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**The Petroleum Sector in Latin America:
Reforming the Crown Jewels**

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The Petroleum Sector in Latin America: Reforming the Crown Jewels

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Résumé

Le secteur pétrolier en Amérique latine, ou comment réformer les joyaux de la couronne

Cette étude analyse la transformation institutionnelle du secteur pétrolier en Amérique latine et examine différents choix politiques et calendriers de réforme. L'Amérique latine, qui offre plusieurs modèles d'ouverture et de dynamique énergétique, fournit un cadre d'analyse intéressant sur le processus de libéralisation dans le cas d'un pays importateur (Brésil), d'un pays traditionnellement autosuffisant (Argentine) et chez des exportateurs (Mexique et Venezuela). On a prouvé que le niveau d'ouverture du secteur pétrolier d'un pays donné est en raison inverse de son degré de dépendance à l'égard des revenus du pétrole : les pays les plus dépendants de leur secteur pétrolier pour les revenus d'exportations et leurs recettes fiscales ont tendance à être moins ouverts à l'investissement étranger. En général, ce principe s'applique aussi en Amérique latine : les importateurs de pétrole et les pays autosuffisants tels que l'Argentine, le Pérou, la Bolivie et le Brésil ont de fait des industries pétrolières plus ouvertes à la participation du secteur privé que les exportateurs (Venezuela, Colombie, Équateur et Mexique). Toutefois, le degré d'ouverture varie beaucoup au sein même de chacune de ces catégories très générales. Cette étude montre que les différences entre pays de même catégorie sont fonction de la situation stratégique et financière de la compagnie nationale du pétrole antérieurement à la réforme, laquelle est liée à l'évolution institutionnelle de l'industrie pétrolière dans ces pays.

Abstract

This paper studies the institutional transformation of Latin America's oil sector. It discusses specific policy choices and the timing of reforms in this industry. Latin American countries present different models of openness and energy-sector dynamics, and allow for an analysis of the liberalization process from a range of points of view: that of an importer (Brazil), of a historically self-sufficient country (Argentina) and of oil exporters (Mexico and Venezuela). The degree of dependence on oil revenues has proven in general to be negatively correlated with the level of openness of the oil

sector. That is, countries more dependent on their oil sector for foreign and fiscal revenues tend to be less liberalized and open to private investment. This principle also holds true in Latin America: oil importers and self-sufficient countries like Argentina, Peru, Bolivia and Brazil indeed have oil industries that are relatively more open to private sector participation than those of the oil exporters in the region (Venezuela, Colombia, Ecuador and Mexico). However, different levels of openness exist within these general categories of importers and exporters. This paper will further argue that differences among countries in the same category are a function of the strategic and financial position prior to reform of their respective National Oil Companies (NOC), which is in turn related to the institutional evolution of the oil industries in these countries.

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"History matters. It matters not just because we can learn from the past, but also because the present and the future are connected to the past by the continuity of a society's institutions. Today and tomorrow's choices are shaped by the past. And the past can only be made intelligible as a story of institutional evolution."

Douglas North¹

INTRODUCTION

Since the late 1980s, Latin American countries have undertaken radical and intensive privatization; however, with very few exceptions, the idea of a market-driven economy has not completely taken hold in the mineral commodity sector, where state control is still very present. Lack of reform in this sector is partly due to the traditional importance of minerals as a key economic resource, a source of both fiscal revenue and foreign exchange. Nevertheless, no institutional structure can entirely escape the force of change, and as such, even the oil sector has undergone an important transformation.

Such change can take numerous forms. Latin America's oil sector is a rich example of change diversity, as it has tested an array of institutional schemes extending from complete privatization (Argentina), through a more state-controlled liberalization process (Brazil and Venezuela) to complete state ownership of the sector (Mexico). As will be discussed below, institutional changes to Latin America's oil sector have resulted from both demand and supply pressures. However, neither the choice of the form of adjustment nor the timing of reform is self-evident, but are rather responses to a country's status as an oil importer or exporter, and to the institutional characteristics and evolution of the individual oil sector.

This paper addresses the institutional transformation of the Latin American oil sector. It discusses particular policy choices and the timing of reforms. The Latin American case encompasses different models of openness and energy-sector dynamics, and provides an interesting framework to analyze the liberalization process from the varying points of view of an importer (Brazil), a historically self-sufficient country (Argentina) and of oil exporters

¹ *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, 1990.

(Mexico and Venezuela). The degree of dependence on oil revenues has proven to be negatively correlated with the level of openness of the oil sector. That is, countries more dependent on their oil sector for foreign and fiscal revenues tend to be less open to foreign investment. Following this argument, oil-exporting countries should generally be less open to private investment than oil-importing countries. In general, this principle also holds true in Latin America: oil importers and self sufficient countries like Argentina, Peru, Bolivia and Brazil indeed have oil industries that are relatively more open to private sector participation than do the oil exporters in the region (Venezuela, Colombia, Ecuador and Mexico).

However, this paper will also argue that, within these general categories, differences in the level of openness are also a function of the strategic and financial position held by each state's National Oil Company (NOC) prior to reform, which is tied in turn to the historical institutional evolution of the oil industries in these countries. In this sense, Argentina's radical liberalization was a response to the inefficient institutional structure of its own industry, which had created a revenue-deficient NOC that required transfers from the state instead of the other way around. Conversely, Petrobras's relatively more efficient institutional structure reduced the incentives for total privatization of its assets "à l'Argentine", allowing the reform process to follow a more balanced mix between state and markets. For oil exporters, the NOC's strategic financing role implies that, in general, there are few incentives for partial or total opening of the NOC's capital structure to private participation. However, supply pressures have created incentives for a partial opening of the sector at the upstream level, in the form of joint ventures with private companies. Again, major differences in the degree of openness exist between the two major oil exporters, Venezuela and Mexico, differences that are determined by the institutional dissimilarities of their NOCs. Mexico's Pemex developed into an inward-oriented institution with a powerful clientelist structure that opposes any liberalization of the sector. Conversely, PDVSA's externally oriented corporate culture has embraced a certain level of liberalization in order to remain internationally competitive.

The paper's argument is developed in four parts. The first part looks at Latin America's energy situation in order to understand the supply and demand dynamics that are pressuring the region to move towards energy liberalization. The second part analyzes oil sector reform in the region. It reviews the institutional transformation of downstream and upstream oil sector components in major Latin American countries. The third part presents a historical account of the evolution of the oil industry in certain Latin American countries and reviews the role of domestic institutions in shaping policy choice. Finally, the fourth part will review the financing role of NOCs to assess how fiscal dependence affects the level of openness in Latin America's oil industries.

LATIN AMERICA'S ENERGY SECTOR : AN OVERVIEW

Few studies concerning the energy industry in Latin America exist in the field of comparative political economy, mostly because oil and the oil industry are generally analyzed in the context of case studies about Venezuela or Mexico. Thus, in order to compare reforms in this industry from a regional perspective, one must first start by understanding the relevance of this industry for the region in terms of production, consumption, exports and reserves.

Latin America has historically been a net exporter of oil. Since the 1970s, oil has been the region's single most important export, although its share has been decreasing (see Table 1). As the largest oil consumer in the world, the United States is the main importer of Latin American oil exports (absorbing approximately 50 percent of Latin America's total oil exports). Yet this is indeed an oil partnership since, while Latin America supplies 36 percent of US total crude oil imports, it also accounts for 39 percent of total oil product imports from the US.

Most countries in Latin America produce some oil. They differ not only in terms of the quantities produced, but also in domestic consumption levels, which in turn determine their net balances and thus their capacity to export. As Figure 1 shows, Latin America has two major oil exporters, Venezuela (2.74 Mb/d in 2000) and Mexico (1.6 Mb/d in 2000), which together account for 75 percent of the region's exports and 65 percent of total oil production. Ecuador, Colombia and Argentina can be considered second-tier Latin American exporters, with oil exports in the range of 250,000-550,000 b/d. Peru is striving for self-sufficiency, and not succeeding, given the increase in its net oil deficit in the late 1990s. Brazil, the third largest producer in the region, is also the region's biggest importer; its net oil deficit has decreased substantially in the latter part of the 1990s.

Trade balances for Latin America show an increase in the region's export capacity in the 1990s, not only for traditional oil exporters like Venezuela, Mexico and Ecuador, but also for new exporters like Colombia and Argentina, who joined the oil exporter list in 1986 and 1990 respectively. Despite this increase in crude oil exporting capacity, the balances for oil products (such as gasoline, fuel oil, kerosene etc.) remain negative in most countries (see Figure 2). Only Venezuela, a traditional exporter of crude oil and oil products, shows a large positive balance in the overall oil trade. However, it is surprising that the second runner-up is Argentina and not Mexico, the latter in fact with a negative trade balance surpassing Brazil's in 1999. This reflects Mexico's deficiencies at the downstream level, which are tied to the lack of investment in the sector. Argentina's production capacity expansion in the petroleum product market resulted from downstream liberalization of its oil industry in the early 1990s.

Studying the oil industry in Latin America is of utmost importance, not only because oil is one of the most successful export products of the region but also because of the region's increasing role as a consumer of oil and gas. Increasing energy/GDP ratios, which depict the elasticity of energy consumption to GDP growth, are a sign of the growth in energy demand. The region has experienced an average economic growth rate of about 3 percent during the 1990-2000 period, of which industrial production was an important component (with an almost 4 percent average growth rate from 1990-2000).² The industrial sector's increase in output is an important driver of energy demand, as this sector is particularly energy intensive.

Energy demand is an important driver of oil and gas consumption because, despite diversification into other energy sources such as hydroelectricity, oil continues to cover more than 60 percent of the region's primary energy consumption needs (see Figure 3). This figure shows a higher dependence of Latin America on oil than the average for the world as a whole, where oil represents 39 percent of total primary energy consumption. Nevertheless, natural gas is now the most dynamic component of energy demand growth, averaging a 4 percent increase annually. According to these estimates, natural gas consumption will almost double by 2010, fueled by the demand for electricity, industry's

² Averages are from the major Latin American economies (Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay and Venezuela). Statistics taken from the Economist Intelligence Unit country database (April 2002).

conversion to gas as a source of energy, and the increasing use of gas by residential customers.³

Until recently, primary energy requirements for natural gas in the region were tied to the availability of naturally occurring resources in each country, given the difficulties in transporting this hydrocarbon product. For example, the natural gas share in Brazil's energy mix was about 6.4 percent in 2000 (already an increase from 5 percent in 1999), while neighboring Argentina's share was as high as 55 percent. Yet the liberalization of gas markets throughout the region, coupled with infrastructure development, has generated an interesting trade in energy resources with important growth potential, particularly within Mercosur. Various intra-regional pipelines have recently been constructed (and more are projected), connecting gas-abundant Argentina and Bolivia to gas-deficient Brazil and Chile. Moreover, environmental concerns in highly populated and polluted Latin American cities like Sao Paulo and Mexico City, and the instability of the hydroelectric supply tied to recurrent droughts, as seen in the 2001 Brazilian crisis, provide additional incentives for converting to gas as an energy source.

Latin America in comparative perspective

Energy demand growth is not a phenomenon unique to Latin America: Asia's energy consumption, for example, has doubled in the past decade and its relative share of global consumption is in the same range as that of Europe and North America (see Table 2). In Asia Pacific, emerging Asia's⁴ share was 19 percent of total world consumption in 2000, up from a 12 percent share in 1990. This implies that energy security issues have become less a North vs. South matter and more a generalized issue among developing nations as well. The 1998 fall in oil prices in response to the economic crisis in Asia was a reflection of this reality.

Table 2 compares Latin America's proven oil reserves, oil production and consumption with other regions in the world. In production terms, the region has increased its market share to almost 14 percent of world production in 2000, from 11 percent a decade ago. This ranks Latin America, along with Canada and the US, as the second most important oil-producing region in overall terms, although the Middle East has a comfortable lead over any other region (with an incontestable 31 percent of world production in 2000).

Brazil, Mexico and Venezuela were particularly responsible for the region's increase in oil production capacity in the 1990-2000 period, accounting for 75 percent of the total expansion. Venezuela, for example, accounted for 35 percent of the region's oil output increase in the 1990-2000 period, while Brazil and Mexico were responsible for 22 percent and 17 percent, respectively.

Important developments on the production side (see Table 3) are somewhat clouded by the region's stagnant reserve base (2.1 percent from 1990-2000) which, if unchecked, could compromise future production capacity. As a result, reserve-to-production ratios

³ An important part of future electricity generated in Latin America is expected to come from natural gas-fueled co-generating plants. Electricity generated in the region until now has been mainly based on hydroelectricity and thermal capacity (fuel and carbon).

⁴ Emerging Asia includes Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, Singapore, South Korea, Taiwan, and Thailand.

have somewhat decreased in the 1990-2000 period. The region's almost stagnant reserve base in the past decade, though, is primarily due to Mexico's downward revision of its proven reserves in line with worldwide accounting practices⁵. Excluding Mexico, proven reserves in the region showed a very positive balance increasing by 40 percent in the 1990-2000 period, with Venezuela, and to a lesser extent Brazil, accounting for the most important increases in the reserve base.

On the consumption side, Latin America is behind Asia, consuming almost 9 percent of total world oil demand versus emerging Asia's 19 percent in 2000. Historically, though, the region has seen an important surge in oil consumption: a 30 percent increase from 1990 to 2000, representing an average annual growth rate of 2.5 percent. Latin America is expected to continue this demand growth, implying a further 30 percent increase in oil consumption by 2010 (see Table 4). The perspective of increasing demand for oil and gas represents a challenge for the production side, one that will require important capital investment in the years to come.

The incentives for reform

The oil industry is capital intensive with extraordinary investment requirements, not only to increase production, but also to sustain current levels, given the industry's incremental costs. That is, the marginal cost or the cost of producing one additional barrel of oil increases over time. Marginal costs increase because oil wells become depleted and in time it becomes more difficult to extract an additional barrel of oil. In fact, as wells become depleted, additional investment is required just to maintain existing production levels.⁶

Thus, from the point of view of opportunity cost, the price of modernizing the oil industry (given the capital requirements involved) is very high. Moreover, the level of debt held by Latin American governments makes the financing of petroleum investment projects even more daunting. Opening the domestic oil sector to private capital is thus a financial alternative to indebtedness in foreign and national markets and/or to the use of scarce domestic resources.

As a result, Latin American oil exporters and importers have indeed engaged in the important process of opening up their oil industries, both upstream and downstream. Net oil importers like Brazil face a pressing demand for energy growth and a desire for medium term self-sufficiency (LAEB, 2000),⁷ while oil exporters like Venezuela face increasing competition from both OPEC and non-OPEC oil exporters crowding the oil market. Second-tier oil exporters face constraints on future production capacity, like Colombia, or on oil infrastructure investment, that require immediate attention if they are to continue to export in the future or even guarantee their own self-sufficiency. Colombia, for example,

⁵ In 1999 Pemex adopted a new methodology (in accordance with the Society of Petroleum Engineers and World Petroleum Congresses) to account for hydrocarbon reserves. Under the new methodology proven oil reserves decreased 39 percent from 47 to 28 billion barrels, while proven natural gas reserves decreased 51 percent from 62 to 30 trillion. (cf. Pemex Annual Reports, 1999).

⁶ For a detailed review of cost theory in the oil industry, see Adelman (1972).

⁷ It has been estimated that to develop its costly offshore resources, Brazil needs oil investment of about US\$20 billion from 2000 to 2020 (Cera, 1999).

requires about US\$15 billion of new investment in exploration and development for it to continue as a net oil exporter after 2004. Oil exports represented, on average, 30 percent of the country's total exports of goods in the 1999-2001 period. In the case of Ecuador, private investment was urgently needed for the development of additional infrastructure to transport oil from production sites to the exporting sites located on the Pacific coast. A private consortium, OCP, is now responsible for this new pipeline in Ecuador.

Regardless of their situation, all countries face important financial capital requirements that need to be met. According to World Bank estimates, the Latin American oil sector requires investment of more than US\$130 billion between 2000 and 2010, which means US\$12 billion annually of energy capital. Moreover, with Latin American countries facing important budget constraints, private investment, either foreign or domestic, seems to be the only financially viable solution to meet the region's energy needs.

Despite the obvious advantages to opening the domestic oil industry to foreign investment, only Argentina has really privatized its oil sector. Most of the countries in the region still have their own NOC, limit competition in either (or both) downstream and upstream activities, impose ownership limitations on private investment at certain levels of the production chain, or require a certain level of participation of the NOC in joint ventures to exploit hydrocarbon resources in the country.

Moreover, Latin American countries have not followed the same paths or patterns in liberalizing their energy sectors and their reform processes have been timed differently. The next section will review the institutional changes in Latin America's oil and gas sector from a comparative perspective.

OPENING THE LATIN AMERICAN PETROLEUM SECTOR

"Public enterprises remain major players in Latin American economies. Those privatizations that grabbed the headlines over the past decade were generally the easiest ones. Many of those that remain will have complex preconditions for disinvestment, putting the political and technical capacities of the owner governments to a difficult test."

Moises Naim⁸

The terms 'liberalization' or 'openness' are used in this paper to describe the incorporation of the private sector into the oil and gas industry. In this sense, the opening of Latin America's oil and gas sector has taken different paths. At one end lies Argentina, which has not only allowed private sector participation at all levels of the production chain but has also privatized its former NOC. Although not completely liberalized, Brazil has revoked its NOC's monopoly by allowing the private sector to participate in exploitation of the country's hydrocarbon resources at the upstream level via concessions; however, the NOC still retains an important presence in the downstream sector. Venezuela trails Brazil's level of openness to foreign investment, but allows its NOC, PDVSA, a greater monopoly in

⁸ *Latin America's Journey to the Market : from Macroeconomic Shocks to Institutional Therapy*, International Center for Economic Growth Occasional Papers n°62, San Francisco, California : ICS Press, 1995.

the oil industry and limits private sector participation in its capital structure. Finally, at the other end of the spectrum lies Mexico, which has largely maintained the totality of the oil industry under state monopoly control. (See Table 5 for an overview of the level of oil-sector liberalization in different Latin American states.)

Among the most liberalized regimes in Latin America we also find different policy patterns. Argentina, Peru and Bolivia liberalized the sector at all levels of the value chain, but privatized their NOCs differently. Argentina, for example, left YPF, its former NOC, as a vertically integrated company, but then forced it to compete with national and foreign companies at all levels of the industry. The privatization method used initially was to float the company on the stock market, although the government at first retained a 20 percent share, which it then sold in 1999 to Repsol, a Spanish oil company. Before becoming part of the Spanish oil multinational, YPF was the largest industrial company in Argentina, representing 20 percent of the domestic stock market.

Peru, on the contrary, divided PetroPeru into operating units and has gradually privatized each unit separately to individual private companies, which has ensured the absence of a privatized integrated oil company.⁹ Peru's objective was to prevent the development of an important company holding a monopoly in its oil industry, such as the case of YPF (now Repsol/YPF) in Argentina. Despite the continued existence of the state company, Peru is open to private investment at all levels of the value chain. PetroPeru has disinvested from all production activities.

⁹ For example, Peru's largest refinery, Pampilla, was sold to Repsol/YPF, with the Peruvian State retaining 40 percent of the stock. The lubrication plants were sold to Mobil Oil, and the upstream part of the business has been awarded to oil companies in the form of concessions.

Although Bolivia should be bundled together in the most liberalized group with Argentina and Peru, the path it has followed to open up its market is distinctive. YPFB's privatization scheme followed a capitalization design, which means that YPFB's equity stake is in fact owned by Bolivian nationals through a pension fund system.¹⁰ For privatization purposes, YPFB, the former state-owned company, was split into three operative units, of which it still holds 50 percent of the capital: two units for upstream operations and one for transportation.¹¹

The middle-of-the-road cases also show important differences. Venezuela, for example, offers different operating contracts that run from risk service contracts to product sharing agreements and joint ventures with private companies for exploration and development of oil and gas reserves. Nevertheless, most of Venezuela's dynamic opening process is at the upstream level, where investment needs are particularly pressing. Some efforts have been made to open up the downstream sector, but subsidies and price controls in Venezuela make this option unattractive to foreign participation.¹² Colombia and Ecuador have similar constraints for opening the sector at the downstream level and, like Venezuela, currently allow private sector participation upstream through PSAs and risk service contracts. Although in Colombia new private sector participation indeed requires an association with the NOC Ecopetrol, certain concessions agreements from the 1970s still exist, representing a small share (3 percent) of the country's total production. In all three cases, though, association with the NOC is a prerequisite for participation in the upstream sector.¹³

Opening up the upstream sector, albeit with limitations, has yielded important results. As Table 6 shows, another measure of the industry's openness to private investment is the actual share of total production that private companies have managed to secure. This table outlines the private sector's share in total oil production at the upstream level and in the total refinery capacity at the downstream level. Currently, private companies account for almost 34 percent of total oil production in Colombia,¹⁴ 44 percent in Ecuador (up from 2 percent in 1990) and 15 percent in Venezuela (non-existent in 1991).

A late participant in the opening-up process that began in the region in the early 1990s, Brazil has, since 1997, revolutionized its oil industry. From being practically closed to foreign investment, it has legally opened up the sector at all levels of the industry, revoked the NOC's legal monopoly and recently increased private participation in its equity

¹⁰ For a review of Bolivia's liberalization pattern see Villalobos (1997).

¹¹ Private investors hold the remaining 50 percent of each unit, and the management of these units was outsourced to private companies. Private participants in the operating units at the upstream level are Andina (formed by YPF, Perez Companc and PlusPetrol) and Chaco (formed by Amoco). The transportation unit went to the Enron-Shell consortium in the form of a long-term concession. YPFB reserved refining and wholesale distribution for itself.

¹² The distribution and marketing of oil products in the country is an example of the difficulties private companies face with highly regulated and subsidized markets.

¹³ Colombia, for example, initially required a 50-50 participation of the state and the private company in developing all upstream activities. In 1999, Colombia reduced its stake in oil contracts from 50 percent to 30 percent. This resulted in the signing of 32 new contracts with private companies in 2000.

¹⁴ Foreign investors' important share in oil production is due to the fact that Colombia never really closed its sector to foreign investment. The big policy development, enacted during nationalization in the 1970s, was the change from the concession to the association system under the 50-50 partnership principle.

structure. Nonetheless, the state continues to have majority participation in Petrobras, and the company has not been forced to divest its current assets. The NOC thus has a large stake in the domestic market, if not a monopoly position. As seen in Table 6, although production controlled by private companies is still practically negligible, the three rounds of concessions granted in Brazil between 1999 and 2001 (and the fourth round expected in 2002) are, in the medium term, expected to significantly increase the private sector's participation in total production.

At the other end of the spectrum lies Mexico, which has only achieved very timid reforms at the Pemex administrative level, as well as some advances in downstream activities, particularly in the transportation, storage and distribution of natural gas. Yet the core of the industry remains in the hands of the state. This extremely closed position, however, is not sustainable in the medium term. The important question for Mexico is, therefore, when and how to liberalize, not if.

INSTITUTIONAL EVOLUTION OF THE OIL SECTOR IN LATIN AMERICA

The initial liberalization process of the oil industry in Latin America can be analyzed from the point of view of a major importer (Brazil), of a self-sufficient country (Argentina), or of oil exporters (Mexico and Venezuela). These four cases cover the whole range of economic possibilities, or starting points, for oil sector liberalization.

These four countries also offer examples of different historical patterns with respect to the development of their oil industries. While Venezuela has been historically an oil exporter, Mexico was, from the 1940s to the 1970s, self-sufficient. Argentina and Brazil have both been oil importers, but Argentina has been mainly self-sufficient since the 1960s. One aspect of the liberalization of the oil sector in the region is that, regardless of the starting point of these countries, the liberalization process has changed the configuration of the domestic oil industries and will probably continue to do so. For example, Argentina became a net oil exporter after the opening of its industry to foreign participation in the 1990s. Brazil's liberalization process seeks to shift the country from its position of being a net importer of almost 50 percent of its oil consumption to self-sufficiency.¹⁵

Whatever their current status, both Brazil and Argentina opened up their industries in an effort to guarantee self-sufficiency. Yet they followed different paths, with Argentina taking a big-bang approach to oil sector reform and Brazil a more gradual approach to liberalization. The timing of the reform process also differed. Argentina began opening its oil sector in the early 1990s, while Brazil did not start its liberalization process until 1999. Because of their different policy choices and the different timing of their reforms, they offer an interesting comparison to oil exporters like Mexico and Venezuela, which have also followed different dynamics and timing in reforming their oil industry. Venezuela's PDVSA pushed for, and thus was able to control, the opening process in the country, without having its monopoly position contested. In the case of Mexico, Pemex is the main obstacle to further reform of a sector that continues to strongly restrict private investment. Mexico is not only significantly restrictive when compared to its Latin American counterparts, but currently has one of the most restricted oil sectors in the world.

¹⁵ The government expects to be self-sufficient by 2005.

These four countries, along with their other Latin American counterparts, have also developed national oil companies that rival oil multinationals in their operational and financial standards. Tables 7 and 8 show that these NOCs rank among the 50 largest oil companies worldwide and are, in each case, the largest company in their country. For example, according to Petroleum Intelligence Weekly's rankings, PDVSA was ranked number 2 among all integrated petroleum companies in the world, second only to Saudi Aramco. Pemex and Petrobras are among the 15 largest petroleum companies in the world.¹⁶ Before its total privatization in 1999, Argentina's YPF ranked as the 30th largest oil company in the world.

The events that led to the liberalization of Latin American economies in the 1990s have been well documented. The debt crisis was the trigger that changed the incentives of the players involved and prompted radical policy change in the region. The reason underlying such disruption was the collapse of the import-substitution industrialization (ISI) model. A more in-depth study of this period is beyond the scope of this paper. However, literature on the political economy of reform does give good insight into the microeconomics of this process, especially since the oil sector was of key importance during the ISI period and is one of the few sectors where state ownership has survived. An understanding of the underlying reasons for oil-sector reform is thus tied to how the industry evolved and to the institutional structure each state adopted. Following is a brief background analysis of the oil industry in the four countries chosen for review, and the liberalization process in each of them (see Table 9 for a chronology of the process of reform).

Argentina: Complete Liberalization

Before Latin America seriously engaged in statist development models, the region had already seen the creation in 1922 of the first NOC in the Western Hemisphere: Argentina's Yacimientos Petrolíferos Fiscales (YPF), whose goal was to exploit the country's limited oil resources. YPF initially coexisted with private companies in the Argentine energy market; it was not until 1949 that the industry was nationalized under President Juan Peron, with YPF left as the sole company operating in the country.¹⁷ Although output increased between 1950 and 1955, oil imports increased by 20 percent in this five-year period, representing 60 percent of total oil consumption and taking their toll on external accounts.¹⁸ This situation forced the Frondizi government to permit private participation again in 1958. The steps taken by the short-lived Frondizi administration were highly successful: oil production tripled and the country almost reached self-sufficiency. However, in 1963 the

¹⁶ Petroleum Intelligence Weekly rankings are the result of the simple sum of the ordinal ranks of each company in six different categories: total oil reserves, total gas reserves, total oil production, total gas production, total refinery capacity and total product sales.

¹⁷ Until the 1940s, the private sector represented almost half of the country's petroleum production (Gadano and Sturzenegger, 1998).

¹⁸ Already by the end of the 1950s, oil represented 23 percent of all the country's imports which, given the precarious foreign exchange situation, forced Peron at the end of his mandate (in 1955) to enter into an agreement with Standard Oil of California to reverse Argentina's declining oil production. The contract was annulled when Peron fell (Gadano and Sturzenegger, 1998).

civilian government was ousted, and contracts with international companies were cancelled.

In 1966, a new coup brought General Onganía to power and again a more pragmatic approach was adopted. In 1967, a new hydrocarbon law was passed allowing private sector participation in the form of concessions. Despite this legal opening, private sector participation was *de facto* limited to service contracts. Again, the overthrow of the government in 1970 impeded the implementation of a coherent program with private companies and, as a result, output stagnated.

It was not until 1976, under the new military regime, that there was a boost to foreign companies' participation in domestic oil production in the form of risk contracts. Interestingly enough, by the 1970s, Argentina's upstream sector was already more open to private participation than was Mexico in 2000. Nevertheless, despite further opening to foreign investment at the upstream level, stringent regulations at the downstream level led YPF to suffer significant losses.¹⁹ These restricted the company's financial capacities and resulted in high debt levels.²⁰ In fact, YPF's finances were a reflection of the country's own dire financial situation, which later exploded into economic crisis and hyperinflation in the 1980s.

To sum up, the country's failure to sustain production levels was tied to the government's irregular stop-and-go oil policy, which, in turn, was a result of the political and economic instability reigning in Argentina from the 1930s to the end of the 1980s. In 1985, an important attempt was made by the Alfonsín government to renegotiate private participation in Argentina's oil sector, when the country took the next logical step and allowed PSAs.²¹

Yet it was not until Carlos Menem came to power in 1989 that the radical transformation of the Argentine oil sector finally took place. By executive decree, Argentina became one of the most liberalized energy markets in the world,²² with private participation all along the production chain, private ownership of extracted crude oil and completely liberalized prices. Since 1993, YPF has been a publicly traded privatized company. The Argentine government sold its remaining 20 percent stake in YPF in 1999 to Repsol, a Spanish oil company.

. Argentina's liberalization process: 10 years later

The radical liberalization of Argentina's petroleum sector began in the early 1990s in the midst of an acute economic crisis. Contrary to other more recent experiences with oil

¹⁹ Since petroleum prices were controlled by the state, YPF ended up buying crude oil at a higher price than it obtained from the sale of its petroleum products.

²⁰ YPF's external debt rose from US\$640 million to US\$4.6 billion over the period from 1976 to 1982 (Gadano, 1998).

²¹ Despite efforts to open up the sector, the first auction of exploration licenses was not very successful. Only 50 percent of the areas tendered were awarded and only 2 out of 77 actually became operational, due to restrictions and regulations in the domestic energy market (Price Waterhouse, 1997).

²² Three regulatory decrees in the Hydrocarbons Act were signed in 1989, inviting bids on tenders for both secondary and central oil fields, eliminating quotas, lifting restrictions on prices and deregulating refineries. Restrictions were also removed on disposal of crude production, permitting producers to trade freely on local and international markets (Price Waterhouse, 1997).

liberalization in Latin America, Argentina's almost decade-long liberalization process provides an interesting time frame to review the sector's development:

- *Argentina, new oil exporter.* Overall, Argentina increased its oil production by 65 percent in the 1990-99 period, representing almost 4 percent annual growth in production capacity. Moreover, since the early 1990s, the country has been a net exporter of oil. In fact, oil is today one of the country's most important exports, currently representing almost 10 percent of total exports.²³

- *YPF, the Cinderella story.* After privatization, the former state enterprise YPF transformed itself from a revenue-losing concern into an efficient and profitable private oil company (see Table 10). The company's oil production increased fivefold, and its reserves by about 80 percent, between 1990 and 1997.

- *Argentine oil companies follow the globalization trend.* With Argentina's change to an oil exporter, the country's oil companies have also followed a process of internationalization. The two integrated Argentine oil companies were, until 1999, YPF and Perez Companc, which ranked as the country's first and third largest companies in terms of total sales. Direct foreign investment by Argentine companies abroad (80 percent of total Argentine FDI between 1990-96) was mostly oil sector investment in South America.²⁴ The rationale behind this internationalization process was the expansion of the oil reserve base of these companies, given the resource limitations in their own country and the profitable opportunities in neighboring countries that had just started liberalizing at the upstream level. As a result, YPF (before its merger with Repsol) and Perez Companc rapidly developed a significant international presence.

The Brazilian pattern: the state competes with private companies

Since 1953, the Brazilian oil industry has been primarily owned by the state through *Petróleo Brasileiro S.A. (Petrobras)*, which until 1995 had a constitutionally decreed monopoly on all the country's petroleum activities. Creating Petrobras was the answer to a policy debate in the country on how and who should develop the Brazilian oil industry, an important decision at a time when the country's industrialization was generating a boom in oil consumption. From 1950-60, for example, oil consumption increased by about 200 percent, an average annual growth rate of approximately 15 percent.

Before Petrobras was created, the Brazilian oil industry was embryonic. Oil production was not covered by national statistics until 1942 and during that entire decade, production did not surpass 2,000 b/d. In contrast, oil production in neighboring Argentina started around 1910, and by the 1940s production was about 60,000 b/d. Interest in the oil sector was primarily in the downstream part of the business, as Brazil's production capacity was highly doubtful, while its consumption potential looked promising.

Apart from the reasonable issue of the lack of an important resource endowment, the underdevelopment of the Brazilian oil industry before the 1950s was also due to the strict regulation of private investment, since this was viewed as a military and security industry

²³ Through a special taxation on petroleum products the government obliged drivers to use natural gas in cars so as to consume its major gas reserves and allow more oil for export purposes.

²⁴ In 1999 YPF was present in Indonesia, Ecuador, Colombia, Venezuela, the United States, Bolivia and Brazil and Perez Companc in Venezuela, Ecuador, Peru, Bolivia, the United States, Brazil and Chile.

(Philip, 1982).²⁵ This meant that the creation of Petrobras did not entail nationalization *per se*, since concessions had never been allowed to operate in the country, but did assure the state's control over the Brazilian petroleum industry.

Elsewhere in Latin America (for example, in Venezuela, Mexico and Argentina) foreigners were the first to develop the oil industry, which meant that an industry tradition and know-how existed at the time of nationalization. But Petrobras had to set up an oil industry practically from scratch. The lack of government expertise explains why, despite legalizing Petrobras's monopoly, domestic private refining companies that had existed in the country prior to 1953 continued operations (although they were not allowed to expand or create new refineries). Foreign companies were in particular allowed to operate in the field of distribution of refined products.

Petrobras was first set up as a state-owned company with majority state participation, but also with private equity participation to guarantee a certain level of capitalization. However, unlike the major transfer of assets in the Venezuelan nationalization process, Brazil's incipient industry led Petrobras to start with a limited oil infrastructure inherited from the former National Petroleum Council (CNP, or Conselho Nacional do Petróleo). The Brazilian government, though, was careful to allow the company financial and administrative independence, which, on the one hand, limited the political involvement seen in other NOCs, and on the other hand, allowed the company to function as a relatively efficient corporation, for a state-owned company.²⁶ Indeed, from the 1950s onwards Petrobras underwent important institutional change, expanding to all parts of the oil business. Petrobras set up a petrochemical company in 1967,²⁷ more than doubled its refining capacity by the 1980s, developed an oil transportation fleet,²⁸ stole market share from private companies in distribution,²⁹ created a subsidiary for international trade (InterBras in 1976) and expanded into other fields by creating subsidiaries in fertilizers (1976) and mining (1977).

In the upstream sector, Petrobras left aside the development of domestic oil resources, in part because of perceived limitations concerning the country's resources. Instead, the company created a foreign subsidiary "BrasPetro" in 1972, to exploit oil elsewhere,³⁰ which

²⁵ Interestingly enough the government was more open-minded about the involvement of Brazilian nationals in the sector than of foreign capital (unlike the Venezuelan government's adverse position towards domestic capital).

²⁶ In the 1960s, Petrobras was placed under the Ministry of Mines, but the company's budget was not under the Ministry's control (Randall, 1993, p. 23).

²⁷ Pesquisa was created as a joint venture between Petrobras (51 percent) and the private sector (49 percent). The petrochemical industry was open to foreign and national capital from the start.

²⁸ Development of a transportation fleet was an important step for an import-oriented oil company.

²⁹ After the creation of Petrobras's distributing arm, Distribuidora, in 1971 (with Petrobras holding 74 percent of the total capital) the state company was able to increase its share of the distribution market from 10 percent in 1965 to 30 percent in 1973 (Philip, 1982, p.380). The idea of granting Petrobras a monopoly on distribution was discussed at some point, but it was rejected by Petrobras itself, which did not want to "damage good relations with the multinationals" (Randall, 1993, p. 26). Currently, Distribuidora holds almost 35 percent of the retailing market.

³⁰ BrasPetro is present in Angola, Colombia, Equatorial Guinea, Bolivia, US, Ecuador, Nigeria, the UK and Argentina.

proved much cheaper, more abundant and more cost efficient than at home. This policy demonstrated Petrobras's independence in terms of energy policy, since it did not support the objective for which it had been created, namely guaranteeing self-sufficiency at home. By concentrating efforts in well-known lower-risk areas and by associating with multinationals in production consortia in foreign countries, Petrobras developed important international expertise that it was later able to use at home. The drawback of this otherwise logical business decision to exploit oil resources where it was more cost efficient was the country's increasing dependence on oil imports at a time of oil price booms and increasing nationalization of upstream assets. During the 1970s, the country imported as much as 80 percent of total oil consumed, which meant a burgeoning import bill for the country. In 1980, for example, Brazil spent 60 percent of its foreign receipts on oil imports (Wirth, 1985). At that time, Brazil decided to launch the famous National Alcohol Program to cope with the energy crisis through the production of alcohol as a substitute for petroleum fuels used in internal combustion engines. The objective was to replace gasoline with ethanol extracted from sugarcane, and in this way reduce the important oil import bill by making use of alternate sources of fuel that were abundant in Brazil.

Therefore, during the 1970s, Brazil was forced again to resort to foreign investment in the form of risk contracts to be able to develop the country's oil resources and, hence, to decrease its large import requirements, an experiment that proved to be patently unsuccessful.³¹ Nonetheless, the price levels of the 1970s and early 1980s made Petrobras's development of its own oil resources profitable. As a result, Brazil, through Petrobras, was able to significantly increase domestic production by an unprecedented average 15 percent annually, which meant a 200 percent increase in production in the 1980-89 period. Petrobras's reorientation towards the development of the country's oil resources meant that the company, at last, was pursuing its initial objective of self-sufficiency: in 1999 domestic production satisfied about half the country's oil consumption, an important achievement from a share of less than 20 percent in the 1980s.

Despite the fact that Latin America was awakening to a very dynamic period of economic reforms and liberalization with the advent of democracy in 1988, the Brazilian government granted constitutional status to Petrobras's monopoly position in all activities related to oil and gas. Yet, less than ten years later, the country was once again discussing liberalization, this time in the hydrocarbon sector.

. Brazil's gradual opening process

Significant liberalization of the energy sector came during Fernando Henrique Cardoso's administration, when in 1995 the Brazilian Congress passed a constitutional amendment allowing private participation (both foreign and domestic) in all levels of the oil industry. A new petroleum bill regulating private participation in the oil and gas industry became law two years after the constitutional change (August 1997). With this law Brazil ended, albeit gradually, the 40-year monopoly of Petrobras. The major energy policy changes in Brazil are summarized below:

a) Construction of a framework for the eventual privatization of Petrobras:

Although full privatization of Petrobras has been rejected (for the time being), the 1997

³¹ 243 risk contracts were awarded to 18 foreign companies and four Brazilian companies, but only five of these contracts yielded results, and only at a limited level. In fact, production from these contracts accounted for less than two percent of total production.

Oil Law allowed the government to reduce its stake in the company to 50 percent plus one share. Until August 2000, the federal government owned 84 percent of voting shares and 53 percent of total capital. On August 10, 2000, the government sold 180.5 million lots of 100 shares for 7.3 billion Brazilian Reals (US\$4 billion). Some 40 percent of the shares were sold in Brazil and 60 percent were sold abroad, as Petrobras launched an issue of American Depositary Receipts (ADR) in New York. With this sale, the government now owns 33 percent of Petrobras's capital, but still holds a majority of voting rights (56 percent). The importance of the operation was not only the reduction of government participation in Petrobras, but also the fact that foreigners were allowed to hold private equity participation in the company's capital, which amounts in fact to a partial privatization of the company. New rules have also given Petrobras greater independence to function as a commercial company in a more competitive environment.³²

b) Petrobras retains its monopoly position:

Not only does Petrobras continue to be mostly government-owned, but also its dominant position in all aspects of the value-chain is assured, despite the opening of the sector to private participation (Cera, 1999). Petrobras will retain its uncontested leadership in the upstream part of the sector, despite new rules allowing private companies to fully exploit oil resources under both product-sharing agreements and concessions. Petrobras's dominant position is guaranteed by: a) special clauses allowing it to retain its rights in those areas in which it has already started to produce oil; b) the company's initial period of up to 3 years to start production in areas where it has determined proven reserves has now been extended from 5 to 9 years, and c) the three rounds of concessions for exploration blocks held between 1999 and 2001 reinforce Petrobras's dominant position, given the number of joint ventures signed with the company in the bidding process.

In downstream terms, the current framework also benefits Petrobras's market position by allowing it to retain existing refineries. Private companies wishing to invest in new refineries need the approval of the ANP (Petroleum Regulatory Agency), which reviews individual cases according to the agency's national refining plan.³³ For the time being, existing pipelines will also remain in Petrobras hands, but through a separate subsidiary that will also control sea terminals and oil tankers. With respect to transportation, private companies can build new pipelines and are entitled to use Petrobras's existing pipelines system for a set fee.

Petrobras has operated as a relatively efficient state-owned company despite its double role as a profit-oriented company with public and social goals to fulfill. Commercially and operationally, the company has achieved surprising technological advances in deep-water drilling, setting various world records.³⁴ The company has achieved important growth in domestic oil production of 1.255 million b/d in 2000, placing Brazil as the 16th most important oil producer in the world (PIW 2001 rankings). Petrobras's relative efficiency is

³² With the objective of separating Petrobras from the state, the national oil agency (ANC) was created to regulate all activities concerning the industry. Moreover, Petrobras was allowed to participate in joint ventures and create subsidiaries without congressional approval. Despite these positive developments, Petrobras will still be constrained fiscally by the fact that its investment plans have to be approved by Congress along with the federal budget.

³³ Since Petrobras holds 98 percent of the country's refining capacity, the concentration of ownership could create disincentives for new entries in the refining sector (Cera, 1997).

³⁴ About 80 percent of Brazil's production comes from offshore wells in the Campos Basin.

one of the reasons why total privatization of the company is not envisioned in the short run, as opposed to the inefficient and poorly managed YPF in Argentina before it was privatized in 1993.

Venezuela: PDVSA's bid for supremacy: the NOC in control of its own opening process

Venezuela is the Latin American economy with the highest dependence on oil. Oil exports represent around 80 percent of total exports, oil revenues represent approximately 50 percent of fiscal revenues and oil activities account for approximately 25 percent of GDP. Venezuela has paid an enormous price for its abundance of oil resources, as its high dependence on oil has also rendered its economy highly sensitive to external shocks. This is a clear example of a 'Dutch disease' country, where the inflow of petrodollars and their impact on the exchange rate has had a destructive effect on the non-oil trade sectors of the economy, such as industry and agriculture, rendering them uncompetitive and, in turn, making the country even more dependent on oil.³⁵

Of all the countries analyzed, Venezuela was the last to nationalize its oil industry. This meant that it had ample experience (half a century) of oil multinationals managing its oil industry. Oil production began in Venezuela in the early 1900s as a production option during Mexico's increasingly nationalistic stance towards multinational companies that culminated in expropriation of the Mexican oil industry in 1938. In the 1930s, Venezuela took Mexico's place as a major world oil producer, second only to the United States; it also represented Royal Dutch Shell's most important source of production (Boué, 1993), and was the largest world oil exporter from 1928 to 1969.

Venezuela's oil industry took root during the long regime of General Gomez (1908-1935). Gomez adopted a very liberal approach to foreign investment,³⁶ thus providing an important impetus to the development of the Venezuelan oil industry. The end of World War II marked the end of Venezuela's reign as the world's leading oil exporter, as it was displaced by more abundant and cheaper discoveries in the Middle East. Yet the country continued to be one of the most important producers and exporters in the world.

The coming of democracy in 1945, led by the social-democratic party Acción Democrática (AD), meant a change in oil policy. The new government was particularly critical of the existing energy policy and wished to reassert Venezuelan sovereignty over the oil industry, which meant a higher participation in oil rents, although it ruled out the idea of nationalizing the industry outright.³⁷ Sovereignty in the Venezuelan case was tied to higher participation in oil rents, not necessarily control over production resources, as in the cases of Argentina, Brazil and Mexico. Venezuela's political and economic history since the discovery of its petroleum resources has been a tug-of-war between the state and oil producers, foreign or state-owned companies, for participation in oil rents. The state

³⁵ For an account of the Dutch disease phenomenon, see Corden and Neary (1982).

³⁶ As Coronel notes, in the 1920s Venezuela had one of the most liberal petroleum regimes in the world, with exploration tariffs and royalties kept at low rates and import duties waived on petroleum equipment (Coronel, 1983, p. 9).

³⁷ For a review of AD's energy policy, see Betancourt (1978).

imposed additional taxes to ensure it would receive half of the net income regardless of the price of oil; this 50-50 principle became law in 1948.

A ten-year military dictatorship under General Pérez Jiménez interrupted the country's first attempt at a democratic government and postponed AD's energy policy changes for a decade. Nonetheless, by 1958, the return of democracy permitted the implementation of AD's more nationalistic oil policy and tougher fiscal terms.³⁸ The new AD government imposed the principle of no more new concessions or renewals of existing concessions, which meant a *de facto* gradual nationalization of the industry by 1983, when all existing concessions would revert to the State. This policy contributed greatly to the decline in production in the 1970s, as the lower production horizon led companies to cut long-term investment in the country. As had occurred in Mexico during Cardenas's nationalist government, Venezuela's nationalist leanings and tougher fiscal and investment terms for multinationals prompted a transfer of investments to the more investor-friendly Middle Eastern producers, whose cost advantage increased in proportion to Venezuela's tougher fiscal terms. As a result, investment in Venezuelan oil decreased by an estimated 80 percent from 1957 to 1964, which severely hurt the country's production growth.

. Venezuela's nationalization: a gentlemen's agreement?

With the multinationals' loss of interest in Venezuelan oil, the government decided to nationalize the industry during the Pérez administration in 1976, nine years before the 1983 deadline for the reversion of concessions came into effect.³⁹ The government thus hoped to halt the decline in production due to the reduction of external investment in the industry. Unlike its neighbors, Venezuela peacefully resolved the issues surrounding the nationalization process mainly because it was in the interest of all parties involved to do so. For multinationals, nationalization proved to be an interesting option since they "had effectively written off their investments in Venezuela and were hoping for some compensation from nationalization" (Philip, 1982, p. 305). For the Venezuelan government, good terms with the multinationals were essential to avoid disruption in production and exports, given their technical and marketing skills. In fact, oil multinationals continued to work with the recently nationalized oil industry right after the expropriation of their assets, through international marketing contracts designed to place the country's petroleum products internationally. In addition, the policy introduced in the 1960s of replacing foreigners at all levels of management guaranteed a rather smooth operational transition, since by 1975 only four percent of white-collar workers in the sector were foreigners.

PDVSA was created as a joint stock corporation whose sole stockholder was the Republic of Venezuela and was set up as a holding company to coordinate, supervise and plan for the 22 concessionaires operating in the country at the time of nationalization.⁴⁰ For administrative and operational purposes, the concessionaires were initially centralized into 14 companies, and a few years later were grouped into four vertically integrated

³⁸ Venezuela's most notable energy policymaker was Juan Pablo Pérez Alfonso, who served as Venezuela's Energy Minister from 1945-48 and 1959-1963, and was one of the key architects of OPEC.

³⁹ For an account of the nationalization process, see Coronel (1983).

⁴⁰ PDVSA effectively inherited a very well-developed industry composed of 22 thousand employees, 5 million acres of concessions, over US\$5 billion of valued assets in buildings and equipment including 12 refineries and 14 tankers (Lieuwen, 1985, p. 216).

subsidiaries: Lagoven (former Standard Oil of New Jersey), Maraven (Shell), Meneven (Gulf) and Corpoven (Mobil and CVP).⁴¹ This structure helped to bring competition to an otherwise monopolized industry, wherein each company operated with very different corporate cultures, mostly inherited from their former concessionaires (Coronel, 1983). In 1997, though, with the opening of the oil sector to foreign companies, PDVSA restructured the industry into functional units (Exploration and Production, Marketing and Services), centralizing its subsidiaries' operations and thereby erasing the oil industry's post-nationalization structure.

After organizing the domestic oil industry, PDVSA shifted its investment efforts from 1983 onwards towards developing a direct presence in consumer markets (see Table 11). In fact, Baena argues that the need to establish independent means for marketing crude (until now outsourced to former concessionaires) led to PDVSA's internationalization policy (Baena, 1999, p. 73). This policy consisted of acquiring refining capacity and access to retail outlets in consumer nations.

. Venezuela's Opening Process: Back to the Future

Lawmakers at the time of nationalization decided not to close the door to associations with foreign companies in the future because of their concerns about the operational and administrative capacity of the newly formed state oil company. This is the origin of Article 5 of the Nationalization Act, which legally permitted the possibility of private participation in the industry through operating contracts (service contracts) or strategic associations (joint ventures). Briefly, the legal provisions for opening the oil industry had existed since 1975, yet it was not until the early 1990s that this piece of legislation proved useful for PDVSA's own purposes.

Under the umbrella of Article 5, PDVSA announced in 1990 that it would auction marginal fields as risk service contracts, for which it did not need congressional approval. In fact, PDVSA had regularly signed service agreements with drilling contractors, oilfield service companies, seismic service companies and the like in order to carry out its petroleum operations. This time, however, PDVSA intended to subcontract the total operation to foreign investors for a period of about 20 years in return for payment in cash or kind. The country's real opening of its upstream activities, though, came with congressional approval of: i) strategic associations or joint ventures for developing gas resources and heavy crude oil resources of the Orinoco belt and, most importantly, ii) the introduction of production sharing contracts (PSAs) for exploiting PDVSA's normal crude oil reserves. In July 1995, Congress approved a bill allowing PDVSA to offer exploration and production rights to private companies on 10 potentially oil-rich tracts. The advantage of this scheme is that private companies assume all the exploration risk. If oil is found, and can be exploited commercially, then PDVSA and the private investor(s) form a joint venture to manage development of the field.⁴² PDVSA also entered into joint ventures with foreign companies to exploit heavy crude reserves in the Orinoco belt (called Hamaca, Cerro Negro, Sincor and Petrozuata; see Table 9).

⁴¹ In 1986, Meneven was taken over by Corpoven.

⁴² PDVSA's financial participation in this venture will vary from one percent to 35 percent. The new venture will be subject to all pertinent domestic taxes, the most important being an income tax of 67.7 percent and a royalty tax equal to 16.7 percent. These contracts have a maximum duration of 39 years.

. A note on Chavez: two steps back and a mild step forward

Concern regarding the possible reversal of the opening of the industry to foreign investment has risen with the Chavez administration (Hugo Chavez took power in February 1999). So far, however, the current administration has reiterated its willingness to respect past engagements and has left PDVSA's international holdings intact for the time being. However, the Chavez administration has proven to be at the least contradictory with respect to the role of the private sector in the oil industry. On the positive side, it has continued with the opening-up process but has changed the strategy away from oil to development of the country's gas resources. The new gas law allows private investment at all levels of production.⁴³ Under the new gas law approved in August 1999, the state legally relinquished PDVSA's monopoly over non-associated gas upstream and downstream operations (it has been estimated, though, that associated gas accounts for about 90 percent of all gas reserves in the country). The first licensing round for non-associated gas was launched in mid-2001 after numerous delays.

Although the Chavez administration has respected past contracts and has not reversed the opening process itself, it has implemented important changes that imply a redefinition or almost a reversal of the reforms implemented in the 1990s. First, changes in PDVSA's management and in the institutional equilibrium between PDVSA and the government have meant a shift towards greater government control over the company's operations. Increased political interference in PDVSA has undermined the company's financial capacity and worldwide reputation.⁴⁴ Second, the new constitution of 2000 is much more restrictive with respect to the possibility of opening PDVSA to private capital: last-minute changes to the wording of the Constitution prevented PDVSA's 100 percent state-ownership from attaining constitutional status. Instead, the Article in question provides a window of opportunity for private equity participation in PDVSA affiliates. Article 303 of the new Constitution reads: "For reasons of economic and political sovereignty and national strategy, the State will remain the owner of all the shares of *Petróleos de Venezuela SA*, or the entity created to run the oil industry [but this disposition] shall not apply to shares of PDVSA affiliates, strategic associations, firms or other entities which have been constituted or will be constituted as a consequence of developing the business." This does not mean, however, that the government is legally allowed to sell equity in its affiliates. The organic law for the regulation of the oil industry, which is the Nationalization Law (known by its Spanish acronym as *Loreich*), rules out this possibility. Thus, changes in the organic law would be required if such were the case (Vas and Escobar, 2000). Third, traditional Venezuelan indifference towards OPEC has changed to almost impeccable conduct in terms of respecting production quotas. This has affected the country's export share in world markets, and even its production capacity. This turnaround

⁴³ The failed Cristobal Colon gas development project (now called LNG project) has been revived from its defunct status since it was signed in 1994. This joint venture between PDVSA (33 percent), Shell (30 percent), Exxon and Mobil (29 percent) and Mitsubishi (8 percent), has nonetheless been scaled down from its original production goals.

⁴⁴ The rating of PDVSA Finance (the financing entity of PDVSA) has been traditionally above the sovereign rating (B2) and stood until March 2002 at Baa1. In April 2002, Moody's downgraded the foreign currency debt rating of PDVSA Finance Ltd. to Baa2 from Baa1. The downgrade was the result of the increased risk from the standoff between President Chavez and the employees of PDVSA over the control and direction of the state oil company. This is the second time since Chavez has been in power that PDVSA's ratings have suffered because of government interference: in February 2000, Moody's downgraded PDVSA Finance to Baa1 from A3.

in energy policy has been rewarded by OPEC countries, who appointed in January 2001 Mr. Ali Rodríguez, first Minister of Energy and Mines under Chavez, as the Secretary General of OPEC. Fourth, a new hydrocarbons law was decreed in November 2001. Royalty rates on oil production have been increased from 16.6 percent to 30 percent (the global average is reportedly 7.1 percent). PDVSA must now hold a 51 percent stake in any new exploration and production agreement. While the draft version of the law proposed a 30 percent fixed royalty rate, this was amended in the final version to take into account the higher production costs involved in Orinoco belt heavy crude projects or the development of marginal fields. Projects that can prove that they would not be financially viable at the 30 percent rate will be allowed a lower rate of 20 percent. However, the current political instability in Venezuela means that there is uncertainty with respect to the application of this new fiscal regime or to the changes in the equity participation of PDVSA in new contracts.

Mexico's highly restrictive oil sector

Nationalization of the Mexican oil industry in 1938 coincided with the beginnings of the modern Mexican state. Petróleos Mexicanos (Pemex) was granted a monopoly on all petroleum activities by the Constitution.⁴⁵ Foreign participation in oil and gas exploration, production and refining is still proscribed by the Mexican Constitution, which partly explains the constraints on the state to divest all activities concerning this commodity. Apart from the possibility of limited service contracts, exploration and production activities are off-limits to private capital. So far, the only substantial reforms include: a) restructuring Pemex operations into four units: Exploration and Production, Refining, Gas and Basic Petrochemicals and Petrochemicals; b) partial liberalization of the petrochemical sector; c) increased reliance on foreign drilling contractors; d) partial liberalization of gasoline distribution and, most important, e) liberalizing the downstream side of the gas sector, particularly the transportation, storage and distribution of natural gas. Yet, despite these advancements, the core of the industry remains in the hands of the state.

. Oil politics before the 1938 expropriation

Mexico's oil industry took its first steps at the beginning of the century, during the 35-year regime of Porfirio Díaz. As with other industries, the Porfiriato adopted a very liberal approach to foreign investment in the incipient oil industry. To further develop oil resources, the government granted concessions on public lands and allowed foreign ownership of land resources. Property rights over oil-rich land were reaffirmed in the 1909 mining law.⁴⁶ Consequently, by 1917 around 90 percent of all oil properties in the country were foreign-owned (de la Vega, 1998).

⁴⁵ It is important to clarify that the original version of the Constitution did not include monopoly or state exclusivity in oil activities. It reasserted the principle of state ownership of the subsoil. Nonetheless, by the 1940s and the institutional construction of the oil industry, an amendment to Article 27 reserved the exploitation of oil and gas resources for the state. For more on this point, see de la Vega (1998).

⁴⁶ This measure proved of key importance to the oil companies' legal case against nationalization (Grayson 1980).

However, by 1910 the political environment in Mexico had changed dramatically. In 1911, Francisco Madero ousted Porfirio Diaz from power. This marked the beginning of the decade-long Mexican revolution. Yet, it was during this revolutionary time that Mexico's oil production flourished to unprecedented levels, in both absolute and relative terms. Production levels reached almost 200 million barrels by 1921. The country would have to wait until the 1970s to produce at the level of the 1920s, and until after 1980 to significantly surpass the 1920s' production level. In the 1920s, Mexico was the second largest oil producer in the world after the United States, and the largest oil exporter in the world, producing almost 25 percent of the world's oil supply (El Mallakh, et al., 1983).

The golden years of Mexico's oil industry came to a peak just when a new regime was at last providing some signs of political stability. Several factors explain the decline of Mexico from the position of one of the most important petroleum exporters in the first two decades of the 20th century to a marginal competitor in world markets by the 1930s: a) the discovery of new and more abundant fields in the United States and Venezuela shifted demand away from Mexico; b) the country's oil production suffered a precipitous decline in the 1930s (from 200 million barrels in the 1920s to around 40 million barrels), due to productivity losses in oil fields; c) Mexico became an important consumer of its own oil and, d) less advantageous fiscal terms which, in turn, made the newly discovered Venezuelan oil more attractive, as it was more favorable for foreign investors. The nationalistic sentiment in the country was reflected in the increasing belligerence of the oil worker unions. This in turn exacerbated the already tense relations between industry and the government. The consequent lack of significant investment began to take its toll on production, which fell approximately 80 percent in the period 1929-32.

In the end, it was the labor issue that triggered the expropriation of assets. A regime still in the process of consolidation had no choice but to favor domestic over foreign interests, particularly when the latter resisted any form of compromise.⁴⁷ Moreover, the decline in production levels and the deplorable state of the oil industry set the stage for the nationalization of foreign assets.

By the early 1930s, the number of oil industry workers amounted to 10,000, organized into 19 separate labor organizations. Under the benevolent eye of a pro-labor government, these organizations merged into a single national union, the STPRM (Sindicato de Trabajadores Petroleros de la República Mexicana), which rapidly acted to increase labor benefits for its workers. The refusal of the multinationals to acquiesce to labor demands ended with the Supreme Court ruling in favor of the labor unions, which was unacceptable to the companies. Negotiations with the Presidency led to a stalemate, the outcome of which was nationalization of the industry. The foreign oil companies retaliated by boycotting Mexican oil.

Organizing the nationalized Mexican oil industry proved to be an enormous challenge. Unlike Venezuela, nationalization in Mexico had not been planned and was not the expected or desired outcome. The years immediately following nationalization proved to be very disruptive for Mexico's oil industry internationally and domestically because of the foreign oil companies' two-year boycott of Mexican oil and the lack of a final settlement with these companies, which delayed the reorganization of the oil industry.

At the domestic level, the challenge was even more daunting. First, unlike Venezuela, important technical expertise left with the oil multinationals. The lack of well-trained

⁴⁷ Unlike British interests, American interests in Mexico feared that Mexico's nationalistic stance might have a contagious effect on neighboring Venezuela. Since Mexico had long ago ceased to be a priority for these companies' overall production and reserves, they could be non-committal vis-à-vis the government. For more on the different positions of oil companies during this period, see Meyer (1992) and Brown (1997).

personnel, technology and simple know-how contributed greatly to the fall in oil production. Although the government had gone directly into the oil business in 1934 with the creation of a company named Petromex (later to be named Pemex), it did not have the capacity or expertise to manage the nationalized oil industry from one day to the next. In fact, production decreased continuously over the ten years following expropriation (the total production decrease was almost 20 percent between 1937 and 1944). The decline in production was partly due to the suspension of all exploratory activities. Because of this, production was “carried out without any technical consideration or knowledge of the size and distribution of Mexico’s oil reserves,” which resulted in an unnecessary exhaustion of existing wells (Barbosa, 1992, p. 195).

Secondly, labor’s belligerent attitude did not stop with expropriation. Far from it; change in ownership meant more bargaining power for the labor unions vis-à-vis the government, whose lack of technical expertise in the industry made it difficult to refuse labor’s demands. As a result, the unions received significant participation in the company’s revenues through policies of: a) overmanning: the number of workers in the oil industry practically doubled in each decade following nationalization;⁴⁸ b) control of recruitment, which created a market for distributing jobs to the benefit of union members; and c) control over Pemex contracts: approximately 50 percent of the industry’s contracts were handled by the union (Sepúlveda, 1980, p.53).

The critical state of Mexico's oil industry changed in the 1950s with a shift in energy policy. Foreign companies were discreetly invited back in through service and risk contracts to help exploit the country’s oil resources.⁴⁹ As a result, exploration and production underwent a significant turnaround and began an upward trend. However, this production increase was not sufficient to compensate for the rapid growth in consumption. Production increased annually at 5 percent a year from 1939 to 1950 while consumption increased 9 percent annually. Among other things, this left less oil for export. This source of income was an important financial cushion for Pemex, since a domestic price control policy to help finance the country’s economic development led Pemex to incur major financial losses. Nonetheless, this period has been called the "Golden Age of Pemex" since, despite its overall problems, the company did manage to triple production levels, quadruple refining capacity and establish a distribution system to supply oil resources to important consumer centers.

The strain of price controls on Pemex’s finances was particularly damaging in the 1958-72 period, because no major price adjustment took place during that time and the country had started importing crude oil in the mid-1960s (1966-1972). Pemex thus had to sell imported crude oil on the domestic market at subsidized prices. During this period the company was unable even to meet its tax payments to the government.

Mexico became a net oil importer in the period from 1966 to 1972.⁵⁰ This situation was in part a reflection of the lack of investment in exploratory activities. However, it also resulted

⁴⁸ In the ten years following nationalization, employment more than doubled while production grew only moderately. This meant decreased productivity in the number of barrels produced per worker per year (of about 10 percent).

⁴⁹ Sixteen contracts were signed between 1949 and 1951.

⁵⁰ Although the country had imported petroleum products (i.e. gasoline) since the 1940s, it had always had a significantly positive balance in oil products. The petroleum product trade balance, though, turned negative after 1971; it was not until 1981, with the construction of three refineries, that the petroleum trade balance showed a significant reversal.

from a lack of long-term planning, administrative hurdles and “misplaced priorities” (Bermudez, 1976, p.78). The following events significantly contributed to Mexico’s problems: a) risk contracts with foreign companies were abolished at the end of the 1950s, due to legal changes in Article 27 of the Constitution, thereby eliminating a possible source of funding for exploratory activities;⁵¹ b) the average cost of finding oil in Mexico increased steadily from 1957 until the 1970s (Philip, 1982), increasing capital investment costs; c) since 1952, Pemex had relied increasingly on domestic drilling contractors, a policy which ended up being more costly to the company than if it had drilled for oil itself (Bermudez, 1976);⁵² and d) the resources that the company did have were invested in non-core areas like petrochemicals.

The increased weight of domestic subsidies, high domestic operational costs due to technical and administrative inefficiency, and falling export revenues, coupled with mounting capital requirements, meant that the only way for the company to finance its own operations was to increase its debt burden. In fact, in 1969, Pemex borrowed 41 percent of its investment budget (Philip, 1982, p.351). The company's debt served to continue subsidizing its own internal inefficiency, the domestic market and government consumption.

. Mexico’s return as a major oil exporter, and exhaustion of the ISI pattern

Mexico’s position as a net oil importer at the time of the 1973-1974 oil shocks, and the subsequent worsening of its external indicators, evolved into the 1976 balance of payments crisis (the first End-of-the-Sexenio crisis). This in turn led to a devaluation of the currency after 22 years of a stable exchange rate system.⁵³ Nevertheless, by 1976 Mexico was bringing on-stream the large reserves of crude oil that had been discovered in the southern part of the country. Consequently, production increased by 70 percent in the period between 1973-1977, which meant not only that the country was again able to fully supply the domestic market, but also was able to export. In 1980, oil represented almost 60 percent of Mexico's total exports. The country’s renewed position as a major oil exporter led the recently elected López Portillo government to postpone economic reforms,⁵⁴ although only for six years, as the same macroeconomic imbalances present in the 1976 crisis resurfaced in 1982 with a vengeance.

The 1973 oil discoveries substantially affected Pemex and Mexico at the domestic and international level. Mexico became a world player on the international oil market: production increased by 200 percent in the 1970s, and reserves increased more than tenfold (from around 5.4 billion barrels in 1973 to 72 billion barrels in 1980). The country went from being an importer in 1973, to a net exporter of approximately 1.5 million barrels of oil per day in 1982. Consequently, the Mexican oil industry came to the forefront of the Mexican economy: i) from 1979 to 1985, oil exports represented 60 percent of Mexico’s

⁵¹ The last risk contract was finally terminated in 1969.

⁵² Contractors' percentage of total drilling increased from 24 percent in the 1952-58 period to almost 50 percent between 1958 and 1964.

⁵³ For an economic account of this period, see for example Zedillo (1986); Ros (1987); and, Lustig (1992).

⁵⁴ In 1976, Mexico signed an agreement with the IMF geared towards correcting major macroeconomic imbalances, which it later abandoned in light of the complete turnaround of its external liquidity situation.

total exports, ii) the oil industry's share of GDP increased from 3 percent in 1973 to 13 percent in 1983, and iii) Pemex substantially increased its total share of public sector expenditures from 12.3 percent in 1973 to almost 30 percent in 1980.

Pemex thus shifted from being a subsidy-prone public company fueling the economic development of the country to a revenue-generating public institution assuring the financial viability of the State. The oil boom provided the country with the financial means to sustain its bankrupt development pattern, not only by direct contributions via taxes to Pemex, but also by an increased resort to debt now made possible by using oil production as collateral. Pemex's relative contributions to the government coffers increased to 25 percent of government revenue in 1980 from less than 4 percent in 1970. Oil boom revenues, in turn, led to a substantial increase in government expenditure, similar to the oil-led development in Venezuela and other oil exporters since the early 1970s. Public expenditure soared to 40 percent of GDP in the early 1980s from 16 percent in 1970, and the number of public enterprises jumped from 84 in 1970 to 1155 in 1982.

Despite expectations to the contrary, the oil bonanza was short-lived. In the early 1980s, oil prices had already started to decline, and fell precipitously in 1986. Nonetheless, those same macroeconomic imbalances that had led to the 1976 crisis continued accumulating during the six-year presidency of Lopez Portillo, leading to bankruptcy of the country. By 1982, Mexico declared a moratorium on its debt obligations and once again negotiated a stabilization plan with the IMF. A difficult period for the country followed, consisting of macroeconomic stabilization and financial austerity; unsustainable fiscal deficits had to be curbed, and this included controlling expenses in the energy sector.

. Mexico and the absence of oil sector reform

Despite Pemex's increased revenues from exports, the company's operating deficit amounted in 1981 to US\$15 billion, opposed to US\$4 billion a year earlier (to approximately 75 percent from 25 percent of the company's sales, respectively).⁵⁵ Consequently, restructuring Pemex's finances was an essential part of the austerity program followed by the de la Madrid administration. Pemex's expenditures had to adjust accordingly, falling in real terms by an average of 10 percent annually. Government efforts at balancing Pemex's financial accounts bore fruit, as operational deficits were kept in check after 1983. Under President de la Madrid and later President Salinas, certain structural costs and inefficiencies started to be addressed: domestic prices of petroleum products were gradually liberalized and the unions' economic power (part of Pemex's inefficiency costs in accounting terms) was significantly reduced, albeit not completely. To start with, in 1988 and 1989 Pemex cut its personnel by 30 percent. External contracting policy also became more transparent and competitive as a result of NAFTA. Social services were outsourced to other companies, redirecting the expenses of workers' benefits to third parties, independent of the company and the unions.

This financial austerity policy, however, had its drawbacks, as it affected all aspects of Pemex's expenses, including investment. Lack of significant investment in the company entailed a scaling-down of much-needed investment projects. As a result, Mexico once

⁵⁵ The increased Pemex operational deficit in 1980-81 was not due to a fall in sales revenues, since these had increased by 19 percent. It was due to increases in: i) tax payments to the government (a 40 percent rise), ii) capital investments (by 80 percent) and, most important, iii) debt repayments (an increase of 125 percent). In fact, in 1981, Pemex's total debt reached approximately US\$15 billion, which meant considerable debt service for the company during the 1980s (15 to 20 percent of Pemex's total sales went to debt servicing).

again became a net importer of gas and petroleum products after 1985 and 1989, respectively.⁵⁶ The trade deficit in petrochemicals alone cost the country approximately US\$3 billion a year.

Energy liberalization gained a certain momentum under the Salinas administration after the negotiation of NAFTA, and advanced warily under the Zedillo administration, its progress clouded by considerable setbacks. Nonetheless, certain steps were taken during these 12 years of slow liberalization of the energy sector.

a) NAFTA advances and liberalization of procurement practices:

As a result of the liberalization of government procurement rules (purchases of goods and services by government entities), 50 percent of Pemex's supply contracts were opened to North American companies in 1994, when NAFTA went into effect. The remaining 50 percent of all government supply contracts have until 2002 to be completely opened to NAFTA partners. As a result of liberalizing these rules, foreign companies were allowed to participate as contractors with Pemex in exploring and developing oil reserves. These contracts may contain performance clauses, conceived as a financial bonus to encourage productivity and reward efficiency. It has been suggested that these clauses provide a powerful argument for possibly allowing risk contracts based on performance criteria and paid for in cash or kind (de la Vega, 1994).

b) Partial opening of petrochemicals:

The number of basic petrochemicals over which the State has total control was significantly reduced (to 8 in 1992 from almost 20 in 1989), thereby decreasing the State's monopoly over this industry. However, attempts at actually selling Pemex petrochemical plants during the Zedillo administration failed because of political problems concerning the allowing of majority participation by private firms.⁵⁷

c) Liberalization of natural gas at the downstream level:

Partial opening of the petrochemical industry and the increase in demand for electricity has increased pressure for the further liberalization of the natural gas sector all along the value chain⁵⁸ Legal reforms in 1995 opened up natural gas transportation, storage and distribution to the private sector, allowing the latter to import or export natural gas freely. However, exploration and production of gas remains closed to private capital.

d) Modernizing Pemex administrative practices:

⁵⁶ In fact, investment fell at an average annual real rate of 8 percent from 1982 on, representing in 1992 just 40 percent of investments made in real 1981-level terms.

⁵⁷ There are no legal restrictions on the construction of new plants by either foreign or domestic private firms for processing secondary petrochemical products. Moreover, there is no impediment to selling all of the Pemex secondary petrochemical complexes. Yet, in 1995, when the government announced its intention of selling 61 plants located in 10 petrochemical complexes, political opposition from the labor unions led the government to annul its invitation for bids. After negotiations with the PRI a renewed attempt at privatization was made in 1998, but this time the government proposed selling only 49 percent of the plants to the private sector, whose lack of interest stalled further reforms in this area.

⁵⁸ CRE estimates that natural gas demand will double over the next decade, and that half of this demand will be used to generate electricity. In fact, it is estimated that natural gas demand by the power sector will increase by an average of about 15 percent annually from 2000 to 2010 (CERA, 2000).

In 1992, Pemex was reorganized into four business units in order to improve clarity in the company's cost structure. These four units are: Pemex Exploration and Production, Pemex Gas and Basic Petrochemicals, Pemex Refining and Pemex Petrochemicals. It has been argued that reorganizing Pemex along business lines opens up the possibility of privatizing non-core business areas (Rubio, 1993).

. A note on President Fox's difficult reform agenda

President Fox has tried to push for a comprehensive energy reform agenda, hitherto without much progress. The Fox administration nonetheless announced in December 2001 a new scheme called multiple service contracts for the exploitation of non-associated gas,⁵⁹ which Mexico urgently needs to cope with the increasing demand for natural gas.⁶⁰ The administration hopes to begin signing these contracts by the end of 2002. Yet the potential for delays is important, given that there are doubts with respect to the legality of this scheme, even if it tries to abide by the country's current legal restrictions. Moreover, opposition parties have already voiced their criticism of this proposal. Although these contracts fall short of opening the upstream sector to private sector participation, they will be (if implemented) a step forward, given that they could be considered a proxy for risk service contracts.

THE POLITICAL ECONOMY OF REFORM IN THE OIL INDUSTRY

"A State's means of raising and deploying financial resources tells us more than could any other single factor about its existing capabilities to create or strengthen State organizations, to employ personnel, to co-opt political support, to subsidize economic enterprises and to fund social programs"

Theoda Skocpol⁶¹

Latin America's experience with state-owned enterprises (SOEs) started with the oil industry in Argentina in the 1920s and Mexico in the 1930s. SOEs then gained significant importance in the more general strategy of import-substitution industrialization. SOEs were seen, in part, as a public policy tool to advance social objectives, such as energy subsidies to foster industrialization. By the 1980s, these SOEs were incurring major losses and were responsible for the large budget deficits that fuelled the episodes of high inflation in Latin

⁵⁹ Instead of bidding on one task, a contractor bids on a package of multiple tasks for a certain period of time (20 years).

⁶⁰ Current natural gas demand in Mexico is about 4.3 billion cubic feet per day and is expected to grow over the next decade to 9 billion cubic feet per day. The government estimates that if no radical changes in the investment practices occur, the supply/demand gap could reach about 7 billion cubic feet per day within ten years.

⁶¹ *Bringing the State Back In*, Cambridge University Press, 1985.

America. Thus, privatization of SOEs was an essential aspect of fiscal policy adjustment during the dire financial crises of the 1980s as, by and large, state-owned enterprises were responsible for the overextension of Latin American states and for the region's unsustainable fiscal deficits that led to the debt crisis. Under this logic, the privatization of state-owned enterprises had both long- and short-term effects. The long-term effect was to halt the drain on fiscal accounts that came from loss-making SOEs; the short-term effect was a one-shot revenue gain for the fiscal coffers. Between 1990 and 1992, Latin America's privatization receipts rose to US\$40 billion, or 10 percent of the region's total foreign debt.

Oil sector reform falls within this general agenda of neo-liberal reforms since it is part of reforming the public sector. However, commodity industries, and particularly the oil sector, occupy a unique place in this agenda because they represent a rare species: state-owned enterprises that are believed to be profitable. By profitable SOEs, this paper refers to those public institutions that have generally served as providers of both foreign exchange and/or fiscal revenues, which is more than most SOEs in other sectors have offered since their creation during Latin America's import-substitution era.

Thus, SOEs in the commodity industries are an exception, and this is what makes them interesting. National oil companies in particular have escaped the sweeping forces of liberalization because they do not meet the pre-condition for privatization in the first place: that of being deficit and debt-ridden state-owned companies. Although this is the first step in explaining the different fate of NOCs compared to the majority of state-owned enterprises, much needs to be said about the different paths followed by these countries in the opening of their oil sector to private sector participation. Differences between countries are linked, among other things, to their level of dependence on fiscal and external oil revenues. The degree of dependence on oil revenues has proven to be negatively correlated with the level of openness of the oil sector. That is, countries that are more dependent on their oil sector for foreign and fiscal revenues tend to be less open to foreign investment, and this dependence is generally linked to a country's oil-exporting status. In line with this argument, oil-exporting countries in Latin America have proven to be less prone to liberalization than oil importers. Thus, the position a given national industry holds in the global market does play a role in explaining its level of openness.

The strategic financing role of national oil companies

External and fiscal deficits are a structural problem in Latin American countries. For this reason, debt flows play an important role in external and fiscal financing, as shown by the large foreign financing requirements of Latin American countries compared to other emerging regions. Despite significant improvement in debt indices from their debt crisis levels, foreign financing will continue to be an important part of the region's equation as long as external and domestic deficits continue to endure and foreign savings continue to fill the investment gap resulting from the region's low domestic savings rates. Argentina's 2001-2002 debt crisis serves as yet another example of this major structural weakness in Latin American economies.

How do external and fiscal imbalances enter the discussion on reform in Latin America's oil sector? First, as mentioned before, they help to explain the strategic nature of certain state-owned companies. Second, the issue sheds light on the privatization process from a financial point of view. That is, the privatization of public enterprises that were draining the

central government's fiscal accounts served to reduce the overextended Latin American state and thus, fiscal deficits. However, NOCs have played a central role in Latin America's economy because of both the significant financial benefits they offer as a source of fiscal and external revenue, and their role as a subsidizing mechanism for the rest of the economy. Also, NOCs have played a role as lenders of last resort to governments via their direct access to external credit or as providers of indirect government financing. These are some of the mechanisms used:

a) National oil companies are a source of fiscal revenues:

Common wisdom regarding public enterprises holds that transfers only flow from the government to the deficit-driven public company. Regardless of their efficiency, NOCs are an exception to this rule since they have generally contributed fiscally to the government coffers by a series of revenue-gathering mechanisms such as royalties, income taxes, sales taxes (on domestic sales) and export taxes (on foreign sales).

Table 12 shows that in Mexico, Venezuela, Ecuador and Colombia, the NOC is an important contributor of fiscal revenues to the State. In Venezuela and Mexico, the fiscal take has been, at different stages, more than 60 percent of the company's sales, which implies a large share of the oil rents transferred to the state. Taxes on NOCs have been important independent of the NOCs exporting or importing nature. For example, significant fiscal taxes were imposed on YPF all throughout its history; the same can be said of Pemex, even in the period when its export base was 20 percent of total production (today Pemex fiscal taxes represent about 50-60 percent of the company's total income).

b) Latin American NOCs are among the region's biggest borrowers.

This fact came to light at the time of the debt crisis. The decapitalizing policy of some NOCs had to be financed somehow, since they had to absorb domestic subsidies, contribute to fiscal revenues and maintain inefficient operating structures. The relatively more efficient NOCs did not resort to debt to finance daily operations. Nonetheless, even for these efficient NOCs, financing future production required important capital investment, and indigenous resources were insufficient on this count. After the 1970s, with greater availability of foreign financial capital, NOCs came to represent a large share of the total foreign debt. For example, in the 1980s, YPF and Pemex represented between 15 and 20 percent of their countries' total foreign debt (in 1982 Pemex alone owed almost US\$16 billion to foreign creditors).

Figures on foreign energy debt partly reflect the fact that NOCs have served as external financing mechanisms for the State, given their relatively good access to international financing. Time and again, governments have resorted to using the NOCs' more advantageous access to international markets as an indirect financing source. Generally, the government's high taxes imposed to extract additional revenues from an NOC force the latter to finance itself internationally to cover its expenditures, including tax payments to the government.

Venezuela is an interesting example of this dynamic. The government's difficulty in accessing international markets (due to its lack of credibility concerning timely debt repayment) is reflected in its Moody B2 country rating, which is given to highly risky countries. PDVSA was until October 2001 also rated B2, but this rating was revised according to new standards on country ceilings. However, the company finances itself through PDVSA Finance Ltd., its financial arm that has investment grade status (currently

at Baa2).⁶² This way, it escapes the government's low ratings and obtains significantly better financing conditions. However, during the 1998-99 oil-price slump, PDVSA had to pay the government approximately US\$3.4 billion in extra dividends to cover the deficit arising from declining fiscal oil revenues (these were down to 6.9 percent of GDP in 1998 from 13.3 percent of GDP in 1997). At the same time, PDVSA's total debt increased by US\$3.6 billion (to about US\$8.9 billion) in 1998, the extra dividends being covered by the company through increased borrowing. In early 1999, Moody's raised the issue of political interference as providing grounds for a rating revision if PDVSA Finance started "borrowing to effectively finance dividends to the State, rather than for corporate PDVSA's general financing needs for growth or refinancing" (Moody's, March 1999, p.3).

Mexico's institutions have also acted as guarantor to raise international funds. For example, Mexico has twice used Pemex's crude oil as collateral in securing external financing. In 1982, advance sales on Pemex oil were used as a guarantee for a US\$1 billion loan bailout in order for the country to continue its debt repayments. A second example arose during the 1994 peso crisis, when the US government again bailed out the Mexican government with a contingent credit of US\$20 billion. In return, the Mexican government was required to deposit Pemex oil revenues in an account in the US so that they could be seized in the event of debt non-repayment.⁶³

Summing up, the NOCs' strategic position as net fiscal contributors (in Venezuela, Mexico, Ecuador and Colombia) will continue to hamper their complete opening to private capital, particularly with respect to equity participation. Even with partial opening, shareholders (who can exercise their evaluation of the NOCs through the stock market) might constrain the government's freedom of action to intervene in the company's operations to increase taxes or cut its budget. However, this does not prevent private sector participation in the oil industry. On the contrary, as Latin American governments are internationally restricted to keeping fiscal deficits in check, their planned investments in the energy sector (particularly demanding in terms of capital) are bound to suffer from setbacks, delays, downsizing or cancellation without financial backing by foreign investors, as in Mexico.

The institutional evolution of NOCs helps to explain the differences among oil importers and exporters

Within the broader categories of importers and exporters, differences in the level of openness are also a function of the National Oil Company's (NOC) financial position prior to reform, which is in turn tied to the historical institutional evolution of the oil industries in these countries. The full privatization of Argentina's YPF, for instance, can be explained by the fact that the company had been accruing deficits in one of the most profitable sectors in the world because the government had been decapitalizing the industry since its inception. As Solberg notes, YPF's financial crunch resulted from an extremely heavy tax burden (68 percent of sales revenues), price controls on petroleum products, and arrears in other state

⁶² In February 2000, Moody's downgraded PDVSA Finance to Baa1 from A3 and in April 2002 from Baa1 to Baa2.

⁶³ For an account of relations between energy and debt in Latin America, see OLADE (1988). For a review of the same subject in Mexico, see de la Vega (1988).

companies' payments to YPF (state-owned companies like National Airways and Aerolíneas Argentinas represented 20 percent of YPF's total sales). YPF lost money in every year after 1975, and by the end of 1981 the company had a deficit of US\$4.1 billion (Solberg, 1985). It has been said that YPF was managed just like any other branch of the public administration, with no financial autonomy, no financial analysis of real costs and a hiring policy based on political rather than technical criteria (Philip, 1982, p. 420). This situation was compounded by the fact that, unlike Pemex, the company had no external source of revenue to cushion domestic subsidies.

YPF's insolvency during the 1980s explains both the timing of reforms and subsequent policy choices. The Argentine government treated YPF's privatization like that of any revenue-absorbing, inefficient state-owned company, and therefore it chose to follow the same strategy as with any other public company, namely, complete privatization of assets at all levels of the value chain. Timing was determined by the implementation of market reforms in the economy as a whole: oil sector reforms followed the same big-bang approach as economic reforms, given the acute financial crisis that had plunged the country into hyperinflation. As a result, the fiscal contribution of YPF and the oil industry as a whole is more important today as a completely privately run industry than it was before privatization. Table 12 shows that today the industry represents 17 percent of export revenues.

Although Pemex's inefficiencies could be compared to YPF's, the fact that Mexico transformed itself into a major world exporter in the mid 1970s meant that Pemex, unlike YPF, could get away with its inefficiencies given its revenue-generating gold mine status for the Mexican state. The institutional development of Mexico's oil industry nurtured the emergence of a powerful clientelistic structure within Pemex due to the historically strong bargaining power of oil unions. This entailed large transfers to Pemex's own employees, via their important share of the company's service contracts or via the trade of positions within the company. As a result, Pemex was (and still is) considerably overmanned, another reason for the company's inefficiency. It is these actors, with their resource bases in Pemex itself, who have most strongly opposed reform. Since the company continues to provide the Mexican government with more than 30 percent of its fiscal revenues, pressure for reforms is not as acute as in the case of YPF, which required transfers from the state.

It is interesting that Petrobras and PDVSA, although for completely different reasons, did not suffer the same fate as Pemex and YPF in terms of continued treasury problems resulting from an unsustainable subsidy policy and inefficient institutional structure. Petrobras's pricing policy was more in line with international prices, so that the company, unlike those in Mexico and Argentina, could profit from its domestic operations. Venezuela, on the other hand, followed an important subsidization policy in its domestic market. But the strain on its finances was nowhere near that of Argentina and Mexico, since the domestic market represented only 10 percent of total production. (In Mexico, the domestic market absorbed from 50 to 100 percent of production, and 100 percent of production in Argentina.)

The profitability of Petrobras and PDVSA is also tied to their dependence on international markets for either exports or imports. This international exposure required the development of an important institutional capacity for PDVSA to be a world exporter, or for Petrobras to be an international producer. In both cases, the international market gave them access to technology, competitive world standards, and financial opportunities they would not have had if they had been in an autarchic situation, like YPF and Pemex. In other words, while Petrobras was more cost-efficient and made profits by producing elsewhere than in Brazil, PDVSA could be profitable by selling almost all of its production internationally. YPF had to both produce and sell domestically when in fact it was not

necessarily a well-endowed country in terms of the cost of extracting oil. Pemex, on the other hand, until the 1970s was obliged to sell domestically at highly subsidized prices, the international market being reserved only for surplus capacity.

Apart from their position in the world oil market, PDVSA's and Petrobras's more profitable situation was also the result of conscious government policy to allow these companies relative financial independence. When Petrobras was created, it was a well-capitalized financially independent company in which government intervention was relatively less harmful than in YPF and Pemex. Moreover, for most of its initial years, Petrobras was given tax exemptions in order to develop the then practically non-existent oil sector. The political non-intervention policy was followed even more closely in the case of PDVSA. Policymakers at the time understood the importance of guaranteeing the company's financial viability. As a result, 10 percent of total sales were given to the company for investment purposes. However, one can argue that, since Chavez took power in 1999, this autonomy and independence have been seriously challenged.

The financial profitability of these two companies, along with their reputation for relative efficiency, gave them an important degree of control over energy policy. The policy choice followed in the process of opening-up Brazil and Venezuela is an example of this leeway. In the case of Venezuela, PDVSA controlled its own opening process, whereas in Brazil the government-controlled opening strategy was very careful to place Petrobras in an almost unbeatable position. In other words, in both cases the NOC obtained the best possible deal: gaining access to private capital, technology and foreign financing, while at the same time maintaining their monopoly position (legally or *de facto*) in their domestic markets. In sum, both companies have enjoyed more freedom of action in terms of energy policy than Pemex and YPF have had in their countries, as the latter have been pegged as inefficient and corrupt institutions. Thus, as the Petrobras case shows, it is not only the country's position in world oil markets that matters, but its historical exposure to the oil market and the more efficient institutional structures that develop as a result.

CONCLUSION

Latin America provides an interesting setting for analyzing policy change according to a country's position in the world oil market. The region offers a range of examples, from oil importers to self-sufficient countries and oil exporters. Latin America is also a rich example of the diversity of change, as it has undergone an array of institutional schemes extending from complete privatization (Argentina), to a state-controlled liberalizing process (Brazil and Venezuela) and to complete state ownership of the sector (Mexico). In light of this diversity, a country's place in the world oil market does seem to be pertinent for explaining reform, or lack thereof, to a certain extent. The Latin American experiences also reveal the importance of the financial position of the NOC prior to reform, which is in turn tied to the institutional evolution of each country's oil industry. In this sense, the institutional evolution of Argentina's NOC provided the incentives for radical liberalization of the sector. Conversely, Petrobras's efficient institutional structure delayed the need for total privatization of its assets "à l'Argentine", allowing the reform process to follow a more balanced mix between state and market.

The level of openness to private sector participation is related to a country's position as

a net exporter or importer, because this determines their role as providers of either foreign exchange and/or fiscal revenue. In oil-exporting countries, the incentives for liberalization tend to be less present because revenue-deficient Latin American states have few incentives to let go of these strategic companies or to lose control of the sector. Important insights from the literature on the political economy of reform suggest that reforms come when the costs of maintaining this inefficient system outweigh the benefits. In this sense, inefficiency tied to public ownership of NOCs is not sufficient in itself to outweigh the financial and strategic benefits derived from state control over this sector. Most governments in the region find it difficult to remain financially viable despite major reforms in the economy. Now, however, this situation is no longer tied to the expenditure side of the fiscal equation (as in the 1980s) but to the difficulty of raising sufficient non-commodity tax revenue or of developing a diversified fiscal base. This explains the reluctance to completely open the oil sector to private sector participation or to open up the capital structure of these companies.

The need to secure this fiscal revenue may have prevented the complete privatization of the NOCs or even the elimination of the NOCs' monopoly position in certain areas, but it does not explain reform diversity. Latin America offers examples of reform in the oil sector that can be carried out without the need to relinquish the state's control over the industry. In fact, Latin American governments do face great pressure to open the industry to private capital in order to finance the high cost of capital investment in the oil sector. The industry demands constant capital investment to increase or simply maintain current production. Therefore, opening the oil industry at the upstream level has proven to be a satisfactory way of meeting these investments without resorting to debt. This is true of Ecuador, Colombia and Venezuela. The most interesting case in this respect is Mexico's continued rigid position with respect to foreign participation in the energy sector. Some believe that the question is not whether this will happen, but rather when these changes are most likely to take place. The political economy of reform also provides important insights into the process of change. In this sense, there is a consensus on the benefits of crises for the distributional costs of reform: in a crisis, the cost of maintaining the status quo increases, altering the incentive structure of all actors involved. The result is an overall increase in the benefits of change. In Venezuela, incentives to reform were supply-driven, resulting from changes in the international oil market. The country's objective to remain a top oil producer and exporter left it no other choice but to open its sector to private capital, in order to retain its international competitiveness. Conversely, in Mexico's more inward-oriented industry, incentives to reform are more likely to come from demand pressures or from a demand-generated energy crisis within the country (similar to that endured by Brazil in 2001) that could make the current opposition to reform too costly for the country to bear, even in the face of powerful interest groups.

Reforms are far from complete in the Latin American oil sector. As such, the final outcome is yet to be written. Nonetheless, with the recent changes seen in the two major oil exporters, Mexico and Venezuela, we could see a paradoxical convergence of both companies in terms of government intervention and efficiency, as the Chavez energy agenda continues to take its toll on PDVSA and Mexico's very gradual reform agenda leads to more efficiency within Pemex. In other words, changes in energy policy in each country could lead to the Venezuelization of Pemex and the Mexicanization of PDVSA. Comparing the dynamic evolution of the oil industry in these two countries would thus make an interesting future topic for research.

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Figures

Table 1
Latin America's five leading exports, 1970-1999
(% share)

Ranking 1999		1970	1980	1985	1990	1995	1996	1997	1998	1999
1	Crude Petroleum	14.4	28.1	24.9	17.7	9.9	12.5	10.8	7.1	9.3
2	Motor vehicles	-			2.2	3.6	4.4	4.8	5.4	4.6
3	Petroleum products	9.2	10.6	11.6	7.3	3.3	3.4	2.9	2.2	2.8
4	Calculators/accounting machines	-	...	...	...	...	...	...	1.7	2.2
5	Motor vehicle parts	-	...	...	...	1.6	1.6	1.7	2.1	2.1
6	Insulated wire cable	-	...	...	...	1.6	1.8	1.8	2	2.1
7	Coffee	13.5	7.7	6.7	3.5	2.8	2.2	2.8	2.5	1.9
8	Television sets	-	...	...	...	1.4	1.4	...	1.9	1.8
9	Copper refined	4.9	2.3	1.5	3	2.2	1.8	2	1.7	1.6
10	Other telecoms equipment		...	...	...	...	...	...	...	1.5
	Share of the 10 leading Latin American exports	-	58.4	54.4	43	29.2	32.6	31.6	28.3	29.9

Source: ECLAC, various issues

Table 2
Regional overview of production, consumption and reserves in 2000
(World share)

	Share of world oil production		Share of world consumption		Share of world reserves		Reserve production ratio*	
	1990	2000	1990	2000	1990	2000	1990	2000
Total Latin America	11.4%	13.8%	7.6%	8.6%	12.0%	11.8%	44.3	32.9
North America w/o Mexico	16.6%	14.0%	27.5%	28.0%	4.2%	3.4%	10.6	9.5
Total Europe	7.0%	9.3%	22.9%	21.4%	1.6%	1.9%	9.8	7.7
Total Former Soviet Union	17.7%	11.0%	12.8%	5.0%	5.6%	6.4%	13.5	22.7
Total Middle East	26.8%	31.0%	5.2%	5.9%	65.7%	65.3%	103.6	83.2
Total Africa	10.2%	10.4%	3.0%	3.3%	5.9%	7.1%	24.6	26.8
Total Asia Pacific	10.3%	10.6%	21.0%	27.8%	5.0%	4.2%	20.5	15.6

* Reserve/Production ratio indicates the number of years the region can continue producing at current production levels.

Source: Own estimates based on BP-Amoco Statistical Review of World Energy (2001).

Table 3
Latin America's oil production, consumption and reserves in 2000
(Levels and % growth rates)

Indicators	Argentina	Brazil	Colombia	Ecuador	Mexico	Peru	Venezuela
Production, in millions of b/d (2000)	0.82	1.255	0.71	0.405	3.45	0.105	3.235
<i>Avg. annual growth rates 1990-2000</i>	4.9%	6.8%	5.8%	3.3%	1.7%	-1.8%	4.6%
Consumption, in millions of b/d (2000)	0.43	1.825	0.23	0.14	1.84	0.15	0.495
<i>Avg. annual growth rates 1990-2000</i>	0.4%	3.2%	1.4%	3.9%	2.7%	2.2%	2.2%
Net oil balances, in millions of b/d (2000)	0.39	-0.57	0.48	0.27	1.61	-0.05	2.74
<i>Net oil balances, avg. annual growth rates 1990-2000</i>	2.7%	5.9%	9.1%	-1.3%	1.6%	-12.7%	2.0%
Reserves/Production ratio, in years of production (2000)	10.5	17.7	10	14.4	23.5	8.1	66.4

Source: Own estimates based on BP-Amoco Statistical Review of World Energy (2001).

Table 4
Latin America energy production and consumption
(In Mtoe)*

	1971		1995		2010		1995-2010 Estimated annual growth rates (%)	
	Prod.	Cons.	Prod.	Cons.	Prod.	Cons.	Prod.	Cons.
Oil	137	127	281	224	424	329	2.5	2.4
Gas	28	12	93	50	185	94	4.9	4.0
Total	181	127	452	342	738	540	3.2	2.9
*Million tons of oil equivalent								
Source: IEA (2000)								

Table 5
Level of Liberalization/Openness in the Latin American Hydrocarbon Industry*
(As of end 2001)

Country	Private Participation Upstream			Private Participation Downstream			
	Privatization of OC	Concessions	Product-sharing or risk service contracts	Refining	Marketing and Distribution	Transport	Petro-chemical
Argentina	Yes	Yes	n/a	Open	Open	Open	Open
Bolivia	Partial	Yes	Yes	Open	Partly open	Open	Open
Brazil	Partial	Yes	Yes	Partly open	Open	Partly open	Open
Colombia	No	No ¹	Yes	Partly open ²	Open	Partly open ³	Open
Ecuador	No	No	Yes	Closed	Open	Partly open ⁴	Open
Mexico	No	No	No	Closed	Partly open	Partly open	Partly open
Peru	Partial	Yes	n/a	Open	Open	Open	Open
Venezuela	No	Partly open ⁵	Yes	Closed	Open	Partly open ⁶	Open
*Scale of openness: Open, Partly open, Closed.							
¹ Colombia has existing concessions granted in previous decades operating in the country, but does not allow new concessions.							
² Legally there are no impediments to private investment in refining, but the state's subsidization of petroleum products in the country has made private participation unattractive.							
³ ECOPETROL currently owns approximately 60 percent of the pipeline system in the country and has participation in the additional 40 percent of privately owned pipelines.							
⁴ A pipeline is currently under construction (as of June 2001) in Ecuador that will be built, operated and then transferred after a period of 20 years to the state. OCP Limited is responsible for the project, with participation by Alberta Energy Company Ltd of Canada, AGIP of Italy, Kerr-McGee and Occidental of the United States, Repsol-YPF of Spain and Techint of Argentina.							
⁵ Concessions are not allowed in the exploitation of oil and associated gas, but have been partly allowed in non-associated gas, as shown by the first licensing round held in mid-2001. Non-associated gas, though, accounts for only a small part of the country's gas reserves.							
⁶ New gas pipelines will be allowed under the new licensing agreements of mid-2001. This does not include disinvestment from PDVSA's current pipeline system.							
Sources: EIA- various reports; OGI- various issues; Petroleum Economist, various issues and information from Ecopetrol, Petro-Ecuador, PetroPeru, Pemex and PDVSA.							

Table 6
Liberalization/Openness based on actual share of private sector participation
(As of 2000/2001)

Country	Private sector share of oil production	Private sector share of refining capacity
	%	%
Argentina	100	100
Peru	100	55
Ecuador	44	0
Colombia	34	0
Venezuela	15	0
Brazil	n/a	2
Mexico	0	0

Sources: Own estimates based on NOCs' annual reports and information from PetroPeru, PDVSA, PetroEcuador, Ecopetrol, Petrobras and Pemex.

Table 7
Latin American NOCs and their world ranking in 2001
(Based on financial criteria)

Overall World Ranking	Company	Country	Ownership Status	Revenue		Net Profit	
				US\$ million	Rank	US\$ million	Rank
2	PDVSA	Venezuela	State-owned	32,648	10	2,818	8
7	Pemex	Mexico	State-owned	34,048	8	155	58
13	Petrobras	Brazil	56% state-owned	22,546	15	982	20
35	Ecopetrol	Colombia	State-owned	3,885	53	520	31
45	Petroecuador	Ecuador	State-owned	1,139	75	-	-

Source: PIW (2001)

Table 8
Latin American NOCs and their world ranking in 2001
(Based on operational criteria)

Company	Oil Output		Gas Output		Refining Capacity		Worldwide product sales	
	1,000 b/d	Rank	Million cf/d	Rank	1,000 b/d	Rank	1000 of b/d	Rank
PDVSA	3,295	4	4,101	10	3,070	4	2,500	7
Pemex	3,450	3	4,679	7	1,525	10	1,650	10
Petrobras	1,324	16	1,447	23	1,935	8	1,818	9
Ecopetrol	443	35	258	67	300	46	273	49
Petroecuador	259	44	112	82	175	60	140	65

Source: PIW (2001)

Table 10
YPFs' financial and operational results before its merger
(Selected years)

	1990	1995	1997
Net Income (in million US\$)	-576	793	877
Proven reserves			
Oil (in million of barrels)	790	1 149	1450
Gas (in billion of cubic feet)	10 921	8 358	9736
Production			
Oil (in thousands of b/d)	78	136	433
Employees	51 000	10 000	10 000
Average extraction costs	6.70	2.72	-

Source: Price Waterhouse (1997), Petroleum Intelligence Weekly, (1999)

Table 11
Venezuela's downstream interests overseas

Year	Location	Activity	Participation
1983	Germany	Refining & Marketing	50% of Ruhr Oel –JV with Veba Oel)
1985	Curaçao	Refining	Shell
1986	Sweden, Belgium and the UK	Refining, Distribution & Marketing	50% of AB Nynas Petroleum-JV with Axel Johnson
	US	Refining, Distribution & Marketing	50% of Citgo-JV with Southland Corp.
1987	US	Refining & Distribution	50% of Champlin –JV with Union Pacific
1989	US	Refining	100% of Champlin
1989	US	Refining, Distribution & Marketing	50% of Unoven-JV with Unocal
1990	US	Refining, Distribution & Marketing	100% of Citgo
1991	US	Refining	JV with Seaview Petroleum Company
1992	UK	Refining	Nynas' equity participation in Tarmac
1993	US	Refining & Marketing	Amoco's refinery in Savannah
	US	Refining	JV with Lyondell

Source: PDVSA annual reports, Al-Moneef (1998), Boué (1998)

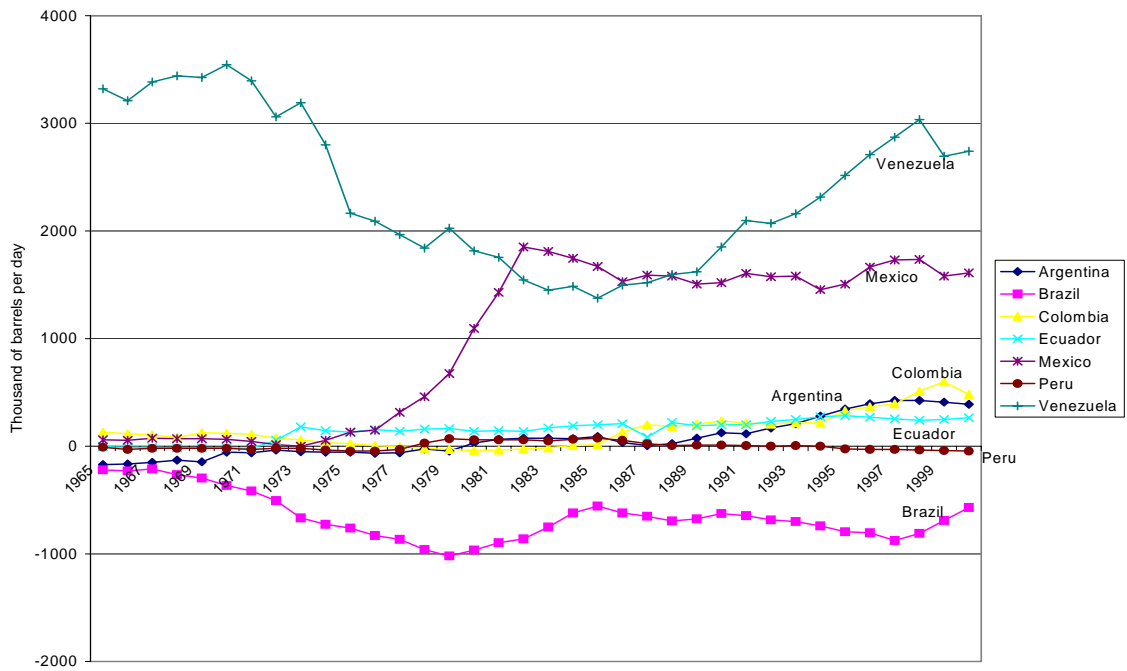
Table 12
Latin America's dependence on oil receipts, 2000-2001 averages

	Oil exports % total exports of goods	Oil revenues % fiscal revenues of the federal government
Argentina	17	n/a
Colombia	30	20
Ecuador	48	34*
Mexico	9	33
Venezuela	83	48

*Share of oil revenue in non-financial public sector revenues

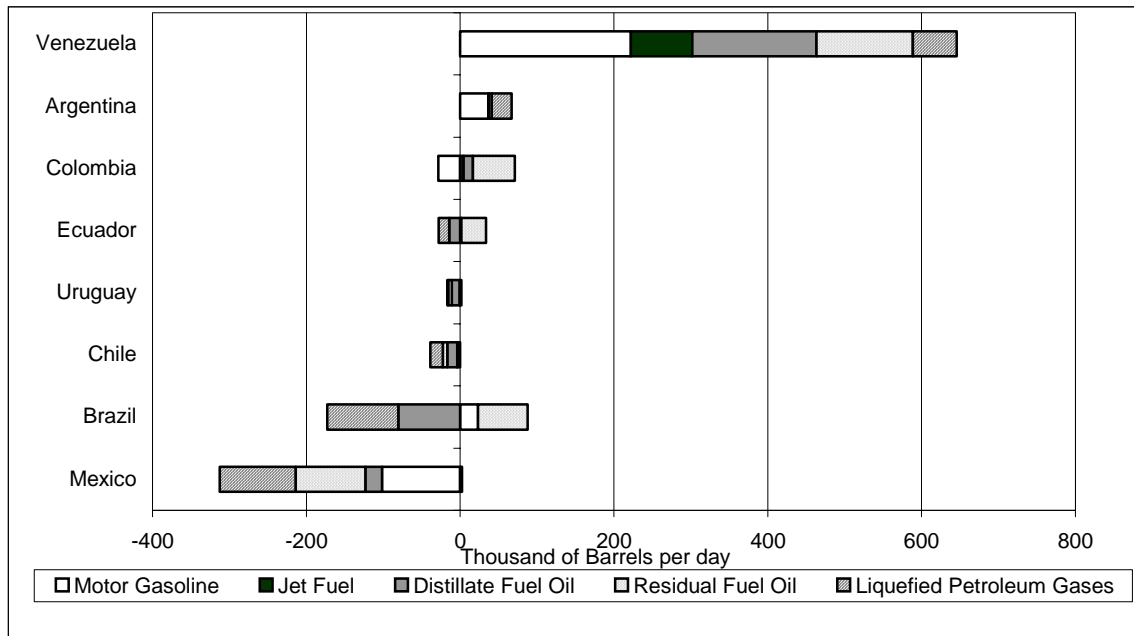
Source: Own estimates based on Ministries of Finance and Central Banks from Venezuela, Colombia, Ecuador, Mexico and Argentina and the IIF.

Figure 1
Latin American oil balances, Selected Countries
(In thousand b/d)



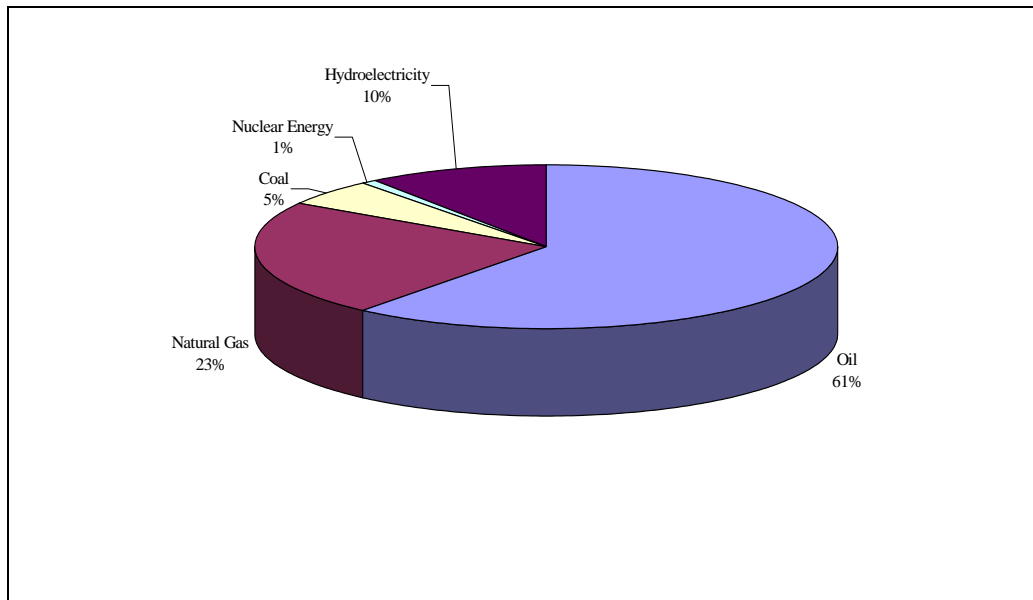
Source: BP Statistical Review of World Energy (2001)

Figure 2
Latin America oil product balances, selected countries (1999)
(In thousand b/d)



Source: EIA, 2002

Figure 3
Latin America's Primary Energy Consumption by type of fuel (2000)



Source: BP-Amoco Statistical Review of World Energy (2001).