Regional Economic Growth in Mexico: The 21st Century Economy | Alejandro Díaz Bautista • Mayrén Polanco Gaytán

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The 21st Century Economy

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Summary

Integrating the region and ensuring that goods, services and people move easily across borders is at the core of the North American Free Trade Agreement (NAFTA) between Mexico, Canada and the United States (US). Member countries facilitate this trade through faster customs procedures at borders and a more favorable business climate behind the border.

The central concern of growth economists in Mexico, however, is with the causes of economic growth in our country and it is difficult to say much about that without a theory of growth. Another concern for economists in Mexico is regional economics.

Regional economics in Mexico is concerned with the spatial allocation of economic activity. It is centered along the analysis within regions and states or metropolitan areas of a country. Mexico as a country is now one of the fastest-growing economies in Latin America and a model of financial and commercial integration. But formidable development and economic growth challenges lie ahead for Mexico in the next quarter century, as we observe the deep contrasts between Mexico's rich and poor states, growing urban centers and destitute rural areas, and between Mexicans rich enough to be considered between the richest men in the world and owning companies that are able to compete with industrialized countries, and those Mexicans for whom the benefits of globalization have not yet materialized.

In recent years, Mexico is among the best macroeconomic performers in the Latin American region, with private sector growth and competitiveness, improvements in infrastructure, environmental protection, and public governance. In the coming years, Mexico faces many challenges in order to support economic growth. The economic reforms, including the financial sector reform, labor reform, energy and decentralization, promises to give

the country a greater legitimacy, stronger sustainability and a higher rate of economic growth.

The present book covers the effects of human capital and research and development on growth and regional convergence in Mexico. It also takes a closer look at institutions and economic growth in Mexico; and also covers trade, economic growth and convergence.

1
Introduction to the Book

For several decades, rapid economic growth has been the key to success for developed countries. An educated workforce, a large population boom, major technological advances, and abundant fossil fuels were the key components of economic growth, generating substantial and broadly distributed increases in standards of living in many countries.

Economic growth constraints will push the issue of distribution to the forefront of political discussions. In his book, *Capital*, Thomas Piketty predicts that economic growth will slow to between 1 and 2% by the end of the 21st Century. This trend, he further argues, will be accompanied by higher returns to capital and lower returns to labor, thereby exacerbating economic inequality.

The central concern for growth economists in Mexico, however, is related to the causes of economic growth in our country and it is difficult to say much about it without a theory of growth. Another concern for economists in Mexico is regional economics. Regional economics in Mexico deal with the spatial allocation of economic activity. They are centered on the analysis within regions and states, or metropolitan areas of a country. Mexico, as a country, is now one of the fastest-growing economies in Latin America and a model of financial and commercial integration. But formidable development and economic growth challenges lie ahead for Mexico in the next quarter of a century, as we observe the deep contrasts between Mexico's rich and poor states, growing urban centers and destitute rural areas, and between Mexicans rich enough to be considered among the richest men in the world and who own companies that are able to compete with industrialized countries, and those Mexicans for whom the benefits of globalization have not yet materialized. In recent years, Mexico is among

the best macroeconomic performers in the Latin American region, with private sector growth and competitiveness, improvements in infrastructure, environmental protection, and public governance. In the coming years, Mexico faces many challenges in order to support economic growth. The pending reforms, including the fiscal reform, financial sector reform, labor reform, energy reform, and decentralization reform, promise to give the country a greater legitimacy, stronger sustainability and a higher rate of economic growth.

Hence, in this introduction I will briefly discuss developments in the theory of economic growth over the past few decades and how they are applied to the regional Mexican case, which is the theme and objective of this book.

The income gap that separates the world's rich and poor nations is the main economic fact at the beginning of the 21st Century. Nearly two-thirds of the world's population lives in countries where average income is only one-tenth of the US level. Mexico's average Gross Domestic Product (GDP) *per capita* is about one fourth of the US income *per capita*. But that doesn't mean that the income gap is not large enough between both countries. Since the starting points for all countries were not so far apart prior to the industrial revolution in Europe and the beginning of the nineteenth century in North America, these disparities must be attributed almost entirely to differences in growth rates of *per capita* income. Over the past century, the growth economists observe a basic fact, which is that the world has two kinds of countries: the rich club of countries that have managed to sustain economic growth over long periods of time, and those countries defined as medium and low-income countries.

Most growth analysts would date the birth of the modern theory of economic growth to the 1950's, but the growth economists in Mexico would say that the classical economists, such as Adam Smith, David Ricardo, and Thomas Malthus were the first to discuss many of the basic ingredients of modern growth theory. Particulary, their emphasis on competitive behavior, equilibrium dynamics, and the impact of diminishing returns on the accumulation of labor and capital are integral elements of what is called the

neoclassical approach to growth theory. In the case of Mexico, the neoclassical tradition has had a big impact on the way the theory of growth has been developed. During the 1950's, the neoclassical approach to understanding growth was formalized by Solow and Swan (1956) and was later extended by Cass (1965) and Koopmans (1965). The basic assumptions underlying the neoclassical growth model, with a productive capacity that can be adequately characterized by a constant-returns-to-scale production function with diminishing returns to capital and labor, has been the basis of the empirical work done in Mexico at research centers and Universities for the last twenty years. The other assumptions, in which firms are price-takers in a competitive marketplace, which means that no individual firm has any influence over market prices and individual firms are assumed to possess no market power, are also accepted by growth economists in Mexico. The assumption that technological change or productivity growth is entirely exogenous and independent of the actions of the consumers and producers and is available to all countries at no cost, has always been taken with some reservation.

The implications of the neoclassical model of growth are straightforward for a middle-income country. The first major implication is that sustained increases in *per capita* income can be supported only by sustained increases in total factor productivity. In such a model, the output per worker can only rise if the ratio of capital per worker increases or total factor productivity increases. The assumption of diminishing returns to capital showed us that there is a limit to how much capital accumulation can be added to output *per capita*. Hence, the only way to increase output per worker in the long run is to have sustained productivity growth. This major weakness of the neoclassical growth model has been detected by economists around the world and has not been overlooked in Mexico. Long-run growth in the model is exogenous and determined by an element that is entirely outside of the model.

The second major implication of the neoclassical model is conditional convergence, which states that national or regional economies with lower initial levels of real output per worker relative to the long run level should experience faster economic

growth. This property follows from the assumption of diminishing returns to capital: the lower the ratio of capital per worker, the higher the return of investing in capital. Hence, the lower the ratio of capital per worker, the faster the rate of capital accumulation and the faster the growth rate of output per worker. This implies long run convergence in output *per capita*. Economic convergence is said to be conditional here since the long run level of capital per worker and output per worker depend on the savings rate, the growth rate of the population, and the existing technology, factors that are unlikely to be identical across regions and countries. For Mexico, we would know that most factors vary even at the state level. When comparing the data on the savings rate and the growth rate of the population between Mexico and the United States (US), we observe huge differences. The convergence thesis also requires the assumption that all regions can acquire technological progress at no cost, which is a very strong assumption even in a surrealist world like Mexico.

For several decades, the neoclassical growth model remained the benchmark model of economic growth and continues to remain strong in many parts of Mexico. During the 1980's, more sophisticated growth models were developed in the industrialized countries' research centers. A key feature of these new models is that, unlike the neoclassical model, technological change is not assumed to be exogenous. Hence, the new endogenous growth models explain where technologically driven productivity growth comes from. In the new growth models, the accumulation of knowledge plays a key role in driving productivity growth in these models.

For the Mexican growth theorist, there are essentially two seminal lines of work in the endogenous growth literature. The first line includes the work done by Romer (1986) and Lucas (1988). In this line of work, the assumption of constant returns to scale is dropped. Particulary, knowledge is assumed to be an input of production with increasing returns to scale, so that it may be possible for *per capita* output to grow without bound. In addition, convergence of *per capita* incomes need not occur in the long run for different regional or national economies.

The second line of endogenous growth models is based on the articles by Romer (1990), Grossman and Helpman (1991), Aghion and Howitt (1998), and others. In these models, an effort is made to model the microeconomic environment in which firms may accumulate knowledge. In particular, the assumption of perfect competition must be dropped. This is because the acquisition of knowledge through research and development activity is costly and can only be rewarded if firms have some ex-post market power. Hence, firms are assumed to compete in a monopolistically competitive environment, which is a model more closely related to the Mexican economic environment. As in the first class of endogenous growth models, *per capita* output growth can occur without bound since there need be no tendency for the economy to run out of ideas. Furthermore, convergence may not occur in the long run for different regions and countries.

Much of the new economic growth research in the industrialized world also includes models of the diffusion of technology such as the work of Grossman and Helpman (1991). An area of research which has been rarely touched in Mexican studies. In newer growth models, an effort is made to analyze directly how technological progress is transferred across regions and countries, and how an open economy may be better able to receive the benefits of technological progress. The question of openness and technological transfer is of great interest for Mexican growth economists. One important implication of this research is that the location of research and development (R&D) activity plus regional openness may matter for regional and national growth in Mexico.

Another key feature of the endogenous growth models is that the long-run growth rate can depend on government actions. In the basic neoclassical growth model, government does not have an impact on the long-run growth rate. In an endogenous growth framework, however, government policy can affect the long run rate of growth, since government policy actions, such as taxation, fiscal and monetary policy, provision of infrastructure, protection of intellectual property, regulations, maintenance of law and order, can affect the underlying rate of inventive activity. Government and institutions, therefore, have great potential for harm or good in

these models. In Mexico, any economist can say that government policy actions have had a lasting effect on the growth rate of the Mexican economy.

The economics of growth in Mexico have come a long way since they regained center stage for economists in the last few years. The early focus of economic growth in Mexico was on theoretical models that generated self-sustaining growth, but newer models of economic growth have been applied for Mexico, which have increasingly replaced older models with an attempt to shed light on the factors affecting economic growth in Mexico. On the empirical front, the search for determinants of growth has gone from basic economic growth variables (such as physical and human capital) to newer determinants of economic performance such as trade and institutions. Our understanding of the economic growth process in Mexico has increased considerably as a result. However, there remain serious questions in the existing growth research in Mexico. Neither the cross-national growth literature nor existing country studies have made adequate progress in answering these and many other fundamental questions. Of course, there is no shortage of country studies in the literature due to the shortage of researchers in Mexico. At the international level, recent growth studies begin to answer some of the economic growth questions. The studies explore the respective roles of human capita, trade, institutions, political economy, and initial conditions in driving patterns of technological convergence and accumulation in selected countries. Mexican economists look at growth as determined by initial and secondary determinants. The standard initial way in which Mexican economists look at growth is that of total output of an economy as a function of its resource endowments (labor, physical capital, human capital) and productivity with which these endowments are deployed to produce a flow of goods and services, increasing the gross national product. The relationship is expressed in the form of an economy production function, with the letter representing total factor productivity. Total factor productivity captures not only the technical efficiency level of the economy, but also the allocative efficiency with which resource endowments are distributed across economic activities. The growth of *per capita*

output can in turn be expressed in terms of three determinants: physical capital deepening, human capital accumulation and productivity growth. This is the usual and standard neoclassical growth accounting decomposition, and it has given rise to a large literature on sources of growth accounting. But one must be careful about interpreting such decompositions because accumulation and productivity growth are themselves endogenous. The secondary determinants of growth are the determinants mentioned by Rodrik (2001) including integration and openness (trade), culture and institutions. Trade or integration relates to market size and regional openness, and the benefits and costs of participation in international trade in goods, services, capital, and labor. Institutions refer to the quality of formal and informal, sociopolitical arrangements, that range from the legal system, the level of corruption and to political institutions. An observer in Mexico knows that institutions play an important role in promoting or hindering economic performance. Trade and institutions are obviously endogenous in Mexico and evolve with economic performance. Nonetheless, it is useful to think of these as secondary causal factors to the extent that they are not fully determined by incomes *per se*. Openness and trade are obviously shaped in large part by a country's conscious choice of policies; and institutional development is at least partly a choice variable as well or can be determined by developments exogenous to the economy.

The significance of trade and integration in the economy as a driver of economic growth has been a persistent theme in the literatures on economic history and development economics in Mexico. At the international level, Sachs and Warner (1995) have argued that countries that are open to trade experience show unconditional convergence to the income levels of rich countries. Leading international policy makers from the World Bank and Intertational Monetary Found (IMF) frequently make the case that integration and globalization of the economy is the surest way to prosperity. The traditional theory of trade does not support such claims, and the evidence is mixed. However, newer work on regional endogenous growth models generates large dynamic benefits from trade openness, provided technological externalities and

made learning effects go in the right direction. Capital flows may enhance the benefits further, as long as they go from rich countries to poor countries and come with externalities on technology and management.

Institutions have received increasing attention in the Mexican growth literature as it has become clear that property rights, appropriate regulatory structures, quality and independence of the judiciary, and bureaucratic corruption could not be taken for granted in many settings and that they were of utmost importance to initiating and sustaining economic growth. North and Thomas (1973) mention that before the assumptions were that these institutions would arise endogenously and effortlessly as a product of economic growth. The view as of today is that institutions are essential preconditions and determinants of growth. For the Mexican case, the casual observer sees the benefits for the economy of Property Rights and how corruption is bad for economic growth. There is also a simultaneous two-way interaction between trade and institutions: as better institutions foster trade, Anderson and Mercuiller (1999) and increasing openness to trade may have an effect on the quality of institutions (Wei, 2000).

Mexico has gone through remarkable transformations during the last two decades in their economic performance, while other countries have experienced sharp deteriorations. This suggests that moderate changes in country specific circumstances (government policies, democratic elections and institutional arrangements), often interacting with the external environment, can produce discontinuous changes in economic performances, which in turn set off virtuous or vicious cycles. An in-depth country study of the determinants of economic growth in Mexico can highlight the important determinants of growth in ways that cross-country empirics cannot show.

The government policy toward trade in Mexico plays a key role as well as the institutional setting in the economic growth of the country. Specific public policies such as a free trade agreement that is directed at international economic integration of Mexico do not correlate very well with economic performance, once one looks at the regional evidence. The evidence also shows that regio-

nal institutions with less corruption can overcome geographical constraints and lousy initial conditions. In order to promote and sustain growth in Mexico, we must have elements that are highly specific to a country's circumstances. An approach to institutional reform that ignores the role of local variation and institutional innovation is at best inadequate, and at worse harmful. The case of Mexico complements the literature on growth by providing more specific detail on how institutional arrangements matter to economic performance. A good example is monetary policy in Mexico. Good institutions are those autonomous institutions that provide public officials with the incentives to work and provide a public good at least cost in terms of corruption and rent seeking. Thinking in such terms helps endogenize the concept of good governance in Mexico. Economic growth in Mexico requires extensive institutional reforms within the existing institutions, rather than the conventional wisdom on institutional reform, which holds that the complementary nature of institutional reforms requires a long list of reforms to be pursued simultaneously. Sustaining economic growth in Mexico in the face of adverse circumstances such as world economic recessions requires even stronger institutions. The policies required to initiate a transition from a middle-income country equilibrium to a state of rapid growth are qualitatively different from those required to ignite growth a very low-income country. The institutional requirements of re-igniting growth in a middle-income country can be significantly more demanding than those of an industrialized country due to the uncertainty about the rules of the game. Economic growth in Mexico must be accompanied with good fundamentals that would provide the economy with the resilience to handle adverse shocks.

A few broad conclusions can be drawn from this brief overview of the determinants of economic growth in Mexico. While endogenous and neoclassical growth models offer different explanations for the growth process, in both models, the growth in total factor productivity and technological change is an essential component of economic growth. In the neoclassical model, technological progress is essential for long run growth in *per capita* output. In endogenous growth models, productivity growth results from spi-

llovers from human capital accumulation or inventive activity and this is what generates long run growth in *per capita* income. Hence, productivity growth is an essential component of overall economic growth in Mexico. For Mexico, capital accumulation and population growth are not sufficient for sustained growth in *per capita* income. In the neoclassical model, the law of diminishing returns limits the extent to which raw factor accumulation can raise *per capita* income. The emphasis, therefore, should be on accumulation of inputs of superior quality. The accumulation of capital and labor will increase the long-run rate of economic growth if this capital embodies more sophisticated technology and if workers are more skilled. Human capital plays an important role in the growth process of any country and Mexico is not an exception. Institutional factors such as government regulations, monetary and fiscal policy, provision of basic infrastructure, political stability, clearly matter for long run economic performance in Mexico. This is because the accumulation of factors of production and the development of new technologies do not occur in a vacuum.

The critical role for economic theory is no longer simply to explain how the existing system works, but also to explore how the economic system can be changed to become more adaptive and resilient in the face of the challenges of the 21st Century, and how it can be more directly designed to support human well-being, in the present and the future.

Simultaneous changes are needed, in both the actual economy and in economic theory, as well.

The economic theory that was accepted as standard during the second half of the 20th Century has serious impediments to meeting the challenges of the 21st Century. These impediments include inappropriate goals.

Standard economic theory prizes wealth creation above all, and most often defines this goal in terms of steadily growing GDP, instead of focusing on what economies should really produce, which is human well-being, in the present and the future.

We observe a bias toward monetary values: application of cost/benefit analysis or a focus on narrow measures of economic success often lead to an effort to apply monetary measures to hu-

man values, such as dignity, health, or fairness. The focus on what can be submitted to the measure of money leads to an overemphasis on formal markets and pays insufficient attention to essential unpaid economic activities.

Difficulty in dealing with the future: the standard use of discounting often leads to conclusions that make future concerns appear less significant than they are.

A number of tools and concepts used in economic analysis accept the existing distribution of resources as a given or not really up for discussion. These include the concepts of Pareto optimality, aspects of the Coase theorem, and a focus on aggregate growth indices at the expense of disaggregated inequality indicators. The strong assumptions of rationality at the root of the theory often are used to assert that the existing system is the best possible; if it could have been made better, it would have.

Bias against the public sector and in favor of markets: economists, businesspeople and politicians have joined in a chorus of disparagement against government, buttressed by an increasingly blind, but fervent, belief that markets can solve all problems. In fact, while markets can be a part of the solution to many human needs, they rarely can be the whole solution.

Markets need boundaries, rules, and safeguards against their internal tendency toward concentration of power and their lack of internal motivation to work for the wider good. In many situations markets are, in fact, the problem. Some attention to environmental concerns has led to the idea that, if there are market failures, they can be corrected by internalizing externalities.

It needs to be emphasized that market actors have no inherent incentive to do this: that incentive must come from outside the market system.

In order to redirect economics to be more useful, and more truly reflect the world we now face, a good starting point is to go back to the goals that are embedded in economic thinking. Here it is useful to make the distinction between intermediate and final goals. Final goals are ends that are worth achieving in themselves, while intermediate goals are pursued because they are expected to contribute to the final goals.

The economic system must maintain and, where necessary, rehabilitate, the productive resources required to preserve or increase human well-being in the future. These must include not only the obvious things, like factories and roads and other infrastructure. Productive capital needed to maintain well-being also necessarily includes natural resources, as well as human health and education, and cohesive social systems.

Economic exchange and production occurs in Mexico, and incentives are a very important matter. Any long run public policy will therefore influence productivity growth and economic growth since public policy is a critical determinant of the institutional environment in Mexico. In the subsequent sections, the discussion centers on the theoretical work and the literature review some of the more recent empirical studies.

The book is organized as follows. The second chapter covers the effects of human capital and research and development on growth and regional convergence in Mexico. The third chapter takes a closer look at institutions and economic growth in Mexico. The fourth chapter covers trade, growth and convergence. The fifth chapter centers around regional labor productivity in Mexico. The last chapter closes the volume with conclusions to the determinants of economic growth and an overview of future economic growth in Mexico.

2
Economic Growth Considering Human Capital

Introduction to Human Capital and R&D in Mexican Growth

Historically, economic theory has given emphasis on physical capital accumulation at the most robust source of economic growth, at least in the short-run, with exogenous technical progress being the long-run determinant of growth. The exogeneity of technological progress in the neoclassical growth model and the difficulty of explaining long-term economic growth (because of diminishing returns to physical capital) have restricted the analytical capacity of the neoclassical model and its empirical verification. This problem is solved by endogenous growth models developed by Romer (1986).

In the recent growth literature, the accumulation of human capital and research and development (R&D) have gained a central role. This section tries to narrow the bridge between the fields of regional convergence theory, economic growth, and human capital. Unlike traditional economic growth theories, which tend to focus on exogenous comparative advantage or technological differences among regions as causes for growth, regional economic growth emphasizes the roles of increasing returns to scale in production, human capital, and R&D in determining the growth of economic activities. Particularly, I consider the interaction of regional human capital and R&D economics following the recent work in economic growth and convergence. Using the recent developments in economic growth, the study centers on the regional convergence pattern in Mexico emphasizing the effects of human capital, R&D and interregional spillovers on growth.

Economic growth in Mexico can be explained by many components or determinants. For example, the rate of investment, the rate of return to capital, the rate of growth of the labor force in numbers or in hours worked, the contribution of human capital or of the increment in the average quality of labor, institutional and openness factors and the residual representing real cost reduction. They are all sufficiently different from each other. Therefore, economists recommend the study of each component of growth to be done separately.

The economic gap between Mexico and other nations has widened notably over the past quarter century. In 1960, Mexico's *per capita* GDP was practically the same as Spain's GDP and more than twice that of the Republic of Korea. In the early 1990's, Mexico's *per capita* GDP was estimated to be barely one quarter of Spain's and a third of Korea's. This has occurred both because Mexico has had a relatively low rate of economic growth since the early 1970's compared to other emerging markets and because the country has maintained a relatively high rate of demographic growth in most regions.

Fischer (1991) states that macroeconomic policy matters for growth, but not that only macroeconomic policy matters. For Mexico, reasonable macroeconomic stability is necessary for sustained growth. But beyond the overall economic strategy pursued by the country, the market and outward orientation, and the size and role of government both in providing physical and social infrastructure, especially for human capital is crucial in order to achieve economic growth. In the second half of the 1990's, following the Mexican crisis of 1995, the Mexican economy had a strong performance. By the first half of 2000, it reached 18 consecutive quarters of positive growth. Moderate economic growth has been achieved with low inflationary pressures during the Fox Administration. But the growth of an economy not only depends on macroeconomic policy aimed at showing good fundamentals. The growth of any economy also depends on increases in its factors of production or the additions received with each passing year by the reservoir of physical and human capital used to produce goods and services within that economy. Economic growth is similarly influenced

by the increased productivity of the factors of production. In any economy, there are only two possible sources for obtaining these resources: external savings and internal savings. Mexico's painful experience has shown that excessive dependence cannot be placed on external savings as to finance domestic investment and consumption. External savings are necessary, but they should not exceed reasonable limits. Thus, the availability of internal savings is a factor of crucial importance in determining investment in the economy and, consequently, its growth rate.

While capital is often thought of as machinery and inventory, the stock of productive knowledge embodied in the workforce is also a form of capital. The country's human capital assets also influence growth and can increase if greater resources are available. These resources must necessarily come from growth.

Mexico is a small open economy where there are plenty of natural resources, which are a poor substitute for highly skilled labor. This has led the economy to specialize in resource intensive sectors and to invest too little in human capital. Investment will encourage economic growth to finance greater investment in the human capital that sustains the entire general growth process.

Investments in education, training, and organizational experiments involve forgoing some consumption today in order to create better possibilities for production and consumption in the future. One might distinguish between the stock of knowledge and its embodiment in workers and organizations. The stock of knowledge available to an economy depends on its own investments in generating knowledge and its access to knowledge in other economies around the world. The knowledge embodied in workers in an economy depends on investments in education, training, and other forms of knowledge dissemination.

Education, training, and new ideas have contributed to growth in the high performance emerging market economies, especially in East Asian economies compared to other developing economies, in ways that are not captured by standard growth accounting methods. The influential papers by Romer (1986) and Lucas (1988), led to a re-awakening of interest in determinants of economic growth. During the last decade, several models of eco-

nomic growth tend to emphasize the importance of investment in intangible assets as a major source of economic growth. Investment in R&D and human capital have been identified as yielding high social returns for emerging economies like Mexico. Empirical studies have also confirmed the positive correlation between economic growth and educational or R&D expenditures at the macroeconomic level. Consequently, an important topic for Mexican economists who study the interaction of convergence and economic growth is the interaction of R&D and human capital in regional growth.

Endogenous growth theory and new trade theory created a new interest in regional economics and economic geography over the last decade. In the new regional economic perspective, internal regional conditions rather than external demand conditions are the most important growth stimulating factors. Economies of scale exist in relation to capital, more specific in the production of human capital or knowledge and technology as in Romer (1986) and Krugman (1991a, b). The marginal product of capital grows as the stock of capital expands. Put simply, the more we invest in knowledge the more the economy grows. In analyzing the strength of regions, Porter (1998) mentions that factor creation is related to social, cultural, historical and economic conditions in a specific national context. Demand impulses from the home market are important in the development of knowledge. A nationally well-developed functional division of labor is considered important in creating dynamic learning externalities and in utilizing economies of scale and scope (Porter, 1998). Competitive strength in Mexico could be developed in an interplay between factor conditions, demand conditions and the existence of related industries competing on an arena characterized by tough rivalry and continued improvements in all aspects of regional economic activities, including R&D. Dynamic competition is therefore characterized both by regional rivalry and co-operation. Taking the arguments of externalities, transaction costs, and dynamic competition into account, agglomerating forces are basically localization and urbanization externalities, which tend to lead to the regional clustering of economic activity and a concentration of human capital. This

may lead to a core-periphery pattern of regional economic growth and therefore β-divergence between the rich core states and less prosperous periphery regions. Alternatively, if labor remains relatively immobile between regions, knowledge spillovers are high, and congestion costs are significant, then economic growth will induce spatial dispersal of economic activity and therefore β-convergence. The case studies of Silicon Valley by Saxenian (1994), Northern Italy by Storper (1992) and the Baden-Württemberg region in Germany by Sternberg (1999), are examples that show the importance of human capital and knowledge spillovers, which induces regional growth in core regions. For the Mexican case, we have several questions that are unanswered. What is the role of human capital and R&D in the regional growth process of Mexico? Does human capital support the transmission of knowledge and therefore promote future growth? The empirical work attempts to provide new insights on the regional pattern of the interaction of the Mexican states over the 1970-2000 period. The empirical work gives the literature review on human capital and R&D models and regional growth studies. The empirical part of the present section presents the data used in the human capital and R&D model, the empirical methodology, and the empirical results given by the regression analysis.

A Review of Models and Studies in Human Capital and R&D

Most economic theories have treated knowledge, either implicitly or explicitly, as an important factor in explaining economic growth phenomena. The basic Solow (1956) model explains economic growth as a function of labor augmenting technological progress, population growth and the saving rate. It shows that the capital stock per effective unit of labor, k, converges towards a steady state k* at which actual investment is equal to break-even investment. Moreover, the neoclassical Solow model implies that the steady state income *per capita* (Y/L), depends positively on the saving rate and negatively on the population growth and depreciation rate. Although classical economists treated knowledge as an outside disturbance in their model specifications, Marshall (1965) was

among the first neoclassical economists to point out the importance of knowledge in economic affairs. Marshall (1965) mentioned that capital consists in a great part of knowledge and organization, as knowledge is our most powerful engine of production. In the eighties, the new endogenous growth theories were developed on the assumptions of imperfect competition between firms, the role of history, ideas and accidents, and the appearance of multiple equilibrium in the markets. The existence of increasing returns for explaining sustained growth is supported and influenced by the research progress made in trade theory and industrial organization.

Romer (1986) defends the endogenous economic growth and increasing returns to scale view from location and knowledge accumulation perspectives. Some theoretical models of economic growth, such as Lucas (1988), Becker, Murphy and Tamura (1990), Rebelo (1991), Barro and Lee (1993) and Mulligan and Sala-i-Martin (1992), emphasize the role of human capital in the form of educational attainment. Lucas's (1988) spillover model considers knowledge that is acquired through formal schooling and informal interaction with other people in the economy, where the individual investments in human capital do not take the spillover effect into account.

Lucas (1990) mentions that great differences in *per capita* income are mainly explained by differences in human capital *per capita*, including cultural traits and skills of people in different regions. The average level of human capital in the form of occupational skills or education in a country can obviously influence the level of *per capita* income in the economy. Romer (1990) assumes a Solow (1956) type production function $Y = K^{a}(AL)^{1-a}$ where K is capital, L is labor, A is the stock of ideas invented and DA the number of ideas generated at a point in time, which depends on the number of researchers and their productivity as well as the current stock of ideas. The productivity of researchers is a decreasing function of the total number of researchers as there is greater duplication of research effort (wasted resources for society).

Another recent line of research in the economic growth literature, such as Barro and Sala-i-Martin (1991) focused on the convergence of regional income in developed economies. They ad-

dress the question of whether poor regions tend to converge toward rich ones. For the US, they estimate the rate of convergence of *per capita* personal income from 1880 to 1988 to be around 2% per year by looking within or across four geographical regions. They concentrate on factors that lead either to convergence or divergence, but the factors that may explain one, may not explain the other. Another explanation of regional convergence and divergence could be given by technological diffusion and R&D. Barro and Sala-i-Martin (1995) elegantly discuss endogenous growth models and the convergence hypothesis in the neoclassical growth model. They argue that in the long run, the world growth rate is driven by discoveries and ideas in the technologically leading countries. Followers converge toward the leaders because copying is cheaper than innovation over some range.

The new economic geography and most endogenous growth models recognize the concept of capital accumulation, knowledge and research spillovers in determining the location and growth of core regions. The regional model could combine imperfect competition with human capital, innovation-based growth and learning-by-doing in innovation. These forces generate intraregional and interregional spillovers from a high level of human capital and R&D. Aghion and Howitt (1998) derive a model that is driven by product differentiation, quality improvements and research spillovers. Bottazzi and Peri (1999) consider a model with N regions in the spirit of the endogenous growth literature where skilled workers are perfectly mobile both between research and production and across regions. Each region innovates by adding further intermediate goods that increase the productivity and technological level of the region itself. They also allow for spillovers in the level of knowledge across regions. Specifically, there is a catch-up process, which prevents an individual region *per capita* income level to grow increasingly apart from other regions or a dissemination of knowledge across space, which binds all the regions economic growth.

In Mexico education is considered an important factor in explaining recent economic growth. However, there have been moderate advances in terms of education and R&D in the cou-

ntry. Between 1970 and 1995, the illiterate population under 15 years of age diminished from 26 to 11% in Mexico. However, the human capital indicators for Mexico show a low level of enrolment in the elementary and high school age groups compared to other countries, as well as a low number of researchers per million inhabitants, which are shown in the table 2.1.

Table 2.1

Education in Mexico (2014)

Cost by primary and secundary students as % of GDP per capita	
Mexico	11 and 16
OECD countries	19 and 24
Coveraga of university education (%)	
Mexico	21
Argentina, Chile and Uruguay	28
Average of students by classroom in basic education	
Mexico	27.2
OECD countries	18
Elementary, Junior High, Baccalaureate Matriculation (%)	
Mexico	71
Colombia	73
Panama	74
Uruguay	79
Peru and Brazil	80
Researchers per million inhabitants	
Japan	5130
Mexico	97

Sources: Secretaría de Educación Pública (2000) and OECD (2000).

For Mexico, the 21st Century will be the century of an economy based on knowledge, where expenditures for future development of scientists and researchers, which includes expenditure on R&D and the expenditure on education and educational programs, will drive economic growth in the medium and long terms. However, when making international comparisons of R&D activities, Mexico ranks among the lowest in Organisation for Economic Co-operation and Development (OECD) countries. In terms of gross domestic expenditures on R&D, Mexico ranks as one of

the last countries within OECD in terms of the ratio of domestic expenditures on R&D activity to GDP and in terms of expenditures *per capita* as given by OECD (2000). These observations give rise to the question as to the degree to which R&D activities and education are promoted in Mexico. The use of the R&D expenditures as an indicator for the technological development has received two kinds of criticisms. On the one hand, it has been claimed that R&D spending is an overstated measure of the efforts in technological activities in view of the high rates of failures that are likely to occur in R&D projects. On the other hand, others have argued it's understatement, since it does not include the payments for imports of technology. Another way to measure the technological development and research in a country is by the number of researchers in the country. The average level of human capital in the form of occupational skills or education and the number of researchers in a society can obviously influence the level of its *per capita* income. This is why it is important to study the influence of R&D activity and the level of human capital in the promotion of regional economic growth in Mexico.

The Model of Economic Growth, Human Capital and R&D Spillovers

Mankiw, Romer, and Weil (1992) have shown that growth differences across the world are surprisingly consistent with the Solow model, when augmenting with human capital. Coe and Helpman (1995) and Bayoumi, Coe, and Helpman (1999) have found that both R&D and human capital contribute significantly to total economic growth. Moreover, R&D has become increasingly important, especially for smaller countries. Econometric studies for the US and Europe using aggregate and micro level data have also underlined the importance of regional specialized knowledge. The international evidence tends to confirm the existence of intraregional human capital and R&D spillovers in the growth process. In this study, the basic model of human capital, R&D spillovers and regional economic growth is based on Romer's (1996) endogenous model of technological change and the Aghion and Howitt (1998) growth model. The empirical framework to study conver-

gence is based on the Barro and Sala-i-Martin (1992) neoclassical growth model. In this section, the analysis is focused on the regional interaction and convergence of human capital and R&D. The identification of the regional interaction structure is based on a generalized growth regression analysis that focuses on the relationship between regional income *per capita* growth and the human capital and R&D activity. The dependent variable is the average annual income *per capita* growth rate between 1970 and 2000 obtained from National Institute of Statistic and Geography /*Instituto Nacional de Estadística y Geografía* (INEGI, 2015). To test the convergence hypothesis of income *per capita* and to estimate the annual velocity of convergence, a non-linear model is derived from the aggregate production function where the independent variables include the level of income *per capita* in each state in Mexico, and β is the velocity of convergence or the average annual rate at which economies get closer to the steady state. The higher the β, the lower the period of time necessary for the system to reach the long run balance. The initial regional income *per capita* is considered to be an additional explanatory variable in the regressions in order to test for conditional β-convergence because in a semi-endogenous growth setting the conditional convergence through technological diffusion will be reinforced by the familiar Solow-like conditional convergence. The error terms will be assumed to be Independent and Identically Distributed (IID). with zero mean and variance σ^2. The best procedure for estimating the stock of human capital is the one followed in Barro and Lee (1996) at the international level and Díaz-Bautista (2003) at the Mexican and international level, by approaching the human stock of a country in terms of the level of education of its working age population according to the years of schooling at all levels of education. This is, therefore, the method followed here.

Recent empirical research of the contribution of human capital accumulation to economic growth has often produced discouraging results. Educational variables frequently turn out to be insignificant or to give the "wrong" sign in growth regressions, particularly when these are estimated using first differenced or panel specifications.

The accumulation of such negative results in the recent literature has fueled a growing skepticism on the role of schooling in the growth process and has even led some Researchers to seriously consider possible reasons why the contribution of educational investment to productivity growth may actually be negative.

The basic source of schooling data is a diverse set of indicators provided by national agencies on the basis of population censuses and educational and labor force surveys. Various international organizations collect this information and compile comparative statistics that provide easily accessible and homogeneous information for a large quantity of countries. Perhaps the most comprehensive regular source of international educational statistics is UNESCO's Statistical Yearbook. This publication provides reasonably complete yearly time series on school enrollment rates by level of education for most countries in the world and contains some data on the educational attainment of the adult population, government expenditures on education, teacher/pupil ratios and other variables of interest. Other useful sources include the UN's Demographic Yearbook, which also reports educational attainment levels by age group and the IMF's Government Finance Statistics, which provides data on public expenditures on education. Finally, the OECD also compiles educational statistics both for its member states and occasionally for larger groups of countries.

The data on education used in the present study comes from the Secretaría de Educación Pública (2000), INEGI (2015), and the Ministry of Education website. The educational independent variables used to condition the data are measures of the percentage of the population that are illiterate, in elementary school, junior high school, high school, or college. Illiterate refers to the percentage of people that don't know how to read and write. Elementary is a variable that shows the percentage of people with elementary school studies completed. Some junior high school is a variable that refers to the percentage of people that have more than elementary studies but haven't finished junior high school. Finished junior high school refers to the percentage of people that completed a level of education in the National Educational System.

High school refers to the percentage of people that completed a level of education in the National Educational System. College refers to the percentage of people that are in college or completed a level of education in university studies. The R&D activity is measured by the number of researchers per state at the SNI (Sistema Nacional de Investigadores / National Research System) in the year 2000, provided by National Council for Science and Technology/*Consejo Nacional de Ciencia y Tecnología* Mexico (Conacyt).

The econometric results are shown in the table 2.2.

Table 2.2

Estimated Results of the Velocity of Convergence in Income *Per capita* Conditional to R&D and human capital variables in Mexico

Period	1970-1993	1970-1985	1970-1980	1970-2000	1985-1993	1970-2000
α	-0.008	0.031*	0.046	-0.023	-0.010	15.98
	(-0.66)	(2.04)	(1.912)	(0.405)	(-.154)	(1.98)
β	-0.014*	-0.031*	-0.018	-0.032*	0.014	-0.45*
	(1.62)	(2.66)	(1.276)	(2.54)	(-0.61)	(2.38)
Elementary School	.10572	0.026328	-0.08076	0.017*	-0.8378	0.150
	(.0457)	(0.0545)	(0.0886)	(2.26)	(0.1759)	(1.78)
Some Junior High School	-0.36605	-0.176821	-0.1999	0.0015	0.1792	-0.149
	(.1524)	(.18183)	(.29560)	(0.141)	(0.3266)	(1.78)
Finished Junior High School	6.01545	2.43713	5.1203*	0.0028	-0.4447	0.162
	(1.851)	(2.1678)	(3.524)	(0.186)	(0.7874)	(1.98)
High School	1.8517	0.704419	0.860725	0.006	0.11467	0.145
	(.560)	(0.6687)	(1.0871)	(0.372)	(0.4351)	(1.98)
College	-0.79644	-0.187491	-0.456506	0.225	-0.2228	0.147
	(0.33)	(0.4048)	(0.6581)	(1.495)	(0.4026)	(1.71)
Illiterate	0.017202	-0.002294	0.012342	0.003	0.00067	0.161
	(0.0098)	(0.011)	(0.019)	(0.365)	(0.0056)	(1.96)
R&D Activity						0.003
						(1.79)
Half life	50.4	22	37.8	31.7	49.8	32.5
R^2 adjusted	0.40	0.44	0.22	0.07	0.06	0.32
T (years)	23	15	10	30	8	30

Dependent Variable: Average annual income *per capita* growth rate.
* Significance at 5% level. T stats in parenthesis.

The results are based on generalized least squared regressions with and without R&D activity and by level of human capital. For the period of 1970 to 1993, the conditional convergence parameter is around -1.4% and significant, while for the period of 1970 to 2000 the parameter is close to -3.2% without considering the R&D activity. The results indicate that the states of Mexico can reach a level of long run income convergence. Depending on the period of analysis used, the convergence or divergence result can be obtained. For the period of 1985-1993, the convergence parameter is positive 1.4%, but not significant indicating that the states of Mexico were diverging in this short period from the long run level in income *per capita*. The graph of the growth rate of income *per capita* versus the level of income *per capita* for the period of 1980-1999 shows the divergence result due to the positive correlation between the two variables, without using Tabasco and Chiapas. This implies that the rich states are growing at a faster rate than the poor states in Mexico, and regional disparities are increasing. The results indicate that the proposed method can serve as a guideline for regional growth convergence and divergence specifications in Mexico. The results depend on the time period that is involved and on the structure of regional human capital and R&D activity. In other words, it depends on the assumed geographical extent of R&D activity in Mexico. Only for the regression with the R&D, no regional significance of human capital can be detected. The result seems to be generated by the concentration of R&D in the Mexico City area, where more than 50% of all R&D activity in the country as a whole is made.

For the period of 1970-1993 the half-life was 50.4 years. This is the number of years to cover half the distance of the logarithms of income *per capita*. However, the regressions yields a non-significant coefficient for all explanatory variables, except for the convergence coefficient. The convergence coefficient confirms the findings of previous studies on conditional β-convergence done in Mexico, which include Garza Campos (1994), Díaz-Domínguez (1995), Esquivel (1999), Díaz-Bautista (2000b) and Messmacher (2000).

The empirical analysis provides empirical evidence for the hypothesis that R&D spillovers are regionally bounded and do not

constitute a significant source of regional economic growth. The huge agglomeration in Mexico City can be assessed as the main origin of the non-existent R&D spillovers at a regional scale in Mexico. As for human capital, elementary education is starting to be an important factor that explains regional economic convergence in Mexico due to the similar coverage at the state level.

Conclusions to Human Capital, R&D, and Growth

In this section, we have research the role of human capital accumulation and R&D in explaining growth paths across the Mexican states over the 1970-2000 period. Moreover, the human-capital-augmented growth equation was estimated using a consistent generalized least squares econometric technique that allows for the speed of convergence as well as for the short-term dynamics and variances to change across regions. An important finding in the paper is that of β-convergence for the Mexican states when augmented with human capital and R&D. The regions in Mexico that are initially far below their stable states grow faster than the regions that are close to their stable states.

In the study, we tried to obtein control for the steady state of a regional economy by adding extra explanatory variables such as the level of human capital and R&D, which have been interpreted in the literature as potential determinants of a region's stable state.

Barro and Sala-i-Martin (1995) showed that conditional convergence is a universally relevant phenomenon, and that the rate of this convergence is surprisingly stable at around 2% per year. While the basic objective of Mankiw, Romer and Weil (1992) is to show that the growth differences across the world are surprisingly consistent with the Solow model, augmented with human capital. The interesting results seem to be that basic human capital is important in determining the level of convergence in the states of Mexico in accordance with Mankiw, Romer and Weil (1992), with rates of convergence far higher than previously anticipated. It is in this sense that educational policies oriented to permit an increased regional growth of the less developed regions in the regional integration process becomes very important. The building up of a regional integration process should be considered by the Mexican

Government in order to bring economic growth to all of the regions involved not leaving some regions aside. The results also confirm the empirical evidence on bounded non-existent knowledge spillovers, shown by the increased concentration of R&D activities in Mexico City. In other words, the findings suggest that regional growth is not determined by regional R&D activity, due to the lack of expenditures on R&D at the national and regional level, and to the increase concentration of R&D in the Mexico City Metropolitan Area. Thus, the empirical analysis confirms the qualitative hypothesis that R&D knowledge and human capital contribute to the regional growth process of Mexico, and human capital supports the transmission of knowledge and therefore promotes long-term growth. Some new insights provided by the regional analysis are centered on the limited regional extent of knowledge and human capital spillovers in Mexico.

The results of the Programme for International Student Assessment (PISA) 2000 human capital study renewed the interest in the contribution of human capital to economic growth. So far the exploration of large country comparisons delivered rather mixed results. Concentrating on those OECD member countries which participated in PISA 2000, this paper uses panel data estimation techniques to refine this analysis.

Preliminary estimation results reveal a positive impact of the human capital stock on economic growth suggesting that an increase in the average schooling years by one year yields a rise in the GDP growth rate of about 0.5 percentage points. When taking possible endogeneity into account in an instrumental variables approach, the conclusions on the impact of the level of human capital on economic growth are demonstrated to be rather fragile.

3
Institutional Change, Corruption, and Regional Economic Growth

Introduction to Institutions in Mexico

New Institutional Economics (NIE) endeavor to integrate the theory of institutions into economics. Ronald Coase, who explicitly introduced transaction costs into economic analysis is cited as a central figure for the field. The term was introduced by Oliver Williamson in a paper written in 1975. It has since become a standard or banner uniting a diverse group of economists who shared one common intellectual ground: institutions matter, the relationship between institutional structure and economic behavior requires attention, and the determinants of institutions can be analyzed with the aid of economic theory. NIE is inherently an interdisciplinary field of study. It includes work in property rights analysis, the economic analysis of the law, public choice theory, constitutional economics, the theory of collective action, transaction cost economics, the principal-agent approach, the theory of relational contracts, and comparative economic systems. The commonality of all these approaches is that, unlike neoclassical economics, the institutional framework is not assumed as given but is explicitly treated as an object of research, and the implications of any given institutional arrangements for economic behavior are taken into account.

According to Douglass North (1990), another seminal contributor to or primary proponent of NIE, institutions, form the incentive structure of a society, and the political and economic institutions, in consequence, are the underlying determinants of economic performance.

North (1990) defines institutions as the humanly devised constraints that structure human interaction. They are made up of formal constraints (such as rules, laws, constitutions), informal constraints (such as norms of behavior, conventions, self-imposed codes of conduct), and their enforcement characteristics.

North (1990) then defines organizations as groups of individuals bound together by some common purpose to achieve certain objectives. Organizations include political bodies (political parties, regulatory agencies), economic bodies (firms, trade unions), social bodies (churches, clubs), and educational bodies (schools, universities).

Formal rules must be securely nested in hospitable informal norms for them to function well, since it is the latter that legitimizes the former. Also, appropriate political institutions must be supportive of economic institutions. Economic performance is influenced by polities since they define and enforce the economic rules of the game. Thus, the formation of polities that will create and enforce property rights is a critical component of development policy. Formal institutions are embedded in a political culture, that is, the matrix of informal norms, values, traditions, and historical path dependencies. Even the best institutions will not work well in the absence of a supportive political culture. Alternatively, seemingly less optimal formal institutions can often be made to work given the right leadership, judgment, and political will. There are times when it is preferable to work within the context of imperfect existing institutions, rather than use up political capital on long-term institutional reforms.

Although there is now a consensus that institutions matter, the process of integrating institutions and institutional change into economic theory is still fairly new. Thus, the causality of the various links and channels of influence between the institutional set-up and growth and the development outcome is still not well or fully understood.

Defining the nature of institutions in Mexico is extremely important. The importance comes from the notion that good institutions may promote economic growth in a region. North (1993)

has settled upon defining institution to be any socially imposed constraint upon human behavior.

In recent years, the Mexican government attempted to improve the economy by liberalizing and restructuring the economic systems and institutions. Through privatization of public activities, deregulation of national industries, and freeing of international trade, the Mexican government feels that growth will be enhanced. The government has also allowed greater political competition and more open public debate. Yet, some economic analysts say that the economic payoff has been disappointing.

A successful economic growth development policy in Mexico entails an understanding of the dynamics of economic change if the policies pursued are to have the desired consequences. A dynamic model of economic change in Mexico entails an analysis of the institutional regional polity since it is the polity that specifies and enforces the formal rules. While we are still some distance from having such a regional model, the structure that is evolving in the new institutional economics in Mexico, even though incomplete, suggests radically different development policies than those of either traditional development Mexican economists or orthodox neo-classical economists.

Mexican neo-classical economists have implicitly assumed that institutions (economic as well as political) don't matter and that the static analysis embodied in allocative efficiency models should be the guide to policy; that is getting the prices right by eliminating exchange and price controls. But a basic fact for Mexico is that institutions can never be treated as an exogenous actor in development policy of the country and getting the prices right only has the desired consequences when you already have in place a set of property rights, good institutions and enforcement that will then produce the competitive conditions that will result in efficient markets. Economic reforms in Mexico are matters of public policy, laws or rules that express collective goals and provide rewards and punishment to attain them. But policies are no more effective than the institutions that underlie them. Institutions in Mexico are defined as stable, recurring patterns of behavior that help determine what policies are chosen and how they are executed.

If Mexican institutions are weak or ineffective, policy is likely to be the same. A public effort to combat political corruption in Mexico will not get far without an effective ombudsman or regulator with an official office to carry it out. The effectiveness of such offices, in turn, depends on factors that include good personnel, sufficient resources and a high level of demand for their services. Government organizations in Mexico in the1980's and 1990's, are most of the time, organizations that do not command the respect, loyalty, and dedication that characterize institutions in the full sense of the term.

In institutional terms, Mexico can be characterized as a federal republic governed by the 1917 Constitution. It is a country comprised of 31 states and the federal district. It has a democratic presidential system of government and three large political parties: the Institutional Revolutionary Party (PRI), in power from 1929 to 2000, the National Action Party (PAN) representing the rightist opposition and in power since 2000, and on the left of the political spectrum, the Party of Democratic Revolution (PRD) which rules Mexico City. The political systems include several smaller parties. The president is the head of the federal government. The president is elected by universal suffrage for a single six-year term administration. Legislative power is vested in the Senate comprising 64 members, each state and the federal district being represented by two senators, and the House of Deputies Representatives of 500 members of which 300 are elected by universal suffrage and 200 are elected by proportional representation. Senators are elected for six years and Representatives for three years. The governor is the chief executive in each state and is elected by universal suffrage for six years while legislative power is vested in the House of Representatives, elected for three years. The municipalities are the third level of government.

They are headed by the mayor and the city council elected for three years. Mexico's recent decentralization was launched through constitutional reform, which transferred more power to the states and to the municipalities. This reform gave both the states and municipalities new consultation, decision-making, control, policy implementation, and financing responsibilities. In spite of the

high degree of autonomy relating to the use of resources, states do not have sufficient resources to carry out their new more democratic responsibilities. The limited fiscal reform at the state level is an important impediment for the regional growth in the country.

The current economic reform movement in Mexico started in the 1980s and 1990s. In the De la Madrid administrations, market-oriented policies and liberalization came to prominence in Mexico. Many opposition parties in Mexico did not take kindly to market friendly reforms. Although policy changes and economic reform brightened the outlook in the Salinas and Zedillo years, prudent observers are concerned that economic growth can easily be hampered in the Fox Administration by the lack of presidential power and the right regional economic policies. A major reason for skepticism lies in Mexican public institutions, which may frustrate well-intended policies. Even when the federal governments chart a particular economic course with the National Development Plan, they may lack the institutional robustness to stay on that course.

If the current trend of reform is to shrink the state, there has been some progress in Mexico.

Many of the largest public enterprises have been put on the block for sale in the 1980's and 1990's. The government wage bill was reduced marginally, also reflecting salary compression, which did not necessarily mean greater efficiency in the public sector. To overcome the 1982 debt crisis and in accordance with agreements reached with IMF, Mexico adopted a strict stabilization reform policy which was carried out between 1988 and 1994 through a major structural reform adjustment program whose priority was the modernization of its production and distribution system, the decentralization of production, and the design of financing methods compatible with stabilization requirements through three priority policies: privatization, trade liberalization and economic deregulation. An agricultural structural adjustment program was also launched in 1993. But ten years later, the agricultural sector is one of the sectors that have lagged behind in the Mexican economy. The Fox Administration aims to put government finances on a firmer footing, which should be reflected in diminishing fiscal budget deficits and increasing the tax base. Fiscal budget deficits are not new to Mexico. Mexico's populist policy beca-

me overextended in the 1970's, and assumed responsibility for social programs (particularly food and power subsidies). This led to over budget spending, which was rationalized by the constraints placed on government by structural adjustment. The North American Free Trade Agreement (NAFTA) agreement has also reduced tariffs on trade goods with other countries, suggesting Mexico's increasing openness to the global economy. Ten years after the signing of the NAFTA agreement shows Mexico as a leading exporting nation.

The key test of good institutions is whether these democracies can carry out peaceful transfers of power through the ballot box. Mexico in 2000 has passed this test. We can count the election where the incumbent party PRI lost, an opposition party known as the PAN won. Although, the change of political party in power is a sign that institutions are changing in Mexico, the recent history within institutions is characterized by interest groups, political parties, elected officials, and public bureaucracies that accomplish little. In Mexico, business associations, technocratic groups, and other organizations have led the impetus for reform. This section reviews institutional change and economic reform in Mexico and the role that institutions have played in encouraging regional economic growth. When observing a specific country's institutional structure, progress in anticorruption efforts seems to be an important variable. Economic research on the causes and consequences of corruption often relies on empirical evidence on some quantitative measure of corruption present in institutions. The present section defines corruption and summarizes recent findings on its impact on regional growth in Mexico. It also presents empirical evidence on the effects of corruption in institutions and state organizations and how they influence lasting regional economic growth.

Institutions, Corruption and Economic Growth

The term institution has two overlapping meanings in economics and the social sciences. In organization theory and management, an institution usually refers to a role or organization; while in economics, an institution may also include a rule or convention. In either form, institutions have two important properties, they shape the way people act and they persist over time.

North (1990) has explained economic change and reform by stressing the role of institutions. A crucial element of a reform in the institutional structure of the Mexican economy is the method of enforcement of property rights and contracts. There are some cases where contracts are self-enforcing; when all parties to a contract have an economic incentive to comply with the terms of the contract. An important case is when the parties repeatedly engage in contract transactions with each other so the gains from repeated trade outweigh the gains from violating any single contract. In many cases, contract compliance is self-enforcing in Mexico, and there is a need for a third party to carry out enforcement. But the problem is ensuring that the enforcers do not act in their own interest rather than impartially enforcing the contract. Such enforcement requires ascertaining the terms of the contract and adjudicating whether the terms have been violated. These are not costless operations, so resources are adjudicated to the enforcement agency, but there is a difficult problem in determining whether the demands of the regulatory or enforcement agency are the minimum required or whether they are inflated. North (1994) has also mentioned that productivity increases and economic growth result from both improvements in human organization and from technological developments.

Bardhan (1997) gives a possible definition of corruption in institutions as the use of public office for private gains, when public officials use their office not to maximize social welfare, but to serve their individual interests. Tanzi (1998) mentions that the most popular definition of corruption is the one used by the World Bank (2015), which is the abuse of public power for private benefit. The problem is modeled as a principal agent problem. The director in the model delegates some decision power to an agent. The agent knows the director's rules of preference in exercising the power. The principal's problem is that the agent may serve his own interests rather than the director's. In this theory the director is defined to be the top level of government and the agent is a government official designated to carry out a specific task. For a given set of opportunities and incentives, there should be only one balance level of corruption. Once high-level corruption equili-

brium is reached as a result of a temporary change in the nature of opportunities and incentives, widespread corruption may be very hard to eradicate even if the situation related to opportunities and incentives returns to normal.

The economic literature on corruption tends to focus on bribery. Rose-Ackerman (1999) does not seem to distinguish between the two. Corruption tends to have at least two principal aspects: market imperfection, and illegality or secrecy, and corruption is the secret and usually illegal abuse of conferred monopoly status. In many market-oriented economies, and in Mexico in particular, government restrictions upon economic activities give rise to rents of a variety of forms. Rent seeking takes the form of bribery, corruption, smuggling, and black markets. Corruption is generally defined as an illegal or unauthorized transfer of money or an in-kind substitute. Rose-Ackerman (1978) consider both the supply side and demand side of the phenomenon, from the supply side, the person bribed for any service must necessarily be acting as an agent for another individual or organization since the purpose of the bribe is to induce him to place his own interests ahead of the objectives of the organization for which he works.

The evidence of the effects of weak institutions and corruption on economic growth is done through wide range of channels. The effects of corruption on the economy can be thought of in terms of the distortionary effects on the allocation of resources to the extent to which ongoing economic activity is redirected and rendered less efficient. Disincentive effects or the degree to which risk and uncertainty are introduced into the economic environment and thereby deter prospective economic activities and, especially, investment. OECD (1997) mentions that the distortionary effects that arise from corruption can be thought of as multiplier effects where any redirection of economic activity carries multiplier implications for the economy as a whole, and these will be directly related to other factors. Other effects on competition, fiscal policy, debt, growth and investment may be present.

Recent empirical research has shown a strong relation between the pervasiveness of corruption and poor development performance in low-income countries. Mauro (1995) finds that

corruption has a significant negative impact on investment and growth. The impact on investment is robust with the inclusion of other control variables, but the impact on growth is not. An improvement of one standard deviation in the corruption index is associated with an average increase in the investment rate of about 3% of GDP in Mauro's study. Mauro claims to establish causality (from corruption to low investment levels) with the use of a measure of ethno-linguistic fractionalization.

For the case of Mexico, Díaz-Bautista (2001) analyzed the effects on institutions on regional economic growth at the state level. The model followed the standard approach in Mankiw (1993) and Barro and Sala-i-Martin (1995), with the standard neoclassical growth model is derived from a constant returns to scale production function with two inputs (capital and labor) that are paid at their marginal products. It also follows the line of research in corruption done by Mauro (1995).

The empirical analysis showed the relation between regional economic growth and institutions at the state level using a corruption proxy within Mexican institutions, human development and human capital variables. The empirical variables used in the study are the annual growth rate of GNP *per capita* between 1970 and 2001. The initial production is the GNP *per capita* in 1970 and the final period is 2001. The data for GNP *per capita*, production and population comes from the INEGI (2015). The information of the human development index as the state level in Mexico comes from the United Nations Development Program, Human Development Report and World Bank (2015). The human development index is composed of variables showing life expectancy, the level of human capital and the income *per capita* in different states. For human capital a proxy constructed by the proportion of the population that studies elementary school and junior high school which comes from the data by the Ministry of Education known as SEP and the INEGI website. The corruption variable comes from the index of corruption by Transparencia Mexicana (2001) and Transparency International (2000, 2002). The corruption variable is defined as the level of corruption in institutions, and it is estimated as the index of bureaucracy in the government at the state level. The index goes from 0 to 100, in which the lower the index is,

the less corruption that is indicated. Mexico City was the entity with the highest level of corruption in the country and the state of Colima was the state with the lowest level of corruption. A border dummy variable was also included to indicate the northern states that border the US. The regional convergence equation had the change in income *per capita* as the dependent variable and the income *per capita*, human capital, human development index, the institutional or corruption variable and the border variable as independent variables. Four regressions were performed as a type of control for the independent variables. The method of estimation was generalized least squares with instrumental variables for the period of 1970 to 2001. The following table 3.1 shows the empirical results.

Table 3.1

Empirical Estimates of the Regional Convergence in Income *per capita* for the Mexican States, Conditional to Institutional, Human Capital and Border Variables (1970-2001)

	A	B	C	D
Constant	0.602 (4.873)	0.634 (4.235)	0.160 (0.220)	1.044 (3.614)
Log GNP 1970	-0.1609* (3.24)	-0.149* (2.54)	-0.414* (3.55)	0.0184* (5.06)
Corruption	-0.00706 (1.38)	-0.007064 (1.36)	-0.010* (2.79)	-0.011* (2.89)
Elementary Human Capital		-1.0075 (-0.38)	-5.281 (-1.96)	-5.281 (-0.21)
Junior High Human Capital			-0.759 (-0.32)	-0.091 (-0.31)
Human Development Index			3.298* (3.05)	-2.18* (1.71)
Border				-0.096* (2.20)
R Squared	0.21	0.19	0.17	0.48
S.E.	0.106	0.107	0.109	0.072
Log Likelihood	27.97	28.05	28.23	41.75
F Statistic	5.36	3.52	3.65	6.78

Dependent Variable: Growth Rate of Income *per capita* 1970-2001.
*Significance at 95%. T Stats in parenthesis.

In the case of Mexico, the regional model of growth was empirically tested with institutional variables, with results of regional convergence at the state level for the period of 1970 to 2001. The R^2 adjusted is relatively average for the Mexican states sample, indicating that the model describes the situation rather well for those sets, specially for the final regression which explains more than 48% of the differences in income *per capita* among Mexican states over the period from of 1970 to 2001. The coefficients on the level of income are negative and significant for the first three regressions, implying that there is evidence for convergence towards the respective steady states in the country sets. For the final regression, the coefficient is positive and significant which indicates some divergence when including all the independent variables. The results from the first regression A for the Mexican states clearly show the negative and significant sign at a 95% level, confirming the existence of regional convergence considering the corruption variable and educational variables. For the period of 1970 to 2001, the conditional convergence parameter in regression C is negative and significant, indicating that the states of Mexico will reach a long run income level when considering the institutional and human capital variables. The tendency of the differences in corruption shows a significant process of convergence when considering the institutional variable as shown in the first three regressions. When a Border variable is included, we observe a regional divergence process for the Mexican states for the period of 1970-2001. The Border States may be growing at a different rate than the rest of the states in Mexico. The institutional variable is negative and significant for the regression, which gives us an idea of the negative effects of corruption on regional growth in Mexico for the 1970-2001 period. This result is in accord with estimates that state that 5 500 million dollars are the cost of corruption per year in Mexico's institutions. The F statistic in the regressions is significant. With a low p value of 0.05 and a critical value of 3.34, we get a result in favor of the alternative hypothesis that at least one on the coefficients in the model is not equal to zero and the model is significant. In Mexico, we identify the process of regional growth with evidence of convergence and divergence in the

states when considering institutions. The expectancy is that the income *per capita* gap between the rich states of Baja California, Jalisco and Nuevo Leon and the poor states of Chiapas, Oaxaca and Guerrero could be reduced in the long run. The long run could be thought of as a period between 45 and 100 years long. It would take the whole 21st Century for the states of Mexico to converge in terms of income *per capita*.

Conclusions

The section attempted to accumulate the existing knowledge regarding institutions, corruption and regional economic growth as well as its internal mechanism and interacting variables. Evidence is presented showing that corruption in institutions in Mexican states may have considerable adverse effects on regional economic growth. New institutional arrangements that give ordinary people and civil society organizations more say in policy decisions offer the best hope for breaking the trap of bad government in Mexico. So does the arrival of new, more honest leaders, who can spearhead institutional innovations. Institutions evolve slowly in Mexico and the odds are always stacked against changes in the status quo. Regional policy-makers recognize that there can be hidden corruption costs when dealing with state institutions. For this reason, policies should be designed to reduce the hidden costs of dealing with state institutions, thereby reducing the costs of surveillance and increasing the probability of detection of speculation and corruption within institutions.

4
Trade Openness and Convergence in Mexico

Introduction to Openness and Convergence in Mexico

This section studies how free trade can induce the convergence in the long-run *per capita* income among regions of a country. The analysis extend the existing analytical framework of growth theory to help develop a kind of trade-related openness convergence models, which can replicate the successful growth story of countries in East Asia.

The relationship between trade and growth has long been a subject of great controversy and much study among economists. Despite a number of multi-country case studies using comparable frameworks, numerous econometric studies using large cross country data sets, and important theoretical techniques concerning how trade and economic growth interact, there is still some disagreement concerning the real relationship between economic growth, convergence and openness.

One important reason for the divergence in views on the subject of trade and economic growth is related to the differences among researchers in the methodology applied to the cases studied.

Some authors' focus, on whether there is a causal relationship between increases in trade and increases in growth (or between increases in growth and increases in trade), without any regard to the reasons for the increases in trade or growth. Most economists are interested in the effects of differences in government policies on trade and growth. Openness is sometimes interpreted in simple terms to include only import and export taxes or subsidies as well as explicit non-tariff distortions of trade or in varying degrees

of complexity to cover exchange rate policies, domestic taxes and subsidies, competition and other regulatory policies, education policies, the nature of the legal system, institutions, and culture.

In Mexico and in the developing world, economists that study trade and growth relationships are greatly hampered by the lack of good data even on matters as levels of import protection and usually are forced to undertake case studies. While many insights have been revealed from such studies about the nature of growth and its relationship with trade, we cannot use broad generalizations. For Mexico, the import substitution policies of the fifties and sixties were the dominant growth policy and there was also extensive government intervention at influencing growth rates. Mexican economists and policymakers became skeptical about the growth merits of import substitution policies and to begin to advocate more export-oriented, outward looking trade policies.

It is known that Mexican trade has expanded significantly since the eighties. But what has been the contribution of the North American Trade Agreement (NAFTA) to the expansion of Mexican trade? Has the expansion of Mexican trade contributed to the growth of the Mexican Economy? This paper also looks at the historical relationship between trade and growth in Mexico, from 1970 to 1998. More specifically, it measures the importance of NAFTA on the opening of the Mexican economy. The above period includes two different stages of the Mexican economy. The first one, from 1970 to 1982, represents the last phase of the industrial import substitution era in Mexico, characterized by government intervention in the economy and by the Organization of the Petroleum Exporting Countries (OPEC) bonanza. The second stage begins after the debt crisis of 1982 and runs up to the present. It is characterized by economic reforms such as privatization and liberalization of international trade. The paper studies the effectiveness of trade liberalization, and specifically that of NAFTA, on the expansion of international trade, and the impact of trade on economic growth during the liberalization stage of the Mexican economy. The study also carries out the regional analysis of openness at the state level and regional economic growth. This study builds on the sources-of-growth model and

builds on the propositions of the new institutional economics that treat institutions as explanatory variables.

NAFTA Trade Overview

The world economic configuration in the 1980's made it impossible to return to the national import substitution policies, which had been pursued in Mexico before the trade opening of the 1980's.

Some of the import substitution policies included the protection of the domestic market in many sectors as part of a strategy of import substitution industrialization, managed trade in sectors such as auto, restrictions on foreign investment and ownership, particularly in the energy sector, and high levels of public ownership. Several trade policies before NAFTA, were aimed at expanding trade and inducing growth in Mexico. The De la Madrid and Salinas de Gortari presidential administrations implemented substantial unilateral trade liberalization policies before NAFTA.

The central argument for the creation of NAFTA in the US, Canada and Mexico was very much based upon the classical and neoclassical liberal theory of free trade. The classical theory holds that trade liberalization is a win-win proposition since it allows each partner country to specialize the areas in which it holds a comparative advantage. Resulting specialization produces overall economic efficiency gains, which feed into higher incomes, which in turn result in faster growth of the newly integrated free trade market.

By creating a set of enforceable rights with strong institutions and by securing non-discriminatory market access, NAFTA served the interests of mobile transnational corporations, which want to allocate production and investment between North American countries. NAFTA was controversial in the US because of the new dimension of accelerated economic integration with Mexico. Mexico, as a low wage developing country, raised in magnified form the issues of potential job losses and downward harmonization which had been previously discussed in relation to the free trade agreements (FTA) by Canadians, and raised these issues in particularly acute form for US workers. The NAFTA agreement became the first major example of a comprehensive economic integration agreement between a low wage developing country and

advanced industrial economies. The regional economic gap between the US and Canada on the one hand and Mexico on the other is far greater than that between the original member states of the European Community, and new entrants such as Spain, Portugal and Greece.

A major shift in the economic policy was made in Mexico in the 1980's. After an initial unilateral reduction of tariffs and the elimination of import permits, Mexico joined General Agreement on Tariffs and Trade (GATT) in 1986 (today the World Trade Organization) and has since then pursued an ambitious trade agenda at both regional and bilateral levels. Mexico joined APEC in 1993, then became member of OECD in 1994 and has negotiated 11 free trade agreements (FTA's), which have contributed to the Mexican integration to the world economy and dynamic export performance. Today, Mexico's network of free trade agreements covers 32 countries, which accounts for more than 60% of the world's GDP and provides preferential access to a potential market of over 870 million consumers. As of 2002, Mexico has become the tenth economic power in the world in economic terms.

Free trade agreements are a vital component of Mexico's economic strategy to improve global competitiveness and ensure long-term growth. The free trade agreements, along with our strategic geographic location, have increased investment opportunities in Mexico. These opportunities are further enhanced by the prospect of a comprehensive trade liberalization agreement with the European Union and other countries in the Asian pacific region.

The export sector is one of the most dynamic of the Mexican economy and the leading generator of jobs. The number of exporting firms has also grown. Today, small and medium-size Mexican firms, participate in export activities. They are contributing to job creation and the development of stronger domestic markets. In the last seven years, the growth of Mexican exports has contributed with at least half of the growth in our GDP. More than half of the 3.5 million permanent jobs created since August 1995 are related to export and foreign direct investment activities. Jobs created by the export sector are usually better paid in Mexico. In 2000, companies that exported 80% or more of their production paid salaries 62%

higher than the rest. Those that exported 60% of their production paid wages 38% higher than the rest. In the same year, wages in the maquiladora sector were 5 times higher than the national minimum average wage. Mexico has also diversified its export base. In 1987 oil and related products represented more than 30% of our exports. In 2000, 87% of our overseas sales were manufactured goods. Mexico's export activity has also expanded across the country. Until recently, export activities were concentrated in a few large cities and in the northern Border States. But southern states and states in the Yucatan peninsula have implemented programs that increase maquiladora activities in their states. The effect of the NAFTA agreement in the last ten years is significant. In the last decade, Mexico's trade liberalization and sound market policies have resulted in more than a 400% increase of our exports (from 41 US billion dollars in 1990, to 166 US billion dollars for 2000); and a 310% rise in Mexican imports (from 42 US billion dollars in 1990, to 174 US billion dollars by 2000). Since the entry into force of NAFTA in 1994, North America is seen as one of the most economic integrated trading regions in the world. By 2000, one third of the region's total trade is carried out between NAFTA partners, creating more trade opportunities in a large economic marketplace. NAFTA has led to increased trade flows between Mexico, Canada, and the US. During the first seven years of its implementation, Mexico's trade with its NAFTA partners tripled, reaching US $275 billion in 2000.

In 2000, trilateral trade reached 659 billion dollars, 128.2% more than that registered in the same period of 1993. Since January 1994, trade among NAFTA partners has grown at an annual average rate of 11.8%, surpassing that of world merchandise trade (world's annual average rate 7%). Since NAFTA, trade opportunities for Mexico and Canada have increased dramatically. Mexico has become the fourth largest trading partner for Canada, surpassing Germany, and bilateral trade with Canada has tripled, reaching more than US $12 billion for the year 2000. Mexico is one of the most important destinations for Canadian products, and it is ranked as Canada's third largest export market behind the US and Japan. In 2000, Canadian exports to Mexico reached more than US $4 billion, which represents a growth rate of 242% compared to 1993. Mexico is also Canada's

fourth supplier only after the US, Japan and the United Kingdom. Díaz-Bautista (2002a) estimated that since the creation of NAFTA, Mexican exports to Canada have almost tripled, reaching US $8.1 billion in 2000. Cornett (2001) has also shown that intra industry trade is extremely high within NAFTA. Cornett (2001) further shows that NAFTA integration is not only in terms of trade but also terms of integration of the production systems.

NAFTA has created new trade and investment opportunities for Mexican, Canadian and US firms. Today 50% of its total FDI is intra-regional. The US is Mexico's leading source in FDI. Between 1994 and 2000, US firms have invested more than 40.3 billion dollars; 59.3% in the manufacturing sector, 20.5% in services, 14.2% in commerce, 4.3% in transport and communications and 1.7% in other sectors. The 12011 companies with US capital operating in Mexico are mainly located in Mexico City, Baja California, Estado de Mexico, Nuevo Leon, Baja California Sur, Jalisco, Chihuahua, Sonora and Tamaulipas. Canada is also Mexico's fifth source in FDI. Between 1994 and September 2000, Canadian firms have invested nearly 2.8 billion dollars; 57.1% in the manufacturing sector, 28.3% in services, 9.1% in mining, and 5.0% in commerce. The 1215 companies with Canadian capital currently operating in Mexico are mainly located in Mexico City, Baja California Sur, Jalisco, Sonora, Quintana Roo, Estado de Mexico, and Chihuahua. Production partnerships have contributed to the creation of a more integrated and competitive market in the automotive, electronics and textiles sectors. The rate of growth of income *per capita* at the state level can be explained by the trade openness of each state. The northern Border States have rates of growth that are higher than the national average and are a major source of the regional differences between 1980 and 1999. The states of Chiapas and Tabasco were adversely affected due to the large dependency on oil exports in the last two decades of the century. Some states, such as Veracruz and the State of Mexico have had a high demographic rate, which contributes to the decline of income *per capita* in the period of 1980 to 1999. The high growth advance states include Border States such as Chihuahua, and new states, which are more open, such as Quintana Roo, Queretaro, and Aguascalientes. Some states can be classified as dynamic intermediate regions, which show an impor-

tant dynamism in terms of productivity and employment such as the states of Guanajuato and Puebla. The dynamic intermediate regions reflect an adequate process of adaptation and a strategy of growth based on dynamic activities with some of the branches of manufacturing and the third sector in general. We also observe declining regions which correspond to the southern periphery with a low level of industrialization, low human capital indicators and problems due to the lack of economic activity and openness. The states of Guerrero and Chiapas are representative of the group below the national average growth rate. Finally, the data shows that states within the northern border have a higher growth rate in Mexico.

NAFTA has provided incentives for US and Canadian firms with investments in other regions to relocate their production in Mexico. Six years after the implementation of NAFTA, employment had risen in Canada by more than 14.3%, in Mexico it increased 24%, and in the US, employment grew over 11%. The implementation of NAFTA had a positive effect in most states and sectors of the Mexican economy, although certain sectors of the economy, such as the rural sector, face a low level of growth. In the period of 1985-1999, the income *per capita* in Mexico increased at an annual rate of growth of 0.2% a year. For the period of 1980-1999, the annual rate of growth was 0.4% a year. The Northern Border states, and the center of the country, have the highest rates of economic growth. And new tourist states such as Quintana Roo and Baja California Sur have also benefited from more economic openness. The geographic vicinity of the Northern States of Mexico to the NAFTA partners has somewhat enhanced Mexico's dynamic trade performance effects (as seen table 4.1).

Table 4.1

Rate of Growth of Income *per capita* at the State Level

(In percentage between 1980 and 1999)

Quintana Roo	2.4
Aguascalientes	2.4
Chihuahua	2.4
Querétaro	2.2
Distrito Federal	1.8
Campeche	1.5
San Luis Potosí	1.4
Coahuila	1.3
Durango	1.2
Colima	1.2
Zacatecas	1.1
Morelos	1.0
Sonora	1.0
Nuevo León	0.9
Yucatán	0.9
Baja California	0.8
Guanajuato	0.7
Tamaulipas	0.6
Sinaloa	0.6
BCS	0.6
Oaxaca	0.6
Michoacán	0.5
Tlaxcala	0.5
Puebla	0.4
National Average	0.4
Guerrero	0.4
Hidalgo	0.3
Jalisco	0.2
Estado de México	– 0.5
Nayarit	– 0.5
Veracruz	– 0.5
Chiapas	– 3.2
Tabasco	– 6.6

Source: INEGI (2015).

Growth and Openness Empirical Exercise

The change of mentality by Mexican economists and policymakers regarding the best policy approach to promote growth was significantly influenced by a series of detailed country studies together with some cross-country econometric analyses of the import substitution process with the interactions between trade and growth. There is a large empirical and theoretical literature on the impact of trade on growth between the 1970's and the 2000's. The findings are ambiguous but mainly show a positive correlation between free trade and growth according to Edwards (1992); Barro and Sala-i-Martin (1995); and Sachs and Warner (1995). There is some literature that explains the channels through which free trade leads to faster growth according to Grossman and Helpman (1989) and Romer (1990). There is also literature that represents, in a more explicit way, the effect of institutional change on economic development as specified by Campos and Nugent (1999). For the case of Mexico, Lustig (1998) tries to explain the impact of structural adjustments on Mexican growth. Hanson (2000) also examines whether US-Mexico economic integration is causing economic activity in the US to relocate to the US-Mexico border region. Hanson (2000) finds that growth of export manufacturing in Mexico may account for a substantial portion of employment growth, in general, and of manufacturing employment growth, specifically, in US border cities. Hanson (2000) suggests that NAFTA contributes to the formation of binational regional production centers along the United States–Mexico border. The establishment of the NAFTA agreement between Mexico, Canada and the US has been a major mechanism to open the Mexican economy to both trade and foreign investment. The importance of openness on the rapid growth of Mexican trade at the national level since the eighties can be tested empirically. Trade liberalization began with Mexico's unilateral reduction and homogenization of import tariffs, implemented by the administrations of Presidents de la Madrid and Salinas de Gortari. The reduction of import tariffs was followed by reductions of trade and investment barriers through the NAFTA framework. A unilateral trade openness dummy variable with value one is created from 1986 to 1999 and a NAFTA dummy variable with a value

of one is created from 1994 to 1999 in order to represent NAFTA's contribution to liberalization. We can compare the impact of these two trade openness policies against the autarky period of the previous stage (1970-1982). To control, and for the effect of exchange rate policies with the variable they show the devaluation of the Mexican peso using the rate of change of the nominal exchange rate, and a dummy variable with a value of 1 for years when the rate of change was larger than 50% (as seen tables 4.2 and 4.3).

Table 4.2

TSLS Openness Regression Results

Independent Variables/ Regressions	1	2	3
Intercept	18.220 (0.911)	18.171 (0.271)	18.920 (0.701)
Reforms of De la Madrid & Salinas administrations	11.216* (4.65)	11.518* (4.06)	11.499* (4.22)
NAFTA implementation with Zedillo	21.563* (6.67)	21.293* (6.58)	20.934* (6.53)
Nominal Devaluation Rate, %		0.017 (0.60)	
Devaluation dummy			0.420 (0.12)
R^2 adjusted	0.79	0.79	0.78

Dependent Variable: Openness of the Mexican Economy or the percentage of imports and exports in relation to GDP.
*Statistically significant at probability values larger than 95%. T-values in parenthesis. The sample includes 29 years of observations, between 1970 and 1999.
Sources: INEGI (2015) and Bank of Mexico (2015).

Table 4.3
TSLS Openness Regression Results

Independent Variables	1	2
Intercept	2.894 (0.92)	2.879 (0.18)
Reforms of De la Madrid & Salinas administrations	0.505* (6.60)	0.470* (5.76)
NAFTA implementation with Zedillo	0.517* (5.14)	0.540* (5.30)
Nominal Devaluation Rate, %		0.001 (0.17)
R^2 adjusted	0.80	0.82

Dependent Variable: Natural Log of Openness of Mexico's Economy.
*Statistically significant at probability values larger than 95%. T-values in parenthesis.
Sources: INEGI (2015) and Bank of Mexico (2015).

The regression results are significant and supports the proposition that unilateral trade reforms and NAFTA have been effective in expanding Mexican trade. The effect of openness and economic growth in Mexico at the national level can be studied using the neoclassical growth model. The mean annual rate of growth of real GDP *per capita* in Mexico between 1970 and 1998 has been 1.33%, but with a declining trend. Specifically, previous work by Mankiw, Romer and Weil (1992) had found it useful to presume a specific production function (Cobb-Douglas) and a technology function that is labor augmenting. Following Mankiw, Romer and Weil (1992), I assume that growth of technology and depreciation will add up to 0.05. I also believe that the variables that determine income simultaneously determine changes in technology. Thus, the assumption that the residual technology is not that restrictive. The dependent variable in the econometric study is the difference variable or growth rate of real *per capita* GDP. The growth rate is explained by the growth of production factors and by technological and institutional changes. Here, the proportion of gross investment over GDP represents the change in physical capital, and the percentage of gross high school enrolment represents human capital. The variable labor force growth is usually omitted in all studies,

because of econometric problems, as the dependent variable is *per capita* GDP. The total productivity of those production factors is determined by the nature of the technology and those economic institutions that affect allocative efficiency. Total factor productivity is approximate by means of the variable *per capita* real GDP. A negative sign of this variable will indicate a case of overall decreasing productivity over time, and a presumption that there are institutions and policies that reduce market efficiency. The growth rate is also conditioned by its comparative advantages in the world economy. The study represents this condition with the variable growth of the international terms of trade. Due to the impact of oil prices on Mexico's exports, this variable exhibits a high variation coefficient (as seen in the following table 4.4).

Table 4.4

TSLS Growth Regression Results

	1	2	3
Intercept	-23.699 (-0.42)	-25.723 (-0.90)	-22.857 (-0.35)
Gross Investment (% of GNP)	1.376 (0.53)	1.572 (0.71)	1.432 (0.29)
H. School Enrollment (% gross)	0.041 (0.590)		
Income *per capita*	-0.003* (2.55)	-0.004* (4.41)	-0.004* (4.58)
Trade Liberalization		0.0810* (2.72)	0.0852* (2.50)
Terms of Trade Growth			0.086* (2.77)
R^2 adjusted	0.55	0.62	0.67

Dependent Variable: Real *per capita* GDP Growth Rate.
* Statistically significant at 95% level. t-values in parenthesis.
Sources: INEGI (2015) and Bank of Mexico (2015). The sample includes observations between 1970 and 1999.

This study uses the variable trade as an explanatory factor for growth. To represent the structural changes implemented after the year 1982, the variable trade is multiplied by the variable liberalization period, which is a dummy variable with a value of

1 since the year 1983. This period overlaps with the administrations of three Mexican Administrations of Presidents de la Madrid, Salinas de Gortari, and Zedillo. Other factors that could affect the growth rate, such as population growth and infant mortality (Barro and Sala-i-Martin, 1995). These variables were included in this study, but the estimated coefficients were not statistically significant.

The variable showing increasing openness or growth of terms of trade has a positive coefficient, which is statistically significant. We observe that the high variability of international oil prices affects the variability of Mexican growth. In addition, the long run trend of terms of trade growth is slightly negative contributing to a deceleration of Mexico's growth. The last two regressions include the variable trade, the subject, or this study. Trade during the liberalization stage, has a positive and statistically significant coefficient. We observe the negative coefficient of real *per capita* GDP supports the proposition of decreasing factor productivity in Mexico in the long run. We would like to see that trade expansion is having a positive effect on Mexican growth. But the Mexican economy is not growing faster. An explanation is the long-term decline of total factor productivity shown by the negative coefficient of real *per capita* GDP. The decline in total factor productivity could be attributed to the inertia of the institutions of industrial-import substitution period. We can also explain it as the long-term decline in the terms of trade and its large variations or the impact of political instability on investment.

The empirical analysis of openness and regional convergence at the state level is also performed. The dependent variables used is the annual percentage increase in the income *per capita* between the period of 1970 and 2000 using data for all the states and the federal district in Mexico. The independent variables are the initial level of income *per capita* by state reported by INEGI, population and the proportion of the population with a junior high level of education that comes from the statistics given by INEGI (2015) and the Ministry of Education (2015). The annual rate of growth of the population for the years of 1990-2000 comes from the Mexican census in 2000. The openness variable for the year 2000, by state, is defined as the ratio of imports and exports over total

income at the state level. The openness variables are constructed with data by INEGI, the Ministry of Finance and the *Secretaría de Desarrollo Económico* (Secretariat of Economic Development) of each state. The dichotomous border variable is used to identify the states of Mexico that border the US. The following table presents the results of the convergence regressions considering trade openness for the period of 1970-2000. The results in the table 4.5 indicate convergence due to the negative and significant sign of the income variable when openness and the border variable are included in the regressions.

Table 4.5

GLS Convergence Regressions for the States of Mexico considering Openness and Border Effects (1970-2000)

	(1)	(2)	(3)
Constant	0.255* (2.57)	0.282* (2.64)	0.25* (2.16)
Initial Income	-0.054 (-0.51)	-0.258 (1.08)	-0.19* (2.976)
Openness		0.079* (2.51)	0.130* (2.53)
Population Growth 1990-2000		0.025 (1.38)	0.026 (1.33)
Education		0.005 (0.51)	0.0003 (0.32)
Border Effects			-0.058 (0.74)
R^2	0.008	0.127	0.482
F	0.26	4.3	5.6

Dependent Variable: Annual Growth Rate of Income.

Note: Initial income is the income *per capita* in 1970. The openness variable is the ratio of export and imports over total state product. Population growth is the rate of growth of the population for the period 1970-2000 by state.

Education is the percentage of the population with junior high level of attainment in the year 2000. A Border effect is a dummy variable to represent the northern border Mexican states with the United States. T stats in parenthesis.

* Significant at a 95% level.

Sources: INEGI (2015), SEP (2015) and Secretaría de Desarrollo Económico (2015) estatales.

The first regression presents a non-significant convergence result. While in the third regression a significant conditional convergence result is obtained. Note that the openness variable is also significant in explaining the growth rate of income. The result supports the idea that openness contributes to the growth rate at the state level in Mexico, which contributes to the regional convergence process in the country.

Conclusions for Economic Openness

North American trade integration has been underway since the early 1980's and increased substantially since the establishment of NAFTA. The NAFTA agreement has contributed to the increase of Mexican trade and openness. A large portion of NAFTA and US-Mexico trade is intra-industry trade and is the result of US multinationals establishing export assembly operations in the Northern Border of Mexico and Mexico's largest cities.

This study supports the proposition that trade openness and NAFTA have contributed to the expansion of Mexican trade. It also supports the proposition that the expansion of trade has been a source of economic growth at the national and state level. However, the findings are apparently in contradiction with the observed low rate of growth at the national level in Mexico in the 1990's and in the first decade of the new century, even after an important trade expansion. Other factors can explain this low rate of growth. Among them, are the persistence of institutions that prevent a more efficient allocation of resources; the large dependence of the oil sector in Mexican exports and public finances; and the temporary negative effect on investment of democratization movements. Classical and neoclassical trade theory, as well as modern growth theory show that import protection or trade openness, can promote or retard growth depending upon the economic circumstances. We also have evidence that protection seems to be able to promote growth over long periods in particular industries and that even broad import substitution policies can accelerate general growth in the early stage of their use.

In this regard, a more sophisticated model must be developed to analyze the relationship between economic growth and

trade regime, including a better index for openness and trade regime. Particulary, we may as well focus on the optimal level of trade protection and some qualitative variable hard to be captured in traditional models. Finally, the study finds that the expansion of trade has been a source of economic growth in Mexico at the regional state level and a major source of regional state convergence.

5
Regional Labor Productivity in Mexico

Introduction

The recent empirical evidence in Mexico shows that over the last few years important changes have taken place in terms of productivity. Certain states, which are not always the most developed, show high rates of growth and very positive dynamics of development. However, other state, which are not necessarily the less-developed or peripheral ones, show, at the same time, more negative dynamics of development with rates of economic growth clearly below the mean. All of this reflects processes of convergence and divergence, which take place at the state level in Mexico in a more competitive and globalized context. Therefore, different traditional methods are necessary to capture, at least in a partial way, the complexity of these processes. A possible approach is to study the impact of the important economic transformations of the last few years on the productivity of the Mexican state regions using an alternative model.

Productivity plays a key role in the evolution of regional economies in Mexico, as evidenced in a great number of studies. The gains in productivity are the result of a complex process of technical and structural changes that include, from the incorporation of technological progress or the introduction of new methods of production and new products, to the intra and intersectoral reassignment of resources in Mexico.

The motivation for this study came from the fact that productivity levels in Mexico differ significantly across sectors and industries. These industry differences suggest that it is worthwhile

to analyze the causes of the productivity gap in more detail, and that industry specifics should be highlighted. An analysis of the mechanisms that might lead to convergence or divergence of labor productivity on the industry level is conducted in the next few sections.

Industry convergence in regional productivity

Regional economics are concerned with the spatial allocation of economic activity. They are more concerned with the allocation among regions of a country rather than with urban areas, this is typically the preview of urban economics. Regional economics are also useful in that they provide more basic questions in economics. For example, examining economic trends within and among regions can shed light on theories of aggregate economic activity. This is the case regarding the relatively new and growing literature on economic growth, regional convergence and, labor productivity. Several studies have been made at the industry level analyzing labor productivity.

Different growth theories explain the productivity convergence (or divergence) in different ways. The traditional growth theory explains conditional productivity convergence via the accumulation of capital, which leads to decreasing factor returns and hence towards a slowdown of productivity growth. The traditional trade theory predicts an equalization of factor prices through international trade or factor movements. The equalization of factor prices is what brings about an equalization of factor productivity. The new models of endogenous growth or the new trade theory explain divergence and convergence of productivity. Models including a catching-up effect caused by the absorption of foreign knowledge, for example, may very well explain convergence. While models that implicitly have a coefficient of productivity for the accumulated production factor of one (AK models) explain the absence of convergence. Solow (1956) and Swan (1956) predict a catching-up process via the accumulation of capital if in one region the stock of capital is not optimal. In the Cass (1965) and Koopmans (1965) model, this implies that the time preference rate is lower than the interest rate. When all the regions have reached their steady state,

the force promoting convergence will vanish. Productivity growth is subsequently determined only by technological progress. Hence, one would expect an initial convergence process driven by the convergence of the capital stock per employee.

Recent convergence models presented in Barro and Sala-i-Martin (1995) contrast whether or not a situation of relative lag at a given moment, tends to decrease in time. In other words, whether or not the regions with low levels of labor productivity have higher rates of growth than regions with high levels of labor productivity, in such a way that a catching-up effect takes place. Convergence can appear either in a conditional or a non-conditional way. In the latter case only when the variables that determine the stationary state of the regional economies are controlled. The former case addresses the absolute convergence that includes a series of implicit assumptions based on the notion that the regional economies do not differ significantly in their economic fundamentals. This fact reflects a capacity of the regional or state economies to converge to the same long -run balance value and at the same speed. This implicit assumption of the absolute convergence does not necessarily have to appear in reality. The regional economies can differ quite significantly in the economic structures, providing that the process of economic convergence would neither have to evolve to the same point, nor should it lead to the same long-term levels of equilibrium. These assumptions can be tested by using models in which the variables appear in such an explicit way that they are considered determinants of the stationary state of each economy. In other words, equations of conditional convergence could be estimated where all the parameters considered could differ for each of the considered regions. The presence of absolute or conditional convergence is not only a question of methodological or econometric discussion. The policy implications that are derived from both are completely different. If we accept the existence of different regional realities that determine different long-run trends, we are providing a wide field of action for public policies than if the non-conditional economic convergence is verified.

Gerschenkron (1962), Abramovitz (1979) and Verspagen (1991) developed alternative models with technological spillovers

assuming that one country holds the technological leadership in a certain industry while those countries lagging behind are able to reduce the productivity gap by absorbing technological knowledge from the leading country. Not only labor productivity but also total factor productivity should converge, as the countries lagging behind are catching up.

Newer models include the AK models of the so called, new growth theory such as Romer (1986, 1990) and Lucas (1988) which include cumulative factors for the production of goods that become relevant, making the tendency of convergence weaker or completely disappearing. This finding not only applies to the whole economy but also to single industries.

Dollar and Wolff (1988, 1993) analyzed international data for the manufacturing sector provided by the UN Yearbook of Industry Statistics for the years of 1963, 1979, 1982 and 1986 covering 13 OECD countries. The authors added 28 industries into four groups (heavy industries, medium industries, light industries, and other industries). For the period from 1963 to 1982, convergence for overall manufacturing as well as for the four different groups was identified. Dollar and Wolff (1988, 1993) argue that levels of productivity are more similar between industries than between the aggregate levels. Increases in productivity are mainly fueled through shifts in employment structures towards capital and technology intensive industries.

Cuadrado-Roura *et al*. (1999) analyze the evolution of regional differences in Spain and emphasize the importance of a disaggregate analysis at an industry level. They find convergence in regional productivity at the aggregate regional level but not at the sectorial level.

Paci (1997) found convergence across 109 European regions from 1980 to 1990, not only for manufacturing but also for Services. The speed of convergence was estimated at 1.7% annually for Manufacturing, while the estimate for Services was at 1.2% somewhat lower. Paci (1997) claims that most of the country dummies were significant. This means that the process of convergence is present at the overall European level as well as on the national

level. Despite this, no convergence was found for agriculture or for the *per capita* income level.

Bernard and Jones (1996) tested the convergence hypothesis with the traditional approach suggested by Barro (1991). According to their results, the service sector is an important engine for international convergence. Bernard and Jones found a negative relationship between the initial level of productivity and the subsequent rates of productivity growth for the Manufacturing sector. However, the estimated parameter was not significant. The results of their analysis of total factor productivity correspond to those of labor productivity. Van Ark (1995, 1996) is less interested in the question of convergence, as he tries to identify periods of growth and stagnation. Using the method of growth accounting, he estimates the importance of single components fueling the growth of productivity. Van Ark (1996) showed that countries like France, West Germany, Netherlands, and Great Britain could catch up to the US on the aggregate level. There is also a continuous process of convergence for the agricultural sector, while for manufacturing, the process of convergence came to a halt during the eighties. Among the four European countries, hardly any convergence was found.

Gouyette and Perelman (1997) could identify a clear process of convergence concerning the service sector while for manufacturing they could not. Gouyette and Perelman (1997) mention that there has been convergence of productivity in the service sector but not in the manufacturing sector. Countries with a high level of productivity enjoy almost no increase in total factor productivity with regard to the service sector. This implies convergence across countries concerning the service sector. For manufacturing the picture is rather ambiguous. Countries with high efficiency levels can nevertheless experience high growth rates.

Broadberry (1993) already pointed out that, on the one hand, by looking at the US, Great Britain, and Germany he could find no convergence for manufacturing within the period from 1870 to 1978. On the other hand, convergence for the whole economy was present. Broadberry (1993) concludes that the results for manufacturing are consistent with the results for the whole economy, the global convergence of GDP per Worker cannot be explained in terms

of technology transfer in manufacturing. This in turn suggests the need for a more general view of the catching-up process. In addition to composition effects through structural change, productivity trends in sectors other than manufacturing have a role to play.

In the case of Mexican manufacturing when we exclude maquiladoras, we observe that labor productivity rose rapidly between 1988 and 1996, over 7% a year compared to 1% a year between 1981 and 1987. However, most of the recent productivity gains occurred in large and export-oriented firms. Maquiladoras and small manufacturing operations had little or no productivity gains between 1988 and 1993. When we compare to US manufacturing productivity, we observe that labor productivity increased an average of about 3.2% a year since 1981; while the Mexican rate for manufacturing productivity increased only 1.7% a year.

Industry Concentration and Specialization

The location quotient (LQ) technique is the most commonly used economic base analysis method. It was developed in part to offer a slightly more complex model to the variety of analytical tools available to economic base analysts. This technique compares the regional economy to a reference national economy, in the process attempting to identify specializations in the local economy. The location quotient technique is based upon a calculated ratio between the local economy and the economy of some reference unit. Industry specialization or concentration is also measured by location quotients. Location quotients measure the industry's share of the regional state total employment divided by the national share of that industry. An LQ greater than 1 indicates that an industry is more concentrated locally than it is nationally and generally indicates that the industry is exporting its product. When a state has a basic sector or more than national average employment in a sector, extra employment is involved in production for export.

The approach taken to analyze labor productivity convergence is to use the LQ shares by industry in order to explain the state differentiated catching up process in Mexico for the period 1970-2000. The data used in the present study comes from the INEGI (2015) databases for income *per capita* by state and for the number of

jobs in the industry at the state and national level. The fictive labor productivity series under the assumption that for each region, the initial labor input industry mix does not change. The basic method of regional analysis is the location quotient (LQ) for each sector. The LQ is computed as the share of the region's jobs in an industry divided by the share of the nation's jobs in the industry. The aggregate productivities growths are then solely assumed to be within sector dynamics. Once the series are constructed for each state in Mexico, I appraise the convergence properties of the aggregate productivity with the unchanged employment structure in order to compare them to the convergence properties for actual productivity data and income *per capita* (as seen in table 5.1). The LQ describes the importance of the industry in each state. If LQ is greater than one, we would think that the sector is a basic sector in the state economy. If less than or equal to one, it's assumed to be a non-basic sector. Suppose an industry has a LQ of 1, then the industry has just enough employment to satisfy local demand. If an industry has a LQ of less than one, then there is not enough employment to satisfy local demand. All local employment is for local consumption, and in fact we probably import some additional units of that good. An industry that has a LQ of more than one, then local consumption is satisfied, and the state industry exports the good. The overpowering advantages of using location quotients are that the method is inexpensive and the exercise of computing excess employment may give the analyst an opportunity to gain insights of interest in themselves. Furthermore, in free open market state economies in Mexico, the region basic industries are known as the comparative advantage regions.

Table 5.1
LQ Shares by Industrial Sectors in the States of Mexico

Sector / State	División										
	1	2	3	4	5	6	7	8	9	GD6	GD7
Aguascalientes	0.9867	2.2991	0.7540	0.5360	0.3974	0.7827	0.2774	0.3506	12.1108	0.8845	0.4930
Baja California	0.3011	0.7338	2.4463	1.0768	1.1107	0.6749	8.2675	0.3137	9.5742	0.6993	0.4408
B.C. Sur	2.0126	0.6090	0.3406	0.6272	0.1352	0.5285	0.1117	0.5920	18.9869	1.3868	1.1895
Campeche	1.4287	0.1163	0.7796	0.6954	0.2094	0.4953	0.1564	1.1778	19.9882	1.4599	1.0096
Chiapas	0.9665	0.1582	1.2069	0.5539	0.2503	0.6936	0.2856	0.5965	22.6064	1.6511	1.1808
Chihuahua	0.5180	0.9249	1.0599	0.4675	0.4512	0.9311	1.4339	0.2212	8.7975	0.6425	0.3324
Coahuila	0.7399	1.7771	0.5710	0.5387	0.4104	1.01052	1.0613	0.4772	10.6582	0.7784	0.5131
Colima	1.7677	0.0800	0.9278	0.4748	0.2118	0.63091	0.2084	0.6160	20.3014	1.4828	1.2435
Distrito Federal	0.7821	0.5111	0.4752	1.9984	1.4263	0.27563	1.68527	0.6933	14.0406	1.0255	1.8740
Durango	0.9374	2.5190	5.3818	0.6719	0.1775	1.18295	0.17106	0.3083	12.8615	0.9394	0.4820
Guanajuato	1.0659	2.4827	0.4042	0.8414	1.3341	0.9168	0.50595	0.3279	14.0716	1.0277	0.5022
Guerrero	0.9455	0.7215	0.8816	0.4033	0.0929	0.54198	7.60801	0.4235	18.5745	1.3566	1.7348
Hidalgo	1.0011	2.4571	0.8177	0.4666	1.0049	1.34989	0.83723	0.2875	13.2606	0.9685	0.8714
Jalisco	1.5600	0.7494	1.4505	0.8442	1.3425	1.60230	1.23467	0.4348	14.7093	1.0743	0.6126
México	1.1288	0.9903	0.9225	1.2470	1.6299	1.06021	1.50359	0.1494	15.4092	1.1255	0.7758
Michoacán	1.3564	0.4267	2.8269	0.6629	0.4052	1.67096	1.49754	0.3331	20.2174	1.4766	0.7330
Morelos	1.0706	0.6156	0.5229	0.5901	0.9907	2.03841	0.87411	0.2360	18.6892	1.3650	1.2382
Nayarit	1.7398	0.1696	0.8943	0.4806	0.0472	0.71059	0.19993	0.7355	20.2784	1.4811	1.2023
Nuevo León	0.8148	0.4699	0.9467	1.3446	1.3743	2.46230	1.38629	0.4708	12.5859	0.9192	0.5570
Oaxaca	1.6932	0.5323	1.8492	0.4924	0.5317	1.20167	0.63616	0.3400	19.9586	1.4577	0.9169
Puebla	0.9954	2.6288	1.0186	0.4259	0.4466	2.01210	0.81419	0.1757	13.0100	0.9502	0.7478
Querétaro	0.4585	0.7361	0.2891	0.7563	0.7408	0.49959	105.141	0.0096	0.76164	0.0556	2.5690
Quintana Roo	0.5462	0.1476	1.0168	0.7665	0.0740	0.60411	0.94103	0.7217	24.4606	1.7866	0.9673
San Luis Potosí	1.3935	0.5280	1.0848	1.3247	0.6219	1.02346	1.00480	0.6993	14.9887	1.0947	0.7027
Sinaloa	1.4766	0.0441	0.6562	0.7328	0.2072	0.4595	0.21276	0.7856	20.8790	1.5250	1.0575
Sonora	1.2045	0.9049	0.5391	0.7259	0.5700	0.55396	3.09579	0.5614	13.0560	0.9536	0.3472
Tabasco	1.5220	0.0773	0.6429	0.5515	0.6267	0.32243	0.05908	1.0156	18.5040	1.3515	1.3634
Tamaulipas	0.7267	1.1179	0.3493	1.0044	1.2370	0.68720	1.45684	0.4753	11.8722	0.8671	0.5822
Tlaxcala	1.1605	2.9440	0.4269	0.5825	0.6888	2.56010	1.43584	0.1969	11.2321	0.8204	0.6211
Veracruz-Llave	1.6938	0.4948	0.8970	0.7695	1.7546	0.60710	0.36910	0.4099	18.6484	1.3620	0.8016
Yucatán	1.4807	1.9636	0.7337	0.7156	0.5388	0.87729	1.94519	0.9973	13.8221	1.0096	0.6253
Zacatecas	0.2990	1.0829	2.2022	0.5912	0.2152	0.19952	29.7856	0.0053	0.3983	0.0290	4.9898

For sector 9, in table 5.1, the other manufacturing sector, most states in Mexico have a LQ greater than one indicating that the sector is exporting manufactured goods. In contrast, for the Metals, Machinery and equipment sector also called sector 8, the LQ quotient is less than one for most states, indicating some sectorial imports in the region. Similar to the population employment ratio, the LQ is a measure of the ability of the local market to capture sta-

te economic activity. In Mexico City, the LQ is significantly greater than one indicating that some sectors represent the strength of the Metropolitan Area. The important basic sectors in Mexico City for the year 2000 are sector 4 (paper and printing), sector 5 (chemical and plastic), sector 7 (basic metals), sector 9 (other manufactures), sector GD6 (commercial, restaurants and hotels), and sector GD7 (telecommunications and transport). In the case of the state of Baja California Norte, the basic sectors include sector 3 (wood products), sector 4 (paper and printing), sector 5 (chemical and plastic), sector 7 (basic metals), and sector 9 (other manufactures). For the state of Baja California we think in terms of specialization of the local economy. The Baja California sectors with LQ greater than one are the other manufactures. It is no surprise that the state specializes in the manufacturing sector and is considered a power. Another interpretation focuses on the exporting potential of the basic sectors in Baja California. The LQs by state and sector in Mexican manufacturing, over time, have become more alike as manufacturing has been distributed across the states. The LQs are relatively close to 1, similar to what has happened to the manufacturing sector in the US. An exception for Mexico, is sector 9 where the LQs are much greater than one. Sector 9 shows an industry cluster or geographic concentration of interdependent companies with similar suppliers, products, labor pools, and institutions that together constitute an important competitive advantage for each regional state.

Looking at labor productivity growth between 1985 and 1998 shows a quite diverse picture in Mexico. While some states (like Baja California, Tamaulipas, Queretaro, and Jalisco) showed an increase of labor productivity, others, such asas Campeche, Tabasco, and Guerrero, even experienced decline in labor productivity. The mechanism for convergence can be explained by the traditional growth model for labor productivity. The analysis of the annual rate of growth of labor productivity by state in Mexico shows states diverging in terms of labor productivity during the period spanning between 1985 and 1998 (as seen in the following table 5.2).

Table 5.2
Annual Rate of Growth of Labor Productivity
by State in Mexico (1985-1998)

Aguascalientes	7.18	Morelos	2.13
Baja California	11.11	Nayarit	-0.22
bcs	-3.98	NL	2.26
Campeche	-10.78	Oaxaca	3.17
Coahuila	1.78	Puebla	3.39
Colima	-3.31	Querétaro	4.48
Chiapas	-0.09	Quintana Roo	-2.36
Chihuahua	5.91	San Luis Potosí	2.24
Distrito Federal	-1.55	Sinaloa	-0.75
Durango	0.29	Sonora	6.09
Guanajuato	3.99	Tabasco	-6.19
Guerrero	-4.27	Tamaulipas	6.44
Hidalgo	-1.87	Tlaxcala	4.48
Jalisco	4.15	Veracruz	-1.7
México	0.62	Yucatán	2.87
Michoacán	0.37	Zacatecas	0.85

After determining the economic and labor productivity strength of each state in Mexico, the question arises: Why are some states competitive and growing, while others are not? Many studies have analyzed state economic growth within a country, but, thus far, there has been little consensus about the relevance of specific factors in explaining relative economic performance.

Most studies have considered the effects of funds, wages, and education. Due (1961) and Wheat (1986) mention that state and local funds were thought to play a minor to insignificant role.

However, a more recent study like Munnell (1990) indicates that state and local funds do have a significant negative effect. Munnell (1990), Bauer, and Cromwell (1989), and Carlton (1979) suggest that wages have a significant effect on business activity and growth. Higher labor costs are likely to reduce the rate of employment growth. Many believe that human capital also enhances a region's ability to grow, but a recent study by Duffy (1994) indicates that it plays a marginal role at best.

Empirical Results of Labor Productivity

A cross-sectional model of the states in Mexico was estimated with the competitive position of each of the states being the dependent variable and the location quotient, local banking credit and funds, education, urbanization, wages and state openness being the independent variables. The location quotient was obtained by the previous equation described. Banking credit is a variable by state in constant millions of dollars in September 2000. The educational variable is the average age of schooling for people 15 years or older, while the urban variable is the percentage of the population that lives in a city in each state. The minimum wage is given by state in pesos. The wage is introduced into the model as to avoid the constant labor productivity assumption. Its impact can be ameliorated slightly through using income data, which can be assumed to reflect regional productivity variation through differences in wage rates. The assumption that local demands are met first by local production in LQ analysis, presents the need for an openness variable. The openness variable is constructed by using the sum of imports and exports over total production in each state.

In accordance with previous studies, the data used for labor productivity growth was the annual rate of growth from 1985 and 1998. All the necessary data was obtained from INEGI (2015) and Bank of Mexico (2015). The next two tables show the important disparities in income and labor sectorial convergence that are present at the sector level in Mexico. The model was estimated using Two Stage Least Squares (TSLS) with instrumental variables. TSLS was used to avoid the endogeneity problem that may be present in the model. TSLS refers to a stage in which new endogenous variables are created to substitute the original ones, and a stage in which the regression is computed using the newly created variables. The purpose of the first stage is to create new dependent variables, which do not violate Ordinary Least Squares (OLS's) regression recursivity assumption.

The following table 5.3 shows the labor productivity growth convergence analysis. The table provides evidence in support of the low growth dynamics of the industrial labor productivity for

the Mexican regions. The analysis gives no indication of convergence in labor productivity, due to the nonsignificant coefficients.

Table 5.3

The Mexican Sectorial Convergence TSLS Regressions (1985-1998)

Division	Sectors	Level	lq	Bank	Education	Urban	Wage	Openness
1	Food Products	-11.02	-0.75	-0.007	0.40	0.013	-0.04	10.07*
		(-1.41)	(-0.45)	(1.00)	(0.22)	(1.57)	(0.08)	(3.27)
2	Textiles	-7.17	0.92	0.007	-0.057	0.11	-0.01	9.98*
		(0.85)	(1.17)	(0.96)	(0.33)	(1.28)	(0.02)	(3.87)
3	Wood	-11.57	0.25	0.007	-0.22	0.13	-0.06	10.72*
		(1.50)	(0.41)	(0.97)	(0.12)	(1.56)	(0.12)	(4.20)
4	Paper	-13.63	3.64	-0.001	-0.24	0.13	-0.09	10.77*
		(1.79)	(1.34)	(-1.62)	(-0.14)	(1.58)	(-0.18)	(4.408)
5	Chemical and Plastic	-14.01	-2.12	-0.001	0.349	0.11	-0.02	10.26
		(1.87)	(1.65)	(1.46)	(0.20)	(1.36)	(0.04)	(4.22)
6	Non metalllic Chemicals	-8.37	1.01	-6.71	-0.38	0.09	-0.02	10.81*
		(-0.98)	(0.87)	(0.90)	(0.21)	(1.05)	(0.05)	(4.33)
7	Basic metals	-10.68	0.03	-6.64	-0.082	0.15	-0.03	10.46*
		(1.40)	(1.12)	(0.09)	(0.46)	(1.81)	(0.07)	(4.19)
8	Machinery metals and equipment	-4.96	-5.42	-5.70	-0.97	0.12	-0.07	8.57*
		(0.67)	(2.49)	(0.84)	(0.60)	(1.66)	(0.16)	(3.15)
9	Other Manufactures	-7.47	-0.23	0.001	-1.45	0.16	0.02	8.10*
		(0.98)	(1.83)	(0.90)	(0.81)	(1.96)	(0.04)	(2.88)
GD6	Restaurants and Hotels	-7.47	-3.19	-6.41	-1.45	0.16	0.02	8.10*
		(0.98)	(1.83)	(0.90)	(0.81)	(1.96)	(0.04)	(2.87)
GD7	Telecom and Transport	-11.62	-0.001	0.001	-0.262	0.132	-0.06	10.86*
		(1.48)	(0.00)	(0.951)	(-0.145)	(1.464)	(0.13)	(4.21)

Dependent Variable: Labor Productivity Growth.
* 95% significance level. T stats in parenthesis. LQ are the LQ shares estimated by sector.

Neither convergence nor an increase of average productivity are present in the restaurant and hotel industry. The results for the Mexican regions follow the previous results obtained for Norway, Sweden, and the US which shows a declining labor productivity. Labor productivity seems to depend on national attributes like consumer

preferences. Moreover, differences may be partly due to different data definitions, for example, the number of employees. Manufacturing exhibits little and nonsignificant convergence across states.

The coefficient on openness was positive and significant at the 1% level, while the coefficient on wages is negative and nonsignificant. The F-statistic of 5.2 indicates the labor productivity model is significant at the 1% level. The adjusted R- squared ranges from 0.55 to 0.57, which is unexpectedly high given that the competitive position is similar to a residual effect in that two major determinants of state employment growth, income growth and industrial structure with LQ's, were already taken into account.

Conclusions to Labor Productivity

A location quotient measures an industry's concentration or specialization in a state's geographic area relative to the national economy geographic area. In this study, a location quotient was used to compare the share of an industry's employment in the state in relation to the same industry's share of national employment. The different approach to convergence using labor productivities shows the industry, and regional, differentiated catching up process inside the Mexican regional economic space. During the period 1970-2000, Mexican regional convergence processes for labor productivity were rather weak at both aggregate and industry sectorial levels, which prevent us from giving a single conclusion for all sectors.

Apparently, convergence is not present by sectors when doing the labor productivity growth analysis. If anything, divergence seems to be present, when examining state labor productivity growth between 1985 and 1998 in Mexico. Although the location quotient used in the study is not a perfect measure for the export activity, it does quickly identify unusually large industries within a geographic area. Division 9 shows large LQ coefficients in relation to other divisions. The location quotient technique usually requires the assumption that the two areas being compared, such as the state and the nation, share uniform consumption patterns and labor productivity. In the study, we control for wages, education, and state openness. The openness variable is significant

when explaining labor productivity growth. If we do not control with the openness variables, a high location quotient, indicating a higher share of regional employment in any given industry, this would be the result of a less productive labor force or unusual local consumption patterns, not export-producing employment. The positive and significant effects of the openness variable on labor productivity growth supports the view of export demand as the prime mover in regional state growth in Mexico. If most Mexican states grow, then the whole country must also be growing, despite the fact that it may not export at all. It appears then, that internal trade and demand in a state can generate regional growth, although convergence may not be present. We identified two primary barriers to continued sectorial economic growth in the states of Mexico. The two primary factors are access to capital and access to high-skilled and experienced workforce, which are not significant in the study. Specific policy recommendations could include getting the investment community aligned with local basic industries, involve people that work in the basic industry in lecturing/teaching at local universities, especially teaching with the latest technologies. Another policy recommendation is to have wages that are more according to labor productivity by sector and state in Mexico.

One of Mexico's biggest hurdles to raising, in order to raise productivity, is its large informal economy. The informal economy is one of the main reasons for its subpar growth in the past three decades. Productivity or average hourly output per worker has increased 5.8% a year in Mexico's large modern companies since 1999, while at traditional firms such as small family-owned stores, or family-owned bakeries, it has fallen 6.5% a year.

We observe a modern Mexico, a high-speed, sophisticated economy with cutting-edge auto and aerospace factories, multinationals that compete in global markets, and universities that prepare more engineers than Germany. And there is also a traditional Mexico, a land of sub-scale, low-speed, technologically backward, unproductive enterprises, many of which operate outside the formal economy.

Around 54% of Mexico's non-agricultural workers are employed in the informal sector, compared to 38% in Brazil and 47% in Argentina.

Lack of productivity has been a recurring theme for Mexican Finance Minister Luis Videgaray and President Peña Nieto. Aware of the problem, the government set up a national productivity committee last year that aims to draw more of the country's informal businesses into the formal sector where companies pay taxes, wages are higher, workers have benefits and social security, credit is available, technology is put to use, and output is greater.

Labor productivity is low in Mexico and the economic crises have played a key role in the lack of growth in productivity. Over the past 20 years, labor productivity grew 2.1%, as compared to a 64% increase in Ireland or an 82% increase in South Korea over the same period. This is partly due to economic crises that reversed gains. The 1995 crisis caused labor force productivity to fall drastically and the crisis in 2008 derailed the slow recovery that was occurring. In real terms, labor productivity in Mexico during 2011 was below its 1995 level. Thus, increases in productivity have been insufficient to offset the various crises suffered by the country. Capital accumulation has accounted for a greater share of growth than labor.

6
Mexico's Regional Economic Growth, Recent History and Outlook

Mexico's dream of becoming a first world ranked nation with high rates of economic growth are not new. The National Development plan intends for all Mexican men and women to live in peace in a democracy with economic growth and personal security. The essence of the plan for Mexico to meet the challenges that arise in the different transitions of the political, demographic, economic, and social spheres, bearing in mind, at all times, that success is the result of establishing clear long-term objectives and the proper and timely application of well-defined strategies for building a new country. A period of 25 years was defined as the estimated amount of time for national development to crystallize. The vision of Mexico in the year 2025 that the government aspires to is summed up as follows: a nation that is fully democratic; with a high quality of life; that has managed to reduce extreme social imbalances; and that offers its people opportunities for comprehensive human development and coexistence based on respect for the legality and the true exercise of human rights. The Mexican government's vision of Mexico is that of a dynamic nation, with leadership within the world environment, with steady and competitive economic growth, with inclusive development, and in balance with the environment. It should be a nation of pride stemming from its roots, boot multiethnic and multicultural, and with a profound sense of national unity. However, the recent economic history of Mexico has shown that a steady and competitive growth, in the near future, will not be easily obtained.

Mexico's long-term growth has been characterized as one that depends on import substitution industrialization to a global trade interdependence of the economy. In order to enhance the

economic fundamentals and to reduce inflation, the government established economic programs that stabilized costs, improved government finances and allowed the economy to grow with a low inflation rate. In other words, the quantity of money in circulation was not allowed to increase, and prices were prevented from constantly increasing by the application of wage indexation. During the presidency of Ruiz Cortines and López Mateos, the program for stabilizing development was set in motion. López Mateos nationalized the energy industry, completed the nationalization of railroads, and created the National Commission for free textbooks. By 1964, at the end of his presidential period, Mexico had enjoyed thirty years of political stability and stable economic growth. The end of the import substitution economics came during the presidency of Lopez Portillo. Varying rates of economic growth and the trade liberalization process culminating in the NAFTA agreement and entry into GATT characterized the presidencies of Miguel de la Madrid and Carlos Salinas. Since taking office in late 1988, Salinas privatized banks, ended costly government subsidies, streamlined the government bureaucracy, liberalized foreign investment regulations, sold or closed inefficient companies, and proposed the NAFTA agreement to enhance economic growth.

The last administration of the 20th Century in Mexico was under President Zedillo. In 1999, Mexico experienced a 0.5% growth in productivity, a true achievement given its –0.6% growth record from 1990 to 1998. However, real industrial wages saw a decrease of negative1.5%, and the minimum wage had a negative growth of -1%. On December 1, 2000, Vicente Fox of the National Action Party was inaugurated as Mexico's President. This was a historic victory over the Revolutionary Institutional Party, which had held the presidency for 71 years. The Fox administration maintained the economic policies implemented by the two previous administrations with poor results in terms of economic growth in the first couple of years of the administration. Fox's administration showed clear signs of tensions with the Mexican Congress in areas such as foreign trade and foreign policy disputes, the rejection of the government's power reform plan, the fiscal reform, and the composition of the public sector spending cuts. The administra-

tion has also maintained the openness policies in terms of trade acknowledging the benefits of NAFTA. Ten years after the passage of NAFTA, North America as a whole, shows an increase in welfare with certain sectors facing economic difficulties and increasing inequality. For Mexico specifically, several sectors in the economy had varying rates of growth. During the seventies and all the way to the year 1981, the Mexican economy grew at a rate of 2.9%, due to the multiplier effects of oil revenues. In 1981, the oil crisis brought about changes in the growth dynamics by sector of the Mexican economy. During the period of trade liberalization, some sectors, such as the mining, agricultural and fishing sectors, had negative growth rates. While some sectors show impressive annual growth rates like the financial and insurance service sectors. Mexico experienced an extremely fast development of its goods for trade during the last 10 years as a consequence of the entry into NAFTA. Its share of world exports has grown from 1.1% in 1990 to 3.1% in 1999 while Mexican imports increased from 1.2 to 3.1% of world share. The main impulse for trade growth was provided by the so-called *maquiladoras* in the manufacturing sector: assembling companies, working with imported components and machinery (the vast majority from the US) and re-exporting the production. However, the maquiladora system has been widely criticized, as something that created employment but did not help Mexico to establish a solid industrial foundation. The productive structure of the country changed during the 1980's and 1990's, and GNP grew at rates near 3% a year during the same period due to the export-oriented economy and the NAFTA agreement.

Even with the NAFTA agreement and membership into the OECD, Mexico showed great income disparities and persisting poverty in the southern states of the country. However, the consequences of the 1995 monetary crisis and the subsequent economic recession (fall of GDP by 6.2%) were not felt as bad in Mexico due to NAFTA. GDP growth was above 7% in 2000, although it took until 1998 to reach a level of *per capita* income comparable to that of 1994.

The Mexican economy has been transformed into a trading and global nation following the new world dynamics thanks to the NAFTA agreement and the free trade agreements that Mexico

signed with the European Union and Central American nations. Mexico's main trade partner is the US with around an 80% share of total trade in 2000 and a growth of five percentage points since the pre-NAFTA situation. Mexico's largely US exports-led growth is clearly dependent on the US' economic situation. The European Union (EU) comes second in terms of economic ties with 6% of total trade in 2000. At the end of 2000, Mexico ranked 24th among EU trade partners. After the 1995 recession, EU-Mexico trade, in both directions, has constantly increased. EU exports have more than tripled since 1995, while imports have more than doubled. Growth has accelerated during 2000, particularly during the months following the entry into force of the FTA, with an increase of exports of 32.9% and of imports of 48.5%. EU has a substantial trade surplus with Mexico: exports are almost double of what the imports are. Other important commercial partners are Japan and Canada (both with about 2.2% of total trade). Canadian access to the Mexican market continues to improve under the terms of NAFTA. Japan has also showed interest in signing a trade agreement with Mexico. Mexico and Australia have signed a declaration in a recent meeting of the World Trade Organization as to open the way to reach a future agreement and to promote and protect investment in their countries. The future outlook for Mexico is directed towards the complete opening of the economy in terms of trade. Mexico and the US seek to expand the trading agreements to all 34 countries in North, Central, and South America plus the Caribbean nations (except Cuba) in a trade agreement known as the Free Trade Area of the Americas (FTAA). The FTAA would create a single trading block from Alaska to the Patagonia that would rival the European and Asian blocks. The FTAA is expected to compete with an East Asia free-trade zone that could come into place in 2010. The global trend in the 21st Century of forming strategic trade blocs is increasing given the trading success of the EU and NAFTA as well as the two-year stalemate in the World Trade Organization efforts to set up a global free-trade regime. Mexico's membership into the 21 country membership of APEC, will also mark the trend towards the ambitious goals of liberalizing trade by 2010 for industrial members and by 2020 for developing members. Mexico is

deeply committed to World Trade Organization (WTO) new round negotiations and can be expected to play a key role in the future, as a country that will link ties between developed and developing Members.

But the opening up of the economy has also brought a worsening of the condition of inequality and disparity in Mexico. While it is argued that thanks to these agreements there exists an indisputable economic, increasing trade and social development, at the same time, there is also recognition that there are great disparities between some regions in Mexico. Mexico has suffered a rise during the last decade of the number of people who live in extreme poverty.

From 20 million poor existing in 1994, to 50 million by the year 2000. After the Mexican Crisis of 1994, and the decline of 6.2% in the GNP in 1995, the Mexican economy grew at rates of 5.1% during the years of 1996 to 1999. Even with the decline in gross domestic product, employment actually rose slightly. Díaz-Bautista (2003) shows that unemployment remained low in Mexico even in the middle of the Mexican crisis. The impact of the crisis, both in severity and duration, also shows up in the real wages trend. Real wages fell substantially in 1995. But while gross domestic product rose sharply in the following years, real wages remained below pre-crisis levels through 1998.

Investment was one of the most important sources of sustainable economic growth in the period of 1996 to 1999. In an open Mexican economy, domestic and external savings finance gross investment. By the year 2000, the economy grew at a rate of 6.6% with a saving-output coefficient of 23.6%, from which domestic savings represented 20.4% and external savings 3.1%. In 2001, the saving-output ratio fell to 20.7%, domestic savings decreased to 17.8%, and external savings declined slightly to 2.9%. The Fox Presidency was characterized as having the ability of passing deep structural reforms in order to promote growth and by increasing the savings-investment ratio. If the structural reforms had not been passed during the Fox administration, the country would not have been able to attain growth rates higher than 3 to 4% in the years to come and certainly would have had less than the 7% that was promised during the presidential campaign. The income dis-

tribution in the country would have also worsened if no structural reforms had been implemented in the country and the number of people living in poverty would have increased in the coming years.

In terms of regional growth in Mexico, we observe a relative process of catching-up among the Mexican regions in terms of income *per capita* during the last twenty years. Nevertheless, the conditional convergence analysis qualifies the previous result given that, although the existence of a catching-up process is present in the differences between regions at the national level, we observe sufficiently differentiated behaviors for quite a few regions in Mexico that suggest the possibility of different equilibrium tendencies in the long-run for the Mexican States. The tendencies in regional growth in Mexico show advanced regions with growth in terms of income and productivity which are above the mean of the Mexican states, such as Chihuahua, Baja California, and Mexico City. The economic growth of the Northern region has been driven in part by the Maquiladoras established in those states since 1966. United States firms, particularly in electronics, textiles, footwear, and toys, and later in auto parts-responded enthusiastically to the lure of cheap labor in the Maquiladoras. Maquiladoras became a major stimulus to growth in Texas border cities such as El Paso, Eagle Pass, Laredo, McAllen, and Brownsville in terms of both retail trade and jobs from warehousing and distribution. During the Texas recession of the 1980's, the border cities were the most notable growth spots in the state. This fact, in turn, prompted additional efforts by the state government and border communities to capture manufacturing jobs and to provide the components needed by the maquiladoras. Yet, the maquiladora industry has an image of a fly-by-night sweatshop system that exploited powerless young Mexican women and left most of the unemployed former *braceros* and other male jobseekers unemployed, and a direct cause of job loss in US manufacturing. In spite of the enhancement of short-term economic growth, the Maquiladoras do not have a link to the production processes from the host country's needs and respond exclusively to the needs of the Multinational Corporations that set them up. Maquiladoras have provided employment with low wages to over a million people, just on Mexico's northern bor-

der but the benefits of maquiladoras for the economy as a whole in the long run are practically nonexistent for the northern states.

Some states in Mexico can be classified as dynamic intermediate regions, which show an important dynamism in terms of productivity and employment such as the states of Guanajuato and Puebla. The dynamic intermediate regions reflect an adequate process of adaptation and a strategy of growth based on dynamic activities with some of the branches of manufacturing and the third sector in general. We also observe declining regions which correspond to the southern periphery with a low level of industrialization, low human capital indicators and problems due to the lack of economic activity. The states of Guerrero and Chiapas are representative of that group. New regional economic growth proposals for the southern periphery of Mexico have been proposed by Dávila, Kessel, and Levy (2002) with the Puebla Panama Plan. The Puebla-Panama Plan is a regional economic growth plan that has the intention of generating new public policies for the human development of Mexico in the struggles against poverty, promotion of investments and productive developments. The Plan also envisions the fulfillment of strategic investments in the infrastructure which will enable the region to communicate more effectively and take advantage of the possibilities inscribed in the Mexican free trade agreements. It also mentions the possibility of new prices and tariffs on goods and services produced by the public sector and programs as to ensure a sustainable development and economic growth of the southern region of Mexico and Central America. There are eight components of the regional economic growth plan which include: sustainable development, human development, the prevention and mitigation of natural disasters, tourism promotion, enhancement of trade, highway integration, energy interconnection, and integration of telecommunication services.

Public policies in Mexico must encourage investment in human capital and regional openness in order to enhance and speed up the economy's growth rate. Mexico's human capital economic policy should be complemented by financial stability, greater openness and expansion of external markets, increase productivity and income, promote deregulation and competition, maintain

the low level of demographic growth, stimulate internal savings, and increase the growth in the resources that the different government entities allocate to the formation of human capital.

Demographics will be an important factor that influence the economic growth of Mexico. The Mexican population increased from approximately 75 million people in 1984, to 97 million in 1999. By the year 2000, some estimates of the total population in Mexico were close to 97.5 million with a *per capita* GDP of 5 100 US Dollars (USD). Mexico City, with about 20 million people, is one of the world's largest cities. Mexico can be described as a family planning success story. In 1972, Mexico had a total fertility rate of 6.2%, and the population was growing 3.5% a year, the fastest population growth rate in the world. Recent estimates of the population growth in Mexico are close to 1.3%. When we make comparisons for North America, Canada's population was 31 million in 2000; Mexico's population was 97.5 million; and the US' population was about 281 million. While population annual growth rates between 2000 and 2010 for North America are expected to be 1.0% for Canada, 1.1-1.2% for Mexico, and 0.6% for the US.

Mexico is the most populous Spanish-speaking country in the world. More than half of the population lives in the central part of the country. 75% live in cities, due to migration from rural areas and other areas lacking job opportunities, to the industrialized urban centers and border communities in Mexico. Mexico has become an urban society in the last thirty years and it is not expected to change in the next century. The population of Mexico is expected to increase to approximately 136 million people by the year 2020. The Mexican people can expect to live longer now (from an average of 58 years of age in 1960 to 72 years of age in 1998) and they are more likely to be literate (91% literate in 1998). The Human Development Index, which is based on these factors, plus real income over the 1995-1998 period ranks Mexico in 55th place, out of 174 countries. The mortality rate in Mexico (per 1 000 inhabitants) went down from 134 in 1960 to 34 in 1998. The access to a water supply for the period of 1990-1998 was around 85% of the people. The population pyramid in 2000 has an extremely sharp profile, whose wide base is made up of disadvantaged people

living in poverty and which unleashes the drive for migration. In 2000, 40% of Mexican residents were a part of the labor force.

Mexico's population doubled between 1970 and 2000, from 53 million to 97.5 million; while the number of Mexican-born US residents increased more than ten times, from less than 800 000 to about 8.5 million in the same period. During the 1980's and 1990's, changes in Mexican farm policies helped to speed up migration, while the US economy created millions of jobs that could be filled by Mexican migrants. More than half of those who migrate to the US from Mexico, return and settle back in Mexico within the next ten years. By the year of 2020, the Hispanic population of the US will be around 52 million and by the year 2050, it will be 96 million. Hispanics are projected to be a majority in California and Texas by the year 2015. The population of Mexican origin living in the US in 2000 is 20% of Mexico's total population.

The *Consejo Nacional de Población* (Conapo, 1998) in Mexico estimates that the total population of Mexico will reach 131.6 million in 2050. While the US Census Bureau's projection of the Hispanic population in the US is close to 96 million, with 65% of Hispanics having a Mexican origin. The population of Mexican origin in the US in 2050 will be almost half of Mexico's total population. US and Mexican policies regarding migration, will help to determine how fast the Mexican-born US population rises. In the past few years, Mexico has faced a process of accelerated urbanization with an associated creation of new metropolitan areas, one megalopolis and several urban corridors. By 2001, there were 39 metropolitan areas with a population larger than 100 000 inhabitants, which accounted for 46% of the total country's population. The number of metropolitan areas with more than 100 000 inhabitants will increase in the coming decades. New urbanization models for developing cities in Mexico must be implemented in the coming years as to sustain the increasing population. In Mexico, the growing number of people between 15 and 24 years of age, will increase the need of educational systems, infrastructure, and job access. In the long term, the country needs even faster growth to create jobs for the backlog of the unemployed and the one million youths who enter the job market annually. Most likely, Mexico's population growth

will fuel migration pressures. The Mexican government will struggle to provide social welfare, housing, and health services to an aging population. As to overcome the historical deficit of social services and housing and to be prepared for future needs, new programs must be established with the participation of the three levels of government and other participants including the social and the private sectors. Urban development policies should promote a more balanced economic and social growth between cities through a land use planning strategy and actions to improve infrastructure, utilities, and services in strategic cities and states.

Mexico's economy will become more dependent on the US economic cycle in coming years. An example is the recent economic cycle in the Mexican economy, which experienced a deeper than expected deceleration in the first half of 2001, due to slower growth in the international economy, especially in the US. The tight fiscal and monetary policies have maintained Mexico's growth rate in positive terms. The recent fiscal budgets in Mexico can be described as modest, with President Fox's administration determined to reduce the fiscal deficit to less than 0.65% of GDP. The trade dependency on the US will drive Mexico's GDP growth in coming years. In the next decade, almost 90% of Mexico's exports will go to the US. However, the Mexican government has been encouraging trade and investment from the European Union in order to help offset future effects of US economic activity.

It seems that the gross national product *per capita* has somewhat increased in Mexico during the 1990's. The value of Mexican GNP for the year 2000 was estimated around $580 billion USD. Income *per capita* has increased during the past few years, from a level of GNP *per capita* of $3 923 USD in 1995 to around $4 400 USD in 1999 and an expected income *per capita* in 2001 of around $6 295 USD. However, income distribution has worsened. More than half of the population lives in poverty. The only sector of the Mexican economy that is showing real productivity growth is the goods-producing (manufacturing) sector. The increased productivity expected as the result of the 1990's massive liberalization and Internet computerization appears to be an illusion. It is important to identify the factors that have contributed to the

recent weakness of the Mexican economic growth recovery like international volatility, the weakness of the US recovery, and the absence of structural reforms in Mexico. International volatility, and the US economic cycle can be classified as short-term factors from the external environment, while the structural problem could be considered a long-term factor. The effects of the international volatility plus those derived from the uncertainty about the structural reform materialized in a reduction of capital inflows from abroad. The current administration has implemented a consistent macroeconomic policy. However, economic activity did not take off in the last few years as anticipated. By 2001, Mexico's GNP growth was -0.2%. The estimated growth for 2002 is around 1.2%, while the expected growth for the year 2003 is around 2 to 3%. The estimated inflation for 2003 is expected to be close to 4%. By 2003, Mexico shows a high interdependence with the US' economy, which serves as a shield for any emerging market crises in Mexico but doesn't promote the growth process of the economy. The long term regional economic growth program should focus on increasing income *per capita*, obtaining sustainable development, increasing human development, attracting private investment, expanding Mexico's infrastructure and solving the income distribution problems. Achievement of long-term growth would be guided by medium term goals like the inflation target. In order to reach the low inflation targets by the Bank of Mexico, a strict and tight monetary policy discipline would have to be enacted in future administrations.

For the period of 2020-2025 (as can be seen in table 6.1), Mexico's GDP is expected to grow at an average annual growth rate of 2 to 3%, while the annual rate of population growth would be from 1.2 to 1.4%. With those assumptions, Mexico would double the current level of income *per capita* in the year 2025. However, the level of income *per capita* would not reach the current level of income *per capita* of the US or Canada. In 2000, Canada's GDP (constant US $1 990) was $749 billion, compared to $371 billion for Mexico and $8 trillion for the US. GDP annual growth rate projections between 2000 and 2010 for North America are: Canada (2.5%), Mexico (2.9%), and the US (2.9%). Between 2000 and 2010,

per capita GDP is predicted to increase by 12% in Mexico, 16% in Canada, and 25% in the US. By 2010, North American *per capita* GDP would reach about $27 300 per person (constant US $1 990), up 80% from 1980 levels. The North American level of *per capita* GDP in 2010 would not be reached by Mexico even by the year 2025. By the year 2025, Mexico would remain in the ranking of upper middle-income countries.

Table 6.1

Mexican Economic Outlook, 2000-2025

Population in 2000[1]	98 million
Expected Population in 2025	140 million
Annual Rate of Growth of the Population	
Average(1994-2000)[1]	1.5%
Expected Average (2000-2025)	1.2- 1.4%
Life Expectancy (1994-2000)[1]	72 years
Expected Life expectancy (2025)	78 years
Income *per capita* (2000)[1]	$6 295 USD
Expected Income *per capita* (2025)[2]	$12 795 USD

[1] Annual Report by the World Bank (2015) in the World Bank website.
[2]Assuming an annual economic growth rate of 3% and an annual rate of growth of the population of 1.4% a year for Mexico from 2001 to 2025.

Finally, the projected average growth in *per capita* income in Mexico would be over 2.5% per year between 2003 and 2025. Growth in income *per capita* would be condition upon the implementation of deep structural economic reforms, like the energy reform. Mexico's growth would be fueled by demographics, accelerating global trade, knowledge-based technologies, and the integration of capital markets. While economic growth would bring increasing wealth to some states in Mexico, income distribution would remain at critical levels. Growth would be uneven in Mexico; not every state would benefit equally from national growth. Some states may lose out in the growth process. New economic centers of power would rise which would rival the resources available to poor states in Mexico. Economic growth would carry new demands on infrastructure in Mexico, such as water, energy, communications, waste disposal, urban transportation, public health,

housing, and education. Failure to accommodate the demands of infrastructure would trigger a process of growing dissatisfaction with the regional governments. An overlook of Mexico during the beginning of the 21st Century, shows us a country with overwhelming economic prospects. Since the passage of NAFTA, and the entry of Mexico in the OECD, the country seemed to be ready to step out of underdevelopment and into the club of industrialized countries. The 21st Century would be characterized by Mexico's economic and political modernity, in which economic prosperity and globalization promises to transform the whole nation and its regions.

Bibliography

Abramovitz, M. (1979). Rapid Growth Potential and its Realisation: The Experience of Capitalist Economies in the Postwar Period. In: E. Malinvaud (ed.), *Economic Growth and Resources*. London: Palgrave Macmillan - International Economic Association Series.

Aghion, P., and Howitt, P. (1998). *Endogenous Growth Theory*. Cambridge, MA: MIT Press.

Anderson, James E., and Marcouiller, D. (1999). *Trade, Insecurity, and Home Bias: An Empirical Investigation*. NBER Working Paper No. 7000.

Ark, Van B. (1995). Sectoral Growth Accounting and Structural Change in Post-war Europe. Research Memorandum GD-23, Dec. Retrieved from https://www.researchgate.net/publication/4868128_Sectoral_Growth_Accounting_and_Structural_Change_in_Post-War_Europe

Ark, Van B. (1996). Issues in Measurement and International Comparison of Productivity – An Overview. Research Memorandum GD-28, University of Groningen. Retrieved from https://pure.rug.nl/ws/portalfiles/portal/3245043/gd28.pdf

Bardhan, P. (1997). Corruption and Development: A Review of Issues. *Journal of Economic Literature*, 35(3): 1320-1346, September.

Barro, R.J. (1991). Economic Growth in a Cross Section of Countries. *Quarterly Journal of Economics*, 106: 407-444.

Barro, R.J., and Lee, J.W. (1993). International Comparisons of Educational Attainment. *Journal of Monetary Economics*, 32: 363-394.

Barro, R.J., and Lee, J.W. (1996). International Measures of Schooling Years and Schooling Quality. *American Economic Review, Papers and Proceedings*, 86 (2): 218-223.

Barro, R.J., and Sala-i-Martin, X. (1991). Convergence Across States and Regions. *Brookings Papers on Economic Activity*, 1: 107-158.

Barro, R.J., and Sala i Martin, X. (1992). Convergence Nils Gottfries: Insiders, Outsiders, and Nominal Wage Contracts. *Journal of Political Economy*, 100 (2): 223- 251.

Barro, R.J., and Sala-i-Martin, X. (1995). *Economic Growth*. New York: McGraw-Hill.

Bauer, P.W., and Cromwell, B. (1989). The Effect of Bank Structure and Profitability on Firm Openings. *Economic Review*, 25(4): 29-39.

Bayoumi, T.; Coe, D., and Helpman, E. (1999). R&D Spillovers and Global Growth. *Journal of International Economics*, 47: 399-428.

Becker, G.; Murphy, K., and Tamura. H. (1990). Human Capital, Fertility, and Economic Growth. *Journal of Political Economy*, 98: s12-s37.

Bernard, A.B., and Jones, I.J. (1996). Comparing Apples to Oranges. Productivity Convergence and Measurement Across Industries and Countries. *American Economic Review*, 86 (5): S. 1216-1238.

Bottazzi, L., and Peri, G. (1999). *Innovation, Demand and Knowledge Spillovers: Theory and Evidence from European Regions*. London: CEPR Discussion Paper No. 2279.

Broadberry, S.N. (1993). Manufacturing and the Convergence Hypothesis: What the Long Run Data Show. *The Journal of Economic History*, 53(4): S. 772-795.

Campos, Nauro F., and Nugent, Jeffrey B. (1999). Development Performance and the Institutions of Governance: Evidence from East Asia and Latin America. *World Development*, 27(3): 439-452. doi. org/10.1016/S0305-750X(98)00149-1

Carlton, Dennis W. (1979). Why Do New Firms Locate Where They Do: An Econometric Model. In: William C. (ed.), *Wheaton Interregional Movements and Regional Growth*. Washington, DC: The Urban Institute.

Cass, D. (1965). Optimum Growth in an Aggregative Model of Capital Accumulation. *Review of Economic Studies*, 32: S. 233-240.

Coe, D.T., and Helpman, E. (1995). International R&D Spillovers. *European Economic Review*, 39: 859-887.

Consejo Nacional de Ciencia y Tecnología (Conacyt) (2000). Actividades científicas y tecnológicas. Pagina electrónica del Conacyt: https:// conacyt.mx/

Consejo Nacional de Población (Conapo) (1998). Proyecciones de la población de Mexico, 1996-2050 / Projections of the Mexican Population, 1996-2050. Mexico.

Cornett, Andreas P. (2001). International Trade and Specialization in a Global Framework: A Regional Integration Perspective. Centre for European Studies, Working Paper No. 6/2001.

Cuadrado-Roura, J.; Garcia-Graciano, B., and Raymond J. (1999). Regional Convergence in Productivity and Productive Structure: The Spanish Case. *International Regional Science Review*, 22(1): 35-53.

Dávila, E.; Kessel, G., and Levy, S. (2002). *El Sur tambien existe: Un ensayo sobre el desarrollo regional de Mexico. Economía Mexicana*, XI (2): 205-261. Retrieved from https://core.ac.uk/download/pdf/6506966.pdf

Díaz-Bautista, A. (2000) Convergence and Economic Growth in Mexico. *Frontera Norte*, 13: 85-110.

Díaz-Bautista, Alejandro (2001). An Introduction to Institutional Change, Corruption and Economic Growth. Cuaderno de Trabajo, DTE 35/01, Departamento de Estudios Económicos, Colef.

Díaz-Bautista, Alejandro (2002a). *Convergence in Telecommunications Infrastructure and Human Capital: México's Economic Growth in the Emerging Digital Economy*. México: El Colegio de la Frontera Norte, Departamento de Estudios Económicos.

Díaz-Bautista, Alejandro (2002b). NAFTA Economic Integration and Regional Economic Growth: Trade, Institutions and Convergence. In the 15th European Advanced Studies Institute in Regional Science, organized through the Nordic Section of the Regional Science Association (NS-RSA). Eksjö, Sweden.

Díaz-Bautista, Alejandro (2003). *Los determinantes del crecimiento económico. Comercio internacional, convergencia y las instituciones*. México: Editorial El Colef y Plaza y Valdés.

Díaz-Bautista, Alejandro (2003a). Tijuana's Dynamic Unemployment and Output Growth. *Frontera Norte*, 15(29).

Díaz-Domínguez, Mauro (1995). Convergencia Económica. Tesis de licenciatura en Economía. Instituto Tecnológico Autónomo de México (ITAM).

Dollar, D. and Wolff, E.N. (1988). Convergence of Industry Labor Productivity among Advanced Economies, 1963-82. *Review of Economics and Statistics*, 70: S. 549-558.

Dollar, D., and Wolff, E.N. (1993). *Competitiveness, Convergence and International Specialization*. USA: MIT-Press, Cambridge.

Due, John F. (1961). Studies of State-Local Tax Influence on Location of Industry. *National Tax Journal*, 14 (2): 163-173.

Duffy, Neal E. (1994). Determinants of State Manufacturing Growth. *Journal of Regional Science*, 34 (2): 137-162.

Edwards, S. (1992). Trade Orientation, Distortions and Growth in Developing Countries. *Journal of Development Economics*, 39(1): 31-57.

Esquivel, G. (1999). Convergencia regional en México. *El Trimestre Económico*, LXVI, October-Decembre. Mexico.

Fischer, Stanley (1991). Growth, Macroeconomics, and Development. *NBER Macroeconomics Annual*, 6: 329-364. Retrieved from: https://www.journals.uchicago.edu/doi/abs/10.1086/654175

Garza Campos, Marco Antonio (1994). Diferencias interestatales en niveles de vida:: Evolución 1970-1988. Entorno Económico. *Boletín trimestral del Centro de Investigaciones Económicas*, XXXII(1). UANL, Monterrey.

Gerschenkron, A. (1962). *Economic Backwardness in Historical Perspective: A Book of Essays*. Cambridge, MA: Belknap Press of Harvard University Press.

Gouyette, C., and Perelman, S. (1997). Productivity Convergence in OECD Service Industries. *Structural Change and Economic Dynamics*, 8: S. 279-295.

Grossman, G.M., and Helpman, E. (1989). Product Development and International Trade. *Journal of Political Economy*, 97: 1261-1283.

Grossman, G.M. and Helpman, E. (1991). *Innovation and Growth in the Global Economy*. Cambridge, MA: The MIT Press.

Hanson, Gordon H. (2000). US-Mexico Integration and Regional Economies: Evidence from Border- City Pairs. *Journal of Urban Economics*, 50 (2): 259-287.

Instituto Nacional de Estadística y Geografía (INEGI) (2015). *México's Statistics*. Data set at: http://www.inegi.gob.mx/

Koopmans, T.C. (1965). On the Concept of Optimal Economic Growth. In: Rand McNally, (Ed.), *The Econometric Approach to Development* Planning. Amsterdam: North Holland Publishing Company.

Krugman, P. (1991a). *Geography and Trade*. Cambridge, MA: MIT Press.

Krugman, P. (1991b). Increasing Returns and Economic Geography. *Journal of Political Economy*, 99(3): 483-499.

Lucas, Robert E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22: 3-42.

Lucas, Robert E. (1990). Why Doesn't Capital Flow from Rich to Poor Countries? *American Economic Review Papers and Proceedings*, 80(2): 92-96.

Lustig, Nora (1998). *Mexico - The Remaking of an Economy*. 2nd Edition. Washington, D.C.: The Brooking Institution.

Mankiw, N.G. (1993). *Macroeconomics*. New York: Worth Publishers.

Mankiw, N.G.; Romer, D., and Weil, D.N. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics*, 107 (2): 407-437.

Marshall, A. (1965). *The Economics*. USA: Cornell University Press, H. Milford, Oxford University Press.

Mauro, Paolo (1995). Corruption and Growth. *The Quarterly Journal of Economics*, 110(3): 681-713.

Messmacher, Miguel (2000). Desigualdad regional en México. El efecto del TLCAN y otras reformas estructurales. Documento de Investigación No.2000-4, Dirección General de Investigación Económica, Banco de México, Diciembre, pp. 1-33.

Ministry of Education (2015). *Educational Statistics*. Secretaría de Educación Pública, Mexico. Data set at: https://www.gob.mx/sep

Mulligan, C., and Sala-I-Martin, X. (1992). Two Capital Goods Models of Economic Growth. *Unpublished Paper*.

Munnell, A.H. (1990). How Does Public Infrastructure Affect Regional Economic Performance? *New England Economic Review,* Federal Reserve Bank of Boston, issue September/October. pp. 69-112.

North, Douglass C. (1990). *Institutions, Institutional Change and Economic Performance, Political Economy of Institutions and Decisions*. Cambridge: Cambridge University Press.

North, Douglass C. (1993). *Institutions and Productivity in History*. USA: Washington University.

North, Douglass C. (1994). *Institutional Change: A Framework of Analysis*. USA: Washington University.

North, Douglass C., and Thomas, R. (1973). *The Rise of the Western World: A New Economic History*. Cambridge: Cambridge University Press.

Organisation for Economic Co-operation and Development (OECD) (1994). *The Measurement of Scientific and Technological Activities. Proposed Standard Practice for Surveys of Research and Experimental Development*. FRASCATI Manual 1993. Paris: OECD.

Organisation for Economic Co-operation and Development (OECD) (1997). *ISDB 98, International Sectoral Data Base. User's Guide*. Paris: OECD Proceedings.

Organisation for Economic Co-operation and Development (OECD) (2000). *Main Science and Technology Indicators*. Paris: OECD.

Paci, R. (1997). More Similar and Less Equal: Economic Growth in the European Regions. *Weltwirtschaftliches Archiv*, 133(4): S. 608-634.

Porter, Michael E. (1998). Clusters and the New Economics of Competition. *Harvard Business Review*, November-December.

Rebelo, S. (1991). Long-Run Policy Analysis and Long-Run Growth. *Journal of Political Economy*, 99: 500-521.

Rodrik, Dani (2001). *Institutions, Intergration and Geography: In Search of the Deep Determinants of Economic Growth*. Harvard University. Retrieved from: https://drodrik.scholar.harvard.edu/files/dani-rodrik/files/institutions-integration-geography.pdf

Romer, P.M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy*, 94: 1002-1037.

Romer, P.M. (1990). Endogenous Technological Change. *Journal of Political Economy*, 98: S71-S102.

Romer, D. (1996). *Advanced Macroeconomics*. New York: McGraw-Hill.

Rose-Ackerman, S. ([1974] 1978). *Corruption: A Study in Political Economy*. New York: Academic Press.

Rose-Ackerman, S. (1999). *Corruption and Government: Causes, Consequences and Reform*. New York: Cambridge University Press.

Sachs, J., and Warner, A. (1995). Economic Reform and the Process of Global Integration. *Brookings Papers on Economic Activity*, 1: 1-118.

Sala-i-Martin, X. (1996). Regional Cohesion: Evidence and Theories of Regional Growth and Convergence. *European Economic Review*, 40(6): 1325-1352.

Sala-I-Martin, X. (1997). I Just Ran Two Million Regressions. *American Economic Association Papers and Proceedings*, 87:178-183, May.

Sala-i-Martin, Xavier X., and Barro, Robert Joseph (1995). Technological Diffusion, Convergence, and Growth. *Center Discussion Paper*, No. 735, Yale University, Economic Growth Center, New Haven, CT.

Salinas de Gortari, Carlos (2000). *Mexico, un paso difícil a la modernidad*. Barcelona: Plaza y Janes Editores, S.A.

Samuelson, Paul A. (1971). Ohlin Was Right. *The Swedish Journal of Economics*, 73(4): 365-384, Dec.

Saxenian, A. (1994). Regional Networks: Industrial Adaption in Silicon Valley and Route 128. *A Journal of Policy Development and Research*, 2 (2): 41-60.

Secretaría de Desarrollo Económico (SEDECO) (2015). *Economic Statistics*. Mexico. Data set at: https://www.sedeco.cdmx.gob.mx/

Secretaría de Educación Pública (SEP) (2015). *Educational Statistics*. Ministry of Education. Data set at: https://www.gob.mx/sep

Secretaría de Educación Pública (SEP) (2000). Estadísticas Educativas. México: SEP. Website: http://www.sep.gob.mx

Solow, R.M. and Swan, T.W. (1956). Economic Growth and Capital Accumulation. *Economic Record*, 32: 334-361. https://doi.org/10.1111/j.1475-4932.1956.tb00434.x

Solow, R.M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70(1): S. 65-94.

Sternberg, R. (1999). Innovative Linkages and Proximity: Empirical Results from Recent Surveys of Small and Medium-Sized Firms in German Regions. *Regional Studies*, 33: 529-540.

Storper, M. (1992). Regional 'Worlds' of Production: Learning and Innovation in the Technology Districts of France, Italy and the USA. *Regional Studies*, 27: 433-455.

Swan, T.W. (1956). Economic Growth and Capital Accumulation. *Economic Record*, 32: S. 334-361.

Tanzi, V. (1998). Corruption Around the World: Causes, Consequences, Scope, and Cures. *IMF Staff Papers*, 45(4): 559-94.

Transparencia Mexicana (2001). Encuesta Nacional de Corrupción y Buen Gobierno (ENCBG). México. Retrieved from: https://www.tm.org.mx/wp-content/uploads/2013/05/Presentacion-Encuesta-Nacional-de-Corrupci%C3%B2n-y-Buen-Gobierno-2001.pdf

Transparency International (2000). Transparency International Releases the Year 2000 Corruption Perceptions Index. Transparency International the Global Coalition Against Corruption. New index is based on multiple surveys from 1998-2000. Retrieved from: https://www.transparency.org/en/press/transparency-international-releases-the-year-2000-corruption-perceptions-in.

Transparency International (2002). The Integrity Pact. The Concept, the Model and the Present Applications. A Status Report. Transparency International Integrity Pact and Public Procurement Programm. Retrieved from: https://baselgovernance.org/sites/default/files/2020-03/ti_the_integrity_pact_a_status_report_2002.pdf

Verspagen, B. (1991). A New Empirical Approach to Catching up or Falling behind. *Structural Change and Economic Dynamics*, 2: 359-380.

Wei, Shang-Jin (2000). Natural Openness and Good Government. NBER Working Paper No. W7765.

Wheat, Leonard F. (1986). The Determinants of 1963-77 Regional Manufacturing Growth: Why the South and West Grow. *Journal of Regional Science*, 26(4): 635-659.

Wolff, H. (1993). Trade Orientation: Measurement and Consequences. *Estudios de Economía*, 20: 52-72.

World Bank (2015). *World Development Indicators (cd-rom)*. Washington, DC. Data set at: https://databank.worldbank.org/source/world-development-indicators

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Regional economics in Mexico is concerned with the spatial allocation of economic activity. It is centered along the analysis within regions and states or metropolitan areas of a country. Mexico as a country is now one of the fastest-growing economies in Latin America and a model of financial and commercial integration. But formidable development and economic growth challenges lie ahead for Mexico in the next quarter century, as it observed the deep contrasts between Mexico's rich and poor states, growing urban centers and destitute rural areas, and between Mexicans rich enough to be considered between the richest men in the world and owning companies that are able to compete with industrialized countries, and those Mexicans for whom the benefits of globalization have not yet materialized.

In the coming years, Mexico faces many challenges in order to support economic growth. The economic reforms, including the financial sector reform, labor reform, energy and decentralization, promises to give the country a greater legitimacy, stronger sustainability and a higher rate of economic growth.

The present book covers the effects of human capital and research and development on growth and regional convergence in Mexico. It also takes a closer look at institutions and economic growth in Mexico; and also covers trade, economic growth and convergence.

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