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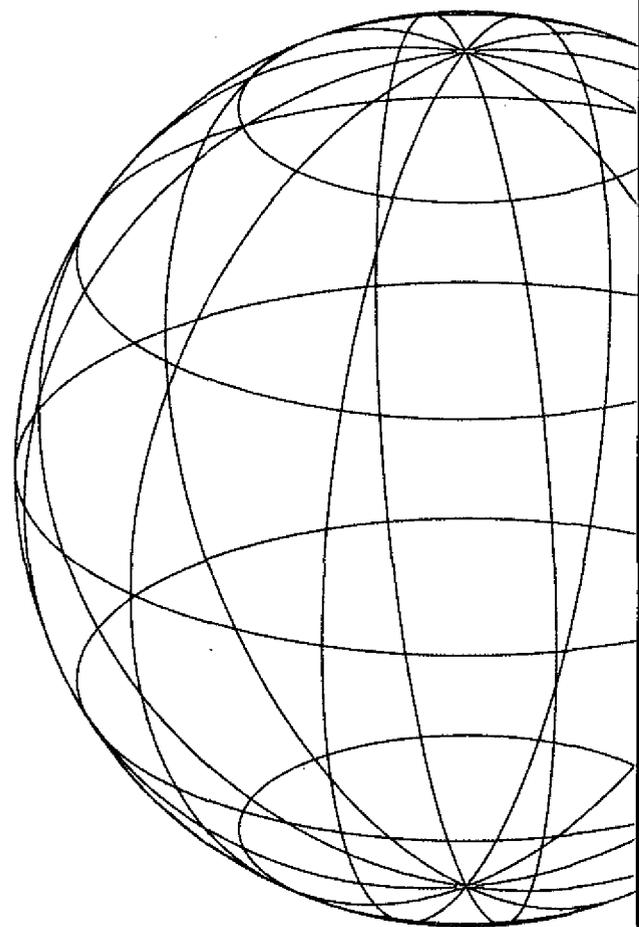
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Productivity
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Country Case Studies

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Country Case Studies

Mexico

Enrique Hernández Laos



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna, 2005

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Executive Summary

Productivity trends and swings

This report presents different estimates of the productivity trends of the Mexican economy over a period of more than forty years (1960-2002), both for the economy as a whole and for different sectors and levels of aggregation. The analysis distinguishes between three main periods. The first period covers from 1960 to 1981, which is broadly characterized by predominantly inward orientation of the economy due to an import substitution industrialization strategy (ISI). The second period covers the years 1982-1987, a time of severe and repetitive economic crises and transition from inward-oriented to outward-looking economic policies. The third period runs from 1988 to 2002, during which time the economy – more open, both commercially and financially - tried to resume economic growth by expanding the export sector.

Several estimates of productivity trends and swings – both labour productivity and Total Factor Productivity (TFP) - are used for the analysis. Overall, the different labour productivity measures show relatively similar long run trends and swings along the three periods under consideration. These ranged from a sustained increase of 3.2 percent per year between 1961 and 1981 – the ISI period – to a contraction of between -0.2 and -4.0 percent during the crisis period of 1982-1987. Finally, there was a slow recovery of between 0.3 and 1.1 percent annually, on average, over the last fifteen years.

In terms of TFP performance and despite differences in both the methods applied and the statistical sources, the estimates yield very disappointing results. Even during the rapid economic growth of the ISI period, TFP grew either relatively slowly at a rate of 1.1 percent per year or even at a negative rate of between -0.4 and -0.7 percent. Throughout the crisis period, all estimates show a systematic collapse of TFP standards, followed by a negative total factor productivity growth between 1988 and 2002. The estimates of TFP growth, broken down according to (pure) technical change and efficiency performance (Malmquist method), indicate a disappointing trend in the latter, despite favourable results in terms of technical change during the past decade. Sectoral disaggregation of productivity indices tends to back up these trends, revealing that the opening of the economy favoured the expansion of TFP in the traded sectors, mainly in manufacturing. Advances in (pure) technical change were paralleled by sizable reductions in efficiency standards even in the Mexican manufacturing sector.

An analysis of the effects of sectoral reallocation of resources on productivity performance suggest that those effects were positive in the ISI period, but zero or negative since the opening of the economy in the late 1980s. Finally, a comparison is made between the Mexican productivity performance and that of the US. By using a recursive regression technique, it emerged that Mexican labour productivity levels followed a dual path vis-à-vis those of the US: a convergent path from 1960 to 1981, followed by a divergent one between 1982 and 2002. TFP *levels* were measured in both countries and the results suggest a systematic trend towards divergence in a long run context. These trends only confirm the awkward panorama facing the Mexican economy in terms of productivity and technological efficiency, given that the divergent path continues up to the present day.

Major determinants of productivity performance

Several issues are examined as factors behind the productivity performance in Mexico as outlined above: a) macroeconomic performance, b) the role of demand growth c) effects of factor accumulation, d) technical development and knowledge absorption, e) factor market functioning, and f) several social and institutional constraints to long run productivity development.

Macroeconomic performance

Macroeconomic management changed dramatically over the last five decades. In general terms the 1950s and 1960s were years of sound monetary and fiscal policies, while the 1970s – and especially the 1980s - were decades of severe macroeconomic instability and serious internal and external imbalances. The 1990s were years of a return to a certain level macro-stability, in spite of the *tequila* crisis of 1995.

The greater macroeconomic instability after the mid-1970s is likely to have negatively affected productivity growth through several channels. The increased “noise” component in price signals led to resource misallocation, the higher risks generated less investment, thus reducing factor accumulation and greater uncertainty may have redirected investment towards less productive assets. There is also clear evidence of macro-economic policy manipulation for political purposes – a further hindrance to productivity performance. Between 1982 and 1987, the economy followed the normal responses typically associated with recessions that explain the productivity collapse of those years. As will emerge later on, the structural reforms implemented from the mid-1980s to the mid-1990s aimed at increasing productivity and efficiency in the Mexican economy. However, in the 1990s, investment remained sluggish and TFP barely recovered, with the exception of the Mexican manufacturing sector. It is clear, therefore, that other systemic causes more structural in nature were behind the slow productivity improvement after 1988.

Effects of demand growth on productivity performance

Demand growth is a determinant of productivity expansion. With the aid of data available, an econometric exercise was attempted to “explain” both labour productivity and TFP rates of growth as a function of rates of growth in total final demand components.

In relation to the long run growth of labour productivity, there is no doubt of the positive effect of domestic final demand expansion on productivity growth, although no significant association was established with export growth in this context. Market expansion due to import substitution policies also had a negligible statistical impact on labour productivity performance.

In the case of long run TFP growth, only the expansion of private consumption of industrial products appears to have been positively and significantly associated with TFP rates of growth. The correlation is not statistically significant in the case of exports. This result also confirms the negative effect of import substitution demand growth on TFP growth rates and shows a negative association of TFP growth with the opening of the economy, compared to the phase of greater inward-orientation in Mexico during the ISI period. This is consistent

with the findings of several specialized studies on Mexico and other developing countries, which all suggest that this association only applied to the manufacturing sector. The repercussions on the economy-wide productivity performance were, however, statistically insignificant because of the limited linkages of the export sector with the rest of the economy.

Physical and human capital accumulation

Mexico's long-term productivity performance has been affected both by demand and supply factors, especially in terms of the accumulation of physical and human capital. Empirical estimates clearly demonstrate the importance of physical capital accumulation for the relatively dynamic labour productivity growth during the 1960s and the 1970s. By contrast, the crisis years of the 1980s witnessed a marked interruption in the accumulation of capital per worker, thus contributing to the productivity collapse in the economy. During the late 1980s and the 1990s, capital accumulation partially recovered, facilitating only a partial recovery of labour productivity growth.

Accumulation of capital also affected TFP growth. Firstly, physical capital accumulates through investment flows, increasing not only productive capacity but also augmenting the economy's capacity for knowledge absorption and technological improvements. Secondly, investment permits the introduction of "best practice" production techniques and, accordingly, its interruption contributes to the ageing and obsolescence of capital stock and has a negative impact on TFP growth. Thirdly, if public capital were complementary to private capital, increases in public investment would render private capital more productive. Finally, private capital accumulation affects TFP growth, depending on the sectoral orientation of the investment expenditures: when diverted towards the export sector, it limits TFP increases when the sector is of an *enclave* type as is the case in the Mexican economy.

The investment rate in the economy increased in the 1960s and 1970s, fell drastically in the 1980s and only partially recovered throughout the 1990s. By the turn of the century, the Mexican investment ratio was still far below its peak level of twenty years previously. Moreover, there is evidence that delays in the investment process contributed to the growing obsolescence of the Mexican capital stock and probably might have interrupted the acquisition of new technology in the 1980s. There are also clear indications of a severe reduction in public investment, an ongoing trend in Mexico, and evidence to suggest that this has had an extremely negative statistical impact on TFP growth. The contraction in public investment reduction as a percentage of GDP was only partially offset by a modest increase in FDI which was largely limited to the acquisition of export manufacturing enterprises, probably reducing the ICOR of the overall economy due to its *enclave* nature. All these trends most probably contributed to the poor productivity performance since the outbreak of the crisis in the early 1980s.

The other determinant of productivity growth that accumulates over time is human capital. Educational attainment levels increased rapidly in Mexico between 1960s and late 1990s. These trends partially changed the educational profile of the Mexican population. However, the lagged character of the educational system in the country is reflected in the small proportion of the population with middle and high school education and professional studies.

The correlation between human capital and productivity in Mexico has been assessed at both macro and micro levels. At the macro level, existing studies found that a labour quality index

for Mexico based on a 7 percent rate of return increased labour productivity at an annual rate of one percent, which compares favourably in an international context and is above Latin American standards. Improvements in the education system “contributed” as much as 60 percent to the long run growth rate in Mexico’s labour productivity. At micro level, the Mincerian estimates found positive and high rates of return on education throughout the 1980s and 1990s. Actual macro and micro evidence points, therefore to a positive correlation between education and productivity in the Mexican economy. The limited effects of education on TFP growth might be attributable, however, to the poor quality of the Mexican school system, as has been documented in very recent research pointed out.

Creation, transmission and absorption of knowledge

The notorious divergence between (pure) technical change and increased technical inefficiency during the 1990s – both economy-wide and in the manufacturing sector - indicates that, while Mexican production was moving towards the technological frontier, the average firm was lagging behind due to a wide range of inefficiency problems.

The evaluation of trends in the innovative capacity of the Mexican economy is based on several indicators. The analysis shows that the absolute number of patents awarded by the United States Patent and Trade Mark Office (USPTO) to Mexico is, by all standards, too low if compared with countries such as Korea and Taiwan since 1993. Figures from the OECD also reflect the small number of patent applications in Mexico in absolute terms. Other studies show that patent counts in Mexico were relatively high in the 1960s, declined continuously until the first half of the 1990s, and picked up again in the second half of the decade after the implementation of NAFTA, although this resurgence was quite modest by historical standards. Even considering the relative level of development of the country, econometric exercises show that Mexico is lagging behind in terms of this innovation indicator.

Patents are a product of research and development initiatives and expenditures (R&D). In this regard, it is clear that, although the country doubled its R&D expenditure as a percentage of GDP between 1993 and 1999, the level is still outstandingly low. This finding is confirmed by studies comparing R&D initiatives of different countries to those of the technological frontier. Other studies find that the gap between social rate of return on physical capital and that of R&D investment is eight times in countries such as Mexico and in advanced countries such as the US only 2.5 times.

It is clear that soaring rates of return on R&D investment are not enough to encourage high flows of innovative activity in the Mexican economy. One possible explanation put forward in this report suggests that, while the shifting of the technological frontier was driven by a small segment of multinational and large, mainly export-oriented national manufacturing enterprises, the real impact of this trend has been limited to date because of the notorious deficiencies in the so-called National Innovation System (NIS) - i.e. the institutional structure which links up creators, users and adapters of knowledge, that is, the productive sector as a whole.

The analysis shows, in effect, that institutions linked to the innovation process in Mexico did not respond optimally to changes in normative rules and incentives stemming from liberalization policies. It therefore appears that the Mexican NIS does not have either an

incentive system to promote local networks of non-market linkages or an appropriate business culture and institutions to enable firms to interact with each other. Furthermore, the NIS seems to be lacking two important stimuli for productivity growth: positive external spillovers and increasing returns on scale in the generation and absorption of knowledge. The severe limitations of the Mexican NIS are among the probable causes of the widespread inefficiencies found in the economy that have hindered productivity growth.

Structure and functioning of factor markets

In a one-sector growth model, TFP responds to a considerable extent to changes in technology. In a multi-sector economy, however, there is scope for the operation of product and factor markets in the sectoral allocation of resources. Failures in these factor markets may help to explain, therefore, a substantial part of the inefficiencies observed in the Mexican economy.

Firstly, the effects of the financial sector performance are examined. During the 1960s, there was a substantial increase in the financial deepening in the economy. However, that process came to a halt during the 1970s, coinciding with the onset of rising macroeconomic instability and with the decline in measured TFP growth. The deterioration of the banking system culminated in the nationalization of all commercial banks in 1982. In spite of the re-privatization process in the early 1990s, total commercial bank financing had reached only 22 percent of GDP by 2000 and was below the level of 40 years previously at the beginning of the 1960s. In short, the financial system of the country has been in a slump since the beginning of the 1970s, thus coinciding with the productivity slowdown in the Mexican economy.

Existing econometric evidence suggests that there is a strong connection between the legal environment, the development of the banking system and productivity growth. Specialized studies in this area show that Mexico's financial markets are poorly developed by international standards and that its legal system has obvious shortcomings in respect of creditor and shareholder rights. These legal shortcomings are prime reasons behind at least part of Mexico's poor productivity performance since the early 1980s. The weak financial system exacerbated the adverse impacts of macroeconomic instability on productivity growth, rendered institutions especially vulnerable to crisis and made macroeconomic management more difficult.

The operating and functioning of the labour market is also a relevant factor behind the disappointing productivity performance of the Mexican economy. In effect, since the early 1980s, the country has witnessed a rapid expansion of the informal sector. As is well known, informal employment is less capital-intensive and less productive than the formal sector jobs and it is therefore hardly surprising that its expansion in the last two decades also coincides with the country's stagnant productivity performance.

The informal market must be analysed in the context of a deep *demographic transition* in the course of which the working population has expanded, thus dynamically increasing the labour force of the country. By contrast, the evolution of formal jobs has been considerably less dynamic since the early 1980s. Therefore, an increased proportion of informal jobs has moved to the service sector. This sector is characterized by higher proportions of non-remunerated working family members, a growing share of small-enterprise employees, only a

small number of whom are covered by the Mexican social security system.

The evidence shows that, prior to the 1980s, the Mexican labour market was relatively efficient in assigning jobs. Therefore, this report concentrates on an analysis, using different econometric exercises, of the functioning of this market during the last two decades. It was found that Mexico's labour market appears to be reasonably integrated, with the possible exception of the market for less skilled workers in the primary sector. Some possible distortions and rigidities also appear to stem from institutional and legal incentives that make it easier for firms and workers to operate in the informal sector, especially given the rising non-wage labour costs and high severance payments in the formal sector. These costs became increasingly onerous as the economy became more globalized.

However important these factors may be, the lack of enforcement of these legal constraints suggests that they are not the only, and certainly not the main reason for the notable expansion of the informal sector. Therefore, labour market operation, although it has contributed somewhat to curbing productivity growth, cannot reasonably be blamed for all the inefficiencies implied by the growing informal sector. It may rather be a symptom of other problems in the economy, such as the lack of capital and financial resources for the growing small-business sector.

Social and institutional constraints

In the long run, the Mexican productivity performance has not converged to the TFP levels of the US. On the contrary, estimates show a gradual but systematic process of divergence throughout the last four decades. These trends suggest that there might be some long run factors that constrain national productivity growth. Drawing on existing literature, this report examines the probable effects of some social and institutional constraints on productivity growth.

Mexico is characterized by a very unequal distribution of income, and long run trends show an increase in inequality over the last two decades. Furthermore, by the year 2000, more than 30 percent of the Mexican population were living below the extreme poverty line and over 50 percent below the moderate poverty line. Therefore, a significant proportion of the Mexican population is excluded from the fruits of progress, and that could be a cause of social conflict.

Although the country experienced several social conflicts in the 1960s and 1970s, they escalated during the 1980s and especially in the 1990s when an armed confrontation took place in 1994 when NAFTA came into force. Thus, high and rising inequality, coupled with elevated poverty indexes could have aggravated the social conflicts in the country, given the inability of its institutions to manage them. This situation inflicted a severe long run constraint on productivity growth.

Mexico's political institutions and organization have changed over the past fifteen years in a manner that should ultimately facilitate the creation of an adequate framework for enhanced economic and productivity development, subject, however to the implementation of other pending institutional reforms to improve co-operation between different State entities. On the economic side, new institutions and organizations seem to have failed to provide the incentives and conditions conducive to higher rates of productivity growth and this calls for their modification to render them a factor of growth. As long as these pending political and

economic institutional reforms remain incomplete, they will represent important constraints to productivity development.

A brief evaluation of where the country stands in institutional development using different indicators shows that, although the changes implemented in Mexico over the past decade have raised the country's governance standards. It nonetheless remains very far behind the US in relation to governance attainment, especially in fields such as rule of law and corruption control in which Mexico's performance is still very unsatisfactory. This institutional underdevelopment of the country might help explain the poor long run productivity performance of the Mexican economy.

Policies Affecting Productivity Performance

The import substitution industrialization (ISI) period

The application of macro policies during the ISI period had opposing effects on productivity performance. As long as monetary and fiscal policies were sound and kept inflation under control, productivity grew at favourable rates. When both policies turned notoriously expansionary in the seventies, fuelling inflationary pressures and provoking increased fiscal deficits, the encouraging effects on productivity growth waned, as continuous revaluation of the real exchange rate generated increased external imbalances that exploded devaluations in the seventies and the eighties.

Sectoral policies also had important effects on the productivity performance in that period, especially those directed at maintaining and increasing protection of the economy from external competition. Industrial protection from imports was granted by means of several instruments (import controls through tariffs and quantitative restrictions, accelerated depreciation and several types of subsidies) and by government agreements with firms to substitute imports, thus affecting the structure of incentives within the economy. The overall process involved a dynamic cost to the national economy in the form of lost opportunities for improvements in productivity.

The studies reviewed clearly indicate the strong effects of this path of development on productivity performance, in terms of large contrasts in technical efficiency among plants of different sizes, notable differences in productivity between the core industrial areas and the non-manufacturing regions of the country, the important role played by public investment in infrastructural provision, high productivity differences between foreign-owned and domestic plants and, finally, high concentration ratios within manufacturing sectors due to the limited size of the domestic market in relation to the large size of the efficient plants in the more advanced sectors. This pattern was indeed quite inefficient from both an economic and social point of view and retarded measured TFP growth.

Economic reforms and the export-oriented economy

The 1980s were largely dominated by stabilization efforts in response to repeated external shocks, years of high inflation, despite the unprecedented fiscal austerity programmes implemented, and of continued devaluation of the Mexican currency. There are few doubts

about the damaging effects of these crisis years on the Mexican productivity performance, insofar as the economy showed the normal responses associated with recessions (excess production capacity, increased informal employment, little incentive to import capital goods, postponement of new investment delaying the introduction of new technologies). The sluggish TFP recovery throughout the 1990s was certainly affected by the severity of the *tequila* crisis. However, at macro level, the *dirty* flotation of the exchange rate regime in place since 1995 has probably severely inhibited productivity growth, due to a very strict monetary policy to control inflationary pressures, which has been reflected in high real interest rates over the past ten years.

Macroeconomic management since the mid-eighties was accompanied by several structural reforms of the Mexican economy in terms of commercial and financial openness, and others related to deregulation of economic activities, including the downsizing of the public sector. The concurrence of the policies implied by these reforms make it difficult to evaluate their probable effects on TFP growth. However, this reports attempts to provide an assessment of the general effects of these policies.

Trade liberalization – especially after the signature of NAFTA – boosted flows of international trade and foreign direct investment (FDI). The studies reviewed show that liberalization enhanced *manufacturing* productivity, mainly into the medium and large-sized enterprises. However, the effects of trade liberalization on the overall economy are much less convincing, and there is nothing to indicate that NAFTA had any positive effects on the Mexican productivity performance at *aggregate* level. Therefore, NAFTA effects have been extremely localized in terms of efficiency and productivity gains, contrary to the common beliefs of its advocates.

In relation to financial reform, it is clear that the limited credit expansion following a series of reforms of the Mexican financial system throughout the nineties has had very limited effects on TFP growth. Credit continues to be both scarce and expensive. Given the strong empirical connection between the legal environment, the financial system and productivity growth, the apparent deficiencies in Mexico's legal system deserve further scrutiny as the country seeks to increase the efficiency of its financial sector.

Simultaneously, the government undertook to privatize hundreds of state-owned commercial enterprises. The privatization process sometimes encountered complications and is not yet complete. Although one of the main objectives of the privatization process was to improve the *financial position of the government*, amongst the explicit motivations behind its implementation was to increase the efficiency of enterprises transferred from public to private hands. The evidence reviewed shows, however, that it was not entirely successful in terms of productivity performance, notably in industries such as sugar-processing, fertilizers, transport (in general) and aviation. Only in a few cases such as iron and steel, communications and commercial banking was the process beneficial in terms of productivity growth, thus contributing to TFP growth in the economy as a whole.

Finally, the Government took steps to deregulate several main sectors of the Mexican economy. A key element was the adoption of a general competition law in 1993. As it is based on the Mexican Constitution, the Federal Law of Economic Competition (LFCE) has very clear limits, insofar as strategic areas reserved for the State are not considered as monopolies. Over more than eight years of anti-trust regulatory activities, only a limited number of cases have actually been processed. An evaluation by a panel of experts reveals

that, although the executive body in charge of the enforcement of the LFCE has matured into a credible and well-respected agency, the degree of general support for competition policy in Mexico is still an open question.

As with all institutional changes, the real and effective enforcement of the Mexican competition law will take time. The Commission in charge of its enforcement will be able to boost efficiency and productivity in the Mexican economy as a whole, provided that it improves the efficacy of its antitrust policies.. However, from a short-term perspective there is nothing to suggest that the limited competition policies adopted to date have had significant impact on the Mexican productivity performance.

Final remarks

The modest recovery of Mexican productivity growth in the past decade was generalized, but rather confined largely to the manufacturing sector. The diverse economic reforms and policy prescriptions adopted since the mid-eighties have undoubtedly been insufficient to regain productivity growth. Mexico faces a severe productivity stagnation problem, which severely limits its economic growth potential. The agenda for the implementation of programmes and policies for productivity enhancement is extensive and provides for different types of initiatives. It will be enough to implement the so-called second-generation reforms for one sector of society, but, for other sectors, policies need to go deeper and must entail a wide range of sectoral and institutional changes in the Mexican economy.

I. Productivity change and levels in the Mexican economy

In a long run context, economic growth can simply be considered a consequence of two main forces: the speed with which a country accumulates productive resources (physical and human capital and labour) on the one hand, and the efficiency and dexterity with which those resources are utilized in the productive process on the other hand.

In this report, we are concerned with the second of those forces, namely the analysis of the behaviour of productivity performance in the Mexican Economy. This section will offer different estimates of productivity trends over a period of more than forty years (1960-2002) for the economy as a whole, and for a variety of sectors and levels of aggregation.

Four questions are addressed in the section: What are the long-run swings in labour and total factor productivity of the Mexican Economy in general, and in the manufacturing sector in particular? What are the roles of capital accumulation and technical assimilation in this process? What was the importance of sectoral reallocation of resources in this process? How does the Mexican productivity performance compare to that of the USA, taken as a technological frontier of the world?

This section starts with a brief review of the long-run trends and characteristics of the Mexican economy throughout the entire period, then addresses the four questions above and concludes with a short summary of the main findings.

Long-run economic trends

It is well-known that economic development is determined by both the mode and strategies of industrialization adopted by different countries (Balassa, 1988). There are of course some "initial conditions" that will influence the path of the development process, but of are the type of policies followed are of equal are greater importance.

In the case of the Mexican economy, both forces were at play throughout the past forty years. By the end of World War II Mexico had embarked on a programme of industrialization via an import substitution process (ISI). In the early 1950s and for balance of payments reasons, *ad-valorem* tariffs were introduced followed by import licences and other trade policy instruments, thus increasing commercial protection from imports, mainly of manufactured products.

By the beginning of the 1960s the first stage of the ISI process – substitution of final consumer goods – was over and steps were taken towards a second stage, consisting of the substitution of intermediate inputs and some easily produced capital goods. Protection was extended to almost all manufacturing branches by a complex import licensing system, higher import duties and the establishment of official prices for imported goods.

The strategy worked for the entire decade during which Mexico industrialized with an inward-oriented path of manufacturing development, as in most Latin American countries, but was almost completely exhausted by the middle of the 1970s. After severe balance of payments problems in 1976, the country partially modified the economic orientation as large reserves of oil were found, extracted and exported to international markets. However, this path of development was short-lived as oil prices collapsed in the early 1980s. By 1982 the

Mexican economy was so severely indebted, with serious internal and external imbalances, that it was necessary to seek support from multilateral financial institutions: the International Monetary Fund (IMF) and the World Bank (WB).

Stabilization and adjustment policies were implemented for several years, affecting the economic growth and provoking several years of high inflation rates and severe stagnation between 1982 and 1987. By 1985, however, structural changes began to be implemented, in particular a strong unilateral liberalization of the external and financial sectors, resulting in a reduction of the role of the state in the economy and increased interplay of market forces.

Although other reforms were implemented in the early 1990s, by then the structure of the Mexican economy had changed dramatically from an inward-oriented to an outward-oriented process of development. This process was further supported by Mexico's accession to the North American Free Trade Agreement (NAFTA) in 1994, and the conclusion of more than 15 trade agreements with different countries and blocks in the following years, including most recently Japan and the European Union.

This brief account will enable us to identify three main periods for the analysis of Mexican productivity trends and swings. The first period runs from 1960 to 1981, and was broadly characterized by a predominantly inward orientation of the economy on account of the *ISI process of industrial development*. The second period covers the years 1982-1987, i.e. the years of severe and repeated economic crises. This period was marked by a transition from inward-oriented policies to an outward-looking orientation of the Mexican economy. The third period runs from 1988 to 2002 when the economy was more open, both commercially and financially and tried – with unsatisfactory results - to resume economic growth through the expansion of the export sector (Figure 1).

In terms of growth, the ISI period was noticeably stronger than the other two periods. During the crisis period, per capita GDP decreased in absolute terms, and in more recent years the economy has only achieved a modest growth, handicapped by the *tequila* crisis of 1995 (Table 1). Likewise, labour and output shifts among sectors are also noticeable during the different periods. In the ISI period, they went from agriculture to industry and services. Shifts in subsequent years were of a more modest nature and went from agriculture mainly to the services sector rather manufacturing, in spite of the increased flow of emigrants to the USA (Table 2).

Methods and statistical sources for productivity measurement

Productivity is usually defined as a ratio of a volume measure of output to a volume measure of input use. However, there is neither a unique purpose nor a single measure of productivity. The objectives of productivity measurement are diverse and, among the most common, are the following: to trace technical change; to assess the efficiency achieved in the production process; to measure real cost savings in production; to identify inefficiencies as a benchmarking standard and, in a more general approach, a measure of a key element of assessment of *standards of living* (OECD, 2001).

There are many different productivity measures, the use of which depends on the objective of the researcher and, in many instances, on the availability of data. In a simple classification we can distinguish single-factor from multi-factor productivity measures. The former relate a

measure of real output to a measure of a single input and the latter a measure of real output to a bundle of inputs.

In this report we will use both types of productivity measures to assess the productivity performance of the Mexican economy. Using the first type of measures, we will estimate three alternative indexes of labour productivity according to different sets of data. The first, based on UNIDO calculations (QL0), relates GDP at constant 1996 PPP dollars (World Tables 6.1) to a measure of the Mexican labour force. A second measure (QL1) relates GDP at constant 1990 PPP dollars - based on calculations of the Mexican system of national accounts - to a measure of the working population. The third measure of labour productivity (QL2) relates GDP at constant 1993 pesos to a different concept of labour input, i.e. remunerated employment, which excludes those considered as officially unemployed and non-remunerated personnel working in the informal sector of the economy.

We also use three multi-factor productivity measures (TFP). The UNIDO estimate (TFP0) was computed using Data Envelopment Analysis (DEA), which permits the estimation of changes in technical efficiency and in technical change itself. The index of TFP growth is measured by applying the Malmquist index method assumptions.¹ Product and labour inputs are the same as those in UNIDO's labour productivity measures, while capital stock figures are UNIDO's own estimates generated from the accumulation of investment data using PPP investment deflators and assuming a 13.3 per-cent annual depreciation rate.

Two additional measures of TFP are employed in the analysis. Both are based on TFP indexes similar to Kendrick's formulation, but our approach is based on a less restrictive set of assumptions than the usual ones about maximization behaviour and is linear in its formulation to avoid the problems involved in the aggregation of non-linear relations (Hernandez Laos, 1985). The TFP1 index is estimated at national level, using output and labour inputs as in QL1. Capital stock figures are our own 2002 update of the Nehru and Dhaneshwa set of data on physical capital stock valued at constant 1990 PPP dollars and applying a 6 per-cent depreciation rate.² Primary inputs are aggregated using as weights labour cost in total output (0.4) and capital cost (0.6), and are kept constant throughout the entire period. TFP2, on the other hand, is estimated at sectoral level and then aggregated to national level. It is based on output and labour inputs as in QL2, but capital figures are those generated by the Bank of Mexico, excluding residential structures and applying different depreciation rates for different types of capital stocks.³ Labour and capital input weights are income shares applied at sectoral level, as presented by the system of national accounts of Mexico.

Finally, for a specific period (1984-2000) and for the production output of manufacturing sectors, we use estimates presented in Brown and Dominguez (2004), calculated with the Malmquist index of TFP using the Encuesta Industrial Anual. These estimates permit a breakdown of TFP change into technological change and technical efficiency.

¹ This approach has the advantage that it does not assume any functional form for the production frontier, and no assumptions are made about maximization behavior of the agents. See: Caves, Christensen and Diewert (1982). For the DEA approach see Färe, Grosskopf and Zhang (1994).

² This lower depreciation rate is taken from the Mexican system of national accounts, and includes depreciation of residential capital as well as productive fixed capital.

³ This estimates exclude the agricultural and electricity-generation sectors.

Productivity trends in the Mexican Economy

Let us first examine the long-term trends and swings in labour productivity. Our three measures do not give a uniform outlook over the entire period. Figure 2 depicts long run trends of the three measures. It is clear that they tended to increase systematically from the early 1960s to 1981, when the upward trend was reversed. Since 1981 QL0 and QL1 have been following a similar pattern: a remarkable collapse in labour productivity performance between 1982 and 1987, followed by a mild recovery afterwards, only interrupted by the *tequila* crisis of 1995. QL2 shows - after the 1981 peak - a deceleration of productivity growth, on which the crises of the 1980s and 1990s had a less severe impact.

Contrasts in the productivity performance of QL2 are due to a rapid increase in informal employment, which is included in QL0 and QL1 but excluded from QL2. Thus, in terms of the total labour force available in the Mexican Economy, there can hardly be any doubt about the acute collapse of the average GDP per working member of the population. Moreover, this collapse has had long-lasting effects for more than two decades insofar as the actual levels are still lower than those reached at the final stages of the ISI period in the early 1980s. However, in terms of the effective use of remunerated employment, the collapse turned out to be a productivity slowdown since 1981, marked by short-term movements in the Mexican economy.

On the whole, the three productivity measures show relatively similar long-run tendencies and swings along the three periods under consideration: a sustained increase of 3.2% per year between 1961 and 1981 – i.e. the ISI period - followed by a contraction of between -0.2 and -4.0 per cent during the crisis period of 1982-1987 and a subsequent slow recovery of between 0.3 and 1.1 per cent annually on average over the last 15 years (Table 2).

Labour productivity performance is strongly affected by the evolution of the capital deepening of the economy. We have three different measures of the evolution of capital per worker in the Mexican economy. The series showing the most rapid increase along the entire period are KL1 and KL2, whereas the slower growth is depicted by UNIDO estimates (KL0) (Figure 3).⁴

Moving to the analysis of TFP and, in spite of different methods and statistical sources of the three estimates on hand, the disappointing performance of the Mexican economy in terms of TFP growth is evident. Even during the rapid economic expansion in the ISI period, TFP grew relatively slowly (1.1% annually according to TFP1). With our estimate TFP1 and TFP2 even showed a decrease of between -0.4% and -0.7% per year. On the other hand, in the crisis period all measures show a systematic deterioration in TFP, followed by a negative performance between 1988 and 2002 (Table 3).

UNIDO's methodology allows a breakdown of TFP components into real technical change and efficiency operation, i.e. the distance of the economy from the production frontier. According to these estimates, the Mexican rate of technical change (TECH0) was slow or

⁴ Differences in KL2 and KL0 derive from the different depreciation rates used in the calculations. The 13.3% depreciation rate applied by UNIDO seems too high if compared to that of 6% applied by the Mexican system of national accounts, considering that both estimates include residential capital. The Bank of Mexico estimates are based on the most recently revised version (2005) of its survey of productive establishments and exclude residential capital formation.

negative between 1961 and 1987. By contrast, from 1988 onwards it accelerated to an amazing rate of growth of 3.6% annually, coinciding with the opening of the Mexican economy to international flows of capital and trade (Table 3). However, this dynamic evolution of technical progress was counterbalanced by a drastic reduction in technical efficiency in the economy, reaching -3.4% per year over the last 15 years of the period.⁵ This compensatory evolution of both variables implies that, the production frontier of the Mexican economy was shifting upwards because of increased technical change. The bulk of the production units were, however, unable to effectively embrace this positive development, thus lowering its average levels of technical efficiency. If this interpretation is correct, the actual productivity problems of the Mexican economy do not consist mainly of a lack of capital accumulation or of technical progress. They may rather be derived from several inefficiencies that impede a rapid diffusion of technology throughout the economy. Before providing an explanation for the productivity trends, two further issues will be addressed: productivity performance differences among sectors and a comparison of Mexico's performance with that of the United States of America.

Productivity performance of economic sectors

There is a clear pattern of productivity trends among Mexican economic sectors.⁶ In general, rates of growth in labour productivity were positive and higher during the ISI period in the majority of sectors, with a dramatic change as ISI petered out and in the crisis period between 1981 and 1987, followed by a mixed performance since the opening of the economy by the late 1980s.

With some exceptions, the favourable development of the 1960s and 1970s was due to increases in capital per worker in most sectors. However, trends in TFP were negative for the majority of the sectors. Manufacturing expanded its labour productivity at 2.8% per year, a rate which can be explained entirely by a more intensive use of capital per worker. Judged by this standard, the industrialization that followed the import substitution process was as inefficient as it is commonly considered by analysts (Balassa, 1988) (Table 4).

By contrast, in the 1980s most sectors showed a precarious productivity performance. Only the manufacturing, construction and financial services sectors registered positive rates of growth, albeit of very modest dimensions. This general pattern was the result of stagnation or reductions in both capital per worker and TFP. There was a generalized disruptive trend in productivity across all sectors, as the economy entered the period of consecutive crises (Table 4).

Following the opening of the economy, from the late 1980s onwards labour productivity growth turned positive in several sectors, but expanded at a slower pace than previously. In this period, the positive growth rates in labour productivity achieved in all sectors - except construction - again reflected the increase in sectoral capital deepening. TFP increases were less favourable, except in the areas of mining and manufacturing, i.e. the tradable economic

⁵ It is interesting to note the setting-off movements between the two variables (TECH0 and EFIC) of the UNIDO measurements (Figure 5). Actually, the correlation coefficient amongst the annual rates of growth of both variables is negative and statistically different from zero ($r=-0.896$) over the entire period (1961-2002).

⁶ Sector trends are based on our estimates QL2 and TFP2.

sectors (Table 4).

The positive manufacturing TFP growth of the last period can be traced in more detail in Table 5. Brown and Dominguez (2004) find, with a Malmquist approach, that TFP in Mexican manufacturing grew at 1.6% per year between 1984 and 2000. This development was exclusively due to a positive increase in technical change (2.1% annually) offset by a decrease in technical efficiency (-0.5% per year), a result in line with that of the national economy, as previously mentioned.⁷

Brown and Dominguez present estimates for two sub-periods: pre-NAFTA (1984-1993) and post-NAFTA (1994-2000). In the former, TFP grew more slowly (1.3% per year) than in the latter sub-period (1.5%), but the sources of growth were slightly different. In pre-NAFTA years, technical change grew faster than in the post-NAFTA period (2.5% versus 1.5% respectively). Nevertheless, the efficiency performance was better in the second than in the first sub-period (1.5 versus -1.2% respectively). However, there was a negative trend in technical efficiency throughout the two sub-periods in several manufacturing sectors (Table 5).

In short, there is some evidence that, after the opening of the economy, the Mexican manufacturing sector had a positive performance in terms of productivity growth, especially in the years after the signature of the North American Free Trade Agreement with Canada and the USA. This improved development was due both to technological improvements and to marginal increases in efficiency standards. Nonetheless, there was still a negative performance in several industrial sectors even in the second half of the last decade.

Effects of input sectoral changes on productivity growth

In order to assess the effects of the changing labour structure on labour productivity growth, its evolution both with and without sectoral changes was compared. Figure 6 depicts contrasts between both estimates, with a variable structure (QL2) and with the 1960 labour structure (QL2K). The differences are attributable to sectoral changes in remunerated employment. Oddly enough, this effect was positive only during the ISI period, and equivalent to 0.6 percentage points of the annual rate of increase in labour productivity between 1960 and 1981. The other two periods registered a zero effect of structural change on labour productivity growth (Table 6).

Considering both labour and capital inter-sectoral shifts, it is possible to assess their effects on TFP growth (Syrquin, 1988).⁸ Figure 7 depicts both trends, with (TFP2) and without structural change (TFP2K). The observed pattern is about the same as that of labour productivity: a positive effect during the ISI period and negative contributions of the sectoral reallocation of resources in the other two sub-periods (Table 6). This result, however, does

⁷ High rates of growth in technical change were achieved by several manufacturing branches such as Non-Electric Machinery (8.7%), the Automotive Industry (5.6%), Apparel (5.1%), Food Industries (4.3%), Basic Metals (4.5%), Non-Metallic Minerals (3.6%), and Wood Products (3.0%). Efficiency markedly decreased, however, in sectors such as Non-Electric Machinery (-5.3%), Apparel (-2.8%), Transport Equipment (-2.6%), and Food Industries (-1.9%) (Table 5).

⁸ We remind the reader that Agriculture and Electricity Generation sectors are excluded from this latter exercise.

not consider the effects of shifting resources from agriculture to the other sectors, so these trends are not strictly comparable with those of labour productivity.

Overall, as inefficiencies derived from an ISI process of industrial development are generally invoked and accepted, it is remarkably odd, however, that the sectoral reallocation of resources was more efficient during the period when the economy was closed (1960-1981) as compared to when it was more open (1988-2002).

International comparisons of productivity: Mexico-USA

Although it has been argued that, by the end of the 20th century, the USA was no longer the world leader in productivity performance (Maddison, 1992), a comparison between Mexico and its northern neighbour will give us an idea of the distance that separates Mexico from the efficiency and technological frontier of the world.

Estimates made by UNIDO suggest that labour productivity levels in Mexico, as a proportion of USA standards, decreased over the past forty years from 42.1% in 1961 to only 32.7% in 2000. Our own estimates allow us to trace the path followed by these comparisons along the entire period. Mexico's levels of labour productivity (USA=100) increased from nearly 30% in 1960 to more than 40% by 1981, tending to diminish in the following years to reach a mere 25.5% by the year 2002 (SHQL in Figure 8).

This dual path followed by Mexican labour productivity levels in relation to the USA (a convergent path followed by a divergent one) is reflected in a recursive regression, which highlights econometrically the statistical significance of both tendencies.⁹ The quantitative results are presented in Table 7, column 1. The autoregressive coefficient $\alpha_1 > 1$ confirms a gradual process of convergence of the two economies between 1961 and 1981. The negative sign of coefficients α_2 and α_3 indicates, on the other hand, that the combined value of the corresponding autoregressive coefficients take a value < 1 , thus suggesting that - from 1982 onwards - the process changed direction from convergent to divergent labour productivity level in Mexico in relation to the USA. It is worth mentioning, however, that the speed of divergence was greater during the crisis years than throughout the open economy period of the last 15 years.¹⁰

As is well known, relative labour productivity levels are strongly influenced by the differences in capital intensity between the two countries. For that reason, it is interesting to estimate the gap in relative TFP levels between the two economies, which can be interpreted as a relative measure of the technical and efficiency levels of Mexico vis-à-vis the USA.

⁹ This exercise tries to measure the direction and change (speed) of convergence/divergence of Mexico in relation to US labour productivity standards. The equation estimated is the following:

$$Q_t = \beta_0 + \beta_1 Q_{t-1} + \beta_2 Q_{t-1} D_1 + \beta_3 Q_{t-1} D_2$$

Where Q_t is Mexico-USA labour productivity gap, D_1 is a dummy variable for the crisis years (1982-1987), and D_2 is also a dummy variable for the unilateral trade liberalization period (1988-2002); D_1 and D_2 interact with the lagged productivity gap.

¹⁰ All coefficients are statistically significant (0.05), and the fitness of the regression equation is also satisfactory from a statistical point of view (R^2 adj. = 0.958) and free of autocorrelation problems (DW=2.1431).

Differences in TFP levels of the two economies were measured by two methods: the geometric and the arithmetic aggregation indexes.¹¹ For a direct comparison between the two approaches, we use the USA as a standard of reference (USA=100). The same Figure 8 depicts TFP levels between the two methods: geometric method (EFIC03) and arithmetic method (EFIC02). After 1981, the tendency is similar with both methods, but the previous period shows a slightly upward trend with EFIC02, while EFIC03 depicts a systematic downward trend along all three periods. According to both calculations, by the year 2002, Mexican TFP levels represented between 40 and 45 per cent of USA levels (Figure 8).

In statistical terms, however, both measures of comparative TFP show a systematic trend towards divergence in a long run context. Recursive regression equations were estimated for both cases, and the relevant coefficients of regression (β_1) have a value smaller than one (Table 7, columns 2 and 3). Furthermore, the divergent tendency accelerated during the crisis years, as is shown by the negative and statistically significant coefficients β_2 in both estimates. This was followed by a return to long run divergence trends, as in 1988, insofar as the value of coefficients β_3 is not statistically different from zero.

In short, the above estimates of Mexican relative levels of TFP compared to the world technological and efficiency frontier show a systematic and long-lasting deterioration over the past four decades. These tendencies only confirm the awkward panorama facing the Mexican economy in terms of productivity and technological efficiency, and that the divergent trends continue up to the present day.¹²

¹¹ Due to scope of this report, we do not elaborate on this point. For the geometric measure see Caves, Christensen, and Dewert (1982), and Keller (2000). For the arithmetic measure see Hernandez Laos (1985). Data for Mexico is the same as that utilized in our estimates of QLI and KLI. Data on the USA economy was adapted from different sources: output from the Bureau of Economic Analysis (BEA) deflated to 1990 prices; labour input - measured by the number of employed persons - is taken from household data of the US Department of Labor; and capital stock figures come from the Nehru & Dhaneswa Data Set, updated by us to 2002 using the perpetual inventory method with a depreciation rate of 6% annually. See for details: Hernandez Laos (2004).

¹² Partial evidence demonstrates that this is also the case for the most successful Mexican sector in productivity terms: manufacturing. Previous estimates (Hernandez Laos and Guzman Chavez, 2004) show that, at least between 1975 and 1996, Mexican labour productivity levels in manufacturing remained relatively constant compared with USA standards, i.e. they had not fully recovered yet from the severe crisis of the 1980s. Just to illustrate this point, Table 8 shows that only a few manufacturing sectors in Mexico improved their comparative standards (USA=100). Among these were the basic metal industries, which, by the turn of the century, had exceeded the levels attained by the USA.

II. Major determinants of productivity performance

There is no “theory” of total factor productivity (TFP) and its determinants (Hall and Jones, 1999). Moreover, in this case the phenomenon to be explained depends on the way it is measured. In the extreme case it might be considered either as a residual – a “measure of our ignorance” (Abramovits, 1956) - or as a refined measure of technical change when applying a frontier production function to separate the “residual” from changes in overall efficiency (Färe, Grosskopf & Zhang, 1994). Other approaches try to identify measured TFP with technical change by adjusting inputs for quality changes, thereby reducing the concept to a mere statistical measurement problem (Jorgenson & Griliches, 1967; Young, 1995).

In all cases, however, different factors influence TFP growth: technical innovation, organizational and institutional changes, shifts in societal attitudes, fluctuations in demand, changes in factor shares, omitted variables and - undoubtedly - measurement errors in variables (Hulten, 2000). Considered in a pragmatic way to describe the meaning of productivity change, it is often conceptually derived from different efficiency changes such as economies of scale, capacity utilization and learning-by-doing, amongst other factors. In this connection, Harberger (1998) has pointed out that productivity measures could be seen in practice as a quest to identify real cost savings in production.

In a taxonomical approach, however, the most recent literature suggests a wide range of determinants of productivity. These range from proximal to remote causes of productivity performance, i.e. from factors affecting the efficiency of economic activity (conditions of demand, factor supply and allocation, creation and absorption of knowledge, functioning and operation of factor markets), to those affecting the economic environment (social determinants) and to more remote and relatively invariant factors (institutional, societal infrastructure, and geographical determinants) (North, 1992; Hall and Jones, 1999; Sachs, 2002).

In the Mexican case, the long run patterns and swings in productivity performance described in the last section shed some light on this investigation. In short, these patterns of productivity change in the Mexican economy help to identify the following questions:

- Why was the Mexican productivity slowdown highly correlated with the onset of macroeconomic instability in the 1970s, which persisted up to the mid-1990s?
- Why was productivity performance more satisfactory during the ISI period than in the export-oriented period?
- In terms of labour productivity, what is the role of factor supply accumulation? What is the role of improvements in human capital accumulation?
- Several questions need to be answered with regard to TFP: Why did technical change have a restrictive influence during the ISI period, and what is the reason behind its marked increase over the last 15 years? Why was there a compensatory trend in technical and allocative efficiency in the Mexican economy?
- In the case of technical and allocative efficiency, what are the main obstacles to productivity improvement from factor market operation?

Productivity performance

- In a long-term perspective and regarding the Mexico-USA productivity gap, is there a structural obstacle to convergence stemming from long-lasting forces of a social and institutional nature?

Each of these questions highlight the different factors behind productivity performance, as previously mentioned. This section will address these factors in the following order:

- (i) the effects of macroeconomic performance;
- (ii) the role of final demand components and overall orientation of the economy;
- (iii) the effects of factor accumulation on productivity development;
- (iv) the effects of the process of technical development and knowledge absorption as a source of productivity growth;
- (v) the repercussions of factor market functioning on efficiency performance;
- (vi) social and institutional constraints to productivity development.

In the case of each factor, an effort is made to identify the direction, intensity, channels and circumstances implied by the different forces behind the productivity performance of the Mexican economy.

Effects of macroeconomic performance

Macroeconomic management changed dramatically over the last five decades. During the 1950s, there was relative fiscal and monetary stability, low inflation, and a rapid increase in GDP – averaging 6.6 per cent over the entire decade. The 1960s witnessed a steady increase in the government's discretionary intervention in order to implement the second stage of the ISI process. Protectionist measures attracted private investment while the economy became increasingly distorted. Nevertheless, sound macroeconomic policies were maintained, helping to sustain rapid growth and remarkable price stability.

By the early 1970s, the situation began to change, when economic growth slowed down at the first signs of the exhaustion of the ISI process. In response, the government increased protectionism, implemented more restrictive laws and regulations and more bureaucracy was created. The government also increased public expenditure along with the number and size of public enterprises. This growth in the public sector resulted in a progressive weakening of fiscal discipline and greater resort to foreign borrowing. Simultaneously, public policy took a more repressive orientation towards the financial sector in order to facilitate government access to private savings. This culminated in the nationalization of the banks in 1982.

The resulting increasingly rigid economy, characterized by both public and private monopolies, significantly increased industrial concentration. By the mid-1970s, a severe balance of payments crisis had developed, although it was short-lived due to the discovery of new oil reserves that increased Mexico's creditworthiness in the years ahead. This, in turn, resulted in increased foreign financing of public expenditure. The artificial economic expansion of the time generated an acute debt crisis in 1982, and consequently, public expenditure – especially investment – had to be sharply curtailed.

The 1980s were largely dominated by the stabilization efforts made in response to the crisis that was aggravated by major external shocks in 1985 (Mexico City's earthquake) and in 1986 (the collapse of international oil prices). The period was characterized by an unprecedented fiscal austerity programme, partially eased in 1989 by significant interest

payment relief provided for by the Brady Plan.

Of major interest, however, was the unilateral trade liberalization implemented by Mexico in 1985, starting a process of external opening that culminated in the signing of the North America Free Trade Agreement (NAFTA) in 1994. In the late 1980s and early 1990s, this liberalization initiative was followed by further reforms involving the privatization of large public enterprises, the deregulation of industry, and the opening up to foreign investment through the liberalization of the capital account of the balance of payments. Figure 9 depicts Morley's indexes of structural reforms for Mexico (Figures 9(a), and 9 (b)), and compares the General Index of the country with other Latin American countries (Figure 10).¹³

By the early 1990s, there was a more enabling business environment with a revival of investment flows and, in particular, increased foreign capital inflows. However, the appreciation of the real exchange rate and the high external deficits triggered a financial crisis again in 1994, known as the *tequila* crisis, which required a stronger adjustment plan that provoked a deeper recession in 1995. This crisis was short-lived due – in part – to the acute devaluation that resulted in a major export boom, itself facilitated by the NAFTA agreement, and which helped to generate a rapid accumulation of foreign reserves. This, together with other fiscal policies and deficit-financing operations, made the country less vulnerable to external shocks. With the onset of the American economic slowdown of 2001-2002 Mexico again faced difficult times due to the stagnation of Mexican exports to US markets. Over the past few years this has triggered a severe stagnation of the national economy.

The greater macroeconomic instability after the mid-1970s is likely to have reduced GDP and productivity growth through the following channels (World Bank, 1998):

- Instability increases the “noise” component in price signals, leading to resource misallocation and increases in non-productive investment as a result of erroneous price signals, thereby negatively affecting productivity performance.
- Increases in the risk of “bad” investments generate less investment thus reducing factor accumulation. Consequently, investors rely more on existing technologies which retards innovation and technical change, thereby affecting productivity growth.
- Increased uncertainty redirects investment towards less productive assets, i.e. real estate, reducing overall productivity levels even though total investment remains the same.
- In addition, there is evidence in the Mexican case that the manipulation of macroeconomic policies for political objectives – elections – has been a traditional source of instability that has probably hindered productivity performance. It must be borne in mind that the post-1980 period involved a greater degree of macroeconomic instability compared to previous decades.

¹³ As can be seen, Mexico's trade reform gained momentum in 1986, after a ten-year period of high protectionism, whereas financial reforms were only fostered after the mid-1980s and during the early 1990s. Capital account reforms were implemented from the mid-1980s onwards, and a similar path was followed by privatization reforms. The implementation of tax reforms started by the early 1980s but had slowed down by the early 1990s. Compared to other Latin American Countries, it is evident that the overall index of reforms in the Mexican economy steadily increased by the mid-1980s and continued to do so, although with less emphasis by the mid-1990s. By 1995 (the last year calculated by Morley et al (1999)) it lagged behind Argentina and Chile and had a similar pace to Brazil. (Figures 9 (a), 9 (b) and 10).

Productivity performance

As was established before, it is worth distinguishing between two periods of macro instability over the last two decades: 1982-1987 and 1988-2002. The former was marked by recurrent recessions resulting from the debt crisis of 1982, the collapse of oil prices in 1986 and the systematic application of recessive stabilization policies. In the latter period, the economy returned to greater macro stability and, as previously mentioned, major structural reforms were implemented. It is important to recall that the productivity performance differed in both periods.

Between 1982 and 1987, the economy had the normal reactions associated with recessions which might help to explain the productivity collapse. Factor (input) utilization followed the acute fall in aggregate demand, and a production capacity excess ensued, reflecting a decline in measured TFP. The fall in aggregate demand also discouraged investment for several years, which explains the fall in labour productivity. By contrast, the increase in the price of new capital goods as a result of the peso devaluation which followed successive balance of payments crises, inhibited capital imports. Furthermore, the prolonged stagnation of the economy pushed many workers into the informal sector with less capital-intensive production and lower productivity, thereby increasing its weight in the total labour force and dragging down indicators economy-wide.

The structural reforms implemented from the mid-1980s to the mid-1990s aimed at raising productivity and efficiency levels in the Mexican economy. By opening up to external trade it was intended to foster foreign competition in domestic markets, increasing – as expected – productivity performance, especially in the tradables sector. Financial openness was to boost the financial sector, thereby alleviating the problem of acute misallocation of financial resources. Privatization policies in place directed at dismantling state monopolies and increasing the allocative efficiency of the economy. Finally, the liberalization of the capital account of the balance of payments was expected to significantly increase foreign capital inflows (World Bank, 1998).

One question arises however: why did investment, in spite of all the reforms implemented, remain sluggish and why did TFP hardly recover, except – perhaps – in the Mexican manufacturing sector? The slow recovery was in part due to a slack aggregate demand. The real exchange rate appreciation over time and increasing current account deficits dampened investors' confidence in the sustainability of the exchange rate regime. Foreign savings were spent on imports of consumer goods and on the purchase of existing domestic assets. This contributed to a slow recovery of demand for labour and of real wages and retarded the growth of the domestic market. Dynamic growth was only achieved in the tradables sector – mainly in exports, of which manufactured goods represented an increasing share. The generalized stagnation of productivity in 2001-2002 can therefore be explained by the significant decline in Mexican exports, mainly to US markets.

It is worth mentioning that, in the Mexican context, it has been argued that the effects of structural reforms were not more significant because they were incomplete (World Bank, 1998). Indeed the reform process did not advance evenly on all fronts and there is evidence that only the markets for tradable rather than non-tradable goods became subject to greater competitive pressure. This is why – the argument follows – only the tradables sectors showed major improvements in TFP growth after 1987. This would suggest that equally vigorous measures to promote more competition in non-tradable sectors *could* yield a high rate of TFP growth in what are referred to as the second-generation reforms. Some of these issues are addressed in Section III of this report. Other systemic explanations of the slow productivity

recovery after 1988 are of a more structural nature, especially those related to the operation and functioning of factor markets, a topic examined later in the report.

Effects of Growth on final demand components and overall orientation of the economy

It is generally acknowledged that productivity depends on the size of the market.¹⁴ In modern terms, this proposition is known as *Verdoorn's Law*, which relates productivity changes to change in the volume of output, which expresses changes in effective demand.

The channels through which this correlation functions vary depending on whether there is a short or a long run context. In the short run, an increase in demand can determine a more efficient use of both capital and labour, given the existent knowledge and innovations. This short run correlation was referred to above as the common effects of expansions and recessions over the trade cycle. This increase in demand does not call for additional investment. However, if demand rises in the long run, firms will introduce more efficient additional machinery and equipment to replace the obsolete stocks. They will also probably make use of increased scales of production, recognizing different processes and probably rationalizing the use of different factors of production, and labour in particular.

Thus, rates of investment and output growth are key elements of the known *learning-by-doing* effect. A faster rate of output growth – induced by the growth of final demand – facilitates the adoption of new technologies, leads to a reduction in the average age of capital stock and enhances efficiency by learning and increased productivity through economies of scale, both static and dynamic. And, although the reciprocal nature of this relationship is admitted – from demand to productivity and from productivity to demand – it is commonly accepted that the dominant force goes from demand to output and to productivity expansion.

However, the distinction between internal and external sources of demand growth in connection with *Verdoorn's Law* is not so common. Demand increases seem to refer to domestic market expansions, although the literature on trade often establishes a correlation between export expansions and productivity growth. In this case, causality is more debatable: is a good export performance the result of productivity growth, or does export growth contribute to a rise in productivity?

Even though in this case the interaction between international trade and long run movements in output and productivity is less understood, a major issue here is the possibility of trade facilitating the transfer of knowledge and ideas across countries. At the same time, the possibility of faster productivity growth, allowing the economy to increase the flow of exports, is recognized (Bernard and Jensen, 1999).

Due to data availability a simplified econometric exercise was undertaken to “explain” both labour productivity and TFP rates of growth as a function of rates of growth in total final demand components. A panel data set of time series (1961-2002) and 17 economic sectors and manufacturing sub-sectors of the Mexican economy were used.

¹⁴ As is also well known, this correlation was first considered by Adam Smith (1974) when recognizing that “the division of labour is limited by the extent of the market (occasioning) in every art increases in the productive power of labour” (Ch. 1, Book I).

The estimated equations are as follows:

$$\begin{aligned} D\beta_{jt} = & \beta_0 + \beta_1 DPCAGR_{jt} + \beta_2 DPCIND_{jt} + \beta_3 DPCSER_{jt} + \\ & + \beta_4 DGCAGR_{jt} + \beta_5 DGCIND_{jt} + \beta_6 DGCSER_{jt} + \\ & + \beta_7 DXAGR_{jt} + \beta_8 DXIND_{jt} + \beta_9 DXSER_{jt} + \\ & + \beta_{10} DXPET_{jt} + \beta_{11} DISI_{jt} + DUMMIES_j + U_{jt} \end{aligned}$$

Where DQ_{jt} expresses yearly rates of growth in the productivity indicator in sector j and year t ; $DPC_$ refers to annual rates of growth in private consumption; $DGC_$ to government consumption; and $DX_$ to exports; while AGR , IND , and SER related to agriculture, industry or services. $DXPET$ represents growth in oil exports and $DISI$ indicates the annual change of an index of import substitution intensity. $DUMMIES_j$ are binary variables to identify economic sectors and manufacturing sub-sectors, and U_{jt} is a random error with the generally assumed properties.

There are estimates for the whole period (1961-2002) and for the two sub-periods: the long ISI-period (1961-1987) and the period following the opening of the economy (1988-2002). The results are presented in Table 9 for labour productivity and in Table 10 for TFP.

Looking first at the labour productivity equation: in the long, Verdoorn's Law is undoubtedly validated. This is borne out by the positive effect of the domestic final demand expansion on productivity growth – insofar as private consumption growth is positively associated with labour productivity growth, as is the expansion of government consumption. The exception here is government consumption of industrial products that shows a negative and statistically significant effect. Oddly enough, export expansions are not significantly associated with labour productivity growth, with the exception of exports of agricultural products.¹⁵

Market expansions due to import substitution policies show no significant effects on labour productivity performance. Furthermore, the results clearly show that, allowing for final demand expansion, the opening up of the economy to external trade brought about an improved labour productivity performance compared to the long ISI-process of the previous decades.¹⁶ This suggests that one of the most important factors behind the somewhat better performance of the ISI-period were precisely the trend in domestic final demand components, increasing labour productivity growth when demand expanded and reducing productivity when demand was disrupted in the early and mid-1980s.¹⁷

¹⁵ It noted, however, that there might be a problem of endogeneity in the equation, thus distorting the econometric results. This remark applies to the TFP equation and obviously calls for further research.

¹⁶ As implied by the positive association of the DAP variable with productivity rates of growth, it must be remembered that DAP is a dummy variable equal to zero for the ISI-period (1961-1987) and to one for the post-reform period (1988-2002).

¹⁷ This assertion is supported by the estimates in the equations of both periods (Table 9). For the 1961-1987 period, private consumption growth was positively correlated with labour productivity growth, while such correlation was negative or insignificant for the second period, in which only exports of services appear to have a positive and significant effect. In both periods, the import substitution indicator appears to also have had an insignificant effect on productivity performance.

Of more interest are the results of the equation explaining TFP growth (Table 10). In this case and in a long run context, only the expansion of private consumption of industrial products appears to be positively and significantly associated with total factor productivity rates of growth, thus partially supporting Verdoorn's Law. However, the negative – and statistically significant – effect of private consumption of services renders this interpretation inconclusive. On the export side, only the growth in exports of agricultural products is positively correlated with TFP growth, while such a relationship is not statistically significant in the case of manufacturing exports.

These results confirm the negative effects of import substitution policies on TFP rates of growth, as the value of the DISI parameter SI is negative and highly significant from a statistical point of view. Finally, and contrary to the results obtained in the labour productivity equation, TFP growth, allowing for the expansion in final demand components, shows a negative, although statistically somewhat insignificant net effect after the opening of the economy compared with the period of more inward-orientation during the ISI years.¹⁸

Leaving aside this analysis of the effects of Verdoorn's Law on productivity growth, the foregoing results raise two questions: a) Why did export growth have negligible repercussions on TFP performance? and b) What are the reasons – if any – behind the fact that the opening of the Mexican economy has not as yet had the favourable effects on productivity attainment, as might usually be expected?

In relation to the first issue, previous research has found little evidence that exporting *per se* is associated with faster productivity growth rates at individual plant level. In a micro-dynamic analysis of Mexico and other developing countries, Clerides, Lach and Tybout (1998) found that relatively efficient firms became exporters; however, in most industries, their costs were not affected by previous exporting activities. Therefore, the assumed positive association between productivity and exporting is explained by the self-orientation of the more efficient firms towards export markets.¹⁹

Furthermore, a well-documented study of the Mexican case (World Bank, 2000) found that there is a clear association between plant-level efficiency and exporting, irrespective of plant size, ownership and industry. Regression results – at micro-level – suggest that high-performance working environments and labour skills are linked to export activity and productivity growth, and that investment in quality control and modernization are made *in anticipation* of entry into foreign markets.²⁰ This may be one reason why Verdoorn's Law seems not to apply to the expansion of export demand on TFP growth: increased trade might

¹⁸ This result might be explained by the different role played by Verdoorn's Law and the import substitution process in the two periods. In the 1961-1987 years, both variables affected positively – and significantly from a statistical viewpoint – total factor productivity growth, whereas in the second period (1988-2002) the Verdoorn effect was not significant, the ISI indicator was negatively correlated and export growth had no significant influence either (Table 10)

¹⁹ A similar path of causality is found in the case of the USA manufacturing sector (Bernard and Jansen, 1999), in which the productivity path for a plant switching from a non-exporting to an exporting operation shows a rise in productivity levels *before* and *during* entry and a flat trajectory thereafter.

²⁰ Amongst non-maquiladora Mexican plants, productivity grows substantially in the two to three years prior to entering export markets, and their productivity continues to rise for at least two to three years after entry, suggesting that learning-by-exporting effects may exist. The World Bank report also finds evidence of learning effects when enterprises start to supply export firms with raw materials, technical assistance, training and sometimes financing.

contribute to aggregate productivity growth, but its effect is one of increased *levels*, rather than an actual higher long run growth rate.

An analysis of the second issue follows on from the above discussion: why is the openness of the Mexican external sector associated with an unfavourable impact on TFP growth over the last 15 years? In this regard – as will be examined in Part III - it has become increasingly clear that the generalized protection from the import substitution industrialization process has yielded few productivity gains, and that the benefits of the strategy are unlikely to offset its costs in terms of the misallocation of resources. For this and other reasons, “outward-orientation” has now become the new orthodoxy, especially because of the expected improvement in technical efficiency once protective trade barriers are lifted. Yet, it must be recognized that the channels supporting the trade productivity nexus are dubious and sometimes based on arguments that lack coherence. There is therefore no firm basis for always expecting higher TFP growth rates as a result of trade liberalization policies.²¹

Trade opening in Mexico was notably stimulated by the country joining NAFTA in 1994. Lopez-Cordova (2003) econometrically analyzed the relationship between Mexico’s entry into NAFTA and its manufacturing productivity performance. His findings indicate that the substantial liberalization of trade and investment flows driven by NAFTA implementation enhanced manufacturing productivity *levels*, especially in relation to the overall poor performance of the economy from the early 1980s until the mid-1990s. However, the effect was once-off and did not affect the Mexican TFP long run rate of growth.

Easterly, Fiess and Lederman (2003) also analyzed the issue and found that NAFTA complemented the effects on productivity of the previous unilateral liberalization. They did not, however speculate on the precise channels of influence: in their view, this issue remains an open question requiring further research. Furthermore and as previously mentioned, it is also clear that trade policies and the NAFTA agreement were implemented in the context of macro-stabilization programmes. Therefore, when the stabilization initiatives eased foreign exchange restrictions and increased capacity utilization, measured productivity also increased, thus making it tempting to credit trade policy with the improved productivity performance.

However, even if openness to trade had positive effects on productivity performance in the manufacturing sector, there are compelling reasons why these effects did not extend to the economy as a whole. Firstly, *manufactured exports remain highly concentrated across firms* and the sector is dominated by maquiladoras, other firms under foreign ownership and some few large Mexican enterprises. Thus, while the shift towards a more open economy and the increase in manufactured exports has been impressive, the greater outward orientation of the economy has neither extended to all areas nor reduced the duality of the Mexican private sector. The unique structure of the export sector constitutes an *enclave* that is not integrated into the domestic economy (World Bank, 2000: 79). The reason behind this is the high import content of manufactured exports, which generates only low margins of value added per unit exported.²²

²¹ As D. Rodrik (1992: 171) has clearly stated: “...we are far from having any systematic theories which link trade policy to technical efficiency *per se*. In particular, we do not have any good reason to expect that trade liberalization will generally be helpful to overall technological performance”. Tybout (1992) and Harrison & Hanson (1999) conclude in a similar direction.

²² The existing evidence does indeed show a severe reduction of inter-industrial linkages within the Mexican manufacturing sector in the 1990s, due to significant increases in import coefficients in the

In summary, although the openness of the Mexican economy – in particular in the post-NAFTA period – may have had positive effects on manufacturing TFP growth, the repercussions on the economy-wide productivity performance seem to have been insignificant so far, as the different estimates presented in the previous section appear to suggest.

Physical and human capital accumulation

Mexico's long-term productivity performance has been affected both by demand and supply factors and, in particular, by the accumulation of both physical and human capital. For a long time, experts have agreed that physical capital accumulation is a primary source of productivity improvement (Kuznets, 1966). Human capital accumulation – in the form of improved levels of education, training and experience – is explicitly considered to be one of the main determinants of productivity growth mainly in a long-run context (Denison, 1970). This section presents the evidence available on the influence of both factors on the Mexican productivity performance.

Physical accumulation and productivity growth

The first section of this report made clear the importance of physical capital accumulation for the relatively dynamic labour productivity growth in Mexico during the 1960s and 1970s. In fact, capital deepening accounted for more than four-fifths of labour productivity increases over the two decades, showing an extensive pattern of growth along the ISI years of development. By contrast, the crisis years of the 1980s witnessed a notable interruption in the accumulation of capital per worker, thus contributing to the productivity collapse in the Mexican economy.

During the late 1980s and 1990s, capital accumulation partially recovered – albeit at a slower pace. This brought about a partial recovery in labour productivity growth during the final years of the century. However, physical capital accumulation affects not only labour productivity growth, but also TFP performance through the following channels:

- Physical capital accumulates through investment flows. High rates of investment are critical for expanding productive capacity. However, since most innovations are incorporated in new plants, equipment and machinery, new investment is one of the possible channels to boost the economy's knowledge absorption and technological improvement capacities and therefore affects measured total factor productivity growth.
- A rapid expansion of new investment facilitates the replacement of old capital goods with new equipment necessary to achieve state-of-the-art production practices. Therefore, interruptions in the investment process contribute to the ageing of capital stock and to its obsolescence, especially in the face of rapid changes in relative factor prices.
- The composition of investment flows is of prime importance in terms of public and private accumulation. If public infrastructure capital is complementary to private capital, an

majority of industrial sectors when the Mexican input-output tables of 1990 and 1996 are compared (Hernandez Laos, 1999).

increase in public investment would not only attract more private capital – boosting factor accumulation – but would also render it more productive. This benefit does not accrue when public investment is a substitute for private investment, and also when such public expenditures are made with less concern for efficiency and profitability than that associated with private investment.

- Finally, private capital accumulation affects TFP growth depending on the sectoral orientation of investment expenditures. If private investment is increasingly dependent on foreign direct investment (FDI) and predominantly oriented towards exporting, the productivity of new capital expenditures may decrease if – as in the Mexican case – the export sector is a form *enclave*, i.e. with limited linkages to the rest of the economy and relatively low value added per unit exported.

Table 11 shows the evolution of the Mexican investment rate, i.e. gross total investment as a percentage of GDP, and Figure 11 depicts its long run trend. Starting with a relatively low level in the early 1960s, the investment rate increased several percentage points until the late 1970s and early 1980s, when it reached a peak value of more than 25 percent. The onset of the debt crisis in 1982 sunk the investment coefficient, which only partially recovered in the following years, marked by abrupt reductions in the mid-1980s and early 1990s. By the beginning of the 21st century, the Mexican investment rate was still far below its peak level of twenty years previously.²³

The lack of investor response in the mid-1980s was due to the fact that, in the early phases of an adjustment programme, investment falls and major gains may not occur until confidence is restored. However, the recovery in later years was sluggish, possibly due in part to the fact that the economic reforms in the late-1980s may have led to large amounts of capital obsolescence that reduced the effective capital stock below measured levels. Bosworth (1998) has examined this issue and found that Mexico does not resemble an economy with increased capital obsolescence, insofar as the Q-ratio,²⁴ although it fell after the 1982 crisis, rose very rapidly after the reform programme began in 1988.

However, there is strong evidence that the delay in the investment process implied a severe ageing of Mexican capital stock, as represented by the net (non-depreciated) value of capital stock as a percentage of its nominal value. Figure 13 depicts the evolution of this ratio and shows the sudden fall in the proportion of non-depreciated capital in the 1980s, followed by a relative increase – especially in the case of machinery and equipment – in the 1990s. This pattern might help explain the TFP slowdown in the eighties, insofar as the ageing of capital may have implied a delay in the acquisition of new technology.²⁵

The above is not, however, does not represent the whole picture concerning the effects of capital accumulation on TFP growth. Table 11 clearly shows that the main factor behind the changes in the Mexican investment coefficient was the evolution of public investment. Indeed

²³ The investment rate of the Mexican economy closely followed the evolution of the domestic savings rate as depicted in Figure 12. The notorious reductions in saving rates in the 1980s and early 1990s were due to the severe restriction on external borrowing that the economy faced and the sizeable payments resulting from servicing the external debt. These payments amounted to more than 7 percent of GDP in some years (Lustig, 1994).

²⁴ This ratio refers to the market value of capital relative to its replacement cost.

²⁵ The pattern followed by this ratio in the Mexican manufacturing sector was very similar to that of the Mexican economy depicted in Figure 13. It is not presented here due to space reasons.

it started out as a modest share of GDP in 1960, increased sharply in the 1970s and then declined again in the 1980s and the 1990s. During the ISI process adopted in the 1960s, public investment focused on the development of key strategic industries, mainly of complementary nature, such as the electricity sector, railroads and irrigation systems. The accelerated expansion in the 1970s coincided with the notable increase in parastatal enterprises. This was induced by the public sector driven growth strategy implemented during second half of that decade in particular, when expansion was concentrated on the petroleum sector.

After peaking at 12 percent of GDP in 1981, public investment in Mexico declined progressively in the following years, a trend that has continued up to the present day (Table 11). It is clear that this decline was driven by fiscal austerity and the drastic reduction of foreign borrowing opportunities in the aftermath of the 1982 crisis. By the end of that decade, however, the continued decline in public investment followed the more private sector oriented strategy of development and was, undoubtedly, also due to chronically insufficient fiscal resources, a situation which arose from the onerous payments to service internal and external public debts²⁶

On the one hand, the decline in public investment was a natural consequence of the privatization process of many state enterprises. On the other hand, the government strategy consisted of limiting its intervention to provide public infrastructure only in cases where it was complementary to private initiatives. Thus, since 1989, with the privatization of the telecommunications sector, Mexico has promoted private investment in railroads, ports and airports, enhancing the role of the private sector in infrastructure provision. More recently, private sector investments extended to electricity generation, highways and toll roads (Figure 14). With few exceptions, however, the financial constraints faced by private enterprises devoted to infrastructure provision – mainly those involved in highways and road construction, electricity generation and railroad operations– suggest very low levels of profitability and, therefore, limited benefits for TFP growth.²⁷

In an exhaustive study, the World Bank (1998) analyzed, using regression techniques, the effects of the ratio of public to private investment on Mexican TFP growth for the period 1960-1995. The results show that both variables are positively correlated and generally significant, which suggests that public capital has induced positive externalities for private capital. Chou tests point, however, to a significant break in the mid-1980s, indicating a widely acknowledged change in the correlation between productivity growth and the public-private investment ratio, weakening the effect after 1985. This should be interpreted as a decrease in the complementarities between public and private investments since the mid-1980s. This is perhaps a result of prioritizing public investments according to the strategy based on the various reforms that have not yet yielded the expected favourable results in terms of productivity growth.

²⁶ Besides external public debt servicing, internal public debt considerably increased in the aftermath of the 1995 crisis, when the Government rescued the private banking sector from a total collapse. This was an operation of enormous proportions involving payment of about 15 percent of GDP with public resources between then and the year 2030.

²⁷ The major part of these efforts took place in 1997 under a new form of public investment based on “Built-Operate-Transfer” or “Build-Lease-Transfer” principles. These investments – not explicitly included in the budget – consist of long-term income-generating investment projects commissioned by the Government, but financed by the private sector, which is repaid from the proceeds derived from the operation of the projects (World Bank, 2003b).

Finally, it should be noted that, in Table 11, the severe reduction in public investment as a percentage of GDP has been partially offset by an increase in the relative importance of foreign direct investment (FDI) for GDP since 1988. There are a number of reasons behind this trend in FDI. Between 1988 and 1994, it reflected the deepening of the privatization process during which public sector assets and enterprises were acquired by foreign companies, especially in the transport, communications and financial services sectors. After 1995, an increased share of FDI was directed towards the establishment and acquisition of manufacturing enterprises, of which a significant part were maquiladoras and other export-oriented industries (Dussel Peters, 2000).

As mentioned before, these manufacturing enterprises have not developed significant linkages to other Mexican economic sectors, and – due to the high import content of input materials – contribute only with low margins of value added per unit exported. This reduces the overall incremental capital-output ratio (ICOR) of the economy, decreasing TFP growth.²⁸

In short, if the rapid increase in physical capital accumulation contributed positively to labour and total factor productivity growth in the 1960s and 1970s, the fall in the accumulation process that followed the repeated crises of the 1980s and 1990s most probably hindered productivity performance in those decades because of the notorious increase in the average age of capital stock in the economy. Furthermore, the significant reduction of public investment expenditures as a percentage of GDP has also had a negative impact on productivity growth, even given that a higher proportion of infrastructure services is now provided by the private sector. Moreover, although FDI has partially offset the fall in public investment expenditures, an increasing proportion has been directed towards the export sector. This has probably reduced the ICOR of the overall economy – due to its *enclave nature* – and therefore restrained TFP growth.

Human capital accumulation and productivity growth

The other determinant of productivity growth that accumulates over time is human capital. The idea can also be traced back to A. Smith who regarded human capital as the capital value of “...the acquired and useful habits of all the members of society”.²⁹ The process of human capital accumulation goes through formal and informal channels. The former are centered around formal educational and training institutions, whereas informal accumulation takes the form of on-the-job training.

Insofar as measured productivity is based on man years (or man hours) instead of efficiency units of labour, i.e. accounting for changes in labour “quality”, changes in educational skills of the labour force will tend to affect the residual measured TFP growth. These are issues

²⁸ The extreme case is, of course, the maquiladora enterprises in which the national cost component does not exceed 25 percent of the value of their exports, including wages, salaries and nationally acquired intermediate inputs. It is important to note, however, that non-maquiladora exports show a similar pattern, as documented well by Dussel Peters (2000) for several branches such as the automotive and car components industries and the electronic and electrical equipment sectors. Studies by Piore (1998) also documented this phenomenon. The other effect of FDI on productivity growth refers to the direction and intensity of spillovers, an issue that is partially addressed in Part III.

²⁹ This follows quite rightly from the fact that capital stands for “produced means of production” and the acquired skills of workers are certainly “produced” by using up material resources (Smith, 1974).

surrounding the accounting of aggregate economic growth, many of which are still unresolved. Research strategies in this field remain controversial (Griliches, 1970; Nelson, 1981).

The correlation through which educational attainment and skill acquisition affect productivity is better understood at microeconomic level. Studies of individuals, households and firms have documented in many countries strong empirical regularities between educational attainment levels of the population and their productivity performance in both market and non-market (home) production activities (Psacharopoulos, 1985; Jamison and Law, 1982).

If these relationships are causal, and education enhances the productivity and earnings of labour, this microeconomic perspective helps to explain the motivation of public groups and private individuals to provide resources for schooling services on the expectation that the rate of return will warrant the investment. Moreover, education is widely viewed as a public good (with positive externalities) that increases the efficiency of economic and political institutions, while accelerating the pace of scientific advances on which productivity growth is also dependent (Schultz, 1988).

Educational attainment levels rose rapidly in Mexico between the 1960s and the late 1990s. In spite of this, the actual levels of enrolment are far from uniform, with the exception perhaps of elementary school attendance (Table 12). Elementary school enrolment increased from 71.3 percent in 1960 to near 96 percent in the year 2000. The expansion was more dynamic at secondary level, but has not yet reached universal coverage (85%). Levels of actual enrolment in high schools (48.3) and vocational schools (18.9%) have been even lower.

These trends have partially changed the education profile of the Mexican population. In the early 1960s, more than 90 percent had no or only had primary education, whereas by the year 2000 this proportion – although lower than 50 percent – was high enough to inhibit productivity growth.³⁰ The underdeveloped character of the educational system in Mexico is also evident in the small proportions of the population with high school or vocational education (Table 13).

Earlier studies have identified the extent of the weaknesses in Mexico's educational system. Londoño (1996), for example, identified an educational deficit of two years in Mexico which is below the standard that would be expected of a country of its level of per capita income. The World Bank (1998) found that Mexico's level of educational attainment in 1960 was significantly below the world average for countries with similar levels of economic development. Although the country's performance in this area improved steadily in the following two decades, it continued to remain below international standards. Only in the early 1990s did Mexico catch up on these international standards, reflecting the remarkable improvement in schooling in the 1980s. No data is available for the year 2000, but it is probable that the gap in Mexican educational attainment levels did not increase, at least in quantitative terms. A further issue, the actual poor quality performance of the Mexican educational system, will be addressed later on in this report.

³⁰ This is a very high proportion if it is considered that, according to previous econometric research, the probability of being formally trained on-the-job in Mexico is virtually zero for employees with less than formal secondary schooling (Llamas and Gonzales, 1997). The high proportion of untrained workers may, therefore, have had very unfavourable effects on productivity levels and growth.

The relationship between human capital and productivity in Mexico was assessed using both macro-level, i.e. through growth accounting, and micro-level approaches. Some previous growth accounting studies have actually incorporated adjustments of the labour force for changes in characteristics associated with differences in productivity, such as education, age and gender.

Bosworth (1998), for example, measured changes in the quality of the labour force by combining schooling data with information on the relative wage structure of workers with different levels of education. He found that an index of labour quality for Mexico, based on a seven-percent rate of return, increased at an annual rate of one percent. This compares very favourably in an international context, and undoubtedly represents a growth in educational attainment above the Latin American average. According to Bosworth's estimates, educational improvements "contributed" as much as 60 percent to the long run growth of labour productivity Mexico from 1960 to 1995.³¹

At microeconomic level, Garro-Bordonaro, Gomez-Mesa and Melendez-Barron (1997) estimated positive and statistically significant rates of return for an additional year of schooling at different levels of education in Mexico. For basic instruction (primary and secondary levels) they found a rate of return of 13.8 percent for men and 11 percent for women. Training courses have rates of return of between 6.4 and 15.9 percent, whereas an additional year of high school and technical studies gives a rate of return of between 7 and 10 percent. The highest premium for human capital investment was found at the levels of basic education, on-the-job training and secondary and high school.

Lächler (1998), on the other hand, found from Mincerian rates of return, that the overall private rate of return on education in Mexico increased between 1984 and 1994. Moreover, he found that the rankings of rates of return for different levels of schooling changed over the same period. By the mid-1980s, lower levels of education uniformly yielded greater rates of return than investments in higher levels of education. This ranking was completely reversed by the mid-1990s, with the private rates of return on primary education declining significantly below those of higher education, which almost doubled. As Lächler points out, this was a direct consequence of the increased dispersion in wages over that period.

Therefore, the actual evidence – both macro and micro – points to a positive correlation between education and productivity in the Mexican economy. However, there are some caveats. As Levine and Kelly (1994) have argued, the effectiveness of education in increasing productivity depends heavily on the existence of complementary inputs: the availability of remunerated jobs and the introduction of modern business organization methods are vital to take full advantage of the enhanced capacity of educated workers. Nevertheless, as we will see in the next section, the increasing importance of the informal sector in the Mexican economy possibly constitutes one of the main obstacles to taking full advantage in terms of productivity growth of the educational attainment of the Mexican labour force.³²

Recent research has shown that a further reason behind the apparently limited benefits of

³¹ See Bosworth (1998), Table 6, output per worker based on the labour force concept.

³² For an extensive analysis of the effects of the increasing informal sector on the Mexican labour market for professionals, see Hernandez-Laos, Solis and Stefanovich (2003).

education lies in the poor quality of the Mexican school system. An extensive study undertaken by the Instituto Nacional de la Educación (INEE, 2004) in Mexico and based on the results of the PISA test taken by fifteen-year old Mexican students, draws the following conclusions:

- Knowledge and skills in mathematics, reading, science and problem-solving in Mexico are significantly lower than those of developed countries. Mexico is behind all OECD members, except for Tunisia and Indonesia.
- The rate of school attainment of fifteen-year old Mexican students is only 58 percent, against nearly 100 percent in the majority of OECD countries.
- A high proportion of the Mexican population of that age lacks minimum competences for a productive life in a knowledge-based society.
- The skills distribution amongst Mexicans of that age is highly uneven in almost all areas of knowledge, when compared to other OECD countries.
- The results of the PISA test in Mexico in 2003 were poorer than those of the 2000 test, with the exception of the area of mathematics. In contrast, Brazil not only enhanced its scores, but also its attainment rates in that period.
- Results from the area of secondary education in Mexico are poorer than those from high school education, and there is also evidence that scores of private schools are better than those of public schools.

In summary, although accumulation of human capital in the Mexican economy has accelerated over the last four decades, the level of educational attainment is far from satisfactory from the point of view of productivity growth performance. This is a consequence both of the low coverage of medium and high school education and the still very low rates of enrolment in vocational education, and the poor quality of the Mexican school system.

Creation, transmission and absorption of knowledge

TFP growth was originally considered as synonymous with technical change (Solow, 1957), but that interpretation was radically revised some time ago. Today the influence of several other factors on TFP growth is recognized, in particular those associated with the increases in efficiency derived from different types of resource reallocations (Solow, 2001).

As was argued in Section I of this paper, it is assumed that the application of more recently developed techniques – such as the Malmquist method – permits a separation of increases in (pure) technical change from the effects of changes in the efficiency of the economy.

The previous breakdown of TFP growth has important implications for the evaluation of long run trends in the capacity of the Mexican economy to create, transmit and absorb knowledge. To put the discussion into perspective, it might be useful to recall the rapid acceleration of (pure) technological change experienced by the Mexican economy in the late 1980s and early 1990s, which was not paralleled by TFP increases due to a systematic deterioration in the

efficiency of the economy.

The combination of both trends could mean – as has already been argued – that, whereas the frontier production function of the Mexican economy was shifting upwards, the average firm was lagging behind due to a variety of inefficiency problems. Here the main problems faced by the country's economy in the process of creation and diffusion of technical innovation is analyzed.

It will be argued that the observed acceleration of technical change over the last fifteen years – responsible for the upward shifting of the frontier – was driven by a small segment of largely export-oriented multinational and large national manufacturing enterprises. However, the repercussions of those movements have been too weak to really have an impact on the entire economy to date, thus having only influencing TFP growth to a limited extent. In this case – it will be argued – the problem lies in the notorious inefficiencies of the so-called National Innovation System (NIS), i.e. the system of institutional arrangements that link the creators of knowledge to the users or adapters of it, the productive sector as a whole.

Initially, it might be pertinent to recall the main trends in (pure) technical change in Mexico throughout the last forty years. In effect, as shown in Section I, UNIDO's estimates of technical change indicate that, during the ISI period (1960-1981), although positive, it grew at the very modest rate of 0.3 per cent annually. During the crisis years (1982-1987), this growth turned negative at - 0.1 per cent per year. It was only from 1988 onwards that technological change accelerated at an unprecedented rate of +3.6 per cent per year. The estimates of Brown-Grossman and Domínguez (2004) also quoted for the Mexican manufacturing sector show too an accelerated growth of about +2.1 per cent per year between 1984 and 2000 as well. These estimates disaggregate by industrial sectors, which indicate that this increasing trend was rather a generalized one, i.e. most industries registered substantial rates of growth of (pure) technical change over the past 16 years.³³

In fact, the acceleration of technical change coincides with the opening of the Mexican economy and, in particular, with the implementation of NAFTA. Therefore, trade and financial openness – mainly in relation to FDI – might have had important effects on the improvement of the knowledge base of the economy. These issues are to be examined in part III of the report when certain economic policy effects on TFP growth are analyzed.

In order to evaluate trends in the innovative capacities of the Mexican economy it is useful to trace the pattern of *ad-hoc* indicators such as patent counts. Table 14 shows some data on the evolution of the number of patents awarded by the United States Patent and Trade Mark Office (USPTO) to Mexico and other selected countries for the period 1980-1999. This kind of information is commonly used as an indicator of the flow of innovation worldwide.

The conclusion to be drawn from the data is clear. On the one hand, there was a reduction in the number of patents awarded to Mexico during the crisis years (1980-1986), followed by a

³³ In the non-electrical machinery industry, technical change grew at a rate in excess of 8 per cent annually and in industries such as food products, and automotive products and base metals at between 4 and 5 per cent per year. Growth rates in the paper and non-metallic minerals sectors also rose rapidly between 2 to 4 per cent per year and even the chemical industry recorded a rate of technical change in excess of 1 per cent per year along this sixteen-year period. With the exception of base metals, the other industries accelerated their technical change more in the later years (1994-2000) of the period). It is worth noting that the most dynamic industries in terms of technical change are export-oriented. Please refer to Table 5 in Section I of this Report.

slight recovery (1987-1999), which coincided with the opening of the economy, especially after the implementation of NAFTA in 1994. On the other hand, it is worth noting that the absolute number of patent counts by Mexico is, by all standards, too low compared with the absolute amount and dynamism of patent counts in countries such as Korea and Taiwan after 1993 and even when compared to Spain and – to a lesser extent – Brazil.

Information from the OECD shows that patent applications by residents in Mexico represented less than 7 per cent of the total, whereas the bulk of applications were made by non-residents between 1983 and 1997. Data from this source also shows the sharp contrast in dynamic terms. In fact, while the number of patents awarded to Mexican residents increased at 2.2 percent per year between 1983 and 1997, those awarded to non-residents increased in the same period at a rate of 31.5 per cent annually (Table 15).³⁴

Long-term trends in patent counts achieved by Mexico and analyzed in the study of the World Bank previously quoted suggest that they were highest in the 1960s, then declined steadily until the first half of the 1990s and finally picked up again after the implementation of NAFTA in the second half of the 1990s. In the World Bank's opinion, however, "... this resurgence was quite modest by historical standards, clearly insufficient to make a significant dent in the observed gap with respect to Canada and US. Mexico is also still far behind East Asian and especially the Korean levels. Moreover it is also behind Costa Rica and Venezuela" (World Bank, 2003a: 175).

Specialists recognize that patent counts might be related to the level of development of countries. In order to assess Mexico's relative position in this field and with respect to the number of scientific publications on offer, the same study estimates – by cross-country multiple regression techniques – a functional form in terms of several "explanatory" variables.³⁵ The analysis shows that Mexico is lagging behind in terms of these innovation indicators given its level of development.³⁶

Patents are a product and a result of research initiatives taken by different agents within the economy. The main input in this case is represented by the amount – and relative size – of research and development expenditures (R&D). Recent available data suggest that Mexico is also behind in this regard. Table 16 shows R&D expenditures as a percentage of GDP for several countries during the 1990s. It can be observed that, although Mexico doubled its percentage between 1993 and 1999, its level is still outstandingly low, even when compared to Brazil, Chile and Spain, not to mention high performers such as the US, Japan and Korea.

Different studies confirm that Mexican R&D initiatives are rather limited by comparison with

³⁴ In this regard, a Mexican researcher concludes: "The vast majority of patents awarded in Mexico correspond to foreign firms, some of which do not produce goods in the country. For these firms, patenting activities are basically undertaken to commercialize products and obtain international protection for their innovative development" (Capdevielle, 2003: 464).

³⁵ The study applies a negative binomial regression equation, utilizing as exogenous variables logGDP, the square of logGDP, log exports and the square of log exports.

³⁶ However, the country has not always underperformed in terms of patent counts. In fact, there were more patents registered in Mexico in the 1960s than at any time afterwards. Registrations started to slow down at the beginning of the 1980s, a trend that was accentuated in the 1990s. The modest recovery after NAFTA was not strong enough to bring the country back to the levels observed for other countries with similar levels of development. Mexico is too far behind high performers such as Korea, Taiwan and India.

those countries at the technological frontier.³⁷ For example, the much-quoted study of the World Bank (2003a) econometrically evaluates where the country stands in R&D and licensing. For that purpose, a correlation between the rates of R&D investment and GDP across countries is derived from a world sample of developed and developing countries (1960-2000).³⁸ The Mexican performance is then evaluated against this relationship for the years 1986, 1993 and 1998, and the study concludes that the country is underperforming, given its level of development and was doing so before and after NAFTA.³⁹

Research activities, like many other economic undertakings, are partly market-driven. Therefore, if the rate of return on the innovative activity is high enough, it will probably thrive. The World Bank study calculates private and social rates of return on R&D activities for countries with different levels of development. It finds that the gap between the social rate of return in physical capital and the one in R&D investments is about eight times in countries such as Mexico and only about 2.5 times in advanced countries such as the US.⁴⁰

This poses the following question: how can high rates of growth in (pure) technical change in the Mexican economy over the last one-and-a-half decades be reconciled with the poor performance of the country in different indicators of innovative activity, taking into account its relative level of development and especially in relation to high performers? To the best of our knowledge, this question has not been addressed before in the literature reviewed and the hypothesis advanced here undoubtedly calls for further research.

High social rates of return on R&D investments are probably not enough to induce high flows of innovative activity and not only just because of the very nature of knowledge creation and absorption or even because of market failures.⁴¹ This situation may be a result of two important obstacles faced by the Mexican economy: the dual structure of its manufacturing sector on the one hand, and the severe inefficiencies in the so-called National Innovation System (NIS) of the country, on the other hand.

In the first case, as argued in the previous section of this report, there is - within the domestic manufacturing industry - a dichotomy: characterized, on the one hand, by a small group of modernized firms, and on the other hand, by a much larger group of markedly less efficient companies.

In this context, while the inefficient firms are technologically backward, the modernized and efficient group of firms is becoming increasingly globalized with regard to the orientation of its production capabilities and in its capacity to acquire foreign technology. There is

³⁷ For an exhaustive evaluation, consult Cimoly (2000).

³⁸ The econometric specification of the regression-equations is assumed to be similar to that applied in the case of patent counts mentioned above.

³⁹ However, a similar exercise for license payments reveals that Mexico has not systematically underperformed in the area of licensing relative to the median.

⁴⁰ The fact that social returns are high does not mean that private rates of returns are high. Unaddressed market imperfections tend to reduce the equilibrium in private marginal return on R&D, and might have unfavourable effects on the marginal cost of innovative activities.

⁴¹ In fact, knowledge is especially susceptible to market failures that lead to underinvestment in R&D and other innovative activities. Among other things, there is the *non-appropriability* of all the benefits derived from innovation, the lumpiness and economies of scale that lead to specialization, the so-called *free-rider* problem, that impedes both innovation and its diffusion and the required collaboration among many firms and institutions (Baumol, 2002).

sufficient evidence to show that the most efficient firms – both multinationals and large domestic ones – have increased their exports and imports of intermediate and capital goods, with highly-specialized production activities and new patterns of specialization. The export sector is mainly composed of *maquiladora*-type firms, in which the pattern of R&D activities and other modes of technology transfer have been mainly dominated by greater integration of imported inputs, while their local contribution to R&D and interactions with local institutions are scarce and fragmented.

Furthermore, multinational and larger national firms rely extensively on foreign sources of advanced technology, and have some integration with countries that lead in international trade and technological innovations. However, as these firms are the result of increased flows of FDI, it is worth noting that this kind of investment concerns activities and decisions of multinational enterprises, in which technological developments occur mainly at their home bases are transferred only to a limited (if any) extent to countries such as Mexico.⁴²

Therefore, the most dynamic science and technology-based sectors, dominated by multinational firms,⁴³ might help explain – at least in part – the surge in (pure) technical advances, i.e. the accelerated shifting of the production frontier of the economy. However, as has been argued, these sectors have limited linkages with the less dynamic domestic sector of the Mexican economy. In the case of the latter, the technological problems appear to be a consequence of the severe inefficiencies of the NIS.

The World Bank study (World Bank, 2003a) provides a diagnosis of the extent to which Mexico's innovation system suffers from inefficiencies, stemming from the lack of high-quality research institutions and their linkages with the productive economy. This phenomenon is also studied in detail in recent research work (Cimoli, 2000). Here we summarize both sources in order to identify the multiple inefficiencies of the Mexican NIS.

In the first place, the problem of an inadequate patenting system underlies Mexican R&D expenditure. The World Bank (2003a) analyzes how well the system converts R&D financing into patenting. Using econometric estimates of country-specific patenting elasticity with respect to total R&D investment,⁴⁴ it finds that Mexico is among the worst performers with its coefficient roughly 6.3% below that of the OECD, and also far below Korea and even Costa Rica and Venezuela.

⁴² As a specialist has concluded in this regard: "Mexico participates actively in the globalization of production, while its participation in the globalization of scientific and technological activities is very poor" (Cimoli, 2000).

⁴³ In a recent book, Baumol (2002) gives an interpretation of the innovative process as the engine of growth. The author emphasizes the two features of the capitalist economy that contribute to its unequal growth record. The first and perhaps most important one is the role of innovation as a primary *competitive* weapon and the resulting innovation race between firms. The second feature is the *routinization* of innovation that transforms it from a sequence of fortuitous occurrences into a businesslike activity that can be relied upon and is reasonably predictable. The two features are to be found particularly in highly *oligopolized* sectors, where huge firms dominate markets and in which innovation has become the preferred competitive weapon. The author exemplifies these sectors with the so-called "high-tech" industries such as computers, drugs and medicine, office computers and accounting machines, optical and photographic equipment, communications equipment and electronic components (Baumol, 2002: 35). Most of these US industries have placed multinational firms in less developed countries like Mexico.

⁴⁴ The exercise uses a pooled regression of 52 countries over a fifteen-year period.

In a further econometric exercise, it finds that data from the Global Competitiveness Report on indicators of scientific and research organizations and on the extent of collaboration between the productive sector and universities, plus the gross enrolment rate in tertiary education, are sufficient to explain Mexico's inefficient R&D expenditure. The World Bank summarizes its findings, arguing that Mexico's inefficiency is due to a combination of low enrolment rates in universities and poor-quality research and linkages between the universities and the productive sector.

On the other hand, Cimoli's (2000) analysis shows that institutions linked to the innovation process in Mexico did not respond optimally to the changes in normative rules and incentives that originated from liberalization policies. His evidence confirms that interaction between firms and the local institutions that produce knowledge is still weak and that domestic firms consider internal rather than external sources of knowledge as more important for their innovative activities.

Even though the government and public institutions account for as much as two-thirds of R&D expenditure (Table 17), neither the public sector nor university research centres are relevant sources of information for Mexican firms.⁴⁵ Furthermore and as indicated in the previous section, although the government and educational organizations have paid special attention to fostering enrolment rates, the country's stock of technicians, engineers and scientists is still inadequate, as is enrolment at the secondary and tertiary levels.

Problems also arise from the inadequate incentives system to produce or adapt knowledge. Initiatives to generate knowledge in Mexico are given little government or private sector support and higher education institutions carry out most of the local R&D activities, although their research capabilities are still poor by international standards. Finally, collaboration between universities and industry in research activities is also inadequate, it has been increasing since the early 1990s, mainly on a regional basis (Casas, De Gortari and Santos, 2000).

In short, Mexico's NIS lacks information and knowledge networks, a necessary basis for modern economic systems. These inadequacies prevent the economy from achieving dynamic and static efficiencies, which – in the Mexican institutional environment – increasingly depend on access to advanced linkages between firms and knowledge flows. The Mexican NIS cannot generate the economies of scale and increasing returns derived from the availability of strategic infrastructural facilities, such as human and physical channels for information flows.

Collaborative efforts are also lacking in the Mexican innovation system. This is a key issue in understanding *diffusion* of knowledge and innovation. Instead – as already argued – most of the more dynamic production activities in Mexico have increased their demand for knowledge and technology from foreign sources. Although this trend enables multinationals and large domestic groups to improve their competitiveness, it hinders the development of local R&D activities as there is no efficient institutionalised framework to absorb and diffuse knowledge throughout the entire economy.

⁴⁵ This is a rather remarkable fact in the case of the most dynamic exporting firms, since they mostly have strong links with such centres in the more developed countries, especially the US.

Therefore, it seems that the Mexican NIS has failed to put an incentives system in place to stimulate the creation of local networks of non-market linkages. It also lacks a business culture and institutions enabling firms to interact with each other, i.e. to stimulate one of the most important sources of growth: positive external factors and increasing returns.

Thus, NIS failures might account for some of the inefficiencies observed in UNIDO's measurements and might explain the marked divergence between (pure) technical change and TFP growth in the Mexican economy over the last 15 years. There are, of course, other sources of inefficiencies in the country's economy, some of which are analyzed in the following sections of the report.

Structure and functioning of factor markets

The steady technical progress observed from the mid-1980s to the late 1990s, theoretically shifted the production frontier of the Mexican economy upwards. However, such significant improvements in technology were not matched by increases in efficiency standards. On the contrary, efficiency indexes systematically decreased over the last 15 years, as suggested by the application of the Malmquist method to assess TFP growth.

Similarly and as was observed, the estimated impact of sectoral shifts in resource allocation within the Mexican economy have had no or negative effects on productivity growth over the past two decades, after a positive, but slight drift during the 1960s and the 1970s.⁴⁶

There are obvious signs of inadequacy in the functioning and operation of the Mexican economy in terms of both technical and allocative efficiency standards. As is well known, allocative efficiency refers to the extent to which the existing combination of outputs corresponds to that which maximizes the aggregate welfare of society. Technical efficiency concerns the appropriate allocation of resources to ensure the efficient production of any particular output, on the production frontier of the industry or of the economy.

Although in the latter case above some internal factors in the plants are of most relevance – those producing the so called X-efficiency (Leibenstein, 1966) - both forms of efficiency are strongly determined by the manner in which factor markets operate in the economy, given that the allocation and efficient use of resources depends on their structure and functioning.

As will be shown, one actual cause of the pattern of inefficiency in the Mexican economy and in several manufacturing sectors can be partially traced back to the operation of both capital and labour markets, an assessment of which is presented below.

The financial sector and productivity performance

In Mexico, the capital market operates mainly through the banking sector, insofar as the stock market is restricted to a small number of very large firms. Thus, an overview of the evolution of the Mexican commercial banking system since 1960 shows that the slowdown in productivity growth coincided with the stagnation of Mexico's financial system.

⁴⁶ Refer to Figure 5 and Tables 3, 5 and 6.

In the 1960s, Mexico's financial system experienced very high rates of growth following the rapid expansion of the country's banking sector (Figure 15), resulting in a substantial financial deepening of the economy. However, in those years the system was heavily regulated in terms of transactions permitted, high reserve requirements and controlled interest rates⁴⁷ and foreign competition was severely restricted.

The process of financial deepening came to a halt during the 1970s, coinciding with the onset of rising macroeconomic instability, and existing controls became more stringent. With a rapid increase in inflation, real interest rates turned negative and were no longer competitive, encouraging capital flight, which, in turn, reduced the amount of funding available to domestic investors. Asset holdings in foreign currency became widespread, adding to the financial system's vulnerability. The policy of growing fiscal relaxation followed by the Government absorbed an increased share of the deposits in the banking system, leaving an steadily dwindling proportion available to finance private sector activities. All this coincided with the decline in measured TFP growth.

This deterioration of the banking system culminated in the nationalization of all commercial banks in 1982. The 1980s were years of severe macroeconomic instability and acute financial and monetary imbalances. This dramatically increased the financial deepening of the economy in 1982 and 1986 – years of rapid inflation – and in 1994-95 during the *tequila* crisis. The phase of accelerated growth in the financial sector, and in commercial banking in particular, represented only a superficial deepening that was quickly reversed after the 1995 crisis, when a period of constant financial downsizing and growth reached just 22 percent of GDP in 2002, i.e. lower than 40 years earlier at the beginning of the 1960s (Figure 15).

As in the previous three decades, the main source of growth in the financial sector continued to be the commercial bank system. Non-bank intermediaries remained underdeveloped, notwithstanding the re-privatization and liberalization of the banks in the early 1990's.⁴⁸ Therefore, the Mexican banking system remained vulnerable, in spite of a support package (bailout) implemented after the 1995 financial crisis which is estimated to have cost at least 20 percent of GDP in present value terms. As a result, banks have been extremely reluctant to take on new risks and lending to the private sector has been on the decline in real terms since the mid-1990s.⁴⁹ In short, the financial system of the country has been in a slump since the beginning of the 1970s, coinciding with the productivity slowdown of the Mexican economy.

There is an increasing amount of literature suggesting the interaction between the structure and functioning of the financial sector and economic and productivity growth.⁵⁰ In effect, the

⁴⁷ Nevertheless, in the 1960s, interest rates remained positive in real terms and were competitive with the real interest rate offered on the Eurodollar market.

⁴⁸ The gradual elimination of fiscal deficits made the Government less dependent on commercial banks' reserves, which permitted – along with the restoration of macroeconomic stability – the dismantling of interest rate controls, the modernization of financial sector legislation and simplification of reserve requirements. For more details, see Clavijo and Valdivieso (2000).

⁴⁹ Financial stringency was particularly severe in the case of micro, small and medium-sized manufacturing enterprises and this has considerably restrained their capacity to export (World Bank, 2000).

⁵⁰ For an overview of this literature, see Levine (1997). For evidence on causality consult Beck, Levine and Loayza (1999), Neusser and Kugler (1998), and Rousseau and Wachtel (1998). Rajan and Zingales (1998) show that industries that rely more heavily on external financing grow faster in countries with developed financial systems.

sector has to move resources from savers to investors in productive activities. This intermediation implies transaction costs to identify the most profitable firms, mobilize capital and make the contractual and institutional arrangements for pooling risks and trading security.

The efficiency of a financial system is measured by its capacity to reduce these transaction costs, therefore optimally allocating the financial resources to the more productive activities. In short, the financial sector provides services to the economy that may enhance (or hinder) productivity growth.

It is in this context that the importance of the regulatory environment has to be highlighted as an effective determinant of financial market development. The World Bank (1998), based on a database developed by Laporta, Lopez de Silanes, Shleifer and Vishny (1996), assessed the positive effects of the scope of creditor and shareholder rights and the efficiency with which the regulatory system enforces laws, on the development of banking systems. A strong correlation was established between the regulatory environment, the development of the banking system and productivity growth.

Using econometric exercises, the World Bank (1998) shows that Mexico's financial markets are poorly developed by international standards and that its legal system has conspicuous shortcomings in the area of creditor and shareholder rights.⁵¹ For the World Bank, these legal shortcomings are "prime candidates" to explain at least part of Mexico's poor economic growth performance since the early 1980s.

These findings highlight the comparatively underdeveloped nature of Mexico's financial and legal systems. However – as the World Bank points out – these systems did not deteriorate overnight, and, were, in fact, less developed in the 1960s. How then can the productivity growth slowdown be explained by the nature of the financial system? The answer is not that the financial system in Mexico underwent a major deterioration, but rather that the world around it changed, transforming an already underdeveloped system into a more serious growth constraint.⁵²

In short, the weak financial system exacerbated the adverse impact of macroeconomic instability on economic growth and productivity, insofar as the underdeveloped nature of many financial institutions rendered them especially vulnerable to crises and constrained macroeconomic management.

⁵¹ For its level of development, Mexico has an extremely poorly developed banking system insofar as the credit extended to the private sector as a proportion of GDP ranks last out of 43 countries. A similar outcome emerges when comparing stock market development. On the other hand, Mexico is the only country in the sample that turns out to have the minimum value for both creditor and shareholder rights, and, although the country's ranking in terms of law enforcement is slightly better, it still remains well below the world mean (World Bank, 1998, Annex II).

⁵² The World Bank (1998) argues that the financial system played a less crucial role in the state-coordinated, inward-oriented development strategy applied during the 1960s and 1970s, than it did in the outward-oriented private sector-based strategy adopted later. Once the private sector took the lead in investment, the financial system was not prepared to perform its intermediary role, resulting in the misallocation of savings and retarding productivity growth. The misallocation of resources was aggravated with the inflow of foreign capital as the Mexican economy became more globalized in the second half of the 1980s and the 1990s.

Labour market and productivity performance

The labour market is a vehicle for allocating jobs and skills between sectors and occupations in the economy. The efficient allocation of labour is a necessary pre-requisite to enhance productivity growth. Potential labour market distortions and rigidities could therefore help to explain the notorious Mexican productivity slowdown and collapse in the 1970s and 1980s.

A major study by Gregory (1986) extensively documented Mexico's labour market, and concluded that, prior to the 1980s, it was fairly efficient in assigning jobs to a rapidly growing labour force, and that institutional regulations had not been a major source of distortions. The problem – according to Gregory – was one of low wages and remuneration, due to inadequate capital accumulation, and gave rise to extremely significant labour market distortions.

However, since the early 1980s, the Mexican economy has witnessed a rapid expansion of the informal sector, which may reflect potential problems in the operation and functioning of the labour market. As is well documented, in the majority of Latin American countries informal employment is less capital-intensive than the formal-sector jobs, so the expansion of the black economy in the last two decades also coincides with the country's stagnant productivity growth performance.

The increasing informal sector in Mexico, however, developed in a special demographic and economic context, in which the labour market has had to operate under extreme pressures that need to be evaluated. The demographic position shows, for example that population growth rates have been decreasing since the mid-1970s – from 3.4 percent a year in 1960 to 1.7 percent in 2000. However, the demographic transition implied in this process has changed the age structure of the Mexican population and high rates of growth have continued in the working-age population. This, together with the notable increases in participation rates – especially those of women – during the eighties and the nineties, has helped to maintain high rates of growth of the working population, increasing the rates of growth of the labour force by 2.5 percent per year by the turn of the century. There have been a high number of new entrants to the Mexican labour market, reaching a level of about 1.3 million persons per year.

In contrast, the evolution of formal jobs has been considerably less dynamic since the beginning of the 1980s. Data on remunerated employment from the Mexican system of national accounts was taken as representative of this evolution. On this basis, it is easy to see the increasing gap between the size of the labour force (LF) and the amount of remunerated jobs (RE). The difference gives an idea of the growing importance of both official unemployment and the size of the informal sector in the Mexican economy (Figure 16).

As the official unemployment rate registered only temporary increases and generally stayed below 4 percent, the vast proportion of the difference between the labour force figures and those of remunerated employment is attributable to non-remunerated individuals, as a proxy for the size of the informal sector.⁵³

⁵³ The International Labour Organization (ILO) calculated more precise estimates of the size of the Mexican informal sector. These placed it at 24.7 percent of the Mexican urban labour force in 1980, 29.9 percent in 1985, 36.0 percent in 1990 and 37.9 percent in 1995. Other estimates by Cortes (2001) using similar methodology point to a relative size of the urban informal sector in Mexico of 32.2 percent in 1988 and 39.1 percent in 1998.

In a previous investigation (Hernandez-Laos, Garro and Llamas, 2000), an analysis was of the main characteristics of informal jobs in Mexico was carried out. The results show that an increasing proportion of these jobs are in the services sector, "unremunerated working family members" account for higher proportions, a growing share is employed in very small enterprises establishments, and only a small grouping of informal jobs is covered by the Mexican social security system.

Traditional explanations of the existence of the informal sector in Latin American countries have focused on labour market distortions that result in market segmentation, i.e. barriers to the movement of labour between the formal and informal sectors, which permits a significant wage differential to persist. In this context, the informal sector is considered to be a residual comprising of the workers that were not absorbed in the formal sector. An alternative explanation sees the informal sector as a voluntary phenomenon, which workers opt for because the net benefits exceed those obtainable in the formal sector (Maloney, 1997).

In our previously quoted investigation (Hernandez-Laos, Garro and Llamas, 2000), the possible existence of labour market barriers or distortions that may have contributed to the growth of informality, and hence to the productivity slowdown in the Mexican economy, was explored. Here the findings are summarized under two headings: a) indicators of the labour market adjustment process and b) indicators of institutional aspects conditioning labour market operation. In both cases, the implications for productivity performance are assessed.

Low unemployment rates in Mexico are a consequence of low reservation wages and flexible wage adjustment. Analysis of this issue shows that there is no evidence that real wages' rigidities represent an important distortion in the Mexican labour market operation. Hence, the productivity collapse since 1982 cannot be explained by a lower utilization of labour, as might be the case for other Latin American countries.

Labour misallocation can still arise, however, through mismatches of skills and jobs. This situation is more likely to occur in conditions of low wage dispersion as a result, for example, of government interference or a failure of the market to reward more productive workers or skills. Even though the cross-country evidence on wages across different skills or labour characteristics yields inconclusive results, it is clear that wage dispersion in Mexico increased over the last two decades, both in terms of remuneration for different educational levels and of wages paid in different sectors. This could be a signal that the market is becoming more efficient in discriminating between different productivity levels, insofar as there was a positive and significant association between the changes in labour remuneration and those in labour productivity in the 1980s and 1990s in Mexico.

The application to Mexican data of a simple demand and supply framework developed by Kats and Murphy (1992) reveals that secular increases in the demand for more educated workers appear to be the driving force behind recent adjustments in the Mexican labour market. This outcome is consistent with the hypothesis that changes in demand for labour are mainly driven by skill-biased technological change, and that the labour market recognizes the education and skills of the workers through wage premiums.

An inefficient labour market is one where the relative wages of different types of workers are not equated to their relative marginal productivities. The econometric analysis applied to the Mexican case in this connection shows that this relation applies unequally across all sectors and different types of labour. This exercise indicates that the labour market may be

malfunctioning in the mainly rural, agricultural sector, with respect to low-skilled labour, a category that appears to be systematically underpaid relative to its marginal productivity. It is indicative of a possible market failure in rural Mexico. However, as informality is mainly an urban phenomenon, this rural labour market failure alone may not help to explain the growing informal sector of the Mexican economy.

Institutional aspects of the country's labour market show other types of distortions, which are more likely to help explain informality. For example, minimum-wage legislation may distort the bottom end of the wage distribution, thereby influencing labour allocation decisions. Moreover, in the absence of unemployment insurance, a binding minimum wage encourages the growth of the informal sector when workers with low productivity cannot find employment at the statutory minimum wage. A detailed analysis of this issue shows that the minimum wage in Mexico, even though binding in principle, is not legally enforced in practice. An examination of the distribution of wages suggests that the minimum wage may be partly binding only in the agricultural sector. Nevertheless, its effects on the expansion of the informal sector may be negligible.

Of more importance are the dimensions and characteristics of non-wage labour costs in the Mexican economy. To the extent that they introduce a tax wedge between the benefits received by workers and the costs paid by firms, they create an opportunity of arbitrage between them to split the deadweight loss by withdrawing from the formal sector. In the case of Mexico, however, lax enforcement has kept these costs at modest levels as long as firms are small and they compare favourably with those of other Latin American countries.

However, what most stands out in the case of Mexico is the evolution of these costs, given that they have increased rapidly by over 44 percent between 1980 and 1995. The component of non-wage labour costs that grew fastest was the contribution to social security, from 13 percent of the basic wage in 1983 to 20 percent by 1994. This expansion in costs was not accompanied by a parallel increase in benefits, making workers more willing to accept compensatory wage reductions that might encourage voluntary migration to the informal sector and thus unfavourably affecting productivity growth.⁵⁴

On the other hand, labour laws in Mexico favour permanent rather than temporary employment contracts, which are an exception. This imposes some restrictions when hiring and firing workers, as transaction costs are higher due to high severance payments, estimated to represent up to 6 percent of the monthly wage bill in the Mexican manufacturing sector. These costs may have become more onerous over the last decade, owing to changes associated with more liberalized external trade and which force firms to compete in a more global setting.⁵⁵

A third institutional factor affecting labour market operation is the impact of unions, whether in respect of contractual working conditions or the imposition of a wage premium. A detailed analysis of 1000 collective contracts signed in the 1990s showed that, in general, they permit a high degree of functional flexibility, a lower degree of numerical flexibility – with regard to

⁵⁴ The social security reform of 1997 only partially corrected these disincentives to formal sector employment.

⁵⁵ To achieve greater flexibility, manufacturing firms are implementing new labour contracting practices, such as sub-contracting, part-time contracts and use of temporary workers to reduce severance costs. These practices, however, involve informal working arrangements and often border on illegality under the existing labour code.

hiring and laying-off workers –and still less flexibility in the area of wage determination, making little use of bonuses for punctuality, productivity and quality.

Further econometric exercises, however, point towards a reduction in unions' influence during the 1990s in terms of extracting wage concessions, despite mixed signals generated by collective contractual arrangements. In any case, the unions' bargaining power is actually confined to larger, more capital-intensive firms, mainly belonging to the formal sector.

In summary, Mexico's labour market appears to be reasonably integrated, with the possible exception of the market for less skilled workers in the primary sector. Institutional and legal incentives make it easier for firms and workers to operate in the informal sector and contribute to distortions and inflexibility in the labour market. Among these are the rising non-wage labour costs and the high costs of redundancies in the formal sector, which have become more and more onerous as the economy became more globalized.

However important these factors may be, the failure to enforce legislation suggests that they are not the only – and certainly not the main– reason for the marked expansion of the informal sector over the last two decades in Mexico. The structure of the labour market has contributed to some extent to the interruption of productivity growth, but it cannot be blamed for all the inefficiencies stemming from the growing informal sector. They could also be a symptom of other economic problems, such as the lack of financing for the expanding small business sector in Mexico.

Social and institutional constrains

The long-term Mexican productivity performance has not converged to the TFP levels of the United States. Estimates show a gradual process of divergence along the last four decades. In a longer term context, previous estimates show that Mexican labour productivity levels had followed a conditional convergence process up to a limit of around 30 percent (USA=100) of USA levels over the period 1895-2002 (Hernandez Laos, 2004). The two countries followed a similar pattern in terms of relative GDP per capita. Lederman, Maloney and Serven (2003) reach a similar conclusion using co-integration analysis with quarterly data for both countries for the period 1961-2002.

These trends suggest that – apart from the medium-term productivity performance of the Mexican Economy – there appear to be some long run factors that constrain national productivity growth. These factors could be social and institutional in character, and therefore their influence on productivity development would be of a long-lasting nature.

Existing literature points out the relevance of those factors that influence the long run development of productivity. For example, Hall and Jones (1999) found in a cross-country analysis that, after adjustments for differences in capital accumulation – both physical and human – substantial differences in labour productivity remain across countries. Contrasts in total factor productivity may therefore be due to a wide variety of factors, among which a fundamental determinant is so-called differences in social infrastructure. The term social infrastructure refers to the institutions and government policies that provide the incentives for individuals and firms in an economy. These incentives can encourage productive activities, such as the accumulation of skills or the development of new products and production techniques, or alternatively they can induce predatory behavior such as rent-seeking, corruption and theft.

Acemoglu, Johnson and Robinson (2002) take this argument a step further and suggest that institutions – and therefore relative productivity levels to some extent – are now strongly influenced by previous events and circumstances, and especially by the pattern of colonization in countries. For these authors, colonization patterns strongly affected subsequent institutions, especially during the late eighteenth and early nineteenth centuries. The resulting institutional structures continued into the twentieth century.

Coastworth (1998), Sokoloff and Engerman (2000) trace the origins of the relative lack of development in most Latin American countries precisely to their divergent paths of institutional development compared to those of the USA or Canada. For these authors, the marked differences in institutions and the notorious degree of inequality in wealth, human capital and political power have been highly relevant. The economic institutions that evolved may have sustained early differences in equality, and this path, in turn, may have inhibited growth and productivity performance. Persistent inequalities have had a double negative effect on economic growth and productivity in twentieth-century Latin America. Among the direct effects is the very low productivity of perhaps one-third of the contemporary Latin American workforce due to malnutrition, poor health and lack of education. The indirect effects include the substantially higher risks of political and social unrest that have discouraged investment and further dampened growth.

In this last section, two issues related to the long run productivity performance of the Mexican economy are analysed, namely the probable effects of social and institutional constraints.

Social constraints on productivity growth

According to Alesina and Rodrick (1994), there is a strong demand for redistribution in societies in which a large part of the population does not have access to the productive resources of the economy and conflict over distribution will generally harm growth and, most probably, also productivity performance.⁵⁶ This correlation follows different channels. Galor and Tsidon (1997) argue that inequality increases during periods of major technological innovation (and adoption) which, by enhancing mobility and the concentration of highly-skilled workers in technologically advanced sectors, generate higher rates of technological progress and productivity.

Benhabib and Rustichini (1996), in their political economy model of interest groups, found that returns on investment accrue to different groups. Their model therefore transforms the accumulation problem into a commons' problem that may lead to underinvestment equilibrium, showing that growth rates can indeed be dependent on wealth.

Rodrik (1999) further explores the determinants of economic (and productivity) collapses after external shocks, such as domestic social conflict and conflict management institutions.⁵⁷

⁵⁶ The authors show that inequality in income and land distribution is negatively associated with subsequent growth and, although they take the distribution of assets as predetermined, they accept that - in reality - growth affects income distribution. This issue is the subject of a debate. - see Deininger and Squire (1998) and Forbes (2000).

⁵⁷ For Rodrik these interactions play a central role in determining the magnitude of the growth collapse following a negative shock. When social division runs deep and the institutions of conflict

If conflicts are not well mediated by institutions, the economy can be paralyzed for years and subject to foreign exchange bottlenecks, import cutbacks, debt crises and high inflation. The evidence provided by Rodrik suggests that social conflict has played an important role, primarily by inducing macroeconomic mismanagement. He found, in fact, that countries, which experienced the sharpest drops in GDP growth after 1975, were those with divided societies and weak institutional structures for conflict management.

Mexico, like the vast majority of Latin American countries, is characterized by a very unequal distribution of income with deep historical roots (Ferranti et. al. 2003). Moreover, long run trends show an increase of inequality in Mexico over the last two decades, after a gradual reduction during the 1960s and the 1970s. In effect, recent research (Hernandez-Laos and Velazquez-Roa, 2003) indicates that the Gini coefficient of household income distribution fell from 0.606 in 1963 to 0.501 in 1984. It then tended to increase – with short run fluctuations – in the following years up to a value of 0.564 in the year 2000. Figure 17 depicts these trends.⁵⁸

The interaction between income distribution trends and the poor economic performance of the country gave rise to a severe increase in poverty in Mexico during the 1980s and 1990s (Figure 18). Our estimates indicate that, by the year 2000, more than 30 percent of the Mexican population was living below the extreme poverty line and over 50 percent below the moderate poverty line.⁵⁹

In short, the distribution of gains from economic growth in Mexico is not only highly unequal, but also largely excludes a significant proportion of its population from the fruits of progress. The roots of this situation lie far back in history but, in spite of all the institutional changes that took place in post-revolutionary Mexico throughout the twentieth century, the situation was aggravated during the last two decades. In the following sub-section, some of the more recent institutional changes in the Mexican economy are reviewed.

Before turning to this issue, it is useful to highlight the continued social conflicts that Mexico has witnessed over the last four decades and the manner in which they have escalated over the past ten years. Although the country experienced difficult social conflicts in the 1960s and the 1970s,⁶⁰ they became worse during the 1980s. This followed the nationalization by

management are weak, the economic costs of exogenous shocks are magnified by the resulting distributional conflicts. Such conflicts diminish the productivity with which a society's resources are utilized in a number of ways: by delaying necessary adjustments in fiscal policies and key relative prices (such as the real exchange rate or real wages), by generating uncertainty in the economic environment and by diverting activities from the productive to the redistributive sphere.

⁵⁸ As is well known, income distribution measurement is very sensitive to differences in methodology. Our estimates are based on household surveys adjusted to match the national accounts total. Szekely (2003) uses the survey figures without adjustment and finds a similar long run trend for the Gini coefficient. This is not the context to discuss the possible causes of the recent trends in Mexico's income distribution. Interestingly Szekely (2003) emphasizes households' physical and human capital accumulation in a changing international context that modified the pattern of specialization and comparative advantage of the country. By contrast, Hernandez-Laos and Velazquez-Roa (2003) emphasize the effects of commercial, technological and financial opening on the economic structure of the country, in the specific context of a dualistic economy with a significant labour surplus.

⁵⁹ Official figures on poverty incidence from the Mexican Government are not very different from those mentioned above. See Comité Técnico (2003).

⁶⁰ In the 1960s, there were major strikes by railroad workers and medical doctors and severe student unrest. In the 1970s, Mexico witnessed an acute confrontation between the government and the private sector, notwithstanding the spread of the rural guerrilla warfare.

presidential decree of all the private banks without the intervention of Congress. A more severe conflict, however ended in armed confrontation in 1994 – the year NAFTA came into force – between the indigenous populations of a southern Mexican state (Chiapas) and the Federal Government. The marked increase in street violence and insecurity over the last few years and continued confrontation between the political powers are just some other features of the unrest in the country.

High and increased income inequality, coupled with a high incidence of poverty, have probably aggravated social conflicts in Mexico, given the inadequate institutional support to address these issues, as will be referred to later on. Furthermore, the combination of social conflicts and weak institutions are likely to have contributed to macroeconomic mismanagement since the seventies and induced the slowdown and collapse of productivity in the eighties. This also helps to explain its marked stagnation in the nineties, which put a severe long run constraint on productivity growth. Furthermore, the large proportion of the population living under poverty conditions not only limits internal market growth and opportunities for education and skill acquisition, but also has negative implications for the average levels of health and nutrition of the Mexican population and leaves little room for productivity improvement.

Institutional change and productivity performance

As previously pointed out, productivity growth is a function of organizational and institutional changes, among other factors. Although the link between institutions and productivity is not straightforward, the vast literature on institutional political economy and institutional economics has underscored the importance of institutions in determining economic performance and development (World Bank, 2002).

Although the study of institutions is well established, there is no common agreement on the definition of an “institution”. Moreover, the literature differs greatly in the approach (historical, evolutionary, old and new institutionalism), methodology, perspective (micro/macro), and the assumptions underlying different theories (Campbell, 2004).

One of the most influential authors for his work on institutional change and economic performance is the economic historian Douglas North (see for example, North 1990). His definition of institutions is broad in that he defines them as the rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction. In his view, institutions can be either, *formal* constraints – such as rules and organizational issues of private transactions, as well as the development of the legal and regulatory environment – and *informal* constraints – such as cultural, social and cognitive processes that provide conventions and codes of behaviour.

He makes a crucial distinction between institutions and organizations: the latter include political bodies (political parties, the Senate, a city council, a regulatory agency), economic bodies (firms, trade unions, family farms and co-operatives), and social bodies (churches, clubs and athletic associations), and educational bodies (schools, universities, vocational training centres). However, there is a “symbiotic” relationship between institutions and organizations insofar as what particular organizations come into existence and how they evolve is fundamentally influenced by the institutional framework, whose evolution is in turn influenced by organizations themselves. In other words, both institutions and organizations

shape the direction of institutional change. This in turn affects the performance of the economy by its effect on the costs of exchange (i.e. transaction costs) and the costs of production or transformation in North's terminology (capital, labour, technology, natural resources).

According to North, institutions are not necessarily or even usually created to be socially efficient. They, or at least the formal rules, are rather created to serve the interests of those with the bargaining power to devise new rules. Therefore, institutional change usually creates opportunities for both increasing and reducing productivity and economic welfare, however defined.

From this perspective, it is clear that the structural changes in Mexico in the 1980s and 1990s probably did affect the productivity performance of the economy because many formal and informal constraints, as well as organizational changes took place during this period. It is important, however, to note that – in our view – these effects, if any, arose not only from the economic transformations (liberalization) described in previous sections, but also from important political changes (democratization) mainly from the late 1980s onwards.⁶¹

In practice, it is hard to isolate the effects of economic reforms from those of other complex social and political transformations, especially considering that economic and political changes took place more or less concomitantly in Mexico. This is further complicated if the controversial relationship between economic and political reforms is involved. This relationship – both in terms of how the latter may affect the former and how the former may influence the outcome of the latter – has been the object of much attention over the past few years (see for example Haggard and Webb 1994, and Geddes 1995). In this connection, different hypotheses have been advanced regarding the effects and channels through which economic (neo-liberal) reforms may promote or hinder political change (democratization/consolidation of democracy). There are, however, also those who have pointed out the *positive* effects of economic reforms on the process of democratization. Two main arguments have been put forward to support this line of reasoning. The first argument is that the diminution of the role of the state, resulting from the privatization of public assets and the deregulation of the economy, promotes better governance and civil society participation. This occurs because the less “interventionist” position of the state enables government activity to be kept in check, thereby reducing corruption and rent-seeking practices. Another argument is that economic reforms – through better or more efficient allocation of resources – set the stage for economic growth, which in turn provides the basis for political stability and democratic change and consolidation (Teichmann, 2001).

On the other hand, there are those who have drawn attention to the *negative* effects of neo-liberal economic reforms. The chief argument here is that these reforms limit the capacity of the state to promote economic growth and to fulfil the basic needs of its citizens (i.e. justice and security) and create higher standards of living. In particular, neo-liberal prescriptions are often held responsible for persistent poverty and income inequality in Latin America, which – it is argued – undermine the legitimacy of the state and make it more vulnerable, thus

⁶¹ The transition to democracy in Mexico has been a rather slow incremental process spanning over a period of roughly 20 years. Some analysts date the beginning of this process back to the student movement of 1968, others to the mid-70's or the 1988 Presidential election, and still others to 1989 when, for the first time in the contemporary history of Mexico, an opposition party won the Governor's election in the state of Baja California.

affecting political change and the consolidation of democracy in this region (Haggard and Kaufman, 1995).

Whatever view is accepted, there is no doubt – as previously mentioned – that these changes influenced, in one way or another, productivity in the Mexican economy. To what extent and in what direction this influence occurred depends on how it was accommodated by existing institutions and organizations. The remainder of this sub-section is devoted to a more detailed review of some of the most important transformations that took place in Mexico in relation to political and economic institutions and organizations.

From a macro viewpoint, and disregarding any causal debate, the democratization process that Mexico has experienced in recent years has modified different political institutions that ultimately constitute the general framework (formal constraints or rules) within which economic and social organizations are set up, public policies are chosen and implemented and economic transactions take place. In this sense, the effect of these political changes on productivity development is, at best, indirect and very often ambiguous.⁶²

Finding the linkages between these changes and productivity performance would not only be a hugely speculative task, but, more importantly, a futile effort, given the vast number of potential intervening factors and the indirect nature of these linkages. Nevertheless, it is clear that – overall – the creation or modification of the political institutions has contributed to the democratization of the political regime in Mexico by increasing political and civil rights and alternatives and obliging the government to be more accountable and responsive to citizens' demands, among other things. However, how does this affect productivity and economic performance?

As discussed in previous sections, productivity performance –whether labour productivity or TFP– deteriorated sharply after 1982 and hardly recovered after 1988. For the same reason, economic growth was, on average, close to zero in the 1980s and, in spite of being more dynamic in the 1990s, did not reach the dynamism of the ISI period. This would suggest a weak relationship between democracy and productivity and economic growth in Mexico, at least in the short run.⁶³

In general, democratic institutions are thought to affect growth through a series of channels, among which the most salient are the following: the stability of governance, which reduces uncertainty by avoiding violent or illegitimate alternation of power, thus increasing investment flows; a strong independent judicial system that increases physical capital accumulation through the rule of law, securing property rights and enforcing contracts; a

⁶² For example, some of the key events throughout this process at federal level were the creation – after the highly contested presidential election of 1988 – of the Federal Electoral Institute (IFE), the Electors' Federal Registry, and new Electoral Courts, constitutional reform and strengthening of the judiciary in 1995 and the Electoral reform in 1996. Other milestones were, the granting of autonomy to the IFE, the strengthening of the party system through public funding and the guarantee of fair conditions in elections. Also worthy of mention are the election of President Fox in 2000, allowing political alternation after 71 years of one-party rule, the enactment of the Federal Law for Transparency and Access to Public Government Information and the creation of the Federal Institute for Access to Public Information.

⁶³ This is consistent with several cross-country studies that have found no solid or significant causal relationship between democracy and economic growth, or alternatively, found weak negative effects (see for example Barro 1996, and Tavares and Wacziarg 2001).

more transparent and closely monitored policy-making process which encourages capital accumulation; greater exposure of the policy-making process to a wider array of interest groups and institutions, sometimes adversely affecting its efficiency and retarding growth-enhancing policies; human capital accumulation as a result of increased government responsiveness to social needs (health, education); government responsiveness may also lead to more redistributive policies, thus reducing income inequality and boosting growth.⁶⁴

This points to the fact that there is no clear-cut effect on economic and productivity growth derived from a democratization process, as diverging counter forces are unleashed by changes in political institutions. Mexico is no exception to this. Moreover, as noted above, these changes are mitigated by existing institutions and organizations.⁶⁵

Finally, it is worth mentioning that, even where a clear-cut effect on economic and productivity growth could be found, the overall impact on the Mexican economy would be ambiguous. This is because the democratization process did not proceed evenly across all regions and, in some of them, increasingly weak authoritarian enclaves are still to be found. It is therefore hardly surprising to find great differences in productivity performance across regions (Esquivel and Messmacher, 2002).

Unlike political institutions, changes in economic institutions have a more direct effect on economic and productivity development. In a previous section, the change observed from the mid-1980s onwards in the general orientation of the economy was briefly described. However, this change was the consequence of focused economic policies, which radically transformed many institutions and organizations.⁶⁶

In general, these changes were intended to increase the allocation of resources through market mechanisms and reduce the state intervention in the economy. To this end, a set of policies were also implemented and included a large programme of privatization of state assets, the introduction of competition in different markets and the creation of independent regulatory agencies. This was intended to improve the technical and allocative efficiency of the economy and result in higher rates of productivity growth. However, as previously indicated, this did not materialize and, although the changes clearly altered the functioning of factor markets (production costs), productivity performance did not improve as expected.

⁶⁴ The same argument may lead to a redistribution of national income from capital to labour, reducing the return on capital, thus affecting the incentives for private investment and physical capital accumulation.

⁶⁵ In Mexico, one topical example relates to structural reforms (i.e. electricity, labour and fiscal reforms) since 2001, which are aimed – it is argued – at improving these input markets and providing the state with more resources in order to accomplish its duties and increase the rate of economic growth. In spite of all the progress in creating and transforming democratic institutions, the existing institutional structure (where the government can hardly reach a majority in Congress) has, among other things, created a deadlock in the discussion of these reforms between the executive and legislative powers, and consequently stopped their enactment and implementation. It can be argued that this has, in turn, adversely affected productivity performance and economic growth.

⁶⁶ Among these we can find the formulation of a deregulation policy as of 1989, the enactment of an Intellectual Property Law in 1991, the Federal Competition Law and the creation of the Federal Competition Commission in 1992, the granting of full independence to the Bank of Mexico (central bank) in 1993, the enactment of a new Law on Foreign Investment in 1993 and the modification - in the second half of the 1990s - of other laws to allow foreign investment in the stock exchange, banks and public bonds market, among other areas. These topics will be addressed in Part III.

From an institutional point of view, this failure can be explained in terms of three different inter-related aspects. During the privatization process, the overriding objective of the government was to maximize the amount of money received for the sale of state assets, neglecting other important issues such as market structure with the aim of creating truly competitive markets. The second aspect is that the introduction of competition did not take place in all sectors. Important markets such as electricity, oil, and gas, which represent essential inputs for most production processes throughout the economy, remained dominated by public monopolies (CFE and Pemex) with all the consequences in terms of inefficiency. Lastly, some regulatory institutions in key sectors suffer from structural design problems. On the one hand, the multiplication of these economic bodies has created coordination difficulties in some cases and, on the other hand, these types of agencies very often struggle with ambiguous mandates, inadequate facilities or a poor institutional architecture to carry out their tasks and enhance productivity development.⁶⁷

To sum up, institutional and organizational factors such as rules and enforcement mechanisms are crucial to accelerate economic and productivity growth. However, to facilitate this it is necessary to build up institutions that give the incentives and create the conditions conducive to more investment in physical and human capital. In Mexico, political institutions and organizations have changed over the past fifteen years in a way that should ultimately provide – subject to the completion of other pending institutional reforms in order to improve co-operation between different state sectors – the adequate framework for greater economic and productivity development. On the economic side, new institutions and organizations seem to have failed to provide the incentives and conditions conducive to higher rates of productivity growth. This, however, calls for their modification to render them a factor of growth. As long as these pending political and economic institutional reforms remain incomplete, they will represent important constraints to productivity development.

Where the country stands in institutional development

As just seen, significant institutional changes have taken place in Mexico over the past decade. Yet, the effects on productivity enhancement have been limited. Although the changes may have evolved in the right direction, they have been incomplete and, in some cases, contradictory. How, therefore, does the Mexican institutional environment compare in the international context, especially with regard to that of the United States?

Kaufmann, Kraay and Zoido-Lobaton (2002) have measured diverse governance indicators of institutional development for several countries, and their estimates may be useful to compare the institutional development of Mexico with that of the USA. Table 18 compares six indicators of governance: Voice and Accountability, Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption.⁶⁸

It is easy to see that, even though Mexico has achieved a better ranking in the last few years

⁶⁷ These issues are addressed in Part III of the paper.

⁶⁸ Governance indicators are oriented so that higher values correspond to better outcomes on a scale from -2.5 to +2.5. These ratings are based on subjective assessments from a variety of sources and are subject to substantial margins of error. A methodological explanation and details of these can be consulted in Kaufmann, Kraay and Zoido-Lobaton (2002), pp. 4-6.

in terms of Voice and Accountability and Political Stability – as a consequence perhaps of the recent political transition of the country, it remains far behind the USA. However, the gains of Mexico in the other indicators of governance have been zero over the past few years, and its rankings lie far behind those of the United States (Table 18).

In short, although the institutional changes implemented in Mexico throughout the past decade have raised the country's governance standards, there is still a very large gap in relation to the USA's governance attainment, especially in fields such as Rule of Law and Control of Corruption, in which Mexico's progress remains very unsatisfactory. This level of institutional underdevelopment in the country may also help to explain the poor long run productivity performance of the Mexican economy.

III. Policies affecting productivity performance

In this final part of the report, the role of public policies affecting Mexican productivity performance is addressed. Particular attention will be paid to the main features of current policy measures relating to productivity, with special emphasis on the last two decades.

In fact, the situation in Mexico case gives clear evidence that the interaction of short-term adjustment costs, risk and uncertainty in the decision-making environment and the business cycle gives rise to less than optimal input utilization from a long-term perspective. Two factors must be stressed in this connection: a) the business cycle, which influences productivity mainly through a diminished (or increased) use of productive factors already in place, and b) the significance of the structural reforms that took place in the Mexican economy since the late 1980s and continued throughout the 1990s, and which supposedly affected long-term productivity growth.

Indeed, with regard to the latter, the policies implemented that led to reforms might have been critically important for productivity growth, especially in the end and from both tangible (technological) and intangible (decision-making environment) points of view. Plant, equipment and technology investment will not be made unless there is a favourable economic climate and, in order to create this, the implemented policies may turn out to be more or less conducive for productivity enhancement.

In this regard, the government may act either a) to rectify market failures to achieve a more efficient allocation of resources, b) to secure the pre-conditions for the pursuit of efficiency by means of inventions and innovation or c) when firms are not technically efficient in the sense that they pursue objectives that prevent them from rationalizing production techniques. It is clear, however, that - in most cases - government intervention does not aim primarily at improving productivity and policy measures may indeed affect productivity performance (OECD, 1984).

The most commonly adopted policies affecting productivity growth include a) macroeconomic policies favouring growth and hence indirectly higher productivity (investment or foreign trade promotion to reduce inflation or strengthen competition, among other measures) or, b) sectoral policies to promote: i) innovation, research and development or to improve technical efficiency; ii) manpower adjustment policies (i.e. training) or measures to improve labour relations; iii) policies aimed at reducing transaction costs in both product and factor markets (i.e. infrastructural development to reduce transport costs, intermediation cost reductions in the financial sector or reductions in non-wage labour costs), and iv) better legislation and regulations (anti-trust legislation and pricing, health, safety and environmental regulations), which influence the functioning of the whole economy or specific industrial sectors.

The section is structured in three parts. Firstly, an attempt is made to examine the productivity effects of the main policy measures taken during the long ISI period (1960-1981). The second part presents a review of the crucial policies implemented to secure the various reforms of the Mexican economy. This covers both those reforms intended to help stabilization programmes and those to support fiscal equilibrium and their effects on productivity performance are then hypothesized. In the third part, other policies are evaluated, and finally, a few additional policy recommendations are suggested to enhance productivity growth both in the present and future years.

The Import Substitution Industrialization period (ISI)

Macroeconomic policies

Two main macro-policies are of interest for our evaluation of the productivity performance during the ISI period: monetary and fiscal policies and the exchange rate policy.

A broad picture of this period shows that, although there was a continued inflation-devaluation process in the years following the end of World War II and up to 1956, tight monetary and fiscal policies were applied from 1977 up to the early 1970s, keeping inflationary pressures under control. Monetary expansion was consistent with a sustained rate of growth of about 6 per cent per year, while allowing average price increases of about 2.6 per cent per year. Real long-term interest rates were positive, averaging 4.29 per cent annually between 1951 and 1969.⁶⁹ Public spending expanded accordingly in line with the availability of public revenues, thus allowing relatively small public deficits as a percentage of GDP.

With regard to the external sector, the expansion of agricultural exports, coupled with an increased deepening of the ISI process – which helped to control the export expansion, entailed relatively small commercial deficits. These were financed by long-term capital inflows and, especially, by loans from international agencies and foreign governments. Although inflation was kept under control, price increases in the country were higher than in the USA,⁷⁰ and, as Mexico maintained a constant nominal exchange rate, the Mexican real exchange rate was 17 per cent overvalued by the early 1970s.

By 1968, the country started to witness a revival of inflationary pressures, which went out of control during the first half of the 1970s, fuelled by considerable relaxation of monetary and fiscal policies. As a result, the public deficit increased from 5.1 per cent of GDP in 1971 to 10 percent in 1975 and to over 15 per cent in 1982.

Even though inflation also accelerated in the USA, the real value of the Mexican currency tended to rise still further, overvaluing it by an additional 4 per cent between 1971 and 1974, 5 per cent in 1975 and a further 13 per cent by the second half of 1976. The significant devaluation of the Mexican peso in 1976 was more than offset in the following years, and by the early 1980s, the real exchange rate was again acutely overvalued by more than 30 per cent. The increased deficits –both public and external –during the second half of the decade were financed by monetary expansion and external borrowing, fuelling inflationary pressures and increasing the external debt. The rapid inflation of the seventies severely reduced both the average real wage rate and the long-term real interest rate. In the latter case, it decreased to a level of -2.34 per cent per year on average over the decade.

These different macro scenarios had major consequences for the country's productivity performance. In the first place, control of inflationary pressures during the 1960s allowed sizable increases in real wages – especially in the urban sectors, while the rapid expansion of

⁶⁹ Real rate of interest (265 to 364 days) deflated by expected inflation. (Aportela, Ardavin and Cruz Aguayo, 2001).

⁷⁰ Between 1956 and 1967, wholesale prices increased only by 32 percent - a modest increase for Latin American standards. However, price increases in the USA were of only 10 percent during that period.

the economy permitted a significant growth in formal employment. Both factors contributed to dynamic increases of the internal market.⁷¹ Moreover, as was indicated in statistical form in Section II, the rapid expansion of final demand allowed – through *Verdoorn's Law* – a rapid growth in labour productivity. These favourable effects started to wane during the 1970s, as macro instability increased inflationary pressures, which, in turn, contributed to a reduction in real wages and turned real interest rates into negative figures.

In the second place, the maintenance of positive long-term interest rates along the fifties and sixties certainly stimulated the domestic savings rate, increasing the disposable internal resources for the expansion of productive capacity and both private and non-competing (complementary) public investment in infrastructure. As a result, capital deepening intensified, also favouring sizable increases in labour productivity. These effects continued to a lesser extent throughout the seventies, although the massive expansion of public expenditure and the extensive creation of public enterprises most probably led to a crowding-out of private investment. This contributed to a gradual reduction of the incremental capital-output ratio of the economy and to a decline in its TFP growth.

Finally, an increasingly overvalued real exchange rate in the 1960s and 1970s – while allowing inflationary pressures to be controlled – most probably restricted the competitive edge of the economy, especially in the export sector. There was lower growth in agricultural exports, especially from the mid-sixties onwards and throughout the seventies. External imbalances did in fact increase from then on, imposing a severe restriction on the availability of foreign currency as of the first half of the 1970s. Balance of payments restrictions became a significant long-term obstacle to growth.⁷² This was due to major difficulties in financing the high external deficits, which were only partially – and temporarily – offset by the revenues from oil exports in the late 1970s. The severe balance of payments problems as a result of the continuing real exchange rate appreciation undoubtedly constrained the Mexican productivity growth rate in the following decades, and in the 1980s in particular. This issue will be analyzed later in this report.

In summary, macro-policies during the long ISI period had contradictory effects on productivity performance. As long as monetary and fiscal policies were sound and kept inflation under control, labour productivity – and to a lesser extent, TFP – grew at favourable rates. When both policies turned notoriously expansionary in the seventies, fuelling inflationary pressures and provoking increased fiscal deficits, the favourable effects on productivity growth waned and uncertainty set in. Throughout the whole period, however, the constant revaluation of the real exchange rate generated increased external imbalances that exploded into severe devaluations in the seventies and continued through the eighties, adversely affecting productivity performance.

Sectoral policies

The policy of import substitution followed by Mexico from World War II onwards had the double objective of improving its balance-of-payments position and boosting the development of its manufacturing industries. The main argument behind this policy was that, because of the slow increase in demand from industrial nations, the expansion of traditional

⁷¹ See: Gregory (1986).

⁷² Moreno-Brid (1988).

exports could not ensure high rates of economic growth and balance-of-payments equilibrium. This argument was commonly advanced at the time by most developing countries of the Latin American region Prebisch, 1959).

As Balassa (1971) put it, this policy was rarely applied as part of a consistent action programme. Rather, the protectionist structures were the historical result of actions taken at different times and for different reasons. These actions were taken in response to particular circumstances and often conditioned by demands of special interest groups. More importantly, there is growing evidence that governments generally adopted a permissive attitude towards requests for protection but failed to inquire into the *impact* of the applied measures on the *allocation of resources* in the national economy. The interaction of tariffs and exchange rates and their effects on exports were also generally disregarded, as were the implications of duties levied on raw materials and intermediate products to protect finished goods.

In the case of Mexico, protection started as a response to short-term balance-of-payments problems at the end of World War II. However, by the middle of the 1950s, a more structured industrialization policy was in operation, which continued throughout the 1960s and a major part of the 1970s. Industrial protection from imports was granted by means of several instruments: a) import controls through tariffs and quantitative restrictions (*permisos previos*) (1948), b) the Law of New and Necessary Industries (*Ley de Industrias Nuevas y Necesarias*), which granted substantial subsidies to firms tending to substitute imports (1954), c) fiscal incentives to benefit reinvestment, d) accelerated depreciation of fixed assets, e) subsidized loans from state-owned banks for new manufacturing projects, f) subsidized strategic inputs produced by state-owned enterprises (e.g. energy), and g) increased public investment in infrastructure in urban centers (Cordera and Oribe, 1981).

Between 1956 and 1981, the growing overvaluation of the real exchange rate fuelled a gradual increase in the levels of protection. At first tariffs were increased and later on quantitative restrictions were raised. The number of import categories subject to control passed from 33 per cent in 1956 to 44 per cent in 1962 and 65 per cent in 1970. By 1975, this proportion was 74 per cent and almost reached 100 per cent by the early 1980s, in spite of the cautious attempts to reduce tariffs and quantitative restrictions during the oil export boom in the late seventies.

These controls were accompanied by agreements between the government and firms willing to substitute imports, in exchange for duty-free imports of parts, components and accessories, and also in exchange for tax exemptions on import machinery and other intermediate inputs utilized in the production process. As a result, effective protectionism tended to increase between 1960 and 1970 in the manufacturing sector from 45 to 67 per cent in the case of consumer durables and capital goods, and from 49 to 90 per cent in the case of transport equipment. Effective protection levels continued to rise during the first half of the seventies (Balassa, 1983). The rapid expansion of oil exports since 1977 – and the easing of external constraints – generated a campaign to reduce the levels of protectionism for a few years. These efforts were interrupted in 1981 when tariffs and quantitative restrictions were raised again due to growing balance-of-payments problems.

The application of protectionist policies for a long time had important consequences for the evolution of the incentives system in Mexico. In general, it gave rise to a considerable amount of discrimination in favour of manufacturing and against primary activities. However,

the discriminatory processes favouring the manufacturing sector entailed the protection of domestic producers from imports. At the same time, within this same sector, protectionism tended to increase from the lower to the higher stages of the manufacturing process and often varied greatly across industries. This cannot, however, be attributed to conscious decisions, given that governments generally used to pay little attention to the interdependence of such decisions.

A detailed study of effective protectionism in Mexico (Bueno, 1971) confirmed these assertions. In effect, this study showed that, at the climax of the ISI period, a) implicit protection was greater than tariff protection for import-competing industries, but lower for non-import-competing and export industries, b) there was a large diversity of both nominal and effective protection rates. This diversity was much greater when tariffs were used, which could be interpreted as evidence of the lack of a consistent set of criteria to set tariff rates, c) effective rates of protectionism were higher than nominal rates on manufactured goods but lower on primary products, which, in turn, reflected the escalation effect in nominal tariffs from lower to higher stages of manufacturing, and d) the net effective protectionism was on average lower than in other developing countries such as Brazil, Chile, Pakistan and the Philippines. Moreover, in Mexico there was less discrimination against exports.

From these findings, the author concluded "... protection was often granted without consideration of the excess cost of domestic products relative to imports", and that "... the system of protection [in Mexico] also lacked downward flexibility to reduce tariffs and to eliminate import permits". Both conclusions led, as early as the beginning of the seventies, to the need to replace import substitution by other objectives such as the *improvement in the efficiency* of industry because the Mexican manufacturing sector was in the urgent need to "improve the utilization of productive factors while widening domestic markets", and because greater levels of efficiency would "create greater possibilities for augmenting exports of manufactured goods".⁷³

This recommendation was satisfactory insofar as protection involved a cost to the national economy on two counts: "static" (allocative) and "dynamic" inefficiencies. In the former case, distortions in the relative prices of inputs and outputs due to protectionist measures led to inefficiencies in the allocation of resources that entailed a cost for the national economy.⁷⁴ In the latter case, if the country had no expectations regarding the abolition of protectionist practices, there was a dynamic cost to the national economy in the form of lost opportunities to improve productivity, given that small domestic markets limited the scope for large-scale production facilities. Moreover, technical change was severely hindered by the lack of sufficient domestic competition and the predominance of seller's markets.

Balassa (1971: 82) estimated the "cost" of protectionism in individual countries, including Mexico. Expressed as a percentage of GDP, the net cost of protectionism in Mexico in the early 1960s was of 2.5 per cent, well below that estimated for other developing countries such

⁷³ Bueno (1971: 200). These assertions were confirmed a couple of years later by the first quantitative evaluation of productivity trends in the Mexican Economy between 1950 and 1967 (Hernández Laos, 1973).

⁷⁴ As a consequence, for example, of interfering with industrial specialization according to comparative advantages between primary activities and manufacturing industries, as well as within the manufacturing sector itself. There are also important disincentives to export, and protectionism interferes with consumer's choice.

Productivity performance

as Brazil (9.5% in 1966), Chile (6.2% in 1961) or Pakistan (6.2% in 1964), but slightly higher than in Norway (1.8% in 1954).

These static estimates, however, do not give a complete account of the effects of protectionism in terms of productivity performance. A more recent study evaluated total factor productivity of the Mexican manufacturing sector at plant level, based on micro-data of the 1975 census of production for more than 100,000 enterprises (Hernández-Laos, 1985).

The main findings of that study permitted an evaluation of the productivity patterns in the Mexican manufacturing sector in the last stages of the ISI period. For each enterprise a TFP *level* was measured in relation to the average TFP *level* within each industry and the resulting measurements were statistically and econometrically assessed. The first finding showed that, within each three-digit level of industrial des-aggregation, there was a peculiarly high degree of dispersion in TFP indexes of individual firms, suggesting significant contrasts in technical inefficiencies within the Mexican manufacturing sector. The findings indicated below emerged from a systematic analysis of TFP dispersion.

- The size of plants has a strong impact on productivity levels and is more marked in lighter industries (food, beverages and textiles) compared to the more capital-intensive sectors (tobacco, chemicals, steel). In this regard, there was strong evidence that the internal market was simply too small in the more capital-intensive sectors to support more than a few plants (in some cases no more than one or two) operating on a minimum scale of efficiency. This suggests that there were severe market limitations on the achievement of internal economies of scale for the plants in those industries.
- The statistical significance of the effects of different indicators of agglomeration economies in the main urban centers of the country, notably in the capital city, was evident. In this context, it was clear that the more efficient plants – once standardized by size differences – were simply located in the large urban (consumer) settlements, a typical pattern of the ISI process, which gave no consideration of the increased environmental costs involved in their operation.
- Furthermore, there was very statistically significant evidence of the positive effects of public investment on productivity levels in the plants, especially in the areas of infrastructural facilities (road construction, electricity and other energy supplies).
- Standardizing data for all the preceding variables, there was significant statistical evidence of higher *net* TFP levels in foreign-owned than in Mexican firms, including public sector manufacturing enterprises.
- Finally, there was also a clear indication of high concentration ratios within manufacturing sectors. These oligopolistic markets were associated with lower levels of structural efficiency, but much higher levels of extraordinary profits.

In short, in the late stages of the ISI process and following several years of industrialization in the shadow of increased levels of protectionism, the Mexican manufacturing sector showed a highly heterogeneous pattern of productivity. It was characterized by a large number of small and, indeed, technically quite inefficient firms, while a few highly capitalized plants, with better productivity levels, were unable to achieve greater economies of scale due to the limited size of the domestic market. A high degree of industrial and spatial concentration was

typical of this stage of industrialization, in which protected markets generated a highly oligopolistic industrial structure and elevated profits, whereas infrastructure provision mainly benefited large firms and foreign-owned enterprises, in particular.

This pattern was indeed quite inefficient from both economic and social points of view and the poor TFP performance in Mexico in the 1960s and the 1970s is therefore hardly surprising. If the industrial policies implemented during the ISI process helped to steadily increase labour productivity during that period, it was due to the rapid accumulation of capital per employee rather than enhanced levels of efficiency. The accelerated transfer of people from rural to urban centres helped to increase allocative efficiency, although the problems related to technical inefficiencies in the manufacturing sector were severely aggravated throughout those two decades. This pattern of development was *extensive* in character, but in no way constituted the *intensive* growth necessary for the sustainable improvement of the economic performance in Mexico.

Economic reforms and the export-oriented economy

Macroeconomic policies

As already indicated, the eighties were years of rapid inflation coupled with severe recessions due to the macroeconomic policies of adjustment and stabilization implemented under IMF and World Bank surveillance. Since international investors refused loans to the country after the *debt crisis* exploded in the early 1980s, domestic consumption was curtailed through increased inflation in order to generate – by way of huge trade surpluses – enough resources to pay the interest on the foreign debt.

In effect, between 1982 and 1987 the inflation rate averaged 94.6 per cent per year, the financial public sector deficit reached -12.6 per cent of GDP annually on average. The amount of net transfers abroad to service the external debt reached, on average, 6 per cent of GDP. Stabilization policies implied a severe social cost, reflected by the sharp drop both in real wages and real long-term interest rates - the former fell by more than 40 per cent and the latter reached a level of -19.4 per cent per year, on average, between 1980 and 1987.

A preliminary agreement on Mexico's foreign debt was reached through the Brady Plan in the late 1980s. This, coupled with gradual reductions in international interest rates, allowed the country to re-implement macro policies to control inflationary pressures from 1989 onwards, as foreign capital started to pour into the country.⁷⁵ Inflation was gradually brought under control through income policies known as "Pactos", whereby the main economic and social pressure groups – trade unions, representatives of the private sector and the government – established specific goals for annual increases in key prices. The main instrument, however, to curtail inflation was an almost fixed nominal exchange rate. This resulted, unsurprisingly, in a gradual overvaluation of the real exchange rate - by more than 30 per cent – by the mid-1990s. As is well known, the outbreak of diverse political conflicts put increased pressure on

⁷⁵ In effect, from 1988 to 2000, payments to service the foreign debt were significantly lowered, reaching 0.9 per cent of GDP annually on average. The foreign capital inflow turned positive, as FDI averaged more than 7 billion per annum in the same period.

the Mexican currency, which led to its sharp devaluation in 1994 and the *tequila* crisis in 1995.

In the late 1990s and early 2000s, government efforts to maintain sound monetary and fiscal policies restricted inflationary pressures, considerably improving, on average, the macro scenario in Mexico from 1988 onwards.⁷⁶ Furthermore, since 1995, the government has maintained a flexible exchange rate, which has helped to avoid a new revaluation of the real rate. However, it is clear that neither real wages nor formal employment have regained the levels of the early eighties, whereas the real long-term interest rate soared, averaging 8.25 per cent annually from 1995 to 2001. Fiscal restrictions – now associated with servicing the *internal* public debt – have, nevertheless, contributed to resource stringency, severely reducing government expenditure and investment in infrastructure in particular.

In summary, the 1980s were largely dominated by the stabilization efforts in response to repeated external shocks, years of high inflation despite unprecedented fiscal austerity programs and continued devaluations of the Mexican currency. The relief provided by the reduction of external interest payments by the end of the 1980s and early 1990s facilitated the implementation of more sound monetary and fiscal policies. These policies were only interrupted by the *tequila* crisis of 1995, which was triggered by the significant overvaluation of the real exchange rate. In the late 1990s and early 2000s, control of inflation was gradually regained, but – despite all the macroeconomic efforts, economic growth remained sluggish, due to the slack external demand.

There are few doubts about the damaging effects of the crisis years of the eighties on Mexican productivity, as the economy showed all the normal symptoms of recessions: excess production capacity, internal demand restrictions that pushed workers into the informal sector and a highly devalued real exchange rate that discouraged capital goods imports. New investment and the introduction of new technologies were delayed and all these factors were undoubtedly reflected in the severe decline of measured TFP during the decade.

The sluggish TFP recovery in the 1990s was indeed influenced by the severity of the *tequila* crisis. At the macro level, there are good grounds for thinking that the *dirty* floatation of the exchange rate – a regime implemented since 1995 – strongly inhibited economic growth. In effect, the Central Bank has since applied a very stringent monetary policy to control inflationary pressures that has been reflected in high real interest rates over the last ten years. This, in turn, has probably restrained new investment and slowed down the diffusion of technology, thus hindering TFP growth.

First generation reforms

Since the early 1980s, the international financial organizations, the IMF and the World Bank, insisted that the stabilization programmes to be implemented should be accompanied by several structural reforms of the Mexican economy in terms of commercial and financial openness, and other reforms related to the deregulation of economic activities, including the

⁷⁶ From 1988 to 2000, the mean inflation rate was substantially lower (23.9 per cent annually), as the public financial deficit went down to - 1.7 per cent of GDP per year on average.

downsizing of the public sector.⁷⁷

Those reforms should have been consistent with the two objectives of the programmes: fiscal austerity and macroeconomic stabilization. Fiscal reform and the privatization of public assets were directed towards the first objective. However, economic deregulation and internal (and external) financial and trade liberalization were not completely consistent with the second objective and the resulting sluggish economic growth and difficulties in achieving macroeconomic stabilization are therefore hardly surprising. A summary of the main characteristics of these *first generation* reforms⁷⁸ follows and, later on, an attempt will be made to document and hypothesize some of their effects on productivity performance.

Trade liberalization

By the early eighties, the Mexican price structure was heavily distorted by the extensive use of non-tariff barriers (import quotas and official prices), which significantly altered market signals, limiting both competitive pressures, the import of new technologies and severely restricting manufacturing exports. By that time, the dismantling of protectionism began to be seriously considered, in order to raise efficiency levels in the economy and curb price increases. In 1983, a gradual reduction of import tariffs and their degree of dispersion was initiated. Import quotas were also cut back, falling from 100 per cent of imports in 1982 to 83.5% in 1984. This process had accelerated by the middle of 1985, when imports subject to controls decreased further to only 30.9 per cent. In 1986, Mexico acceded to GATT and agreed to eliminate the official reference prices and to substitute indirect by direct import controls.

Fiscal support was given to exports by means of *Pitex*, a system that allowed firms to temporarily import raw materials, equipment and machinery for export purposes. In 1986-1987, a top import tariff of 20 per cent was adopted, and the coverage of import quotas was further reduced to only 20 per cent of imports, mainly consisting of agricultural products. Tariff dispersion was also reduced to only five levels (0, 5, 10, 15 and 20 per cent): the simple average tariff level shrank to 10.4 per cent and the weighted average level to 6.1 per cent. It is clear that import competition was being increasingly used by the government to control price increases, mainly of tradable products.

In 1987, with the launch of the *Altex* programme, export firms gained additional administrative advantages, and by 1988, a uniform effective rate of protection was adopted to avoid sectoral discrimination. Between 1989 and 1993, trade openness accelerated as tariffs and import quotas were further reduced and External Commerce Law (*Ley de Comercio Exterior*) – which explicitly regulated all foreign trade transactions - was enacted in 1993. However, some commercial restrictions were maintained in specific sectors such as agriculture, oil refining and transport equipment.

In 1994, NAFTA came into force, thus putting in place the fifteen-year horizon adopted for the elimination of all tariff and quantitative import restrictions between Mexico, Canada and

⁷⁷ These requirements were explicitly included in the Letter of Intent signed by the Mexican government with the IMF in 1982. For details see: Romero (2003: 189).

⁷⁸ This description closely follows the extensive analysis presented in Clavijo and Valdivieso (2000), pp. 19-54.

the USA. However, by the first year of the agreement more than 80 per cent of all restrictions were eliminated, leaving only a few sectors – agricultural products in particular – for subsequent liberalization. During the second half of the 1990s and early 2000s, other trade agreements were concluded between Mexico and several blocks and countries of Latin America, Europe and Japan, which meant a further opening of the Mexican external sector.

Internal financial liberalization

Mexico's internal financial liberalization reforms were carried out in two stages, the first from the beginning of the seventies up to 1987, and the second throughout the 1988-2000 period. The first phase was characterized by gradually increasing institutional flexibility in the Mexican financial system, to adapt it both to the new conditions prevailing in the country (higher inflation and greater public sector borrowing requirements) and to changing external conditions (higher international interest rates and a persistent economic stagnation worldwide). During this stage of reform, the operation of the financial system was not radically changed in terms of monetary policy instruments and objectives when it was nationalized in 1982. The changes were mainly oriented in two directions: liberalization of interest rates and the rationalization of the legal system of compulsory deposits (reserves) in the Bank of Mexico (*encaje legal*).⁷⁹

More important changes were introduced in the second stage of reforms, starting in 1988. This phase was characterized by a wider set of changes in terms of interest rates, *encaje legal*, credit allocation, banking sector privatization, prudential regulation, and, in particular, by a major supervisory role and greater autonomy of the Mexican Central Bank. The dismantling of direct financial direct controls was rapid and comprehensive (in terms of maximum rates of interest allowed and the elimination of the *encaje legal* system), while the privatization of the banking system was swiftly carried out between 1991 and 1992. Prudential regulation reforms were much less far-reaching, since progress in terms of supervision was clearly insufficient, at least until 1995-1996.

The entire financial liberalization process was far from adequate from the point of view of the implementation sequence, given that prudential regulation and supervision were introduced *after* the liberalization of interest rates and the abolition of commercial banks' compulsory reserves. As a result, several unwelcome trends followed the second stage of internal liberalization reforms. Among these was a surge in private credit between 1988 and 1994, which triggered an undesired expansion of the monetary base and the collapse of the financial system, fuelled by the *tequila* crisis in 1995.

The rushed implementation of late financial reforms also inhibited the gradual demonetization of the economy which had been achieved since between the late 1980s and

⁷⁹ In 1974, passive rates of interest were adjusted and an indicator of the cost of money was designed and put into operation, while active rates of interest were gradually liberalized in line with market forces. Between 1976 and 1980, commercial banks were authorized to attract resources from the public by means of new instruments with flexible interest rates, subject to a maximum rate stipulated by the Central Bank. By 1980, bank certificates were also liberalized and, in 1982, government certificate auctions were allowed to freely determine their corresponding rate of interest (CETES). In terms of the compulsory reserve system, a uniform rate for commercial banks was established in 1977, and, by 1987, the marginal rate was reduced from 92.2 to 51 per cent, leaving more resources available to the private sector.

the early 1990s, profoundly affecting the financial deepening of the banking system and depressing the savings rate in the economy. Finally, the high real interest rates, in a context of deficient supervision and regulation, coupled with a rapid credit expansion that gave priority to returns over solvency, led to unfavourable credit decisions, which aggravated the macroeconomic problems of 1994-1995. All these errors forced the government to bail out the banking system at a cost of 20 per cent of GDP in the following years and at the taxpayers' expense.

Opening of the capital account

The oil export boom of the late 1970s *de facto* opened the capital account of the balance of payments. By that time, federal government borrowing frequently exceeded the amount of credit authorized by congress. Consequently, changes in FDI regulations and in the acquisition procedures for short-term government bonds by non-nationals were urgently required.

In terms of foreign direct investment, a mandatory regulation based on the Mexican Constitution was passed in 1973 and exclusively restricted several sectors to state exploitation and operation (e.g. oil, basic petrochemicals, electricity and railroads). Other sectors were reserved for Mexican nationals (e.g. transport and communications, forest resources utilization, radio and television), and still others were subject to specific restrictions (e.g. non-basic petrochemicals and automotive parts). FDI was permitted in the remaining sectors, but could not exceed 49 per cent of the venture's capital stock.

By 1984, a more flexible scheme was adopted, with the suppression of the 49 per cent limit on foreign capital in certain sectors. Most foreign investment was authorized in export-oriented, capital-intensive and technologically advanced sectors. In 1986, the number of regulated secondary petrochemical products was reduced and, by 1989, new regulations to promote domestic and regulate foreign investment came into force, giving rise to a more liberal interpretation to the Law of 1973. According to the new regulations, there was no limit on foreign capital in non-restricted sectors (including glass, cement, cellulose, iron and steel), subject to the fulfillment of a series of pre-requisites in terms of balance of payments results, job creation and training schemes for workers.

In 1993, a new Foreign Investment Law was enacted, incorporating all modifications to the Law of 1973 and, including regulations on areas covered by NAFTA. This new Law included certain criteria in relation to employment and training, technology transfers, environmental regulations and the FDI contribution to national competitiveness. In spite of these modifications, some restrictions were maintained, leaving several activities under the exclusive jurisdiction of the State, restricting some to Mexican nationals and limiting a number of other areas to foreign participation. Investment restrictions were lifted in the secondary petrochemicals, automotive components and bus production sectors. In general, the Mexican manufacturing sector was totally opened to foreign capital with only a few exceptions such as the basic petrochemicals and arms and explosives industries. There is wide consensus among experts that this Law played a central role in the expansion of FDI in the 1990s.

Finally, with regard to short-term capital movements, they started in 1989 with the creation of temporal investment schemes, by 1990 all restrictions were lifted on foreign acquisition of

government bonds and, subsequently, on foreign acquisition of Mexican stock. As is well known, however, short-term capital movements are highly volatile, as they proved to be in the year before the *tequila* crisis.

Privatization of public assets

The large and persistent public deficits of the late seventies and early eighties were the excuse for the implementation of an extensive privatization programme. In 1983, the state administered 1,155 public enterprises in various economic sectors (e.g. steel, air transport, telecommunications, hotels, copper mines, banks, sugar mills, cinemas, entertainment services and even bicycle production). Public sector output accounted for 18.5 per cent of GDP and 10 per cent of the total employment in the Mexican economy.

Although the privatization programme aimed at strengthening public finances by eliminating large amounts of subsidies to public enterprises, its explicit objective was to reduce the inefficiencies and technological underdevelopment of many public concerns. A number of different options were deployed: liquidations, mergers and transfers or sales of public firms (the latter only if the proposed private ownership structure could allegedly operate efficiently).

The core of the privatization programme was carried out between 1989 and 1993, a period in which the government got rid of more than a thousand enterprises: one-third by selling them to the private sector, and half of them were simply closed or liquidated. By 1993-1994, the Mexican public sector consisted of only 200 enterprises and largely remained at that level over the following decade.

It is possible to distinguish between four stages in the privatization process:

(i) closures of firms facing severe financial and operative problems, low productivity and technological base (1983-1984);

(ii) privatization as an instrument to increase productivity and economic competitiveness, mainly in manufacturing (1985-1989);

(iii) sales of large public concerns with monopolistic or oligopolistic positions - e.g. telecommunications, steel mills, banks, air transport (1989-1993);

(iv) less intensive privatization efforts, mainly through concessions to the private sector for the administration of public assets and allowing private operation of public services such as railroad freight transport, ports, storage warehouses and airports.

In more recent years, some progress has been made in privatizing transport and distribution services – and to some extent – electricity generation. The main area pending in the privatization process is the energy sector (oil and electricity).

Fiscal reform

A market-oriented economic strategy started in Mexico between 1989 and 1994. Apart from the redefinition of the role of the state in the economy, a fiscal reform was launched with the

objective of reducing tax rates, eliminating different types of duties, broadening the tax base and modernizing and streamlining the fiscal administration.

The fiscal reform of 1989 tried to implement tax neutrality and harmonize the tax system with those of the main trading partners by reducing the number of taxes and marginal tax rates and eliminating the preferential treatment given to specific sectors. Public income increased thanks to a broader tax base (fixed assets tax), while many tax exemptions were eliminated (e.g. for agricultural products, freight transport and the publishing industry). The accelerated depreciation of assets was allowed and agreements concluded passed to avoid double taxation at international level.

There is wide agreement among experts on the notorious inadequacies of the Mexican tax reform. The drive for neutrality and harmonization of the tax system *negatively* affected the tax collection capacity of the federal government, increasing its dependency on oil revenues, which today account for more than a third of total public revenues. This chronic paucity of public revenues has affected the state's capacity to face the growing needs of the population in terms of social services, education, health care, infrastructure development and environmental protection and has imposed a *pro-cyclical* instead of a stabilizing fiscal policy to face external shocks.

Economic deregulation

The wide spectrum of reforms included the strengthening of internal regulatory frameworks in order to increase competition in more market-driven sectors and, in this area, involved changes of a much diverse nature.

Steps were taken to deregulate both freight and passenger road transport systems. In 1989, road transport was deregulated to allow free transit of transportation vehicles along the federal road network and freely negotiable maximum transport tariffs were permitted. The existing passenger and container transport monopolies were eliminated. In the early 1990s, the private operation of ports and the development of private railroad terminals were also permitted. Restrictions on the private use of federal border and in-shore zones were lifted, thus allowing the establishment of tourist centres. State control over air routes and tariffs was also removed; airports were deregulated and transferred to private management and control.

The attempts to deregulate the telecommunications sector were less impressive. In 1990, the TELMEX concession title was modified, and a first regulatory framework for the sector was put in place. The operation of the national satellite system was also liberalized and a concession granted to a private enterprise. In spite of this, TELMEX continued to operate as a *de facto* (private) monopoly, in local areas in particular, and only in recent years has competition intensified, especially in the area of long-distance calls.

Deregulatory policies were also implemented in other sectors of the economy. By the late 1980s, a reclassification of basic chemical and petrochemical products was issued to broaden the scope of private investment, and, in 1990, Article 27 of the Mexican Constitution was reformed to allow private production of basic derivatives of refined products, while retaining extraction and refining in the hands of the State. In manufacturing, the privatization process was also accompanied by some deregulatory initiatives. In 1990, a law on technology transfers, including the use of trademarks and patents, was passed, but was abrogated by

Congress in 1991. Other deregulatory initiatives taken were directed at salt and match production and at investment in the textile and machinery and equipment industries.

In the early 1990s, the Customs Law was reformed in order to liberalize tariffs, facilitate clearance procedures and increase the mobility of customs agents. In 1992 the Federal Economic Competition Law was passed with the overall objective of ensuring a competitive and non-collusive operating environment for all economic agents, with the exception of public monopolies (oil extraction and refining, basic petrochemicals, electricity generation, nuclear energy, postal services and currency emissions). This Law should allegedly regulate all private concerns in order to avoid collusive and restrictive practices.

In summary, over a period of a few years some sectors were thoroughly deregulated, as was the case of the financial and transport sectors, while others, such as like telecommunications and petrochemicals, continued to operate in a near-monopoly situation even after being transferred to private hands.

Effects of First-Generation Reforms on Productivity Performance

The concurrence of the policies of the first generation reforms makes it difficult to evaluate their impact on the TFP growth of the Mexican economy. Here an attempt will be made to assess their general effects, documenting the facts where possible and presenting hypotheses when dictated by a lack of solid information.

Trade and capital account opening: assessing the NAFTA effects

Trade liberalization – especially after the signature of NAFTA – gave rise to increased flows of international commerce. In effect, between 1986 and 1994, the annual export growth rate was 8.9 percent, while that of imports reached 16.9 per cent per year. In sharp contrast, after joining NAFTA (1994-2002), Mexico increased its exports at a rate of 11.8 per cent per year, whereas imports grew by only 9.5 per cent annually in the same period.⁸⁰

Similarly, the opening of the capital account of the Mexican balance of payments brought about sizable increases in the flows of foreign direct investment (FDI). Some recent figures suggest the dimension of this increase, given that, between 1986 and 1993, FDI averaged 3.6 billion dollars a year, whereas after accession to NAFTA, FDI reached nearly 9.0 billion dollars a year on average between 1994 and 2002.⁸¹

Section II of this report included a partial analysis of the effects of increased exports on Mexico's productivity performance, when assessing the impact of final demand increases on TFP growth. However, for an appraisal of the overall liberalization policies, an assessment of NAFTA effects on productivity seems pertinent, insofar as trade and capital account liberalization were almost completed in Mexico by the time the international agreement with

⁸⁰ These rates of growth are based on exports and imports valued in 1993 Mexican pesos, so they reflect the expansion in *volume* of the country's international trade.

⁸¹ FDI figures are measured in current dollars.

Canada and the U.S. came into force in 1994.⁸²

There have been two recent evaluations of the overall effects of NAFTA on the Mexican economy in general, and on the country's manufacturing productivity performance in particular. The first study (Easterly, Fies and Lederman, 2003) argues that the liberalization of trade facilitates the convergence of TFP levels, even when production technologies differ across countries. As a result, that study tries to identify the impact of the agreement on income and productivity gaps in North America, especially between Mexico and the U.S.

The authors use various methodologies to assess NAFTA effects on income and productivity differentials. Following Harvey (2000) in conducting time series exercises to separate transitory from long-term effects and applying co integration analysis, Easterly et al. investigate whether there is an observable process of income convergence between the United States and Mexico. They find that the debt crisis in the early 1980s and the *tequila* crisis temporarily interrupted a process of economic convergence, which resumed after 1995, i.e. following the signature of NAFTA. This, however, is an inconclusive finding.⁸³ In the same paper, the authors also study the impact of NAFTA on TFP differentials within manufacturing industries across the U.S. and Mexico. Based on a panel estimation of the rate of convergence across twenty-eight manufacturing industries, they found a substantially faster rate of productivity convergence after 1995 than in previous years, and thus concluded that NAFTA had a favourable impact on the Mexican productivity performance.⁸⁴

The second analysis was recently presented by López-Cordova (2003). In it, the author studies the degree to which NAFTA affected TFP in the Mexican manufacturing sector. He measures TFP using a panel of manufacturing plants spanning the 1993-2000 period and applies the algorithm of Olley Pakes (1996) to address the possibility of sample selection and concurrence problems in estimating production functions that use panel data. In that way, the author quantifies TFP levels and evaluates the impact that the dismantling of protectionist barriers and the rise in foreign manufacturing operations in Mexico have had on plant productivity performance. He also looks at the role of reallocation of resources in explaining

⁸² For Mexico, NAFTA fulfilled various important functions, just as the codification of many liberalization initiatives set the stage for a deliberately assumed evolution towards a more liberal trade and investment regime. It was an integral part of the government's strategy to attract FDI and repatriate capital, along with the privatization and debt reduction policies. It also helped to assure Mexico's preferential access to US markets, its closest trading partner and by far the largest source of foreign capital (OECD, 1996). The agreement provided for the immediate elimination of tariffs on a number of goods and the removal of tariff and non-tariff barriers on all trade over a period of ten years. In addition, it liberalized trade considerably in some key sectors such as transportation, telecommunications and professional services, and allowed for mutual access to government procurement contracts. Besides, NAFTA liberalized significantly Mexico's foreign investment regime, set up common standards for competition policy, and established new government technical standards and sanitary and phytosanitary measures.

⁸³ In effect, this result has been severely challenged by Westbrot, Rosnik and Beker (2004), who show that the econometric model used to quantify the favourable effect of NAFTA gives different results when applied to authorized economic series (the Penn-World tables or OECD data). In such a case, the result is the opposite, i.e. NAFTA seems to have contributed to economic divergence instead of stimulating economic convergence between Mexico and the USA. These different results can solely be attributed to errors in the construction of the series utilized by Easterly, Fies and Lederman (2003).

⁸⁴ They did not hypothesize, however, on whether productivity convergence was the result of increased imports of intermediate goods from the U.S., competitive pressure and preferential access to the U.S. market, or increased Mexican innovation resulting from a variety of factors and patenting aided by enhanced protection of intellectual property rights under NAFTA.

productivity improvements.

There are five main findings from this thorough evaluation:

(i) Increased import competition in the 1990s played a major role in improving plant efficiency. Mexican tariffs had a negative and significant impact on both the level and the growth rate of productivity. In addition, an increase in the ratio of imports to output in a given industry is also negatively and significantly correlated with the level and growth rate of productivity.

(ii) Preferential access to U.S. markets for Mexican goods has a positive impact on plant productivity.

(iii) Mexico's exports do not have a positive effect on plant productivity growth. Exporting has an important role, however, in allocating resources to more productive firms and industries, therefore raising allocative efficiency.

(iv) With regard to the use of intermediate goods in the production process, the econometric evidence shows that imported inputs seem to have an adverse impact on productivity growth, especially among foreign firms.

(v) Since NAFTA stimulated capital inflows, it is important to distinguish between intra-industry spillovers and inter-industry spillovers that occur as FDI pours into downstream or upstream industries in the production process. The result is clear: foreign presence adversely affects productivity among producers in the same industry, but the inter-industry impact is positive through both backward and forward linkages, though the net effect of all three effects is undetermined.⁸⁵

Therefore, it seems that the substantial and largely NAFTA-driven liberalization of trade and investment in the Mexican economy in the 1990s has considerably enhanced *manufacturing* productivity. There are, however, some qualifications to this assertion. In the first place, as Esquivel (2003b) has suggested, it is clear that the database used in these exercises is not representative of the entire manufacturing industry in Mexico, but rather is biased towards medium-sized and large firms, which implies that we cannot easily draw inferences for the whole population from these data. Secondly, not all trade-induced productivity gains based on learning entail the transmission of knowledge of production processes. Moreover, if learning is costly, then trade and FDI alone may not automatically lead to a substantial learning-based development process. Thirdly, NAFTA might have helped spur trade and

⁸⁵ In a separate piece of research, using the same data set of Mexican manufacturing at plant level, Domínguez-Villalobos and Brown-Grossman (s.f.) find that even though foreign-owned firms show higher levels of TFP than Mexican-owned firms, these productivity differences do not in themselves guarantee that foreign firms generate positive spillovers for Mexican firms. After a thorough investigation of this issue, the authors conclude that spillover effects require a series of factors that have been absent in the Mexican export-led model of development. The generalized technological underdevelopment of local plants prevents the generation of externalities from FDI, given that generation of knowledge requires the coordinated action of different actors of society: federal and local governments, universities, research centres and, of course, Mexican entrepreneurs. Fujii-Olechko (2004), using a different data set finds that foreign-owned firms have a positive effect on productivity because of their own higher levels; however, he finds no statistical evidence on the presence of positive externalities on Mexican-owned enterprises. To him, the mechanisms for the transmission of spillover effects are simply absent in the Mexican manufacturing sector.

economic growth, but the reallocation and factor accumulation effects were the main driving forces behind the trade benefits. In addition, NAFTA and Mexico's economic recovery probably boosted FDI, but this did not necessarily lead to an enhanced learning capacity in Mexico's private sector.

For our purposes, it is important to stress, however, the distinction between the effects of NAFTA on both the manufacturing industry and on the Mexican economy as a whole. In the latter case, it is useful to recall that the evidence on the possible convergence path followed by the Mexican economy in relation to the U.S. economy after the implementation of NAFTA has been severely thrown into question by Weisbrot *et al.* (2004) and the results discussed in Part II of this report.

Overall, there is nothing to indicate that NAFTA has had positive effects on the Mexican productivity performance at the *aggregate* level, apart from the possible favourable effects on medium and large-sized manufacturing enterprises. NAFTA effects on productivity, therefore, have been extremely localized in terms of efficiency and productivity gains, contrary to common beliefs of its advocates.

Financial liberalization policies

After the *tequila* crisis in 1995, the banking sector had to be bailed out by the government. The reforms of that year marked the starting point of a more solid recovery of this sector with a substantial improvement in credit assessment and loan provision on the part of banks. In spite of this, loans to the private sector have not been readily forthcoming since 1995. In effect, credit facilities for private firms – too limited by international standards – have shown a marked stagnation until very recently and today only 30 percent of medium-sized and large enterprises have access to loans from commercial banks. Several factors have limited credit supply, but among others, it seems that transaction costs are too high and banks refuse to lend money to high-risk firms, especially those in this size category.

Further reforms have been introduced over the past few years and, in 2000, a new mercantile law was passed, albeit with a remarkably limited impact on credit expansion. Other countries' experience shows that it takes time to train high-ranking officials to implement new legislation. In 2003, the Mexican Congress also passed a reform of the regulatory framework for guaranteed credit transactions, which included changes in at least seven other different laws.

The Mexican experience clearly shows that credit expansion mainly benefited large exporting companies, which represent a lower credit risk for commercial banks, whereas small and medium-sized enterprises still suffer from a lack of credit from the commercial banking sector. They are, therefore, obliged to resort mainly to supplier credit and loans from alternative sources, such as non-commercial banks, are expensive and in short supply. However, while foreign banks have increased their loans to large exporting firms, other credit unions and savings & loans institutions have partially increased their market share in credit provision to medium-sized firms, mainly for housing construction. Slight increases have also been registered in the issue of longer-term corporate debt, denominated in Mexican pesos. Nonetheless, *venture capital*, which has had a significant mobilizing effect on high-tech concerns in other countries, is virtually non-existent in the Mexican credit system.

Productivity performance

It is clear that the limited credit expansion that followed the continuing implementation of financial reforms in the Mexico during the 1990s has had very little impact on the TFP growth. Credit is not only scarce, but expensive too, judging by the wide margins between passive and active rates of interest charged by commercial banks. In some cases, such as credit cards, these are above 40 percentage points.

Given the strong empirical connection between the legal environment, the financial system and productivity growth discussed in Section II, it is clear that the apparent deficiencies in Mexico's legal system deserve further scrutiny as the country seeks to increase the efficiency of its financial sector. Three issues deserve particular attention (World Bank, 1998):

- A detailed evaluation of Mexico's legal system as a first step towards reforming the legal code to strengthen creditor and shareholder rights.
- The need to improve Mexico's productivity growth even in the absence of amendments to the legal code.
- The need to take advantage of any opportunities to improve the functioning of the financial market within the existing legal framework.⁸⁶

It is absolutely clear that further development of the financial system in Mexico is a necessary prerequisite to improve TFP growth conditions in the next few years. In fact, significant financial deepening is a *sine qua non* policy modification necessary to overcome the extensive productivity collapse, which still prevails in the Mexican economy.

Privatization policies

As already mentioned, the government undertook to privatize hundreds of state-owned enterprises: the largest single effort was the 1990 sale of the telephone monopoly and eighteen commercial banks were privatized between 1991 and 1992. Public firms in steel, sugar processing, airlines, TV broadcasting, satellites, airport, seaport facilities and railroads were sold to private investors. Licenses and concessions for activities formerly performed by the State, such as seaport services, storage, transportation and distribution of natural and LP gas, were auctioned off to the private sector, as were licenses for bandwidth frequencies covering a variety of broadcasting services.

The privatization initiatives sometimes encountered complications, and the process is not yet complete. Although one of the main objectives behind privatization was to improve the financial position of the government, amongst the explicit reasons for its implementation was to increase the efficiency of enterprises transferred from public to private hands. Some very recent evidence shows, however, that privatization was not entirely successful in terms of productivity performance, as suggested by the following figures.⁸⁷

⁸⁶ For an elaboration on these three areas of emphasis – creditor rights, shareholder rights and legal enforcement – see, World Bank (1998: 52-54).

⁸⁷ The estimates for the 1980-1988 period are taken from Hernández-Laos (1994), while figures for 1988-1999 are recent calculations of the author.

**TFP Growth before and after privatization
in selected industries: (Annual rates in %)**

Industrial branches	1980-1988	1988-1999
Sugar-processing	5.8	2.0
Fertilizers	4.1	1.6
Iron and Steel	4.4	5.9
Transport (general)	-3.9	-5.0
Air Transport	..	-2.9
Communications	0.8	4.4
Commercial Banks	-5.2	4.2

These estimates suggest, in fact, that not all industrial sectors were successful in terms of TFP growth after privatization, in particular sugar-processing, fertilizers, transport (in general) and air transport. Only in a few areas such as iron and steel, communications and commercial banking was the process favourable in terms of productivity growth, thus contributing to TFP growth of the economy as a whole.

As some of the privatized sectors had natural monopoly features, new regulatory regimes were introduced to deal with market imperfections. However, difficulties arose in some sectors where regulatory schemes were not well designed or not implemented at the right time. Background information from a number of relevant studies of some sectors allows us to evaluate a few selected cases: telecommunications, railroads, ports, civil aviation and airports.

Telecommunications:

In 1990, the state-owned operator, Telmex, was privatized as a temporary monopoly for a six-year exclusivity period to operate basic services. High monopoly prices actually reduced the demand for services in the absence of a substantial subsidy for customers with low purchasing power, and the monopoly led to less, not more, private investment. Therefore, customers and, more generally, the Mexican economy paid a high cost in the form of an underdeveloped telecommunications infrastructure (Wallesten, 2000).

Even though wired telephony penetration in Mexico doubled during the 1990s, telephone prices are much higher in purchasing power parity compared to developing countries such as Brazil, Colombia, Costa Rica and Panama. In general, the evidence suggests that the telephone system in Mexico has not performed well in comparison with other Latin American countries that, by 1998, had not yet privatized their wired telephone companies. They all have better performance indicators with relatively low physical productivity and investment by Latin American standards.

It is clear, however, those high revenues per line, combined with efficient management, have made Telmex extremely profitable, but this has not led to high rates of service expansion in comparison with its neighbours. Telmex seems to be merely less constrained in exercising its monopoly power than are the other incumbent carriers in the Latin American area.

Railroads:

The Mexican railway system has been largely privatized since 1997. The three most significant railroads are now operated and owned by private consortia, and private companies have bought a number of short lines. The 1995 railroad law gave the Ministry of Communications and Transport regulatory authority over the privatized Mexican rail industry.

Although it is still too early to make a detailed assessment of the impact of the sector's restructuring on its overall performance - in addition to the large investments and increase in the total volume handled by the rail system, most productivity and safety indicators have improved, and the operating performance has been better in recent years. From a macroeconomic point of view, the annual savings in subsidies have been considerable, which has led experts to assert that "...The overall macroeconomic impact of the privatization of Mexican railroads has been tremendously encouraging, even after including the cost of restructuring (...) insofar as the efficiency and competitiveness of the rail sector in the long run has increased" (World Bank, 2003b: 75).

Seaports:

Most operational functions in Mexican ports have been privatized since 1993, even though ownership of port assets is still vested in the government. Within each port, private operators compete with each other for concessions to provide different services. The structure and performance of the sector have shown improvements since privatization. The movement of cargo increased by 41 percent between 1990 and 1998, passenger traffic doubled, and container traffic rose threefold. In the latter case though, the level remains well below the international containerization standard of 60 per cent.

In the opinion of the World Bank (2003b), the concessions granted have resulted in substantial gains in efficiency and productivity,⁸⁸ while tariff liberalization has led to significant reductions: tariffs are now equal to or even lower than those of U.S. competitors. Private participation has also induced significant changes in the port industry in terms of infrastructural investments and improvements in the quality of services.⁸⁹ Finally, it is worth pointing out that, prior to the reforms, Mexican ports were net recipients of subsidies from the federal government, whereas the system now generates resources for the government.

⁸⁸ In 1993, for example, the port of Veracruz handled 43 containers / hour-per-ship, and this figure has now risen to 84 containers. Manzanillo now moves 65 containers / hour-per-ship, and Altamira has achieved the international standard of 50 moves per hour. Labour productivity was also enhanced. Port labour reforms had the objective of promoting free negotiations between companies and workers, setting the wages according to workers' qualifications and performance and promoting incentive mechanisms allowing companies clear-cut improvements in productivity for all types of cargo, as in the case of Veracruz Port. Performance in other ports has improved in some areas of cargo and deteriorated in others.

⁸⁹ In terms of investment in infrastructure and equipment, privatization generated substantial capacity increases in the ports system, while improvements in efficiency have increased capacity utilization. The author's own personal estimate is that TFP in the Mexican port sector increased at a rate of between 3 and 4 percent per year between 1993 and 1998.

Civil aviation and airports:

After a failed attempt to deregulate civil aviation in the early 1990s, this sector is still state-dominated in Mexico. Deregulation was followed in 1991 by a period of financial difficulties for Mexican airlines, but the situation began to turn around in 1994 and the enhanced performance continued through 1998 and 1999.

As the commercial fleet is quite old, sustained improvements in the financial situation are still needed to acquire new equipment. This heavy investment burden means that there will be continuing pressure for productivity gains and lower infrastructural charges. However, the past ten years have witnessed a systematic deterioration of TFP conditions in the sector, showing a negative rate of growth.⁹⁰ At present, severe pressures are at work for the re-privatization of this sector, given that antitrust issues are a major concern in the industry.⁹¹

Nonetheless, the Mexican airport privatization programme was launched in 1998 with the identification of 35 airports to be included in four concession packages. These airports, which handle 97 percent of total passenger traffic in the country, were to be transferred from state to private operation. However, it is still too early to evaluate the results of this recent privatization initiative.

In summary, the Mexican privatization process with all its difficulties and complexities has produced mixed results in terms of productivity enhancement in specific sectors and in the overall economy. Some sectors seem to have successfully developed under private ownership from a productivity point of view and as a consequence perhaps of increased competition (iron and steel, commercial banking, seaports and railroads). Others have, however, faced severe drawbacks, either because of inadequate regulatory frameworks (telephony) or due to mismanagement and inefficient operational practices (sugar-refining, fertilizers, road transport and civil aviation).

It is difficult, therefore, to assess the overall productivity effect of the entire privatization process on the Mexican economy as a whole. However, judging by the final outcome – the long-lasting stagnation of Mexican productivity performance over the 1990s – it seems difficult to attribute a major role to the privatization process on productivity enhancement in the economy.

Deregulation policies

A key element in the government's deregulation process was the adoption in 1993 by Mexican Congress of the Federal Law of Economic Competition (LFCE) and the creation of the Federal Competition Commission (CFC) to enforce it. Efficiency was the guiding criterion for the law's application, although it did not explicitly enshrine the goal of promoting economic and productivity growth.

The LFCE has very clear limits. Its mandate to combat monopolistic activities is based on the

⁹⁰ Hernández-Laos (2001).

⁹¹ In 2000, the competition agency (CFC) ordered the break up of CINTRA, a financial corporate holding company that controls Aeromexico and Mexicana (the two Mexican passenger carriers), Aeromexpress (the largest cargo carrier), the main regional airlines and associated service providers.

Mexican Constitution (Art. 28). However, the specific *strategic areas* of the State (postal services, telegraph and radiotelegraphy, petroleum and other hydrocarbons, basic petrochemicals, radioactive minerals, nuclear energy, electric power and the Central Bank functions of minting coins and issuing bank notes) are not considered as monopolies within the terms of the Law and are, therefore exempted from its jurisdiction. Moreover, Article 4 states that state-owned enterprises are only subject to the Law with respect to monopolistic practices when they are not specifically within the scope of strategic areas. Otherwise, the LFCE is applicable to all *economic agents*, including government agencies, and to *all sectors of economic activity*.

Several Regulatory Commissions (CFCs) have been set up in different economic sectors, including telecommunications, electricity and gas, insurance and sureties and pension funds. The transportation sector – including railways, aviation, road transport, and seaports – is regulated directly by the government, whereas the Ministry of Finance controls various areas of the financial sector. None of these sectors is exempted from the Law: in all cases, the competent CFC must determine if there is an absence of effective competition in a market before the sectoral regulator can impose price controls (OECD, 2004).

The tasks of CFCs tasks have been diverse, and their effectiveness in promoting competition has varied. The main resolutions adopted relate to the following antitrust practices:

- *Horizontal agreements*, which include four categories: price fixing, output restrictions, market division and bid rigging. In general, these agreements have been directed to counteract the practice of price determination by the chambers of commerce.
- *Vertical agreements*, which are treated as relative monopolistic practices: vertical market division, resale price maintenance, tied sales, exclusive dealings and refusals to enter a deal.
- *Abuse of dominance* is treated as a relative monopolistic practice under Mexican law. The regulatory schemes established for the telecommunications sector and for road, air, sea and rail transportation provide for price regulation if the competent CFC finds an absence of effective market competition in the area in question.
- *Mergers* are prohibited in the LFCE when the objective or effect is to reduce, distort or hinder market competition.
- *Market power determination* is evaluated by the CFC and regulatory schemes are enforced in relation to price regulation, access control and other sector participation if the Commission finds an absence of effective market competition in the area in question. The Commission may also terminate regulatory controls if effective competition has been restored as a consequence of market changes.
- *State trade barriers* can oblige the CFC to issue rules to prevent the impairment of interstate trade.
- *Consumer protection* is also an area responsibility of the CFCs. Their initiatives here are intended to support the decisions adopted by the Federal Prosecutor for Consumers (PROFECO), i.e. the consumer protection agency.

A limited number of cases have actually been processed in over eight years of antitrust

activities. In effect, only 428 cases relating to monopolistic practices and other restrictions on competition were handled by the Commission between 1993 and 2002, including 291 complaints and 137 ex officio investigations (OECD, 2004).

In a previous report, the OECD (1998) concluded that the Commission had no clear basis of support to implement competition policy, and that its enforcement record up to that point could be questioned. Five years later, in a new report (OECD, 2004), the doubts about the CFC's willingness to fight powerful interests had largely dissipated. In the opinion of the OECD's experts, the Commission had matured into a credible and well-respected agency that had established a remarkable record of achievements given the difficulties of its environment.

However, the extent of general support for competition policy in Mexico is still an open question, and certain deficiencies in statutory authority and judicial review processes constrain the CFC's ability to effectively and efficiently address anti-competitive conditions. The resources of the Commission have also declined despite an increasing workload, and some features of its CFC's procedures and methods of interface with other government entities reduce its efficiency as a law enforcement agency and competition advocate.

As with all institutional changes, the real and effective enforcement of Mexican competition law will take time. However, a few years after its enactment, it seems that, by OECD standards, the CFC is starting to perform more efficiently than was the case some years ago. Moreover, the Commission will be able to promote the efficiency and productivity in the Mexican economy as a whole if it enhances its antitrust policies. The results of these policy initiatives must be viewed in a long run context. From a short-term point of view, however, there is nothing to suggest that the limited competition policies adopted to date have had significant and generalized effects on the Mexican productivity performance.

Final remarks

At the beginning of the 1980s, the Mexican productivity performance collapsed when the economy shrank on account of the *debt crisis*. Twenty years later, productivity growth has not yet completely recovered, in spite of a modest upturn that followed the *tequila crisis* of 1995. As has been clearly shown, Mexico's multi-factor productivity growth and levels lag well behind the productivity and efficiency frontier of the world, as represented by US standards.

The poor recovery of the productivity performance in Mexico has not been generalized, as documented in this report. On a sectoral basis, the recent productivity improvement was confined to some tradable sectors, notably manufacturing. On a factorial basis, however, the estimates clearly suggest a significant divergence path between (pure) technical advances and decreasing levels of technical efficiency for the Mexican economy as a whole.

The diverse economic reforms and policy prescriptions adopted since the second half of the 1980s have been undoubtedly insufficient to regain productivity growth. Trade and financial opening mainly favoured productivity in the manufacturing sector, and even the other reforms undertaken after Mexico joined NAFTA have had no significant repercussions on the overall productivity performance of the economy. NAFTA was simply not enough, as some academics and politicians believed at the beginning of the 1990s – and still naively think today.

Without any doubt, Mexico faces a serious productivity stagnation problem, which severely limits its economic growth potential. The agenda for the implementation of programmes and policies for productivity enhancement is wide and implies different courses of action. For some sectors of society, it is enough to implement the so-called second-generation reforms. For other sectors, policy initiatives need to go further and must involve an extensive set of sectoral and institutional changes in the Mexican economy. This final section of the reports briefly summarizes some ideas in this regard.

Second-generation reforms

For the World Bank (1998), although obsolescence and lag effects cannot be discarded entirely, they do not appear to have been quantitatively significant in explaining Mexico's slow response in productivity terms to the reforms implemented in the late 1980s and during the 1990s. World Bank analysts consider the argument that past reforms remained incomplete to be of more significance, given that the reform process went further in terms of trade liberalization and lagged in terms of domestic deregulation, labour market and financial sector reform. The improved performance reflected in the recent productivity trends in tradable sectors and manufacturing in particular, as opposed to non-traded sectors, suggests that reform efforts need to be deepened before a significant higher productivity growth can be expected.

Thus, the main recommendations of the World Bank Report on productivity enhancement in the Mexican economy are directed at the following areas:

- Maintaining macro-economic stability;
- Reforming the legal underpinnings of the financial sector, particularly with regard to strengthening creditor and shareholder rights and law enforcement;
- Improving the incentives structure in the labour market by reducing non-wage labour costs or, alternatively, by creating a more transparent link between contributions and benefits and reducing the high severance costs;
- Strengthening regulatory reform and domestic competition policies in order to promote faster productivity growth in non-traded sectors;
- Continuing the expansion of education attainment levels, especially in higher education.

Some of these recommendations are termed *second-generation reforms* (Guash, 1997). Several of them have been officially adopted by the Mexican Government, translated into diverse bills and submitted to Congress in recent years, albeit without much success to date.⁹² For the executive branch of government, these reforms are a *sine qua non* for increasing the competitiveness of the country and improving the long run growth rate of the economy. Some Mexican analysts believe that, if implemented, these reforms should improve the productivity performance of the country's economy (Aspe, 2004), but in our view, they are simply not

⁹² There are several bills in Congress awaiting discussion and approval. Among them a proposed deepening of fiscal reform, a labour code reform, change proposals for stock market regulations and a project to implement structural changes in the energy sector to open it to private investment.

enough to recover productivity growth in the years ahead.

The challenges ahead

The Mexican economy is still far away from the world technology frontier, although there are clear indications that some of its sectors are approaching that frontier. Therefore, as Acemoglu, Aghion and Zilibotti (2002) have suggested, the Mexican economy needs to switch from an investment-based to an innovation-based strategy of development, in which the predominant features are short-term relationships, modern enterprises, strategically selected investments and better management expertise. This path of development, however, demands appropriate institutions and policies that promote product and factor market competition, boost technological innovation, generate infrastructural spillovers and foster a highly educated labour force and top-level managers, in order to succeed in the new knowledge-based and more globalized economic environment.

From this point of view, it is clear that *second-generation reforms* are not enough. There is also a need to improve and deepen technical progress mechanisms and for significant changes in the so-called National Innovation System (NIS). This is necessary to ensure technological convergence with North America, since Mexico still suffers from severe inefficiencies and low levels of R&D. In a further piece of research, the World Bank (2003a) draws attention to the following issues:

- Mexico needs to address the inefficiency of its NIS and must therefore improve the quality of its research institutions. This is likely to be contingent on the implementation of incentives reforms and the provision of public subsidies to stimulate linkages between existing research institutions and the productive sector.
- The country needs to continue developing its domestic credit markets, supporting in particular the creation of financial institutions in order to focus their efforts on providing credit for *venture capital funds* and, more generally, on helping to finance collaborative efforts between public research centers, universities and the productive sector.
- Mexico could negotiate with its NAFTA partners the co-financing of research exchange programs.
- Any such efforts will need to be evaluated over time in order to adjust and continuously improve them. Therefore, it might be useful to build an information-based monitoring facility that would play a similar role to that of the National Commission for the Evaluation of Research Activity (CNEAI) in Spain since 1989. Mexico might request the advice and support of the United Nations Industrial Development Organization (UNIDO) to pursue this undertaking.⁹³

Parallel to the strategic changes to improve the National Innovation System, deep institutional

⁹³ For example, UNIDO might collaborate with the Mexican authorities and private sector firms on an in-depth assessment of the problems – and feasible solutions – with regard to institutional links between creators and users of technology in the Mexican manufacturing sector. In this exercise, it might be useful to draw on the experiences of other countries. Another task to be envisaged could be, for example, periodic publication of productivity and technology indicators for both developed and developing countries – including Mexico – in order to provide ongoing benchmarking information.

and economic reform is required to eliminate the persistent dual features of the economy through gradual integration of the primary sector and further development of inter-industrial linkages between the exporting and other sectors of the domestic economy. Furthermore, it will be necessary to improve the governance indicators of Mexican society and to reduce the acute inequality and poverty indexes that characterize it. In short: Mexico needs to engage in a more inclusive and integral path of development, in which an enhanced productivity performance will play an essential role in boosting economic growth and increasing per capita income.

Tables and figures

Table 1
Gross Domestic Product, Population and Per-capita Product, 1960-2002 (Real annual rates of Growth, Percentages)

Concept	Periods			
	1960-1981	1981-1987	1987-2002	1960-2002
Gross Domestic Product	6.7	-0.1	3.0	4.4
Total Population	3.2	2.0	1.6	2.5
Per-capita Product	3.5	-2.1	1.4	1.7

Source: Author's calculations on data of INEGI and Conapo, México.

Table 2
Economic structure by sectors (Percentages)

Sectors	1960		1981		1987		2002	
	GDP	EMP	GDP	EMP	GDP	EMP	GDP	EMP
Agricultural	15.5	45.0	7.9	26.9	8.4	27.6	6.7	19.8
Mining	3.3	1.2	3.4	1.2	3.8	1.2	2.8	0.4
Industry	25.9	17.0	29.1	23.2	27.4	20.3	26.4	24.2
Services	55.3	36.8	59.6	48.7	60.4	50.9	64.1	55.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

GDP: Gross Domestic Product.

EMP: Remunerated employment.

Source: Author's calculations on data of INEGI and Hernández Laos (1988).

Table 3
Three estimates of the "Sources of Growth", 1960-2002
(Annual rates of Growth, Percentages)

Estimates/Sources	Periods			
	1960-1981	1981-1987	1987-2002	1960-2002
<i>UNIDO Estimates:</i>				
Labour Productivity (QL0)	3.2	-3.0	0.4	1.3
Capital Per Worker (KL0)	4.1	-4.6	1.4	1.8
Total Factor Productivity (TFP0)	1.1	-0.5	0.0	0.5
• Technical Change (TECH0)	0.3	-0.5	3.6	1.3
• Efficiency (EFIC0)	0.7	-0.1	-3.4	-0.8
<i>OWN Estimates (I):</i>				
Labour Productivity (QL1)	3.2	-4.0	0.3	1.1
Weighted Capital Per Worker (KL1)	3.8	-0.2	2.1	2.6
Total Factor Productivity (TFP1)	-0.7	-3.7	-1.7	-1.5
<i>OWN Estimates (II):</i>				
Labour Productivity (QL2)	3.2	-0.2	1.1	1.9
Weighted Capital Per Worker (KL2)	3.6	0.3	1.8	2.4
Total Factor Productivity (TFP2)	-0.4	-0.5	-0.7	-0.5

Sources and Methods: See the text.

Table 4
Mexico. The "Sources of Growth" by economic sector¹, 1960-2002
(Annual rates of Growth, Percentages)

Economic Sector	1960-1981			1981-1987			1987-2002			1960-2002		
	q	βk	π									
Agriculture, silviculture, hunting and fishing	2.5			0.2			1.5			1.8		
Mining	3.8	7.9	-4.0	-0.8	2.0	-2.8	4.1	3.3	0.8	3.2	5.4	-2.2
Manufacturing	2.8	2.8	-0.1	0.5	-0.3	0.9	2.5	1.1	1.4	2.4	1.8	0.6
Construction	1.9	4.4	-2.5	-1.2	-4.9	3.7	-2.4	-2.7	0.3	-0.1	0.6	-0.7
Electricity, gas and water	5.8			3.1			0.9			3.6		
Transport and communications	4.3	4.8	-0.5	-2.0	1.1	-3.1	0.1	1.6	-1.5	1.9	3.1	-1.2
Trade, restaurants and hotels	2.4	8.4	-6.0	-1.7	2.3	-3.9	2.2	4.0	-1.8	1.7	4.2	-2.5
Financial Services	0.3	-0.1	0.4	1.1	0.5	0.6	2.1	4.7	-2.6	0.7	1.4	-0.7
Social and personal services	1.2	1.3	0.0	0.2	-0.6	0.8	0.0	-0.3	0.3	0.6	0.5	0.2
Total	3.2	3.6	-0.4	-0.3	0.1	-0.5	1.1	1.8	-0.7	1.9	2.5	-0.5

¹This calculations are based on the method and variables utilized in QL2, KL2 and TFP2.

Table 5
Malmquist index of TFP and its components
in manufacturing, 1984-2000 (Annual rates of growth, percentages)

Industrial Branches	1984-1993			1994-2000			1984-2000		
	TFP	TECH	EFF	TFP	TECH	EFF	TFP	TECH	EFF
Food	2.7	4.0	-1.3	2.0	4.7	-2.7	2.4	4.3	-1.9
Beverages and Tobacco	2.9	4.4	-1.5	-1.2	0.3	-1.5	1.3	2.8	-1.5
Textiles	-5.2	-4.4	-0.8	3.4	1.1	2.3	-1.8	-2.2	0.4
Apparel	2.5	8.2	-5.7	2.0	0.4	1.6	2.3	5.1	-2.8
Lether and Shoes	-6.7	-6.7	0.0	0.6	0.6	0.0	-3.8	-3.8	0.0
Wood and Products	5.5	5.8	-0.3	-1.2	-1.1	-0.1	2.8	3.0	-0.2
Paper	2.4	2.5	-0.1	6.0	2.0	4.0	3.8	2.3	1.5
Chemical	1.1	1.0	0.1	-0.6	1.9	-2.5	0.4	1.4	-1.0
Plastic and Rubber	0.0	0.0	0.0	1.7	-2.6	4.3	0.7	1.0	-0.3
Non-Metallic Minerals	2.9	2.0	0.9	4.8	7.0	-2.2	3.7	3.6	0.1
Basic Metals	6.8	8.3	-1.5	0.7	-1.3	2.0	3.0	4.5	-1.5
Metal Products	-0.3	0.2	-0.5	-0.3	-1.3	1.0	-0.3	-0.4	0.1
Non-Electric Machinery	5.5	9.8	-4.3	2.9	7.1	-4.2	3.4	8.7	-5.3
Electric Equipment	0.8	0.3	0.5	4.1	2.2	1.9	2.1	1.1	1.0
Automotive	5.3	5.2	0.1	4.9	6.1	-1.2	4.1	5.6	-1.5
Transport Equipment	-3.8	0.1	-3.9	1.2	1.9	-0.7	-1.8	0.8	-2.6
Other	2.6	2.6	0.0	2.7	-2.7	5.4	2.6	0.5	2.1
Geometric Average	1.3	2.5	-1.2	2.0	1.5	0.5	1.6	2.1	-0.5

Source: Author's calculations based on estimates of Brown Grossman and Dominguez Villalobos, "Evolución de la Productividad en la industria mexicana: Una aplicación con el método de Malmquist", *Investigación Económica*, 2004 Vol. LXIII, Table 3, page 89-90.

Table 6
Effects of Structural Change on Rates of Growth in
Labour and Total Factor Productivity, 1960-2002.
(Annual rates of Growth, Percentages)

Concept	Periods			
	1960-1981	1981-1987	1987-2002	1960-2002
Labour Productivity				
• With constant structure ¹	2.6	-0.2	1.1	1.6
• Effect of structural change	0.6	0.0	0.0	0.3
• Combined effects	3.2	-0.2	1.1	1.9
Total Factor Productivity				
• With constant structure ²	-1.4	0.5	0.3	-0.5
• Effect of structural change	1.8	-1.0	-1.0	0.0
• Combined effects	-0.4	-0.5	-0.7	-0.5

¹ Sector employment structure (1960). ² Sector Total primary inputs structure (1960).

Source: Author's calculations based on QL2, KL2 and TFP2.

Table 7
Regression Equations to estimate the Speed of
Divergence between Mexico and USA

	QL	EFIC02	EFIC03
b₀	0.5708 (0.7567)	1.4587 (0.7229)	3.9175 (0.3817)
b₁	1.0000 (0.0000)	0.9841 (0.0000)	0.9457 (0.0000)
b₂	-0.0698 (0.0000)	-0.0461 (0.0008)	-0.0401 (0.0091)
b₃	-0.0339 (0.0492)	-0.0327 (0.1996)	-0.0405 (0.1971)
R² (Adj)	0.9576	0.9607	0.9733
DW	2.1431	1.8148	1.9708
F	309.8	327.0	499.9

Source: Author's calculations, see the text.

Table 8
Mexican Relative Labour Productivity Levels in Manufacturing
(USA = 100)

Industrial Branches	1984-1993	1994-2000	1984-2000
Food, Beverages and Tobacco	37.2	32.7	39.4
Textiles, Apparel and Leather	48.8	19.6	25.5
Wood Products & Furniture	15.4	13.1	18.1
Paper, Paper Products & Printing	18.1	19.1	24.7
Chemical Products	54.4	46.3	44.4
Non-Metallic Mineral Products	44.9	42.1	46.6
Basic Metal Industries	51.3	50.2	113.2
Fabricated Metal Products	21.6	18.9	16.0
Other Manufacturing	48.2	34.0	20.8
Manufacturing Industry (Average)	41.7	34.5	40.5

Source: Author's calculations based on data presented in Hernández-Laos and Guzmán Chavez (2004).

Table 9
Regression Equations to Explain Annual Rates of Labour
Productivity by Final Demand Component (Pooled data)¹

Variable	1961-1987	1988-2002	1961-2002
DPCAGR	0.092	-0.051	0.061
DPCIND	0.234(***)	0.210	0.140(***)
DPCSER	0.167(***)	0.314	0.206(***)
DGCAGR	-0.044	0.369(*)	0.166(***)
DGCIND	-0.096	-0.526(***)	-0.246(***)
DGCSER	0.062	0.080	0.073(*)
DXAGR	0.147(***)	-0.300(**)	0.072(*)
DXIND	0.002	-0.201	0.005
DXSER	0.016	0.331(**)	0.025
DXPET	0.009	-0.040	0.001
DISI	-0.022	0.286	-0.025
DAP			0.153(***)
Statistics			
R2 Adj.	0.163	0.302	0.144
S.E.R.	0.046	0.035	0.043
D.W.	2.177	1.707	1.974
F.	4.304 (***)	5.066(***)	5.267(***)
No. Observations	459	255	714

¹ Standardized Coefficients. Dummy variables by sector are omitted for reason of space.

* Different from zero at 0.10.

** Different from zero at 0.05

*** Different from zero at 0.01.

Table 10
Regression Equations to Explain Annual Rates of TFP
Productivity by Final Demand Component (Pooled data)¹

Variable	1961-1987	1988-2002	1961-2002
DPCAGR	-0.030	0.138(*)	-0.036
DPCIND	0.319(***)	0.342	0.367(***)
DPCSER	-0.054	-0.809(***)	-0.155(**)
DGCAGR	-0.060	-0.589(***)	-0.077
DGCIND	-0.092	0.413(**)	-0.042
DGCSER	-0.021	0.099	0.011
DXAGR	0.146(***)	0.022	0.098(**)
DXIND	-0.007	-0.083	-0.019
DXSER	-0.041	-0.064	-0.036
DXPET	0.054	-0.152	0.053
DISI	0.200(***)	-0.840(*)	-0.251(***)
DAP			-0.096(*)
Statistics			
R2 Adj.	0.091	0.258	0.110
S.E.R.	0.078	0.054	0.071
D.W.	1.815	1.755	1.758
F.	2.622(***)	4.108(***)	3.975(***)
No. Observations	405	225	630

¹ Standardized Coefficients. Dummy variables by sector are omitted for reason of space.

* Different from zero at 0.10.

** Different from zero at 0.05

*** Different from zero at 0.01.

Table 11

Gross Fixed Investment (Constant price as % of GDP)

Year	Total	Private			Public
		Sub-Total	National	FDI	
1960-1964	16.8	12.6	11.8	0.8	4.2
1965-1970	19.2	13.1	12.5	0.6	6.1
1971-1977	21.2	13.5	13.0	0.5	7.7
1978-1981	23.8	13.3	12.8	0.5	10.5
1982-1987	17.7	11.0	10.6	0.4	6.7
1988-1994	17.7	13.8	12.1	1.7	3.9
1995-2000	18.4	15.3	12.0	3.3	3.1
2001-2002	19.5	16.1	13.6	2.5	3.4

Source: World Bank (1998) and author's estimates based on INEGI and Banco of Mexico.

Table 12

Rates of Educational Enrolment (%)
(Thousands and percentages)

Concept	1960	1970	1980	1990	2000
Primary instruction					
Educational Enrolment	4,913	8,530	14,666	14,402	14,793
Population (6-12 yr)	6,894	10,038	13,817	14,702	15,494
Rate (%)	71.3	85.0	106.1	98.0	95.5
Secondary Instruction					
Educational Enrolment	227	883	3,034	4,190	5,350
Population (13-15 yr)	2,377	3,495	5,112	6,157	6,297
Rate (%)	9.6	25.3	59.3	68.1	85.0
HighSchool					
Educational Enrolment	110	281	1,180	2,101	2,956
Population (16-18 yr)	2,782	3,107	4,727	5,994	6,122
Rate (%)	4.0	9.0	25.0	35.0	48.3
Profesional Instruction					
Educational Enrolment	113	315	961	1,252	2,048
Population (19-24 yr)	2,947	4,878	7,451	9,476	10,851
Rate (%)	3.8	6.5	12.9	13.2	18.9

Source: Author's calculations based on INEGI, Mexico.

Table 13
Population 15 and over by level of formal instruction
(Thousands and percentages)

<i>Level formal Instruction</i>	1960		1970		1990		2000	
	<i>Abs.</i>	<i>%</i>	<i>Abs.</i>	<i>%</i>	<i>Abs.</i>	<i>%</i>	<i>Abs.</i>	<i>%</i>
Without Instruction	7,808	40.1	8,197	31.6	6,864	13.7	6,684	10.3
Primary Instruction	10,183	52.3	14,448	55.7	21,494	42.9	24,336	37.5
Secondary Instruction	876	4.5	1,660	6.4	10,171	20.3	15,835	24.4
High School	409	2.1	1,012	3.9	7,315	14.6	10,903	16.8
Professional Instruction	195	1.0	623	2.4	4,259	8.5	7,139	11.0
Total	19,471	100.0	25,939	100.0	50,103	100.0	64,896	100.0

Source: INEGI, Mexico.

Table 14
**United States Patent and Trade Mark Office (USPTO). Number of awarded
patents in select years and countries, 1980-1999 (Number)**

Country	1980	1986	1993	1999	Rate of Growth (%)		
					80-85	86-92	93-99
USA	37,354	38,126.0	53,231	83,909	1.2	5.4	7.9
Korea	8	46.0	797	3,562	38.7	50.7	28.8
Taiwan	65	208.0	1,189	3,693	21.8	29.9	20.8
Brazil	24	27.0	57	91	4.6	6.8	8.1
Spain	65	97.0	158	222	3.7	5.4	5.8
Mexico	41	37.0	45	76	4.8	0.9	9.1

Source: Data from USPTO systematized in Aboites (2003:197).

Table 15
Application for patents by residents and non-residents, 1983-1997 (number)

Country	Annual Average			Annual Rate of Growth (%)					
	Residents	Non-Residents.	Total	Residents		Non-Residents		Total	
				83-89	90-97	83-89	90-97	83-89	90-97
Brazil	2,311	11,430.0	13,741	0.2	1.5	10.1	19.7	7.4	17.1
Mexico	638	8,371.0	9,009	3.6	-7.2	2.2	34.2	2.5	31.5
Venezuela	324	1,379.0	1,703	-18.5	-5.9	-3.7	8.9	-7.0	6.8

Source: *Main Science and technological Indicators*, OECD, Paris, 2002. Quoted by Aboites (2003).

Table 16

**R & D expenditure as percentage of GDP in selected years and countries
(percentages)**

Country	1993	1994	1995	1996	1997	1998	1999
USA	2.52	2.42	2.50	2.52	2.57	2.60	2.64
Korea	2.22	4.44	2.50	2.60	2.69	2.55	2.46
Japan	2.80	2.84	2.98	2.83	2.90	3.04	3.04
Spain	0.91	0.81	0.81	0.83	0.82	0.90	0.89
Chile	0.65	0.66	0.65	0.66	0.65	0.62	0.63
Brazil	0.61	0.74	0.87	0.91	--	--	--
Mexico	0.22	0.29	0.31	0.31	0.34	0.47	0.43

Source: Science and technological Indicators. OECD, Paris, 2002. Quoted by Meza Gonzalez and Mora Yague (2002).

Table 17

**R & D Finance structure by Country (1999)
(percentages)**

Country	Government	Firms	Others Sources
USA	29.2	66.8	4.0
Korea	24.9	70.0	5.1
Brazil	57.2	40.0	2.8
Chile	64.3	21.5	14.2
Mexico	61.3	23.6	15.1

Source: OCDE (200) and Conacyt (Mexico). Quoted bay Meza Gonzalez and Mora Yague (2002).

Table 18
Estimate of Governance Mexico-USA(1997/1998 and 2000/2001)

	México		USA	
	1997/1998	2000/2001	1997/1998	2000/2001
<i>Voice and Accountability</i>				
Estimate	0.12	-0.11	1.24	1.52
Standar Error	0.23	0.25	0.24	0.25
Number of Sources	7	5	6	6
<i>Political Stability</i>				
Estimate	0.06	-0.35	1.18	1.1
Standar Error	0.33	0.25	0.23	0.25
Number of Sources	9	6	8	6
<i>Government Effectiveness</i>				
Estimate	0.28	0.18	1.58	1.37
Standar Error	0.18	0.23	0.19	0.23
Number of Sources	10	7	9	7
<i>Regulatory Quality</i>				
Estimate	0.58	0.61	1.19	1.14
Standar Error	0.27	0.23	0.27	0.23
Number of Sources	7	6	7	6
<i>Rule of Law</i>				
Estimate	-0.41	-0.47	1.58	1.25
Standar Error	0.18	0.21	0.16	0.21
Number of Sources	11	8	9	8
<i>Control of Corruption</i>				
Estimate	-0.28	-0.28	1.45	1.41
Standar Error	0.17	0.2	0.19	0.2
Number of Sources	11	7	9	7

Note: Governance indicators are oriented so that higher values correspond to better outcomes, on a scale from -2.5 to +2.5. These ratings are based on subjective assessments from a variety of sources, are subject to substantial margins of errors as indicated and do not reflect to official view of the World Bank.

Source: Taken from: Kaufmann, D., A. Kraay and P. Zoido-Lobaton (2002), Governance Matters II: Updated Indicators for 2000/2001. (<http://www.worldbank.org/research/growth>).

Figure 1
Mexico: Export, Import and Total Trade Coefficients (%)
(1960-2002)

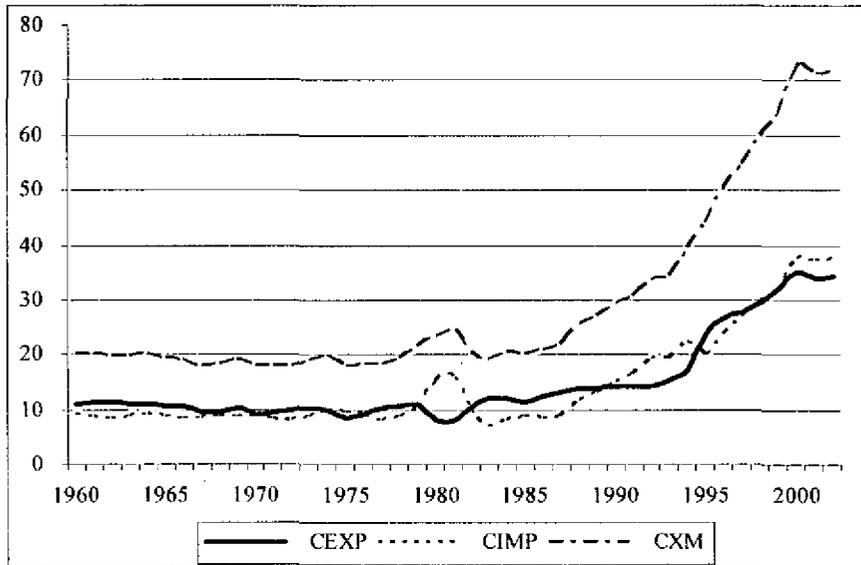


Figure 2
Mexico: Alternative Labour Productivity Indexes (1960-2002)

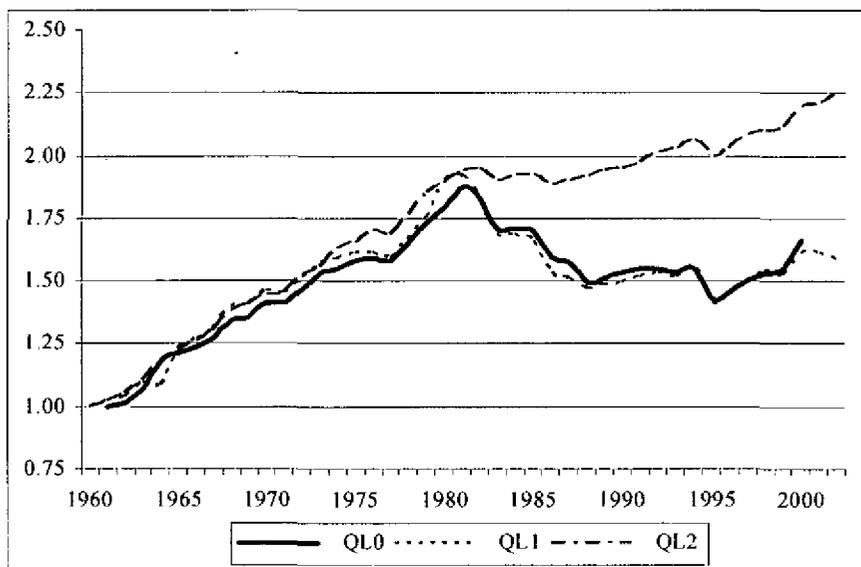


Figure 3
Mexico: Alternative Capital Per-Worker Indexes (1960-2002)

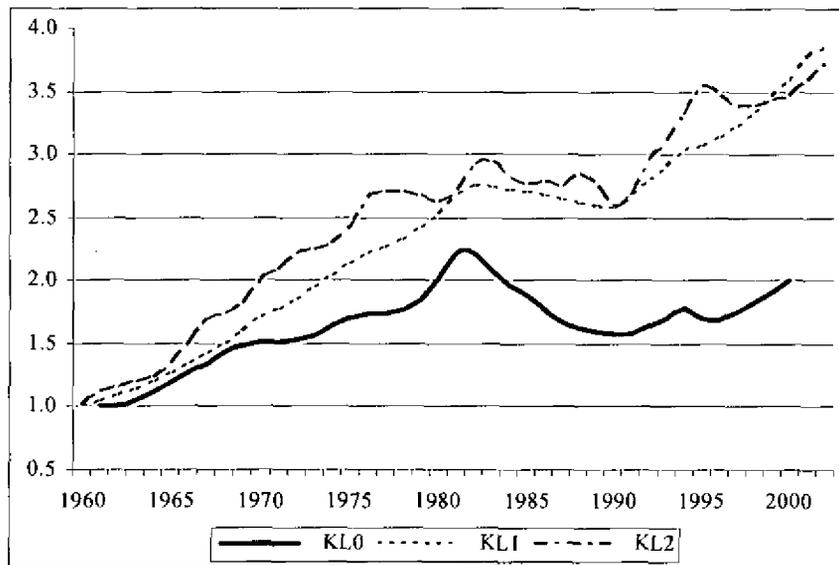


Figure 4
Mexico: Alternative Indexes of TFP (1960-2002)

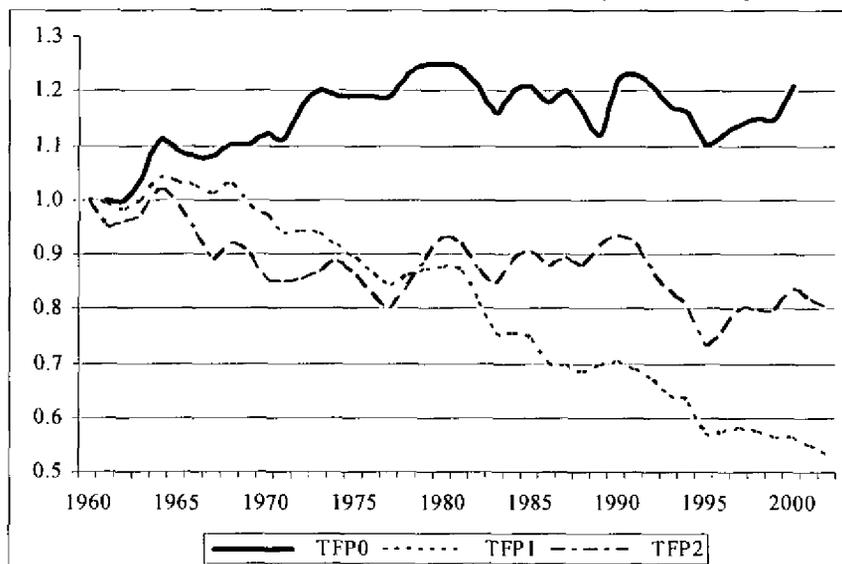


Figure 5
Mexico: UNIDO Indexes of Technical Change and Efficiency (1961-2000)

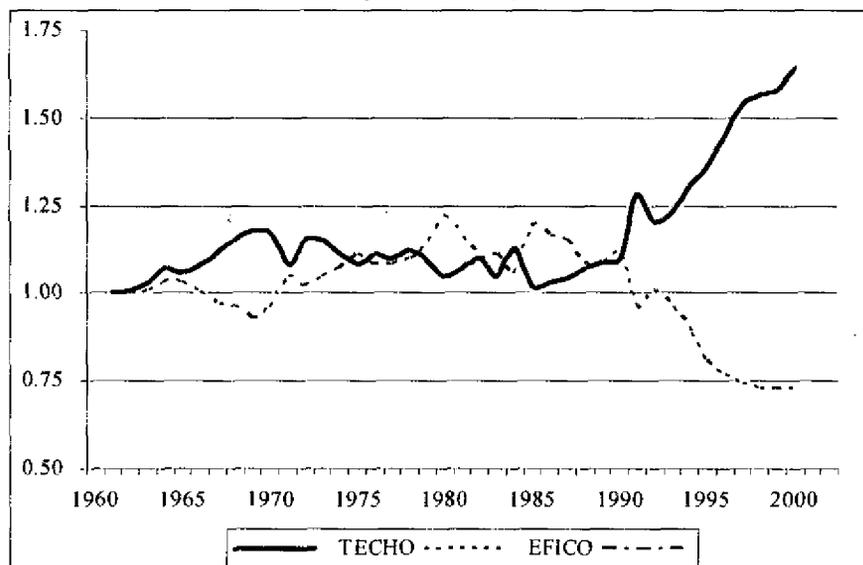


Figure 6
Mexico: Labour Productivity Indexes with and without Fixed Sector Structure (1960-2002)

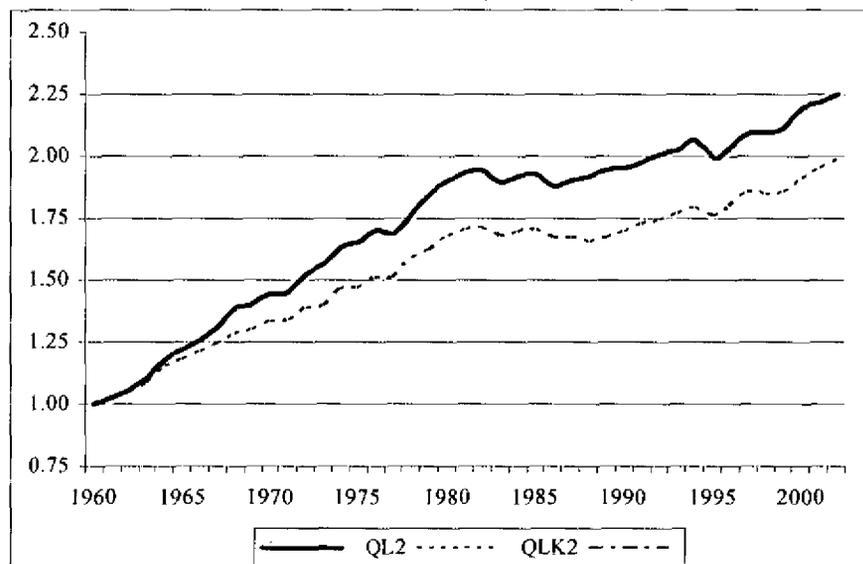


Figure 7
Mexico: TFP Indexes with and without Sector Structural Change (1960-2002)

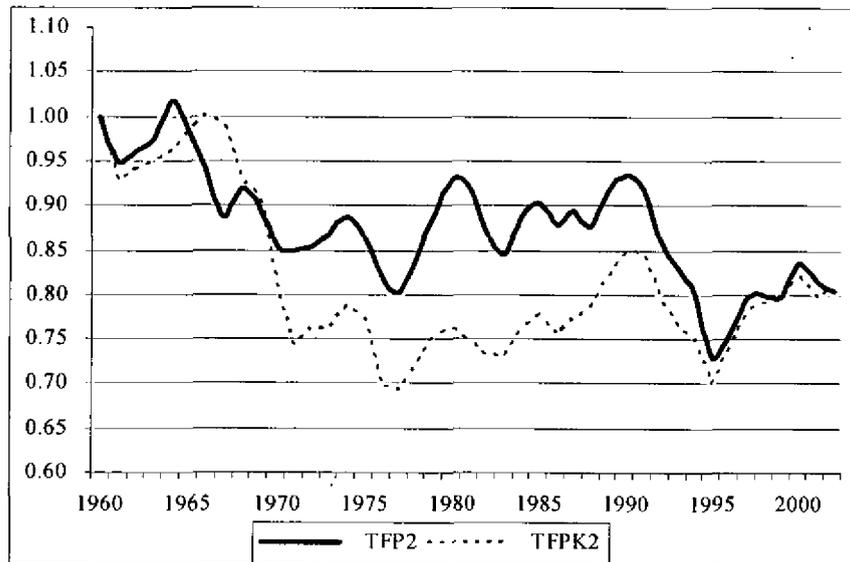


Figure 8
Mexico / USA: Labour Productivity and TFP Levels
 (USA = 100)

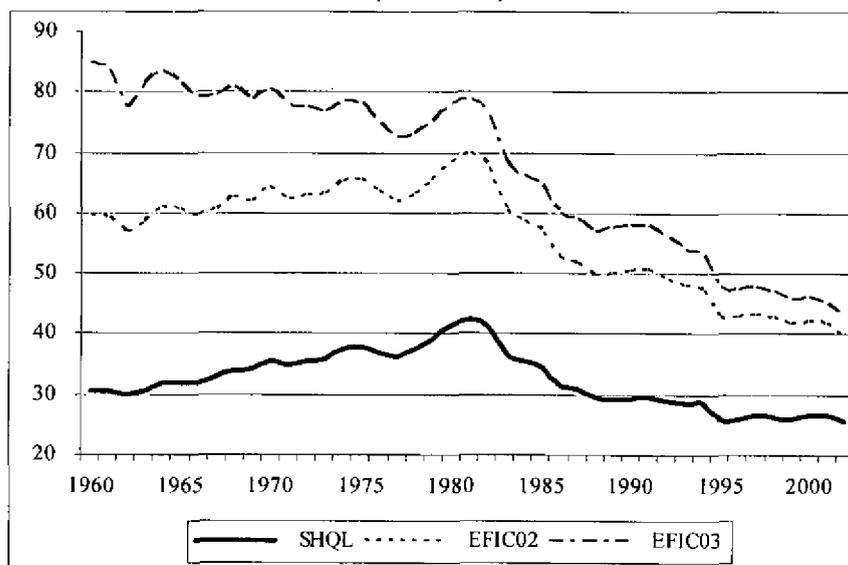


Figure 9 (a)
Mexico: Indexes of Structural Reform (1970-1995)

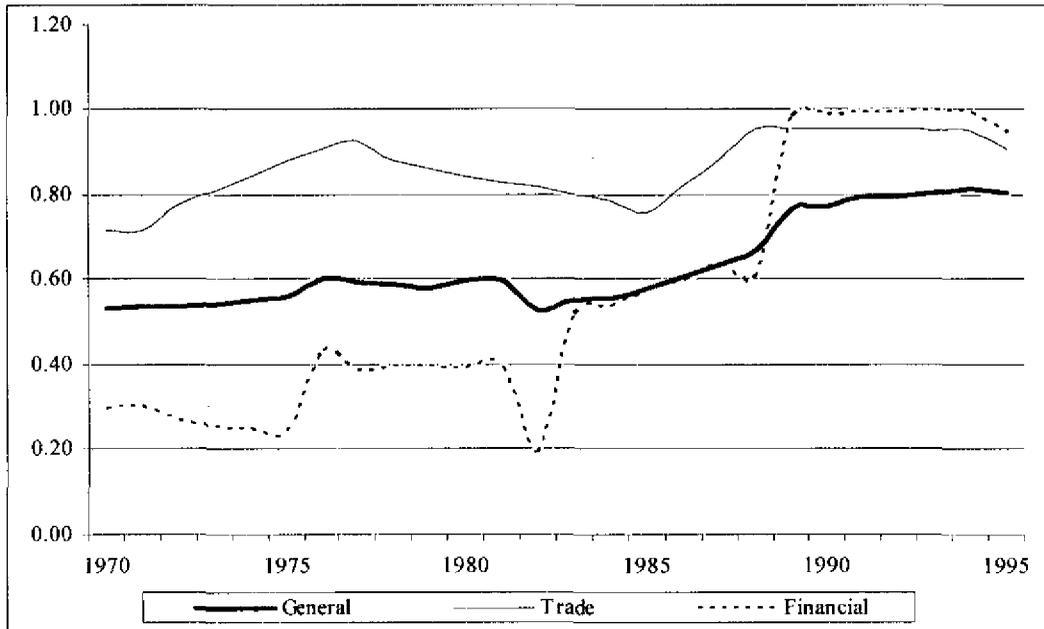


Figure 9 (b)
Mexico: Indexes of Structural Reform (1970-1995)

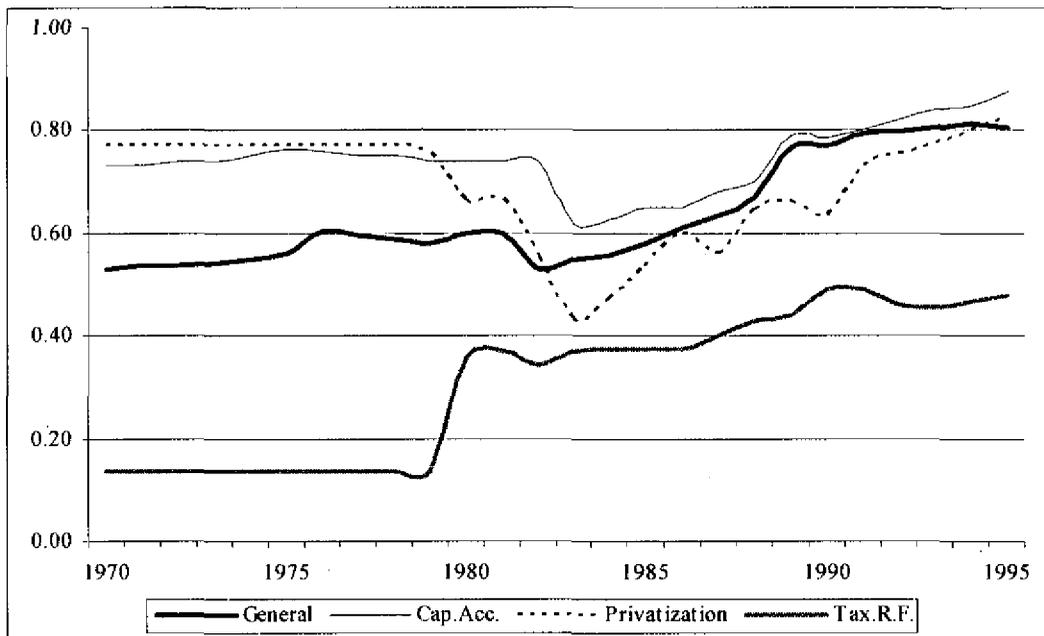
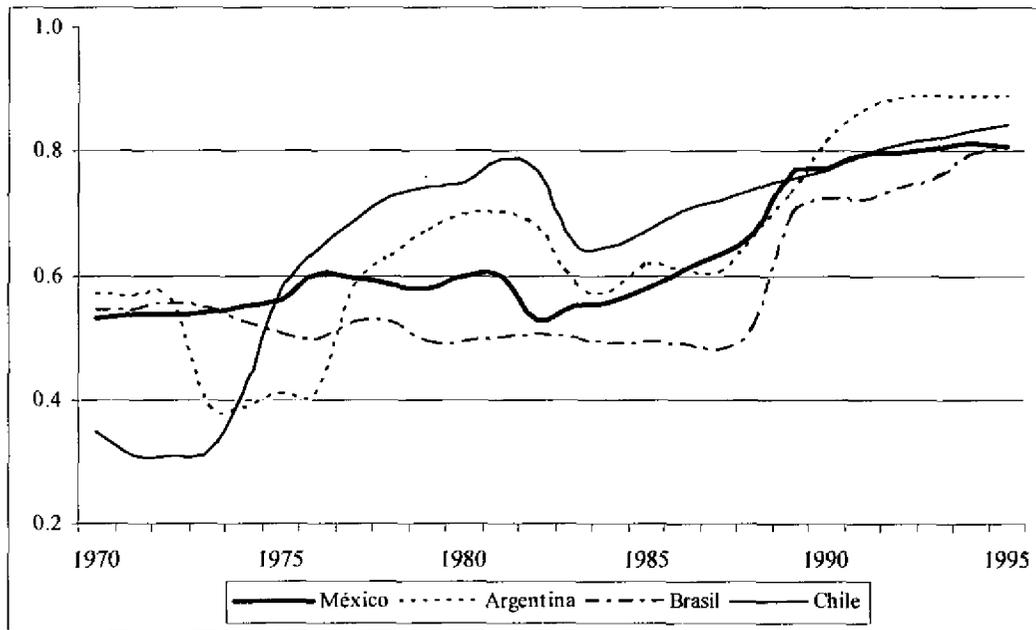
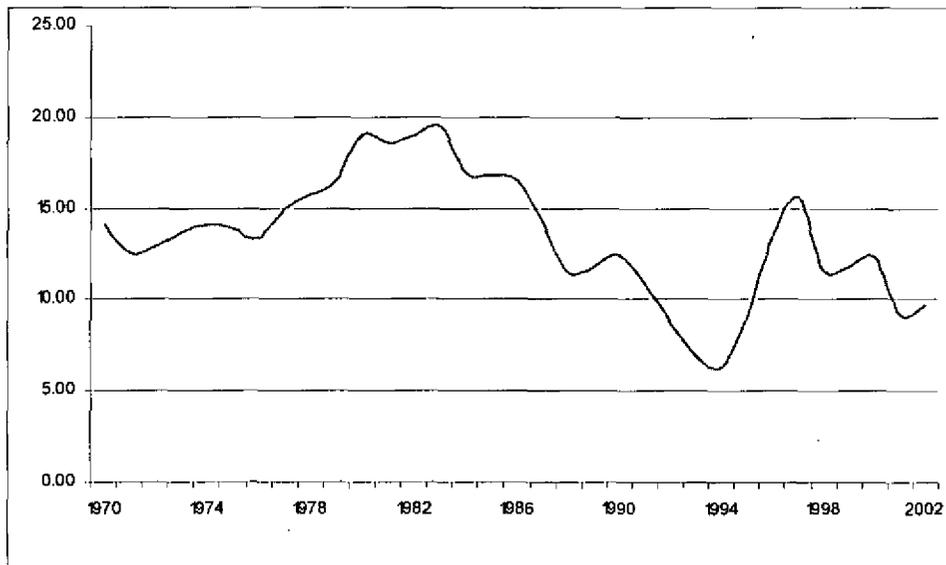


Figure 10
Latin America: General Indexes of Structural Reform (1970-1995)



Source: Morley A. Samuel, Roberto Machado And Stefano Pettinato. *Indexes of Structural Reform in Latin America*, January, 1999.

Figure 12
Mexico: Domestic Saving Coefficient¹ (1970-2002)
(Percentage)

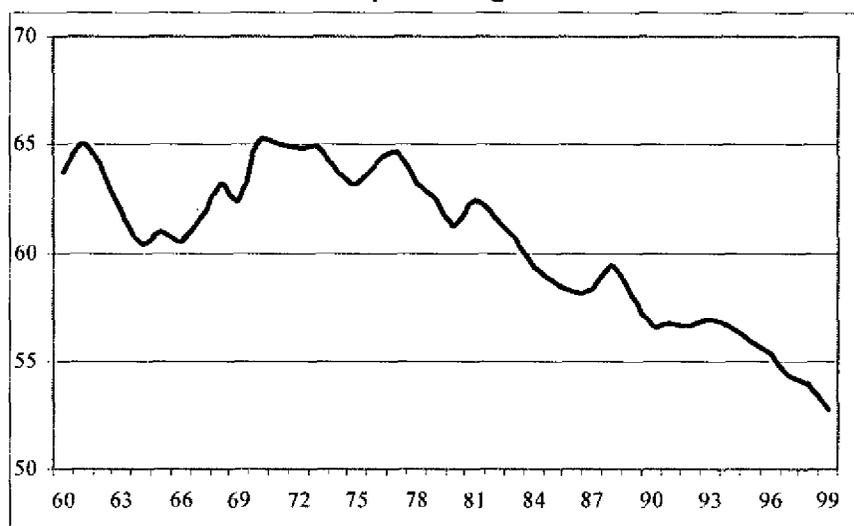


¹ Internal savings as a percentage of Disposable Income.

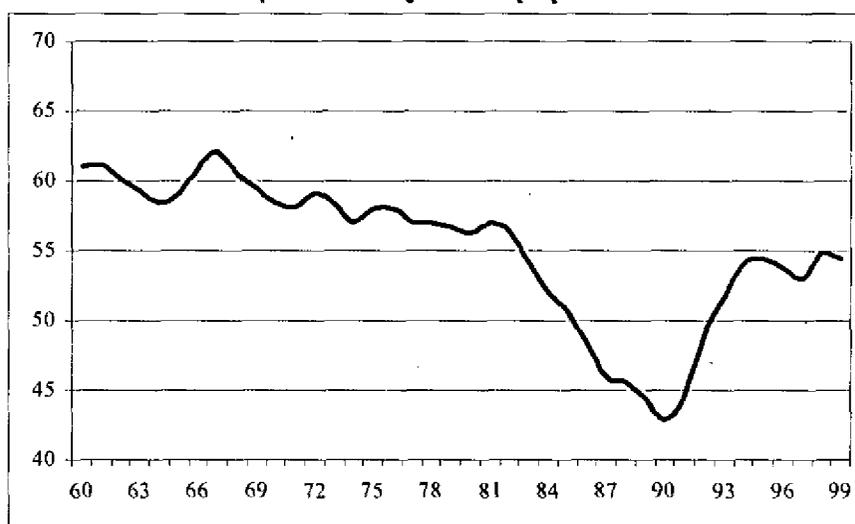
Source: Author's calculations based on INEGI, System of National Accounts, Mexico.

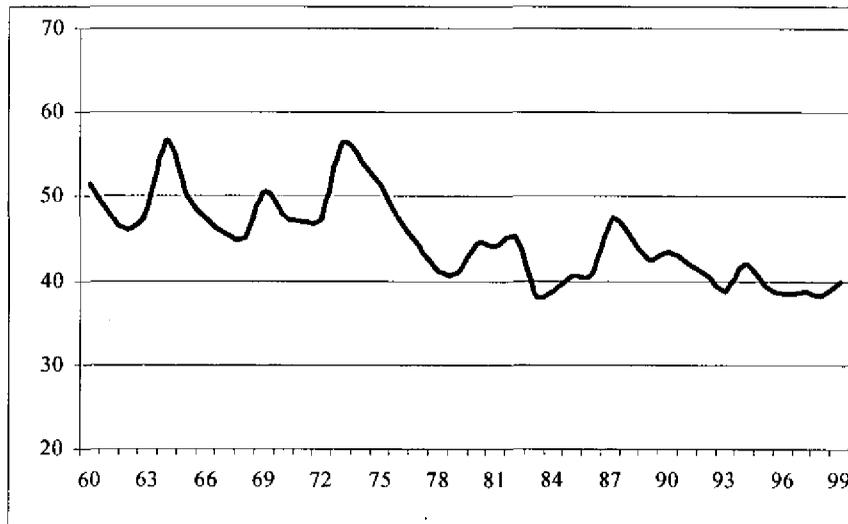
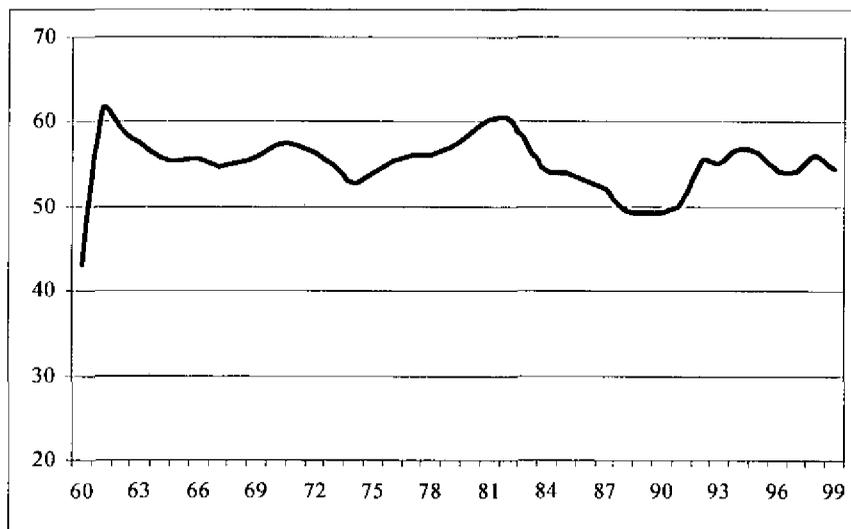
Figure 13
Mexico: Net (non-depreciated) value of capital stocks as a (%)
of its nominal value (1960-1999)

a) Buildings



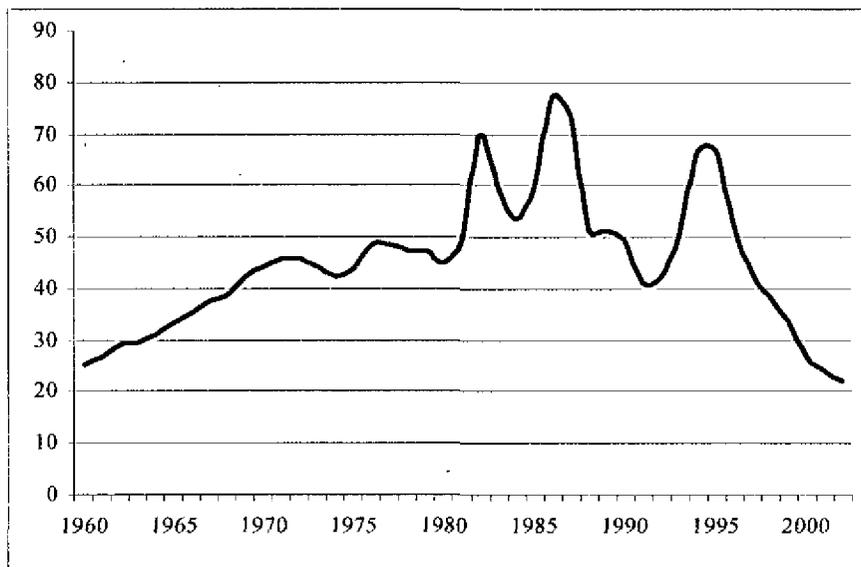
b) Machinery and equipment



c) Transport equipment**d) Office appliances**

Source: Author's calculations based on data of Banxico.

Figure 15
Mexico: Bank System Financing (As a % of GDP)¹



¹ At current prices. Includes: private and mixed banks, deposit and saving banks, financial societies and Bank of Mexico financing.
Source: Banco de México. Indicadores Económicos. México.

Figure 16
Mexico: Labour Force and Remunerated Employment (Thousands)

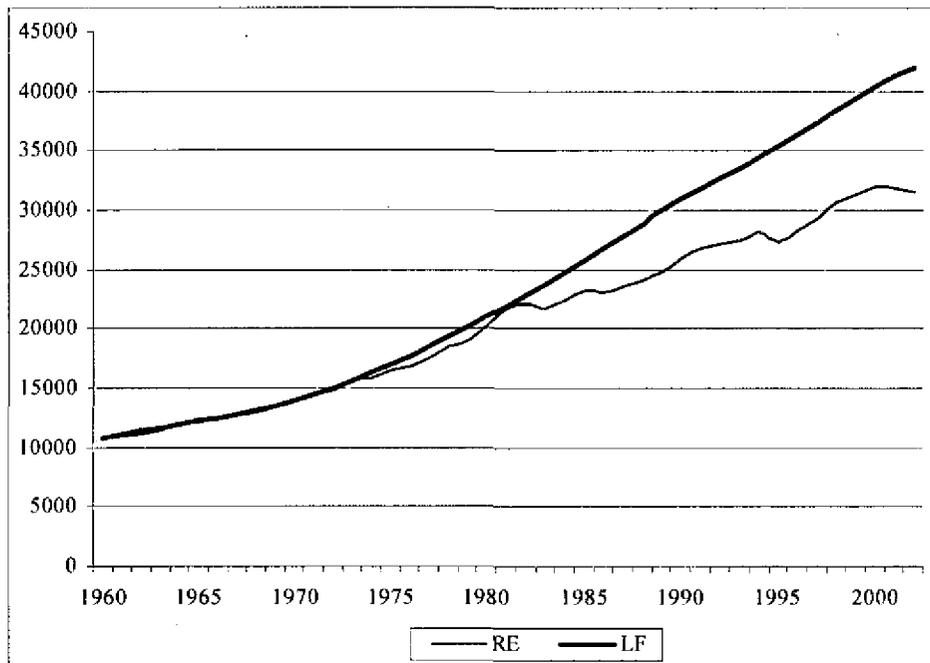
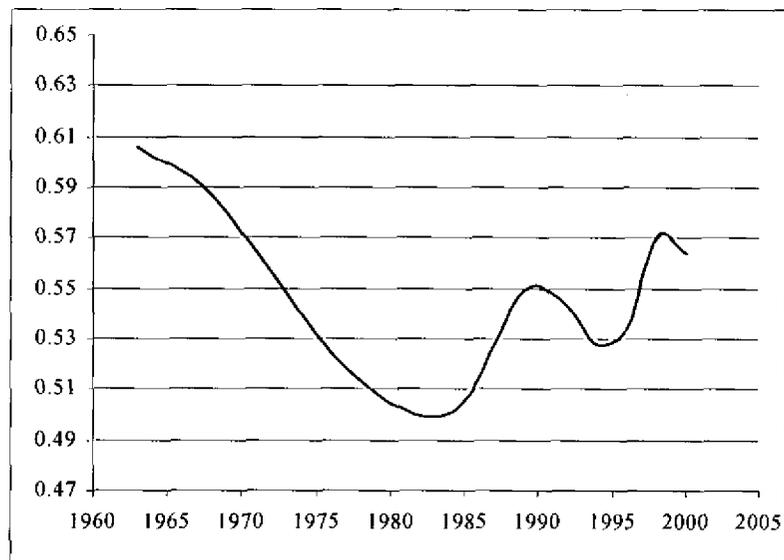
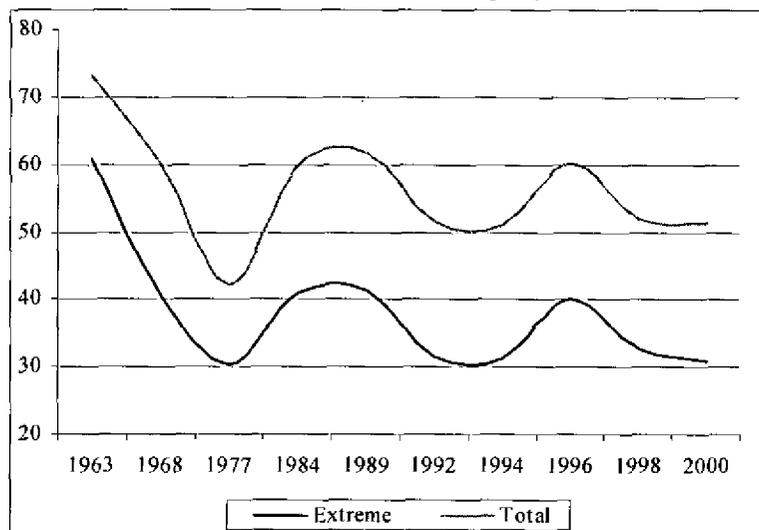


Figure 17
México: Long-term evolution of Gini Coefficient
to measure trends in Household Income Distribution



Source: Hernández Laos and Velázquez, 2003.

Figure 18
Mexico: Long-term trends in Poverty Incidence Index,
1960-200 (Percentages)



Source: Hernández Laos and Velázquez, 2003.

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