countries, R&D activities are very important to the development of the innovation system, even if they are not the main means of technology acquisition and learning. The import of technology, here as elsewhere, is crucial in the early stages of industrial development when design, production engineering, quality control, and learning by doing are more important channels for assimilating better practice technology (Bell and Pavitt, 1993). But sometimes this pattern of excessive reliance on imported technology continues on a large scale over too far extended periods; this seems to be the case of Mexico, in contrast with other more sucessful NICs, where domestic actors of the national innovation system eventually become stronger and develop some R&D capabilities. In this respect, the extent of success in importing technology may be seen in the development of "true competences", which may be defined as the capacity of the firms to master their own environment, including some basic R&D capabilities[13]. The crudest counterpart, as witnessed in Mexico, is

[13] The measurement of technological accumulation in developing countries remains a complex challenge. Typical measurements of payments for capital goods and for technology are not sufficient since they neglect the centrally

a passive and prolonged dependence on imported technology (which may in fact become even deeper on time), even if some modest learning of the kind difficult to measure and value has taken place along the process (Katz, 1987).

The evidence on R&D activities and technical collaboration (technology transfers) among Mexican firms shows that local interactions of this kind are scarce and scattered. First, formal strategic alliances of foreign firms (FF) with national firms have a declining trend after the FF found free trade and full ownership a better option to make business after 1986[14]. But then also the results advanced above with respect to the minor importance of technology operations taking place among Mexican industry and Mexican technology suppliers, reveal a poor development of local technical capabilities. This pattern of conduct applies equally for foreign and national firms, as shown in the surveys reviewed that will follow.

According to Enestyc (1992), only one third of the firms invested in R&D during 1991 (Table 21). The R&D ratios are also very low (0.57 and 0.68 respectively), and the ratios are substantially lower for the firms successful in exports[15] (Table 22). Similar results apply for the little less than half of firms in the sample that take part in technology transfer: the ratio for foreign and national firms oriented to exports are half the ratios of the domestic market oriented firms[16] (Table 22). Thus, exports performance is not supported by technology efforts, which in any event are mostly directed to domestic competition purposes.

Another survey on technology exchanges (Conacyt 1997) corroborates these findings in four respects: a) only some firms, not all of those prominent in their own industry, take part in technology transfer; b) most of the transfer involves foreign sources of technology; c) the main technology contracted or acquired are patents, technical assistance and industrial property rights; and d) firms in the group of Specialized Suppliers (acccording to Pavitt's classification) are less demanding of external technology than others.

These findings are, for the most part, similar for FF and NF as shown in Tables 25, 26 and 27. There we have summarized specific estimates from that survey on the four respects highlighted above:

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important and firm-specific learning activities that in successful developing countries are later transformed into R&D or innovative capabilities (Patel and Pavitt, 1995; Kim, 1992).

[14] The scope to attract foreign capital to new privatizations has also reduced considerably.

[15] A positive trend is that R&D ratios increased between 1989 and 1991 in all kinds of firms, though the increase is modest in proportions around 0.1% (Table 23).

[16] Technology transfer ratios also increased from 1989 to 1991, and for national firms on a larger proportion (Table 24).

a) A large proportion of FF conduct technology exchanges with other FF (including their own Parent companies), but very few of FF do have exchanges with domestic firms (one third at the most). The opposite occurs with NF: they relate frequently to other domestic firms (about three quarters of the 99 NF), but much less to foreign sources (about one third). There are 10 FF and 19 NF with no technology exchanges (Table 25).
b) Foreign exchanges are far more important according to the deficits on the technological balance of payments of both FF and NF: -US$16.7 million dollars and -US$7.0 million dollars respectively (Table 26). Operations with domestic sources of technology account for little less than US$2.0 million dollars for each type of firm (Table 27).
c) Major technology spending is related to foreign patents, foreign technical assistance and foreign industrial property rights (Table 26). Technical assistance and property rights are also relatively important in operations with domestic sources (Table 27); these are the technology concepts most frequently contracted. However, the high average cost per foreign patent acquired (27 by FF) surpases by far the importance of the large number of TA and PR contracts[17].
d) Firms in the group of Specialized Suppliers are less dependent on technology exchanges due to their own better technical capabilities and seem also more capable for better bargaining. These firms, which include capital goods and instruments producers, are themselves technology suppliers and should be seen as prioritary depositories of innovation capabilities as suggested in Guerrieri's figure.

Technology diffusion is in the literature probably the most relevant flow of knowledge for cases like the Mexican industry. Besides other indirect effects, the impacts on productivity of technology diffusion are perhaps as important as R&D investments to innovative performance[18]. One type of technology diffusion may be seen in the dissemination of technology in the form of new equipment and machinery. There is ample evidence of its importance in a number of OECD firm surveys focussing on the dissemination of information technology, including computers, communication equipment, NCMT and other modern hi-tech technologies. For Mexico, the Enestyc surveys also produced some evidence on the adoption of modern equipment, but preliminary analysis indicates that the introduction of modern machinery and equipment has had mixed results: the only significant effect occurred in NF exporters who experienced an increase in export ratios (3.6% on average), but also had to raise their imports content (3.5%; and 4.5% if the equipment is second hand) (Tables 28 and 29).

[17] The cost for national patents is much more modest, as can be inferred from figures in Table 27. This comparison is consistent with the high dependency ratio estimated for the country as the proportion of patents requested by foreigners in comparison to nationals (Conacyt 1997, "Indicadores...1996", p.44): the ratio went up from 8 in 1982 to 19 in 1994.

[18] According to the OECD (1997), "a narrow focus on stimulating research spending or a preoccupation with technology-intensive sectors may lead to the neglect of promoting technology diffusion, which is essential to the evolution of the overall national innovation system" (p.25).

The results are usually incomplete, since these surveys, in Mexico as elsewhere, do not reveal the source of equipment or technology, which limits their usefulness in tracking technology flows among actors within the NIS (OECD 1997, p.23). In the Mexican case, however, we can expect a very high proportion of imported sources of this kind of modern equipment, at least just as much as with most other capital goods scarcely produced in the country. In other words, the specialized suppliers of particular importance for the integration of the innovation system and crucial in the networking of Guerrieri's illustration, are for the most part absent in Mexico. One kind of complementary information is obtained analysing trade flows of hi-tech goods, which include many sectors of capital goods and other hi-tech intermediates.

The reading of Mexico's performance on high-tech trade has to depart from the distinction of exports operations following the three types. Maquiladora exports and temporary exports are different in kind from high-tech exports of higher integration to domestic inputs. The trade balance on high-tech goods runs generally on deficit (excepting years like 1995 when imports were severely constrained), but the deficit is highly ameliorated by trade surpluses in both the maquiladora industry and exports related to temporary imports (Table 30). Imported goods and intermediates for domestic use (labelled as Definitive imports), on the other hand, are four to ten times larger than corresponding Mexican exports (see coverage ratios of 10% to 23% in Table 30 and values in Table 31).

The performance described above indicates the shallow nature (high imports dependency) of most Mexican exports of high-tech goods, since most of these are Maquila and Temporary exports of science based and specialized suppliers industrial goods (Table 32). There are included Maquila exports of FF in a number of sophisticated industries, but we have to be cautious in equating their performance to a Mexican capacity to compete internationally in high-tech activities[19].

b.4. The results of recent performance

- The clusters' performance.

The analysis of recent Mexican industrial restructuring has shown two major effects: first, Mexican industry develops in a highly unbalanced industrial structure specialized in a few sectors, most of them mature industries or 'maquiladora' type of exports, thus losing to the future the dynamic comparative advantage of other more dynamic industries that lead in international trade and technological

[19] Leading sectors and goods traded are listed in Conacyt 1997, "Indicadores ..", p.57. The sectors include electronics, computers, aeronautics, pharmaceuticals, machineries, instruments and some chemicals.

innovations[20]; and second, the industries that lead industrial growth become dependent on imports of technology, as well as on imports of the most technologically dynamic products and intermediates[21]. The benefits of interactions within the dynamics of the national system of innovation are not captured, given the dominance of foreign suppliers of technology, capital goods and intermediates imported from outside the country[22].

For both these trends the cluster of FF importing foreign technology, whereby foreign firms turn more and more into imports and less to domestic producers, play a crucial role. The extent of technological maturity of remaining industries in the hands of national firms may also be crucial in the sense that, for the most part, they are not concerned with innovation as a source of competitive advantage, but rather rest on the natural resource advantage to keep larger domestic materials content, while relying on the international market for new equipment and machinery.

Following the clusters approach we have shown that, for the most part, foreign firms dominate certain industrial sectors while national firms control other more mature resource based industrial sectors. Thus, even if some overlapping between the two clusters can be expected, especially in respect of using the same knowledge producing agents or suppliers when the two types of firms participate in the same industry, we have departed from assuming and have also shown that the differences between FF and NF are more important than their commonalities. These differences could become the basis to design a more targeted innovation policy.

- The development of competences and sources of technology.

Technology involves a complex set of many quite different things experienced across different stages of the firms operations. In this sense, one can also anticipate different channels for the acquisition of foreign technology at the different stages of operations of foreign and Mexican firms. One straight channel is the foreign firm as a channel for entry of new technology incorporated into new firms, new plants, new production processes, new equipment, new products,

[20] The message in Table 33 adapted from Dosi, et.al. is that machinery and equipment industries are at the top of both, innovation ratios and exports growth on a global scale.

[21] One word of caution may be appropriate to avoid a simplistic relation of our concern with the dependency debate of the 1970s, which for the most part assumed dependency to be bad per-se. Here we are suscribing a different, more concrete concern, namely the pervasive effect of excessive imported technology as an obstacle to the full dynamics of the national innovation system. According to the evolutionary perspective of the NIS, national capabilities are developed along the principle that learning is local and cumulative (Cimoli, 1997, p.13; Arjona and Unger, 1997, p.--). The generation of broader capabilities is also dependent on maximizing externalities to the benefit of local clusters.

[22] The pharmaceutical industry studied in Gonsen and Jasso (1998) is a good illustration of dynamic losses in competitiveness.

organizational changes. In this respect, we may anticipate that FDI every year is highly concentrated in a few very large projects[23] that should be monitored very closely to capture the most of their technology spillovers to the NIS (see Tables 34, 35 and 36). Another channel is the contribution of foreign firms to domestic technological activities (R&D, patenting and inventions, training activities, quality control). And thirdly, the transfer of foreign technology, either intrafirm transfers for foreign firms, or arm's lenght acquisitions of Mexican firms from independent foreign technology suppliers. Let us extend some other evidence in this respect.

The results on R&D, patents and other contractual features summarized above indicate that learning and domestic capabilities do not occur spontaneously nor automatically after the FF undertake control of an industry. The number of firms undertaking R&D in Mexico is less than 40%, equally for FF and NF (Table 21). Those with technology transfer expenditures are less than one half, and those entirely passive (ie. without R&D and technology transfer) are close to half of all firms. The ratios on spending do not indicate any significant contribution to domestic innovation capabilities, and this is even more more pronounced in large FFs as shown in smaller weighted averages (Tables 22 and 37).

The transfer (importation) of foreign technology involves technology in many forms like patents, trade marks, technical assistance, engineering services and other disembodied technology; and imports of capital goods, parts, components and intermediate inputs. The processes of technology acquisition, adaptation, starting up and learning on the job need to be analysed by separating the role of the various technology elements into such phases. In practice, the extent of packaging into these phases plays a significant role. Learning may be closely linked to unpackaging, doing, using, copying, repairing, and so on. The most ideally extended diffusion process of technology (the "distribution power" of the system, as it came to be named recently) involves many actors, firms, institutions and individuals alike, accumulating capabilities while they take part in these operations: suppliers, competitors, users, advisors, etc.

The alternative sources or channels of foreign technology suppose potentially different learning capabilities or technical competences. One basic premise may be that most extensive practices of technological packaging come in close association with foreign capital, which in turn leaves little scope for learning by doing and using to local participants. The most recent organizational changes for globalized industries involve some new restrictions (and a few new opportunities as well) to develop local capabilities. These conditions may differ among industries and industrial locations, pointing to the need for a careful analysis of the industrial and technological policy of relevance for each industrial cluster.

[23] Our review of the Dow Jones Information Index for 1996 and 1997 confirms the point: no more than half a dozen well known major FDI projects for Mexico are highlighted there.

Foreign direct investment (FDI) is usually a total technology package that involves product and process technology from the parent office of MNEs, plus machinery, equipment and material supplies from compatible suppliers to the rest of the MNE (intrafirm imports). The extent of export orientation leaves even less space for domestic adaptations and domestic suppliers, as shown in the Maquilas operations of FF. The cluster of foreign firms (FF) can then be characterized as a network of FF and foreign knowledge producing agents that concentrate in the country of origin most of their mutual learning, allowing only marginal participation to the locals in the form of learning by doing.

Traditionally, the second major source of technology for industrializing countries, has been technology transfer. This was a highly debated issue during the 1970s and early 1980s, but then changed to a minor concern aiming to facilitate transfers more than to their control. In the age of globalization, free markets in all spheres, including that of technology, were assumed to maximize returns for all participants. Mexico, like other industrializing countries, took up this agenda and eliminated the Registry for Technology Transfer in 1991. In its place, several mechanisms to protect intellectual property were set, along others driven to increase the firms concern with quality controls, metrology, standards and the like. The expected results were a gradual increase in technological capabilities, which eventually could lead to R&D and other local innovation efforts. Some scattered evidence indicates mixed results, and this paper has tried to ellaborate a coherent description. For the time being, we suscribe that the adjustment set the pace without much attention to deeper sources of knowledge related to transfers of technology.

On a more global perspective, the contribution of large multinational firms to the world's technology, both for industrialized and developing countries alike, has been subjected to critical analysis. Recent evidence on the basis of US patent data shows that, in spite increasing talk about globalisation of large firms' technological activities, they remained remarkably domesticated, even into the late 1980s. The world's largest firms performed only 11% of their innovative activities outside their home country, even if these shares are higher in MNEs based in smaller countries (Patel and Pavitt, 1995, p.37). In any event, the elasticities of foreign technological activities to foreign production are below unity, which suggests that multinational firms prefer to keep technological activities at home more than production activities (Cantwell, 1992). There are little reasons to expect a different trend in the perception of these firms with respect to Mexico.

Secondly (and again contrary to current conventional wisdom), the degree of globalisation of a company's technological activities turns out NOT to be in direct proportion to the technological sophistication of its products, quite the contrary. Firms with higher proportion of their technological activities outside their home countries are making more traditional products in the food, drink, building materials, petroleum and mining (Patel and Pavitt, 1995, Table 2.6). The multinationals export- led Mexican sectors of motor vehicles and computers, on the contrary, are

well below-average in the share of technological activities outside their home country: 4.4 and 9.0 per cent respectively (op.cit)

The third source of foreign technology, imports of capital goods and parts, components and intermediates, is also very important in a country lacking its own complementary or competitive firms in these import depending areas of business; imports account for an extremely large proportion in the supply of specialized suppliers and science based products (Table 38).

These industries, but particularly the capital goods producers, have been considered major depositaries of technological capabilities from the begining of industrial development (Rosenberg 1976). At present the capital goods producers are included as important components of competences to modern NIS, but policies to favour these industries are hard to be accepted in Mexico without the fear to return to protection policies. In one undisputed respect they are a high priority: electrical and non electrical machinery are well at the top of the world industrial trade dynamics (Dosi, Freeman and Fabiani, 1995). The challenge remains, however, to argue also in support of the development of the capital goods industry as a crucial element of technological development[24].

Summary and Conclusions

The evolution of foreign investment is one of the main channels to analize the role of foreign technology in the NIS. The analysis of foreign investment has documented four important trends: the raise of stock market investment surpasing to moderate increases in direct investment (FDI), the declining importance of manufacturing in FDI, the high concentration of FDI in a few manufacture sectors, and the influence of some very large projects in FDI. One accompanying trend of relevance for the Mexican innovation system is that large foreign firms (and some large national firms) reduce the extent of industrial processing and increase imported content in order to improve their international competitiveness for exports and for sales at home. Along these new trends, foreign technology remains the main source of technology.

The relative decline of FDI in manufactures as compared to the raise of FDI in trade, finance and other services, shows also a change in the composition of manufactures in favour of the food industry (in general less inclined to export) and substantial decreases in chemicals and transport equipment which had been the leaders of the export surge after the mid-1980s. This change in the composition of FDI explains larger increases in imports than in exports associated to FDI.

[24] Even mechanical technologies, largely neglected as simpler technologies in the comparison with modern paradigms such as the microelectronics revolution, are still showing significant improvements in technological performance. See evidence in Patel and Pavitt, 1994.

We have seen that foreign firms are most dynamic in adjusting Mexican industry to international competition, but they do continue to favour foreign sources of advanced technology and production inputs while at the same time do not contribute more than national firms to the development of local technological capabilities. The most important result to our concern is that their acting is not allowing the full benefits of domestic interactions within the Mexican NIS.

The evidence indicates successful export performances of foreign and national firms exporters. For both, export ratios are similar and very high. But the difference in imports of these two groups of firms is very significant: national firms are exporting on the basis of natural domestic advantages, whereas foreign firms exports contribute substantially less to Mexico both in net foreign exchange and in the interactions with local material suppliers.

Other pieces of evidence show large reliance on foreign technology acquisitions over national sources of technology, a practice common to FF and NF. Domestic technology operations (the sum of income and expenditures) are less than one fifth of total technology transactions while foreign technology spending represented more than 95% of total spending in a representative sample of firms surveyed. These results are highly associated to operations of subsidiaries of MNEs.

The performance of foreign firms indicates that they are not concerned with innovation objectives. Their contribution to R&D and technology transfer is not substantially larger than what national firms contribute to the acquisition and development of technological capabilities.

The analysis of R&D related and investment related competences, has included their relation to FDI, imports of capital goods, R&D collaborations, technology transfer and other imports. The evidence on R&D activities and technical collaboration (technology transfers) among Mexican firms shows that efforts and local interactions of this kind are scarce and scattered. The results with respect to the minor importance of technology operations taking place among Mexican industry and Mexican technology suppliers, reveal a poor development of local technical capabilities, equally for foreign and national firms. Only one third of the firms surveyed invested in R&D, their R&D ratios are extremely low and the ratios are substantially lower for successful exporters. Similar results apply for less than half of firms in the sample that took part in technology transfer. The conclusion is that exports are not supported by technology efforts, which in their limited scale are mostly directed to face domestic competition.

Another survey has shown that the main technology contracted are now patents, technical assistance and industrial property rights. The largest share of technology spending is on foreign patents, foreign technical assistance and foreign industrial property rights; the very high average cost per foreign patent acquired overtakes in importance to the many TA and PR contracts. And the same survey shows that the

relatively few firms in the group of Specialized Suppliers industries are less dependent on technology exchanges. This may be due to their own better technical capabilities and also because they seem more capable during technical bargaining. Beyond this specific performance, this type of firms should be seen as prioritary agents of wide innovation capabilities, as suggested by many other writers.

Technology diffusion is one of the most relevants flows of knowledge in the literature, though its effects are not always the same for the firms as for the country as a whole. The dissemination of technology in the form of new equipment and machinery in Mexico, has had mixed results in the firms introducing them: they experienced minor increases in export ratios by the hand of increases in imports content. And we can also expect a very high proportion of imported sources of this kind of modern equipment, at least just as much as with most other capital goods scarcely produced in the country. In other words, the specialized suppliers of particular importance for the integration of the innovation system are for the most part absent in Mexico.

Mexico's performance on high-tech trade indicates the very high imports dependency of most Mexican exports of high-tech goods. Most of these are Maquila and Temporary exports of science based and specialized suppliers industrial goods for which is not possible to equate their export performance with a capacity to compete internationally in high-tech activities.

We have shown that, for the most part, foreign firms dominate certain industrial sectors while national firms control other more mature resource based sectors. Thus, even if some overlapping between the two clusters can be expected, especially in respect of using the same knowledge producing suppliers when the two types of firms participate in the same industry, we have shown that the differences between FF and NF are more important than their commonalities. Such differences could guide a more targeted innovation policy to capture the benefits of interactions within the dynamics of each cluster in the national system of innovation. These benefits at present are not captured, given the complex set of factors that give preference to foreign suppliers of technology, capital goods and intermediates imported from other countries.

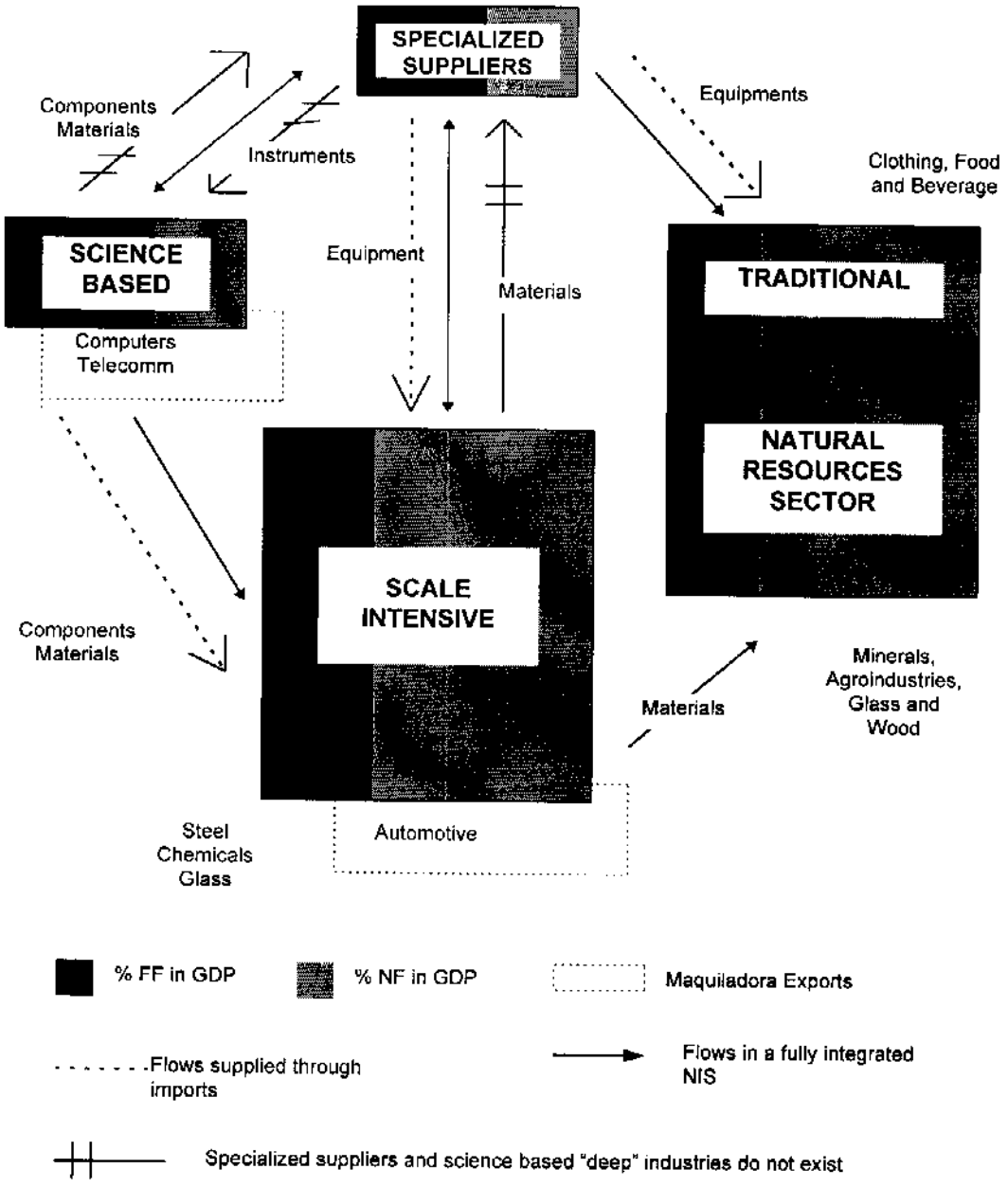
The alternative sources or channels of foreign technology suppose potentially different learning capabilities or technical competences. One basic premise may be that most extensive practices of imports as technological packages act against local learning. Technological packaging refers to the extent of packaging into the phases of technology acquisition, adaptation, starting up and learning on the job. Learning in all these phases may be closely linked to unpackaging, doing, using, copying, repairing, and so on. The related diffusion process of technology involves many firms, institutions and individuals accumulating capabilities while they take part in these operations as suppliers, users, technicians, advisors, competitors, and the like. Unfortunately, packaging comes in close association with foreign capital,

which in turn leaves little scope for learning by doing and using to local participants. The conditions favorable to unpackaging differ among industries and locations, so that appropriate policy would need to be of specific relevance for each industrial cluster.

A final point to emphasize that our concern with the increasing reliance on imports of capital goods, components and intermediates, is not a trade concern. More than their impact on the balance of trade, these industries, and particularly the capital goods producers, are major carriers of technological capabilities for industrial development. In recent international analysis the capital goods producers are included as important components in the gestation of competences to modern NIS, but policies to favour these industries are hard to be accepted in Mexico without the fear to return to protection policies. The challenge remains to argue in a novel way in support of the capital goods industry as a crucial element for the technological development of integrated clusters.

Our main conclusion is that foreign technology and foreign firms do contribute significantly to industrial growth, productivity improvements and international competitiveness, but can not become per se the main engine to develop the local innovation system. The development of a national innovation system based on greater local interactions and knowledege flows requires the promotion of many other technological competences in domestic actors and institutions, including wider and tighter networks of user-producer interactions. This is needed for both foreign and national firms which at present rely on foreign technology at a larger extent than what the consolidation of a Mexican innovation system calls for.

Figure A : INTERACTION AND FLOWS OF EQUIPMENT AND MATERIALS IN MEXICAN INDUSTRY



SOURCE: Adapted from Guerrieri 1993

List of tables .

Table 1: PUBLIC AND PRIVATE INVESTMENT (DOMESTIC AND FOREIGN) AS A SHARE OF MEXICO'S GDP (US$ MILLION), 1981 - 95.

		INVESTMENT			PERCENTAGE OF GDP		
YEAR	GDP	PUBLIC	PRIVATE		PUBLIC	PRIVATE	
			DOMESTIC	FOREIGN		DOMESTIC	FOREIGN
1981	249.5	30.2	34.0	1.7	12.1	13.6	0.7
1982	170.6	17.4	21.2	0.6	10.2	12.4	0.4
1983	148.8	9.8	15.6	0.7	6.6	10.5	0.5
1984	175.7	11.6	18.5	1.4	6.6	10.5	0.8
1985	184.4	12.3	21.1	1.9	6.6	11.4	1.0
1986	130.1	8.5	14.3	2.4	6.5	11.0	1.9
1987	141.1	7.4	14.9	3.9	5.2	10.5	2.8
1988	173.0	8.8	21.5	3.2	5.1	12.4	1.8
1989	205.3	10.0	24.7	2.9	4.9	12.0	1.4
1990	241.8	11.9	28.7	5.0	4.9	11.8	2.1
1991	283.6	12.4	33.1	9.9	4.4	11.7	3.5
1992	328.8	13.8	54.5	8.3	4.2	16.6	2.5
1993	361.1	14.5	58.8	15.6	4.0	16.3	4.3
1994	354.9	14.6	60.6	12.2	4.1	17.1	3.4
1995	214,4	9,0	38,4	-3.4	4.2	17,9	-1.6

Source: For 1981-91: NAFINSA, El Mercado de Valores, no.18, September 15, 1992. For years after, CIEMEX-WEFA, Perspectivas Econòmicas de Mèxico 1994,1995. Data for 1995 are projections.

Table 2: ANNUAL FLOWS OF FOREIGN DIRECT INVESTMENT IN MEXICO, 1980-1995 (US$ MILLION)

YEAR	NEW FDI	INVESTMENT IN STOCK MARKET		STOCK OF FDI	
		$	% CHANGE	$	% CHANGE
1980	1682.8			8458.80	
1981	1701.1			10159.90	20.1
1982	626.5			10786.40	6.2
1983	683.7			11470.10	6.3
1984	1429.8			12899.90	12.5
1985	1729.0			14628.90	13.4
1986	2424.2			17053.10	16.6
1987	3877.2			20930.30	22.7
1988	3157.1			24087.40	15.1
1989	2499.7	414.0		26587.10	10.1
1990	3722.4	1256.0	203.4	30309.50	14.0
1991	3565.0	2881.8	129.4	33874.50	23.1
1992	3599.6	2629.7	-8.7	37474.10	10.6
1993	4900.7	10716.6	307.5	42374.80	13.1
1994	8026.2	4123.4	-61.5	50401,0	18.9
1995	6738.4	-10139.1	-245.9	57139.40	13.4
1996	7618.70	14153.80	1932.60	64758.10	13.30

Source: For 1980-91.NAFINSA, El mercado de Valores, no.18 Sept.15,1992. U.S.Department of Commerce, Business Statistics 1961-88 and Survey of Current Business, June 1992. For years after. NAFINSA, El Mercado de Valores, no.4 Abril , 1995 and SECOFI, Dirección General de Inversión Extranjera (mimeo). For 1996: Banco de México (mimeo)

Table 3: ANNUAL FLOWS OF FOREIGN DIRECT INVESTMENT IN MEXICO BY ECONOMIC SECTOR, 1980-94 (US$ MILLION AND % OF TOTAL FDI)

YEAR	TOTAL FDI	MANUFAC-TURING	SERVICES	TRADE	MINING	AGRICUL-TURE
	$	%	%	%	%	%
1980	1622.8	79.2	8.1	7.3	5.3	0.1
1981	1701.1	82.6	18.8	10.0	-11.1	-0.3
1982	626.5	60.9	37.6	0.2	1.1	0.3
1983	683.7	87.3	1.9	8.6	2.2	0.0
1984	1429.8	88.8	8.5	2.2	0.4	0.1
1985	1729.0	67.4	25.2	6.3	1.0	0.0
1986	2424.2	79.2	13.3	6.2	1.3	0.0
1987	3877.2	61.9	37.0	-0.5	1.3	0.4
1988	3157.1	32.3	59.5	7.8	0.8	-0.4
1989	2499.7	39.3	44.1	15.5	0.4	0.8
1990	3722.4	32.0	59.2	4.6	2.5	1.6
1991	3565.0	18.9	73.8	6.2	0.4	0.6
1992	3599.6	27.4	57.6	14.2	0.2	0.7
1993	4400.7	47.4	31.0	15.5	1.1	0.7
1994	8026.2	39.9	39.9	7.9	0.1	0.1
1995	6738,4	59,4	27,4	7,5	2,1	0,0

Source: For 1980-91:NAFINSA, El Mercado de Valores no.18 Sept.15,1992, US Department of Commerce, Business Statistics 1961-88. Survey of Current Business, June 1992 and SECOFI. For years after: NAFINSA, El Mercado de Valores, no.4 April 1995.

Table 4: CUMULATIVE FOREIGN DIRECT INVESTMENT IN MEXICO BY ECONOMIC SECTOR, 1980-94 (US$ MILLION AND % OF TOTAL FDI)

YEAR	TOTAL	MANUFAC-TURING[a]	SERVICES	TRADE	MINING	AGRICUL-TURE
	$	%	%	%	%	%
1980	8458.8	77.6	8.5	8.9	5.0	0.1
1981	10159.9	78.4	10.2	9.1	2.3	0.0
1982	10786.4	77.4	11.8	8.6	2.2	0.0
1983	11470.1	78.0	11.2	8.6	2.2	0.0
1984	12899.9	79.2	10.9	7.9	2.0	0.0
1985	14628.9	77.8	12.6	7.7	1.9	0.0
1986	17053.1	78.0	12.7	7.5	1.8	0.0
1987	20930.3	75.0	17.2	6.0	1.7	0.1
1988	24087.4	69.4	22.7	6.2	1.6	0.0
1989	26587.1	66.6	24.7	7.1	1.5	0.1
1990	30309.5	62.3	29.0	6.8	1.6	0.3
1991	33874.5	54.2	37.4	6.7	1.4	0.4
1992	37474.1	50.6	40.1	7.7	1.2	0.4
1993	42374.8	50.2	39.0	8.6	1.2	0.4
1994	50401,0	48.6	39.2	8.5	1.0	0.4
1995	57139.4	53,5	35,9	8,9	1,3	0,4

Note: [a] Includes maquiladoras
Source: Own calculations with data from NAFINSA, El Mercado de Valores no.18, Sept.15, 1992 for 1980-91 and no.4, April 1995 for 1992-94.

Table 5: ANNUAL AND CUMULATIVE FDI IN MEXICO BY SECTOR OF DESTINATION (1994-2000)

SECTOR	FDI (US$ mill)							
	1994	1995	1996	1994-96	%	1997-2000	1994-2000	%
3 Manufacturing	{3440}	{144.1}	{2672}	{6256.1}	{55.4}	{6984}	{13240.1}	{63.6}
31 Food	277		702	979	8.7	1165	2144	10.3
32 Textiles	315			335	2.9	183	518	2.5
34 Editorial	20		95	115	1.1		115	0.5
35 Chemical and Oil Prod.	299	50	635	984	8.7	2110	3094	14.8
37 Basic Metal Industries								
38 Machinery and Equipment.	{2529}	{94.1}	{1081}	{3704.1}	{32.8}	{3526}	{7230.1}	{34.7}
381 Metal Prod.		14	5	19	0.1		19	0.1
382 Electronic		63.1	635	698.1	6.2	1720	2418.1	11.6
383 Radio and Tv. Equipm.		35		35	0.3 26.4		35	0.2
3841 Automotive Equipment	2529	17	441	2987		1806	3793	18.2
2 Mining		44.5	5.5	50	0.4	350	400	1.9
4 Construction	140			140	1.2		140	0.7
6 Trade		25	370	395	3.5	2082	2477	11.9
9 Services	2542	65	1847	4454	39.4	1121	5575	26.8
TOTAL	6122	278.6	4894.5	11295.1	100	9537	20832.1	100

Source: Comercio Exterior, May 1994; Expansión, Feb26, 1996. Figures for 1996-2000 are projections.

Table 6: ANNUAL FLOWS OF FOREIGN DIRECT INVESTMENT IN MEXICO BY COUNTRY OF ORIGIN (US$ MILLION AND %)

YEAR	ANNUAL TOTAL FDI $	USA %	GREAT BRITAIN %	GERMANY %	JAPAN %	SWITZER-LAND %	FRANCE %	SPAIN %
1980	1622.8	66.5	3.0	10.5	7.6	6.9	1.2	4.9
1981	1701.1	63.0	2.4	8.6	12.5	4.4	0.6	6.0
1982	626.5	68.0	1.2	6.4	10.4	3.7	1.1	6.4
1983	683.7	39.0	7.2	16.1	0.6	2.4	16.1	1.9
1984	1429.8	63.8	3.1	10.7	2.5	4.2	0.6	0.8
1985	1729.0	76.7	3.3	3.2	4.6	8.2	0.6	0.8
1986	2424.2	49.8	4.3	9.0	5.9	1.4	13.1	3.9
1987	3877.2	68.9	11.1	1.2	3.4	2.5	0.8	3.2
1988	3157.1	38.3	24.3	4.3	4.7	2.7	4.8	1.1
1989	2499.7	72.6	1.8	3.4	0.6	7.8	0.7	1.8
1990	3722.4	62.0	3.1	7.7	3.2	4.0	4.9	0.3
1991	3565.0	66.9	2.1	2.4	2.1	1.9	14.0	1.2
1992	3599.6	45.9	11.9	2.4	2.4	8.8	1.9	1.0
1993	4900.7	71.5	3.9	2.3	1.5	2.1	1.6	1.3
1994	8026.2	49.9	13.7	4.7	8.7	0.7	0.8	1.9
1995	6738.4	64.4	2.1	8.0	2.2	2.3	1.2	0.5

YEAR	ANNUAL TOTAL FDI $	SWEDEN %	CANADA %	NETHER-LANDS %	ITALY %	OTHER COUNTRIES %
1980	1622.8	0.7	1.1	0.0	-1.8	-0.5
1981	1701.1	0.9	0.3	0.0	0.3	1.0
1982	626.5	-0.3	1.3	0.0	0.3	1.5
1983	683.7	4.3	3.2	0.0	0.1	9.2
1984	1429.8	4.3	2.3	0.0	0.0	7.8
1985	1729.0	0.3	2.0	0.0	0.0	0.2
1986	2424.2	1.0	1.7	0.0	0.2	9.9
1987	3877.2	0.9	0.5	0.0	0.1	7.4
1988	3157.1	1.0	1.1	6.9	0.0	9.7
1989	2499.7	0.3	1.5	1.9	0.3	7.5
1990	3722.4	0.4	1.5	3.4	0.1	9.4
1991	3565.0	0.4	2.1	3.4	0.1	3.5
1992	3599.6	0.1	2.5	2.3	0.2	20.8
1993	4900.7	0.0	1.5	1.8	0.1	12.5
1994	8026.2	0.2	2.0	4.8	0.2	12.5
1995	6738.4	0.9	2.3	9.1	0.0	7.1

Source: For 1980-91: SECOFI, Dirección General de Inversión Extranjera. For years after:NAFINSA, El Mercado de Valores, no.4 april 1995 and SECOFI, Dir Gral. de Inversión Extranjera (mimeo).

Table 7: CUMULATIVE FOREIGN DIRECT INVESTMENT IN MEXICO BY COUNTRY OF ORIGIN. (US$ MILLION AND %) 1980-95

YEAR	CUMULATIVE FDI TOTAL $	USA %	GREAT BRITAIN %	GERMANY %	JAPAN %	SWITZER-LAND %	FRANCE %	SPAIN %
1980	8458.8	69.0	3.0	8.0	5.9	5.6	1.2	2.4
1981	10159.9	68.0	2.9	8.1	7.0	5.4	1.1	3.0
1982	10786.4	68.0	2.8	8.0	7.2	5.3	1.1	3.2
1983	11470.1	66.3	3.1	8.5	6.8	5.1	2.0	3.1
1984	12899.9	66.0	3.1	8.7	6.3	5.0	1.8	2.9
1985	14628.9	67.3	3.1	8.1	6.1	5.4	1.7	2.6
1986	17053.1	64.8	3.3	8.2	6.1	4.8	3.3	2.8
1987	20930.3	65.5	4.7	6.9	5.6	4.4	2.8	2.9
1988	24087.4	62.1	7.3	6.6	5.5	4.2	3.1	2.6
1989	26587.1	63.1	6.8	6.3	5.5	4.5	2.9	2.6
1990	30309.5	62.9	6.3	6.5	4.8	4.4	3.1	2.3
1991	33874.5	63.4	5.9	6.0	4.5	4.2	4.3	2.2
1992	37474.8	61.7	6.4	5.7	4.3	4.6	4.0	2.1
1993	42374.8	62.8	6.1	5.3	4.0	4.3	3.8	2.0
1994	50401.0	60.8	7.3	5.2	4.7	3.7	3.3	2.0
1995	57139.4	61.2	6.7	5.5	4.4	3.5	3.0	1.8

YEAR	CUMULATIVE FDI TOTAL $	SWEDE %	CANADA %	NETHER-LANDS %	ITALY %	OTHER COUNTRIES %
1980	8458.8	1.5	1.5	0.0	0.3	1.6
1981	10159.9	1.4	1.3	0.0	0.3	1.5
1982	10786.4	1.3	1.3	0.0	0.3	1.5
1983	11470.1	1.5	1.4	0.0	0.3	2.0
1984	12899.9	1.8	1.5	0.0	0.3	2.6
1985	14628.9	1.6	1.6	0.0	0.2	2.3
1986	17053.1	1.5	1.6	0.0	0.2	3.4
1987	20930.3	1.4	1.4	0.0	0.2	4.1
1988	24087.4	1.4	1.3	0.9	0.2	4.9
1989	26587.1	1.3	1.4	1.0	0.2	5.1
1990	30309.5	1.2	1.4	1.3	0.2	5.6
1991	33874.5	1.1	1.5	1.5	0.2	5.4
1992	37474.8	1.0	1.5	1.6	0.2	6.9
1993	42374.8	0.9	1.5	1.6	0.2	7.6
1994	50401.0	0.8	1.6	2.1	0.2	8.3
1995	57139.4	0.8	1.7	2.9	0.1	8.2

Source: For 1980-91: SECOFI, Dirección General de Inversión Extranjera. For years after: NAFINSA, El Mercado de Valores, no.4 April 1995 and SECOFI, Dirección General de Inversión Extranjera (mimeo).

Table 8: US FDI STOCK IN MEXICO BY INDUSTRY, 1990-95.(US$ million).

YEAR	All Ind.	Petrol.	M Total	A Food	N Chemi-cals	U Prim. metals	F Machi-nery	A Elect. Equip.	C Transp. Equip.	T. Other
1990	10.313	(D)	7784	1119	1703	345	532	676	1762	1648
1991	12.501	(D)	8978	1382	2004	349	472	632	2314	1825
1992	13.723	(D)	9608	1371	2051	(D)	(D)	724	2608	2087
1993	15.221	(D)	9235	2349	2379	(D)	(D)	523	914	2253
1994	15.714	(D)	10001	2800	1952	(D)	(D)	574	1672	2164
1995	14.037	(D)	8856	2278	1303	357	489	615	1621	2193

YEAR	Wholesale Trade	Banking	Finance	Services	Other Ind.
1990	551	(D)	619	291	963
1991	750	(D)	670	317	1633
1992	812	(D)	794	335	1947
1993	895	(D)	2106	233	2467
1994	1017	(D)	2124	262	2230
1995	842	15	2008	412	1772

US FDI STOCK IN MEXICO BY INDUSTRY, 1990-95 (%).

YEAR	All Ind.	Petrol.	M Total	A Food	N Chemi-cals	U Prim. metals	F Machi-nery	A Elect. Equip.	C Transp. Equip.	T. Other
1990	100		75.5	10.9	16.5	3.3	5.2	6.6	17.1	16.0
1991	100		71.8	11.1	16.0	2.8	3.8	5.1	18.5	14.6
1992	100		70.0	10.0	14.9			5.3	19.0	15.2
1993	100		60.7	15.4	15.6			3.4	6.0	14.8
1994	100		63.6	17.8	12.4			3.7	10.6	13.8
1995	100	0.9	63.1	16.2	9.3	2.5	3.5	4.4	11.5	15.6

YEAR	Wholesale Trade	Banking	Finance	Services	Other Ind.
1990	5.3		6.0	2.8	9.3
1991	6.0		5.4	2.5	13.1
1992	5.9		5.8	2.4	14.2
1993	5.9		13.5	1.5	16.2
1994	6.5		13.5	1.7	14.2
1995	6.0	0.1	14.3	2.9	12.6

US FDI FLOWS IN MEXICO BY INDUSTRY, 1990-95 (US million).

YEAR	All Ind.	Petrol.	M Total	A Food	N Chemi-cals	U Prim. metals	F Machi-nery	A Elect. Equip.	C Transp. Equip.	T. Other
1990										
1991	2.188		1194	263	301	4	-60	-44	552	177
1992	1.222		630	-11	47			92	294	262
1993	1.498		-373	978	328			-201	-1694	166
1994	493		766	451	-427			51	758	-89
1995	-1677	133	-1146	-522	-649			41	-51	29

YEAR	Wholesale Trade	Banking	Finance	Services	Other Ind.
1990					
1991	199		51	26	670
1992	62		124	18	314
1993	83		1312	-102	520
1994	122		18	29	-237
1995	-175		-116	150	-458

Source: Survey of Current Business, August 1994, December 1996.

Table 9 : SELECTED DATA FOR US NONBANK FOREIGN AFFILIATES IN MEXICO, 1991-94

YEAR	Millions Of US Dollars						Number of employees (thousands)
	Total Assets	Sales	Net Income	US exports of goods shipped to affiliates	US imports of goods shipped by affiliates	Compensation of Employees	
1991	28,130	35,997	2,895	10,831	9,508	4,710	579
1992	47,057	48,378	5,423	13,168	11,721	7,142	661
1993	56,249	52,820	5,965	14,200	12,953	7,722	408.6
1994	57,200	63,367	5,236	16,232	16,391	9,185	485.9

PERCENTAGE OF GROWTH OF SELECTED DATA BEFORE MENTIONED, 1992-94.

YEAR	Total Assets	Sales	Net Income	US exports of goods shipped to affiliates	US imports of goods shipped by affiliates	Compensation of Employees	Number of employees (thousands)
1992	67.3	34.4	87.3	21.6	23.2	51.6	14.2
1993	19.5	9.2	10,0	7.8	10.5	8.1	-0.2
1994	1.7	19.9	-12.2	14.3	26.5	18.9	7,0

Source: Survey of Current Business, June 1994 and December 1996.

TABLE 10: GDP OF FOREIGN FIRMS AND VARIATION (1993-1988)

TECHNOLOGICAL SECTORS	MANUFACTURES GDP, 1993 [a]	FF IN GDP 1993[a]	% FF IN GDP	VARIATION % FF IN GDP (1993-1988)	ANNUAL GROWTH OF FF
SCIENCE BASED	14,829.8	9,520.7	64.2	21.3	23.5
SUPPLIER DOMINATED	73,137.3	13,749.8	18.8	1.4	15.3
SCALE INTENSIVE	76,157.8	22,923.5	30.1	-2.4	8.1
SPECIALIZED SUPPLIERS	3,772.3	1,629.6	43.2	-2.4	1.8
TOTAL	167,897.2	47,823.7	28.5	0.7	12.2

[a] Millions of Dollars.

SOURCE: PETYC-CIDE Project data. Based on INEGI 1997.

Table 11: EXPORTS, IMPORTS AND FOREIGN FIRMS. 1988-1993

TECHNOLOGICAL SECTORS	TOTAL EXPORTS 1993 [a]	% FF IN GDP 1993	ANNUAL GROWTH EXPORTS	ANNUAL GROWTH IMPORTS
SCIENCE BASED	8,284.7	64.2	170.0	72.6
SUPPLIER DOMINATED	15,309.1	18.8	-1.0	63.0
SCALE INTENSIVE	16,323.5	30.1	27.7	58.2
SPECIALIZED SUPPLIERS	3,059.7	43.2	96.3	52.2
TOTAL	42,977.0	28.5	24.9	60.7

[a] Millions of Dollars.

SOURCE: PETYC-CIDE Project data. Based on SECOFI 1997.

Table 12: IMPORT AND EXPORT RATIOS (1991)

	FIRMS	*M 1991**	*X 1991***	*Correl.Coef*
TOTAL	5071	30.9	16.8	0,42[d]
FF	1005	49,5[a]	30,3[a]	0,67[d]
NF	4066	19.6	7.1	0,10[d]
FFexporter	405	70.0[b]	76,3[b]	0,22[d]
FFnon-exporter	600	43,1[c]	8,4[c]	0,18[d]
NFexporter	464	19.1	70.5	-0.04
NFnon-exporter	3602	19.6	3.9	0,15[d]

Source: PETYC- CIDE Project data. Based on ENESTYC 1992.

* Weighted average: raw materials to totals inputs.

** Weighted average: exports to total sales.

[a] FF > NF accepted with 95% confidence.

[b] FFexporter > NFexporter accepted with 95% confidence.

[c] FFnon-exporter > NFnon-exporter accepted with 95% confidence.

Table 13: IMPORT RATIOS OF FIRMS EXPORTING*

Maquiladoras and non-maquiladora exporters	*No. of firms*	*%M89*	*%M91*	*VarM*
FF exporter	405	84,8[a]	86,4[a]	1.6
FF maquiladora	**279**	**97,9[b]**	**99,2[b]**	**1.3**
FF non-maquiladora	126	55,9[c]	58,3[c]	2.3
NF exporter	464	17.6	20.4	2.8
NF maquiladora	**40**	**85.9**	**98.7**	**12.8**
NF non-maquiladora	424	11.2	13.0	1.8

Source: PETYC- CIDE Project data. Based on ENESTYC 1992.

* Simple average of raw materials to total inputs by firm.

[a] FFexporter > NFexporter accepted with 95% confidence.

[b] FFexporter maquiladora > NF exporter maquiladora accepted with 95% confidence.

[c] FFexporter non-maquiladora > NF exporter non-maquiladora accepted with 95% confidence.

Table 14:IMPORT AND EXPORT RATIOS* OF MAQUILADORA AND NON-MAQUILADORA ACCORDING TO SECTORS (PAVITT)

Maquiladoras	**FFexporter**			**NFexporter**		
Technological Sectors	Firms	X 1991	M 1991	Firms	X 1991	M 1991
Science Based	56	100	99.2	2	95	95.0
Supplier Dominated	164	100	99.2	34	100	98.6
Scale Intensive	34	100	98.3	1	100	100
Specialized Suppliers	25	100	99.7	3	100	98.3
TOTAL	**279**	**100**	**99.2**	**40**	**100.0**	**98.7**
Non-maquiladoras						
Technological Sectors	Firms	X 1991	M 1991	Firms	X 1991	M 1991
Science Based	22	89.0	72.8	7	95.1	34.6
Supplier Dominated	49	92.9	53.5	339	94.4	11.7
Scale Intensive	39	83.9	56.7	69	86.9	15.3
Specialized Suppliers	16	84.0	60.7	9	96.1	14.9
TOTAL	**126**	**87.6**	**58.3**	**408**	**93.4**	**13.0**

Source: PETYC- CIDE Project data. Based on ENESTYC 1992.

* Simple averages: raw materials to total inputs and exports to total sales by firm.

Table 17: TOTAL BALANCE OF PAYMENTS FOR TECHNOLOGICAL OPERATIONS OF FOREIGN AND NATIONAL FIRMS, 1993. (US$ MILL. AND %)

	BALANCE OF PAYMENTS WITH FOREIGN SUPPLIERS {1}	%	BALANCE OF PAYMENTS WITH DOMESTIC SUPPLIERS {2}	%	{1} + {2} {3}	%
FF	-16.750	70.2	1.885	49.8	-14.865	74.1
NF	-7.097	29.8	1.903	50.2	-5.194	25.9
ALL FIRMS	-23.848	100	3.788	100	-20.059	100

Source: CONACYT, Encuesta de Intercambio Tecnológico, 1997.

Table 18: TECHNOLOGICAL MARKET: REVENUES AND EXPENDITURES OF FOREIGN AND NATIONAL FIRMS, 1993 (US$ MILL. AND %))

	REVENUES	%	EXPENDITURES	%	TOTAL TRANSACTIONS	%
FF	4.108	59.8	18.973	70.5	23.081	68.3
WITH EXT.	1.740	25.3	18.491	68.7	20.231	59.9
WITH DOM.	2.368	34.5	0.482	1.8	2.850	8.4
NF	2.759	40.2	7.953	29.5	10.712	31.7
WITH EXT.	0.060	0.9	7.158	26.6	7.218	21.4
WITH DOM.	2.699	39.3	0.796	2.9	3.494	10.3
TOTAL	6.867	100	26.926	100	33.793	100
WITH EXT.	1.801	26.2	25.648	95.3	27.449	81.2
WITH DOM.	5.066	73.8	1.278	4.7	6.344	18.8

Source: CONACYT, Encuesta de Intercambio Tecnológico, 1997.

Table 15: INTRAFIRM TRADE IN GOODS BETWEEN US AND MEXICO, 1992.

INTRAFIRM TRADE IN GOODS BETWEEN US PARENT COMPANIES AND THEIR MAJORITY-OWNED FOREIGN AFFILIATES IN MEXICO, 1992.

	Millions of dollars				Percent			
	All Industries	Manufacturing	Wholesale Trade	Petroleum & Other Ind.	All Industries	Manufacturing	Wholesale Trade	Petroleum & Other Ind.
EXPORTS	10.098	9.335	672	89	100	92.5	6.7	0.9
IMPORTS	10.739	10.423	266	50	100	97.1	2.5	0.5

INTRAFIRM TRADE BETWEEN US AFFILIATES AND THEIR FOREIGN PARENT GROUPS IN MEXICO, 1992.

	Millions of dollars				Percent			
	All Industries	Manufacturing	Wholesale Trade	Petroleum & Other Ind.	All Industries	Manufacturing	Wholesale Trade	Petroleum & Other Ind.
EXPORTS	591	259	311	21	100	43.8	52.6	3.6
IMPORTS	1,470	342	1.099	29	100	23.3	74.8	2

US TRADE IN GOODS AND INTRAFIRM TRADE IN GOODS WITH MEXICO, 1992.

Millions of dollars					Percent				
	Intrafirm Exports					Intrafirm Exports			
TOTAL	Total	By US parent companies to their majority-owned foreign affiliates	By US affiliates to their foreign parent groups	Other Exports	TOTAL	Total	By US parent companies to their majority-owned foreign affiliates	By US affiliates to their foreign parent groups	Other Exports
40.592	10.687	10.096	591	29.905	100	26.3	24.9	1.5	73.3

Source: Survey of Current Business, February, 1997.

TaBLE 16: GROWTH OF IMPORT RATIOS* BY FIRMS

	FIRMS	*% M 1989**	*% M 1991**	*Variation 91-'89*
TOTAL	5071	27.2	30.9	3.7
FF	1005	46.2[a]	49.5[a]	3.3
NF	4066	15.7	19.6	3.9
FFexporter	405	70.9[b]	70[b]	-0.9
FFnon-exporter	600	39.1[c]	43.1[c]	4.0
NFexporter	464	16.6	19.1	2.6
NFnon-exporter	3602	15.6	19.6	4.0

Source: PETYC- CIDE Project data. Based on ENESTYC 1992.

* Weighted average: raw materials to total inputs.

[a] FF > NF accepted with 95% confidence.

[b] FFexporter > NFexporter accepted with 95% confidence.

[c] FFnon-exporter > NFnon-exporter accepted with 95% confidence.

TABLE 19 : INVESTMENT AND CAPITAL INTENSITY IN FOREIGN AND NATIONAL FIRMS. 1988-1993

CORTE	DESCRIPCIÓN	% K OF FF in Total			(K / L) OF FF			(K / L) OF NF		
		1988	1993	VARIATION	1988	1993	VARIATION	1988	1993	VARIATION
3	TOTAL MANUFACTURES	28.9	24.0	-4.9	136.4	82.2	-54.2	93.6	75.1	-18.5
31	FOOD, BEVERAGES AND TOBACCO	9.3	11.2	1.9	116.5	101.0	-15.5	65.2	63.0	-2.2
32	TEXTILES AND CLOTHING	15.3	13.8	-1.4	50.1	29.8	-20.3	34.0	29.7	-4.3
33	WOOD AND WOOD PRODUCTS	16.4	8.8	-7.6	53.5	27.7	-25.8	23.1	23.3	0.2
34	PAPER AND PRINTING	28.4	17.4	-10.9	187.8	204.5	16.7	68.7	91.4	22.7
35	CHEMICALS, RUBBER AND PLASTICS	13.6	21.5	7.9	158.3	121.7	-36.6	265.8	178.6	-87.2
36	NON-METALLIC MINERALS	23.9	13.6	-10.3	283.4	165.6	-117.7	106.8	117.6	10.9
37	BASIC METALS	51.1	49.6	-1.5	809.8	1399.1	589.3	330.0	272.3	-57.6
38	METAL PRODUCTS AND MACHINERY	55.7	37.0	-18.7	82.2	43.8	-38.4	54.1	58.9	4.8
39	OTHER MANUFACTURES	17.2	29.9	12.7	17.9	34.1	16.2	33.8	23.6	-10.2

SOURCE: PETYC-CIDE Project data. Based on INEGI 1997.

Table 20: REVENUES AND EXPENDITURES OF FOREIGN FIRMS BY TECHNOLOGICAL CONCEPTS WITH FOREIGN FIRMS, 1993 (US$ MILL.)

TECHNOLOGICAL SECTOR	PATENTS	INVENTIONS (NON-PAT.)	PATENT LICENCES	KNOW-HOW	INDUSTRIAL PROPERTY	TECHNICAL STUDIES AND CONSULTANCES	TECHNICAL ASSISTANCE	R&D	TOTAL
REVENUES									
SCIENCE BASED	0.140	0.000	0.800	0.002	0.034	0.000	0.191	0.000	1.166
SUPPLIER DOMINATED	0.000	0.000	0.000	0.008	0.126	0.017	0.044	0.007	0.202
SCALE INTENSIVE	0.020	0.000	0.000	0.086	0.108	0.000	0.021	0.000	0.234
SPECIALIZED SUPPLIERS	0.000	0.000	0.000	0.029	0.050	0.011	0.044	0.004	0.138
TOTAL	0.160	0.000	0.800	0.124	0.318	0.028	0.299	0.011	1.740
EXPENDITURES									
SCIENCE BASED	4.586	0.024	0.126	0.380	0.872	0.528	2.128	0.471	9.116
SUPPLIER DOMINATED	0.475	0.114	0.013	0.074	1.030	0.781	0.670	0.181	3.336
SCALE INTENSIVE	1.288	0.000	0.095	0.404	0.905	0.231	1.570	0.241	4.734
SPECIALIZED SUPPLIERS	0.267	0.000	0.112	0.105	0.377	0.046	0.342	0.055	1.305
TOTAL	6.617	0.138	0.346	0.962	3.184	1.585	4.710	0.948	18.491
BALANCE TOTAL	-6.457	-0.138	0.454	-0.839	-2.866	-1.557	-4.411	-0.937	-16.750

Source: CONACYT, Encuesta de Intercambio Tecnológico, 1997.

Table 21: FIRMS WITH RESEARCH AND DEVELOPMENT AND TECHNOLOGY TRANSFER IN 1991

ENESTYC	NUMBER OF FIRMS	WITH RESEARCH AND DEVELOPMENT #(%)	WITH TECHNOLOGY TRANSFER. #(%)	WITHOUT R&D AND WITHOUT TECHNOLOGY TRANSFER. #(%)
TOTAL	5071	1707(33.6)	2290(45.2)	2443(48.0)
FF	1005	398(39.6)	547(54.4)	392(39.0)
NF	4066	1309(32.2)	1743(42.9)	2044(50.3)
FF - EXPORTER	405	107(26.4)	249(61.5)	230(56.8)
FF - NON-EXPORTER	600	291(48.5)	388(64.7)	163(27.2)
NF - EXPORTER	464	102(22.0)	189(40.7)	254(54.7)
NF - NON-EXPORTER	3602	1182(32.8)	1554(43.1)	1790(49.7)

SOURCE: PETYC-CIDE Project data. Based on ENESTYC-92.

Table: 22: RESEARCH AND DEVELOPMENT AND TECHNOLOGY TRANSFER IN 1991

ENESTYC	*% RESEARCH AND DEVELOPMENT IN 1991**	*% TECHNOLOGY TRANSFER IN 1991**
TOTAL	0.63	3.09
FF	0.57	2.83
NF	0.68	3.28
FF - EXPORTER	0.31	1.88
FF - NON-EXPORTER	0.69	3.26
NF - EXPORTER	0.30	1.57
NF - NON-EXPORTER	0.73	3.51

*.- Weighted averages: R&D and Technology Transfer to Total Revenue.
SOURCE: PETYC-CIDE Project data. Based on ENESTYC-92.

Table 23: RESEARCH AND DEVELOPMENT IN 1989 AND 1991. VARIATION

ENESTYC	*% R&D 1989**	*% R&D 1991**	*VARIATION 1991-1989*
TOTAL	0.52	0.63	0.11
FF	0.49	0.57	0.08
NF	0.54	0.68	0.14
FF - EXPORTER	0.18	0.31	0.13
FF - NON-EXPORTER	0.66	0.69	0.03
NF - EXPORTER	0.19	0.30	0.11
NF - NON-EXPORTER	0.59	0.73	0.14

*.- Weighted averages: R&D to Total Revenue.
SOURCE: PETYC-CIDE Project data. Based on ENESTYC-92.

Table 24: TECHNOLOGY TRANSFER IN 1989 AND 1991. VARIATION

ENESTYC	*% TECHNOLOGY TRANSFER 1989**	*% TECHNOLOGY TRANSFER 1991**	*VARIATION 1991-1989*
TOTAL	2.47	3.09	0.62
FF	2.55	2.83	0.28
NF	2.42	3.28	0.86
FF - EXPORTER	1.38	1.88	0.50
FF - NON-EXPORTER	3.20	3.26	0.06
NF - EXPORTER	1.20	1.57	0.37
NF - NON-EXPORTER	2.59	3.51	0.92

*.- Weighted averages: Technology Transfer to Total Revenue.
SOURCE: PETYC-CIDE Project data. Based on ENESTYC-92.

Table 25: NUMBER OF FIRMS THAT CONTRACTED OR SOLD TECHNOLOGY WITH NATIONAL AND FOREIGN FIRMS IN 1993

		WITH FOREIGN FIRMS		WITH DOMESTIC FIRMS		NO TECH.
FOREIGN FIRMS (FF)	SAMPLE	ACQUIRING	SELLING	ACQUIRING	SELLING	OPERATS.
TOTAL FF	(132)	(106)	(17)	(12)	(34)	(10)
PATENTS		27	2	1	4	
INVENTIONS (NON-PAT.)		2	0	0	1	
PATENT LICENCES		11	1	0	0	
KNOW HOW		24	4	3	6	
INDUSTRIAL PROPERTY		79	12	8	24	
TECHNICAL STUDIES		50	3	3	4	
TECHNICAL ASSISTANCE		94	9	5	17	
R&D		46	2	4	4	
		WITH FOREIGN FIRMS		WITH DOMESTIC FIRMS		NO TECH.
NATIONAL FIRMS (NF)	SAMPLE	ACQUIRING	SELLING	ACQUIRING	SELLING	OPERATS.
TOTAL NF	(99)	(34)	(3)	(44)	(31)	(19)
PATENTS		6	0	1	5	
INVENTIONS (NON-PAT.)		0	0	1	0	
PATENT LICENCES		2	0	1	0	
KNOW HOW		10	1	7	2	
INDUSTRIAL PROPERTY		13	2	25	17	
TECHNICAL STUDIES		5	0	13	2	
TECHNICAL ASSISTANCE		24	1	21	18	
R&D		4	0	5	2	
TOTAL	(231)	(140)	(20)	(56)	(65)	(29)

Source: CONACYT, Encuesta de Intercambio Tecnológico, 1997.

Table 26: BALANCE OF PAYMENTS BY TECHNOLOGICAL CONCEPTS WITH ROREIGN FIRMS, 1993 (US$ MILL.)

TECHNOLOGICAL SECTOR	PATENTS	INVENTIONS (NON-PAT.)	PATENT LICENCES	KNOW-HOW	INDUSTRIAL PROPERTY	TECHNICAL STUDIES AND CONSULTANCES	TECHNICAL ASSISTANCE	R&D	TOTAL
FF									
SCIENCE BASED	-4.446	-0.024	0.674	-0.378	-0.838	-0.528	-1.938	-0.471	-7.950
SUPPLIER DOMINATED	-0.475	-0.114	-0.013	-0.066	-0.903	-0.764	-0.626	-0.174	-3.134
SCALE INTENSIVE	-1.268	0.000	-0.095	-0.318	-0.797	-0.231	-1.549	-0.241	-4.500
SPECIALIZED SUPPLIERS	-0.267	0.000	-0.112	-0.076	-0.372	-0.035	-0.298	-0.051	-1.167
TOTAL	-6.457	-0.138	0.454	-0.839	-2.866	-1.557	-4.411	-0.937	-16.750
NF									
SCIENCE BASED	-0.269	0.000	0.000	-0.276	-0.201	-0.307	-0.998	-0.118	-2.168
SUPPLIER DOMINATED	-0.464	0.000	-0.020	-0.164	-0.548	0.000	-1.188	-0.003	-2.387
SCALE INTENSIVE	-0.099	0.000	-0.013	-0.007	0.004	-0.008	-2.330	0.000	-2.452
SPECIALIZED SUPPLIERS	0.000	0.000	0.000	0.000	-0.003	-0.004	-0.083	0.000	-0.091
TOTAL	-0.832	0.000	-0.033	-0.447	-0.748	-0.319	-4.599	-0.121	-7.097

Source: CONACYT, Encuesta de Intercambio Tecnológico, 1997.

Table 27: BALANCE OF PAYMENTS BY TECHNOLOGICAL CONCEPTS WITH DOMESTIC FIRMS, 1993 (US$ MILL.)

TECHNOLOGICAL SECTOR	PATENTS	INVENTIONS (NON-PAT.)	PATENT LICENCIES	KNOW-HOW	INDUSTRIAL PROPERTY	TECHNICAL STUDIES AND CONSULTANCES	TECHNICAL ASSISTANCE	R&D	TOTAL
FF									
SCIENCE BASED	0.012	0.098	0.000	0.000	0.067	0.005	0.186	-0.005	0.363
SUPPLIER DOMINATED	0.014	0.000	0.000	0.159	0.134	-0.009	0.278	-0.004	0.572
SCALE INTENSIVE	-0.056	0.000	0.000	0.255	0.190	-0.095	0.272	0.020	0.777
SPECIALIZED SUPPLIERS	0.000	0.000	0.000	0.000	-0.001	-0.003	0.174	0.004	0.174
TOTAL	-0.030	0.098	0.000	0.414	0.390	0.088	0.910	0.015	1.885
NF									
SCIENCE BASED	0.000	0.000	0.000	0.046	0.087	0.000	0.498	0.000	0.631
SUPPLIER DOMINATED	0.030	0.000	-0.002	-0.001	0.034	-0.029	-0.023	0.004	0.014
SCALE INTENSIVE	0.012	-0.012	0.000	-0.030	1.137	0.067	0.165	0.057	1.397
SPECIALIZED SUPPLIERS	0.000	0.000	0.000	0.000	-0.059	-0.006	-0.068	-0.004	-0.137
TOTAL	0.042	-0.012	-0.002	0.016	1.199	0.032	0.572	0.057	1.903

Source: CONACYT, Encuesta de Intercambio Tecnológico, 1997.

Table 28: GROWTH OF EXPORT RATIOS* AND NEW MACHINERY AND EQUIPMENT

		Acquired M&E		Type of M&E		Acquired	
	Total	No	Yes	Modern	Old vintage	New	2nd.Hand
Firms	-2.3	-4.6	-1.2	-0.9	-1.7	-1.1	-1.5
Foreing Firms							
FF	-0.9	-2.4	-0.5	-0.6	-0.3	-1.2	0.8
FF exporter	0.3	1.2	0.1	0.2	0.1	-0.6	1.0
FF non-exporter	-1.6	-4.5	-0.9	-1.1	-0.6	-1.5	0.5
National Firms							
NF	-2.6	-4.9	-1.4	-1.1	-2.0	-1.0	-2.3
NF exporter	2.6	2.4	2.8	3.6	2.2	3.4	1.7
NF non-exporter	-3.3	-6.0	-1.9	-1.5	-2.7	-1.6	-3.0

Source: PETYC- CIDE Project data. Based on ENESTYC 1992.
*Growth is the difference in export ratios of 1989 and 1991

Table 29: GROWTH OF IMPORT RATIOS* AND NEW MACHINERY AND EQUIPMENT

		Acquired M&E		Type of M&E		Acquired	
	Total	No	Yes	Modern	Old vintage	New	2nd.Hand
Firms	2.4	2.2	2.5	2.5	2.4	2.4	2.6
Foreing Firms							
FF	2.7	3.6	2.5	0.2	2.7	2.0	3.3
FF exporter	1.6	1.6	1.6	1.4	1.9	1.0	2.2
FF non-exporter	3.4	4.8	3.1	2.9	3.4	2.5	4.6
National Firms							
NF	2.3	2.0	2.5	2.5	2.4	2.6	2.3
NF exporter	2.8	1.5	3.5	3.5	3.6	3.0	4.5
NF non-exporter	2.3	2.0	2.4	2.5	2.3	2.5	2.0

Source: PETYC- CIDE Project data. Based on ENESTYC 1992.
*Growht is the difference in import ratios of 1989 and 1991

Table 30: BALANCE OF TRADE IN HIGH TECHNOLOGY PRODUCTS

TYPE	TRADE BALANCE (US MILLION DOLLARS)			
	1993	1994	1995	1996
DEFINITIVE	-3,502.8	-4,871.6	-2,737.1	-5,136.3
MAQUILA	1,154.0	1,260.0	2,194.0	2,326.5
TEMPORARY	560.2	712.3	813.8	2,178.6
TOTAL	-1,788.7	-2,899.3	270.7	-631.1

TYPE OF EXPORTS	COVERAGE RATIOS(X/M)			
	1993	1994	1995	1996
DEFINITIVE	0.10	0.10	0.23	0.18
MAQUILA	1.66	1.50	1.63	1.36
TEMPORARY	2.40	2.34	2.31	2.51
TOTAL	0.70	0.66	1.04	0.95

Source: Based on SECOFI and CONACYT.

Table 31: TRADE IN HIGH TECHNOLOGY PRODUCTS, 1993-1996

EXPORTS

DESCRIPTION	1993		1994		1995		1996	
	$	%	$	%	$	%	$	%
DEFINITIVE	393.2	9.2	513.1	9.3	812.9	10.3	1,156.5	8.5
MAQUILA	2,897.1	68.1	3,760.9	68.1	5,654.1	71.5	8,784.0	64.8
TEMPORARY	961.2	22.6	1,245.1	22.6	1,435.5	18.2	3,620.4	26.7
TOTAL	4,251.5	100.0	5,519.2	100.0	7,902.5	100.0	13,560.9	100.0

IMPORTS

DESCRIPTION	1993		1994		1995		1996	
	$	%	$	%	$	%	$	%
DEFINITIVE	3,896.0	64.5	5,384.7	64.0	3,550.0	46.5	6,292.8	44.3
MAQUILA	1,743.1	28.9	2,500.9	29.7	3,460.0	45.3	6,457.4	45.5
TEMPORARY	401.0	6.6	532.8	6.3	621.7	8.1	1,441.8	10.2
TOTAL	6,040.2	100.0	8,418.4	100.0	7,631.8	100.0	14,192.0	100.0

US$ Millions. Source: Based on SECOFI and CONACYT.

Table 32: EXPORTS OF HIGH TECHNOLOGY PRODUCTS, 1993-1996.

DEFINITIVE

TECHNOLOGICAL SECTORS	TOTAL VALUE			
	1993	1994	1995	1996
SCIENCE BASED	191.4	283.9	428.4	891.4
SUPPLIER DOMINATED	6.3	13.4	26.2	20.1
SCALE INTENSIVE	13.6	1.3	5.1	3.4
SPECIALIZED SUPPLIERS	181.9	214.5	353.2	241.5
TOTAL	393.2	513.1	812.9	1,156.5

MAQUILA

TECHNOLOGICAL SECTORS	TOTAL VALUE			
	1993	1994	1995	1996
SCIENCE BASED	1,508.9	1,908.8	2,586.6	5,463.0
SUPPLIER DOMINATED	380.7	499.4	781.7	625.8
SCALE INTENSIVE	222.6	348.5	511.1	460.9
SPECIALIZED SUPPLIERS	784.9	1,004.6	1,774.7	2,234.2
TOTAL	2,897.1	3,760.9	5,654.1	8,784.0

TEMPORARY

TECHNOLOGICAL SECTORS	TOTAL VALUE			
	1993	1994	1995	1996
SCIENCE BASED	637.3	822.2	976.6	2,904.2
SUPPLIER DOMINATED	16.9	19.4	38.6	89.1
SCALE INTENSIVE	4.8	11.9	48.9	82.3
SPECIALIZED SUPPLIERS	302.3	391.6	371.4	544.8
TOTAL	961.2	1,245.1	1,435.5	3,620.4

TOTAL

TECHNOLOGICAL SECTORS	TOTAL VALUE			
	1993	1994	1995	1996
SCIENCE BASED	2,337.5	3,014.6	3,991.6	9,258.7
SUPPLIER DOMINATED	403.9	532.2	846.4	735.1
SCALE INTENSIVE	241.0	361.6	565.1	546.7
SPECIALIZED SUPPLIERS	1,269.1	1,610.7	2,499.4	3,020.5
TOTAL	4,251.5	5,519.2	7,902.5	13,560.9

US$ Millions. Source: Based on SECOFI and CONACYT.

Table 33: WORLD EXPORTS DYNAMISM AND FDI IN MANUFACTURES IN MEXICO

SECTOR	Shares of Various Commodities in Total World Exports of Manufactures (%) 1929	1989	Rates of Growth in World Exports '80-'89 (% annual incr.)	FDI 1994-96 (US$ million)	FDI 1994-00 (US$ million)
3 Manufacturing	100	100	8	6256.1	13240.1
31 Food			3	979	2144
32 Textiles and clothing	29	9		335	518
3211 Textiles			6		
3220 Clothing			10		
33 Wood Products					
34 Editorial				115	115
35 Chemical and Oil Prod	9	13		984	3094
3511 Fuels			-5		
3512 Chemicals			7		
36 Mineral Products					
37Basic Metal Industries	38	27			
3710 Iron and Steel					
3720 Ores, minerals, non-ferrous metals			4		
38 Machinery and equip.			8	3704.1	7230.1
381 Metal Products				19	19
382 Electronic Equipm.				698.1	2418.1
	(14)	(36)	(13)		
383 Radio & tv Equipm.				35	35
384 Automotive Equip.	10	15	9	2987	3793

Source: For cols. 1-3: Dosi, Freeman and Fabiani, 1994. For cols. 4-5: Comercio Exterior May 1994; Expansion Feb 26 1996.

Table 34: MAIN FDI PROJECTS IN MEXICO,1994

SECTOR	FIRM	FDI (US$ million)	PROJECT
3 MANUFACTURING		(3440)	
31 FOOD		(277)	
	CocaCola-Femsa	195	Beverages
	Sara Lee-Kir	34	Meat processing
	J.Holding-Jugos del Valle	30	Beverages
	Campofrio	18	Meat processing
32 TEXTILES		(315)	
	Cone Mills	150	Jeans
	Sara Lee	155	Cotton
	Warnaco	10	Clothing
34 EDITORIAL		(20)	
	Mexican Business Publishing	20	Printing
35 CHEMICALS AND FARMACEUTICS		(299)	
	PMI-Holdings	139	Fuels trade
	Hoechst-Celanese	80	Chemical products
	PPG	40	Automotive paints
	BASF	10	Plant reconstruction
	Bayer	30	Drugs
38 AUTOMOTIVE EQUIPMENT		(2529)	
	Chrysler	577	Automotive Plant
	General Motors	316	Automotive Plant
	Nissan	315	Automotive Plant
	BMW	176	Automotive Plant
	Ford	155	Plant restructuring
	Honda	70	Automotive Plant
	Components Suppliers	920	Automotive parts
4 CONSTRUCTION	Apasco	140	Cement
9 SERVICES		(2542)	
	IUSA-Bell Atlantic	1000	Celular telephones
	Reichmann-Soros	1000	Real estate
	Aoki	150	Tourism
	Hilton	80	Tourism
	General Electric	75	Finance capital
	Sabritas	52	Restaurants
	Club Robinson	50	Tourism
	Four Seasons	40	Tourism
	Huarte	36	Construction
	Club Med	35	Tourism
	Lan Cop USA	24	Real estate
TOTAL		6122	

Source: Comercio Exterior, Mayo 1994, p.320. These are projected figures by SECOFI.

Table 35: MAIN FDI PROJECTS IN MEXICO: 1995 and 1996.

SECTOR	FIRM	CAPITAL	FDI(US$mill) 1995	FDI(US$mill) 1996	PROJECT
3 Manufactures			{144}	{2672}	
31 Food,	Grupo IAT	Chile	0	534	Stock at Del Monte
Beverages &	Unimark	US	0	8	Juices
Tobacco	Danone	France	0	40*	Milk Products
	Coca Cola	US	0	80*	New Plant
	Pilgrim's Pride	US	0	40*	Poultry
32 Textiles, Foot-	Ropa de Ciénega	US	0	10	Enlargement of Plant
wear & Leather P	California Connection	US	0	10	Enlargement of Plant
33 Wood Prod.	Master Mill Work	US	0	1	Wood Doors
34 Editorial	Kimberly-Clark	US	0	20	Industrial Paper
	International Paper	US	0	75*	Textiles implements
35 Chemical &	BDF	Germany	0	30	Enlargement of Plant
Oil Prod.	Bayer	Germany	0	190	New Plant
	Lakeside	Germany	0	20	New Plant
	La Paz Farmacéutica	US	0	1	Pastes
	Colgate-Palmolive	US	0	86*	New Plant
	Boehringer Ingelheim	Germany	0	58*	New Plant
	Dupont	US	0	70*	Enviromental Techn.
	Amoco Oil Co.	US	0	70*	Fuels
	BASF	Germany	0	41*	Polyethilene Plant
	Standard Prod.	US	0	19*	New Plant
	Sekuriti Saint Gobain	France	50	50	New Plant
36 Non-metal	Vidrieros de Levante	Spain	0	2	Glass
Minerals	Vidrion Sekurit Saint-Gobain	France	0	102	New Plant
37 Basical Metals	National Castings Inc	US	0	16	Bought Sidena Group
	Indiana Cash Drawer	US	0	10	New Plant
	Comp. Franco-Mex.	France	0	11	JV with Tamsa
38 Machinery and Equipment					
381Metal Prod.	Luminex	Colombia	5	5	New Plant
	Kitz Co.	Japan	11	0	Plant for valves
382 Electronic	Monetel	France	50	0	Public Telephones
Equipment	Ericcson Teleindustry	Sweden	13	0	Incr.part.in subsidiary
	Daewoo Electronics	Corea	0	480	2 New Plants
	Electrolux	Sweden	0	5	New Plant
	White Westinghouse	US	0	30	New Plant
	Hewlett-Packard	US	0	50	Distribution Center
	Hi-P Tol and Die	Singapur	0	5	Plastical Compon.
	IBM	US	0	65	Enlargement of Plant
384 Automotive	General Motors	US	9	9	Automotive Plant
Equipment	Mercedes Benz	Germany	0	11	New products
	Calsonic Co.	Japan	0	46	Automotive Parts
	Donalson	US	0	4	Automotive Parts
	Fiat	Italy	0	113	Automotive Parts
	Resortes Monticello	US	0	6.5	Automotive Parts
	Sistemas de Arneces	Japan	0	9	Automotive Parts
	Tachi-S	Japan	0	5	Automotive Parts
	John Deere	US	0	100	New Plant
	Honda Motor	Japan	0	50*	Automotive Plant
	Porsche AG	Germany	0	15*	Assembly and trade
	Nihon Plastic	Japan	0	7*	Autoparts
	Oshima y Mitsuma El.	Japan	0	20*	Autoparts
	Siemens	Germany	0	18	Plant for autoparts
	Yamakawa Ind.	Japan	0	27	Plant for autoparts

cont. Table 35

SECTOR	FIRM	CAPITAL	FDI(US$mill) 1995	FDI(US$mill) 1996	PROJECT
2 MINNING			{44.5}	{5.5}	
	Tek Resource	US,Canada	34.5	0	Gold and Silver Expl.
	AMMJ	Japan	10	0	Minning Exploration
	Echo Bay	Canada	0	5.5	Gold and Silver Expl.
6 COMERCE			{25}	{370}	
	JC Penney	US	10	10	Opening subsidiary
	Kodak	US	15	22	Enlargement of Plant
	Carrefour	France	0	68	Stores
	Sears Roebuck	US	0	25	Enlargement of Plant
	Wall-Mart Stores	US	0	140	New Stores
	MDC	US	0	0.5	New Plant
	HEB	US	0	7°	New Plant
	Despar	Italy	0	12°	Selling food products
	Xerox	US	0	25°	Fdi in prod. projects
	GTE data serv.	US	0	30°	Computer center
	IBM	US	0	20°	Portable computers
9 SERVICES			{65}	{1847}	
Insurance	Aetna	US	0	49	JV with Bancomer
	Hicks, Muse & Furst Inc and Travelers Gr.	US	0	153	JV with Asemex
	AIG	US	0	25°	JV with Interamericana
	Pioneer Seg. Especial.	US	0	10°	Insurance (for 3rd.age)
Construction	Archer Daniel Midland	US	0	150	JV with Maseca
Enviroment	Northumbrian Water G.	England	0	24°	Drinking water distrib.
Entretainment	Blockbuster	US	0	35	Opening 300 stores
Hotelery	Allegro Resorts	England	0	200	New Hotels
	Cabo Real Desarrollo	US	0	50	Hotel
	Desarrollo Cabo del Sol	US	0	55	Hotel
	Desarrollo Palmilla	US	0	25	Hotel
	Host Marriot	US	0	120	JV with Situr Group
	La Concha Beach Resort & Condos	US	0	11	Enlargement of Hotel
Petroleum, Gas & Energy	San Diego Gas	US	0	20	JV with Próxima
	Calpine	US	0	18.5°	Energy project
Banking	AFP Habitat & Citibank	Chile & US	0	100	JV with Serfin
	Banco Bilbao-Vizcaya	Spain	0	21.6	JV with Banca Cremi
	Banco Santander	Spain	0	166	JV with Inverméxico
	Bank of Montreal	Canada	0	450	JV with Bancomer
	Bank of Nova Scotia	Canada	0	175	JV with Inverlat
Communications	AT&T	US	30	0	Enlargement of Plant
	Motorola	US	35	35	Bought a mexican firm
	Hicks, Muse & Tate	US	0	50°	Stock at Acir's Group
Laundry	Continental Colors	US	0	4°	New Plant
TOTAL			{278.6}	{4894.5}	

Note: ° Projections in 1995 for the next year.
Source: Expansión, various issues.

Table 36: MAIN FDI PROJECTS FOR THE LONG RUN IN MEXICO: 1997 AND AFTER.

SECTOR	FIRM	CAPITAL	FDI(US$mill)	PERIOD	PROJECT
3 Manufactures			(6984)		
31 Food,	Miller Milling	US	15	1997	Food
Beverages &	Coca Cola	US	460	1997-98	New Plant
Tobacco	Pepsi Co.	US	450	1997-2000	New Plant
	DNA Plant Tecn. Co.	US	40	1997-2000	New Plant
	Phillip Morris	US	200	Long Run	Food Production
32 Textiles, Foot-	Continental Colors	US	2.6	1997-2000	New Plant
wear & Leather	Chem-Tex	US	60	1997	New Plant
Products	Nien Hsieng	Taiwan	120	1997-2000	New Plants
35 Chemical &	Hoechst Trespaphan	Germany	70	1997-2000	New Plant
Oil Prod.	Nova y Noranda	Canada	2000	Long Run	JV with PEMEX
37 Basical Metals	Phelps Dodge Mag-				
	net Wire Co.	US	42	1997	New Plant
38 Machinery and					
Equipment					
382 Electronic	General Instruments	US	250	Long Run	New Plant
Equipment	Daewoo Electronics	Corea	270	1997-2000	New Plant
	Flecstronic	Singapur	50	1997	Computer Parts
	Natsoll Electronic	Singapur	10	1997	Computer Parts
	Orion	Corea	180	1997-2000	New Plant
	Phillips	Nederlands	300	1997	New Plant
	Samsung-Corning	Corea-US	250	1997-2000	Tv and Computers
	Texas Instruments	US	9.4	1997	Electronical Parts
	General Electric	US	400	Long Run	New Plant
384 Automotive	BMW	Germany	170	Long Run	Automotive Pord.
Equipment	Ford Motor Co.	US	450	Long Run	New line of product.
	Chrysler	US	180	Long Run	New Plant for prints
	Navistar International	US	200	1997-99	Enlargement of Plant
	Volkswagen	Germany	500	Long Run	Enlargement of Plant
	Standard Prod.	US	6.5	1997	Automotive Parts
	Nissan	Japan	300	Long Run	Prod. of New Models
2 MINNING			(350)		
	Curator	Canada	350	Long Run	Reserves Exploring
5 COMERCE			(2082)		
	Amaco Oil Co.	US	150	Long Run	Gas Stations
	GTE data service	US	200	1997-2000	Compute Center
	Reichmann Internat.	Canada	1100	Long Run	Enlargement of malls
	Wall-Mart Store	US	500	Long Run	3 New Stores
	Kodak	US	116	1997	Photography
	Polaroid	US	10	1997	New Plant
	Xerox	US	6	1997	Enlargement of Plant
9 SERVICES			(1121)		
Insurance	AEGON	Nederlands	167	Long Run	JV with Banamex
	ING	Nederlands	140	1996-2000	New Offices
Construction	Boskallis	Nederlands	765	Long Run	JV with Gpo. Protexa
	Capital Alliance				
	Corporation	US	500	Long Run	Hotels
	Inversiones MyS	Peru	200	1997-2000	JV with Grupo
	Trans Canada Pipe	Canada	1,000	Long Run	Gas Distribution
Electricity and					
Water	Central and South				New Plant for
	West Corporation	US	550	Long Run	electric energy
	Groupe Géneral Des				
	Eaux	France	5	1997	Water Treatment
Entretainment	Blockbuster	US	160	1997-2000	41 New Video Stores
	United Artists	US	30	1997	Cineclubs
Hotelery	Viaggi D'Ventaglio	Italy	16	1997	New Hotel
Restaurants	The Palm Restaurant	US	10	Long Run	5 Restaurants
	Mc.Donald's	US	200	1997-2000	Food
Petroleum & Gas	Conoco & Hunter	US-Canada	100	Long Run	Natural Gas Camp
	Natural Gas Clering-				
	house	US	50	1997-2000	Gas distribution
			3893		
TOTAL			(9537)		

Source: Expansión, Various issues.

Table 37: R&D AND TECHNOLOGY TRANSFER IN 1991.

ENESTYC	*% RESEARCH AND DEVELOPMENT IN 1991**	*% TECHNOLOGY TRANSFER IN 1991**	*CORRELATION COEFFICIENT BETWEEN %I&D AND %T.TEC. (1991)***
TOTAL	0.71	2.95	0.28
FF	0.74[a]	2.88[b]	0.37
NF	0.70	2.97	0.27
FF - EXPORTER	0.72[c,d]	2.76[c,e]	0.46
FF - NON-EXPORTER	0.76[f]	2.96	0.26
NF - EXPORTER	0.68	3.10	0.28
NF - NON-EXPORTER	0.71	2.95	0.27

*.- Simple averages: R&D and Technology Transfer to Total Revenue.

** .- Statistical significance with 95% confidence

[a] FF > NF accepted with 95% confidence

[b] FF < NF accepted with 95% confidence

[c] FF EXPORTER < FF NON-EXPORTER accepted with 95% confidence

[d] FF EXPORTER > NF EXPORTER accepted with 95% confidence.

[e] FF EXPORTER < NF EXPORTER accepted with 95% confidence.

[f] FF NON-EXPORTER > NF NON-EXPORTER accepted with 95% confidence.

Table 38: IMPORTS AS A PROPORTION OF TOTAL SUPPLY. 1988-1993

TECHNOLOGICAL SECTORS	TOTAL IMPORTS 1993 [a]	M/ (M+GDP)	
		IN 1993	VARIATION (1993-1988)
SCIENCE BASED	8,863.6	0.37	0.30
SUPPLIER DOMINATED	21,998.5	0.23	0.18
SCALE INTENSIVE	24,547.0	0.24	0.19
SPECIALIZED SUPPLIERS	7,419.9	0.66	0.42
TOTAL	62,828.9	0.27	0.21

[a] Millions of Dollars

SOURCE: PETYC-CIDE Project data. Based on SECOFI 1997.

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