Restructuring and Dynamics of Competition in Mexico's Natural Gas Industry: An Evaluation Using the Competitive Forces Approach

*By Alberto Elizalde Baltierra**

Introduction

With the intent of moving towards a more efficient and competitive natural gas industry for the benefit of consumers, the process of restructuring started in Mexico in 1995. The May 1995 amendment to the Regulatory Law of Constitutional Article 27 on Petroleum opened the downstream activities (transportation, storage and distribution) to domestic and foreign private investments. Exploration and production of petroleum and gas continue to be exclusive prerogatives of *Petróleos Mexicanos* (Pemex), the national oil company, which also has considerable market power in gas transportation and sales. The October 1995 Law of the Energy Regulatory Commission (*Comisión Reguladora de Energía* or CRE) strengthened the CRE as an independent agency of the Energy Ministry and extended its jurisdiction to include natural gas. The Natural Gas Regulatory Law (*Reglamento de Gas Natural*) issued in November 1995 developed in detail the regulatory provisions needed to set the framework for the new operations of the Mexican natural gas sector. New issues are thus introduced: open access to pipelines and secondary capacity trading; unbundling of transportation, storage and gas purchase and sales activities; free trade in gas across international boundaries; price regulation based on incentives and a more flexible approach; and franchises for gas distribution. The March 1996 Directive contains the methodologies which must be used by regulated businesses when setting prices and rates in the natural gas industry. The activities regulated by this Directive include first-hand sales of natural gas by Pemex in Mexico, and the provision of natural gas transportation, storage and distribution services. In order to replicate a competitive market price, the formula for setting Pemex's first-hand sales linked the regulated price with that of the Houston Ship Channel. For transportation and distribution prices, the CRE has adopted a more traditional price cap methodology system that minimizes regulatory intervention and provides incentives to improve efficiency and throughput. In addition, the Natural Gas First-Hand Sales Directive issue from February 2000 establishes the criteria and guidelines that Pemex must observe when carrying out sales of domestic natural gas.

The dynamics of competition describe not only the various players in the market, but also the characteristics of the market itself and how those characteristics dictate the behavior of players in the market and their interactions with one another. How have the dynamics of competition in the Mexican natural gas value chain evolved since the beginning of the restructuring process in 1995? In order to examine this question, we propose a model based on the "Five Competitive Forces that Determine Industry Competition" (Porter, 1980).

* Alberto Elizalde is a PhD student in energy economics at the IFP School and University of Paris IX-Dauphine. He is also one of the two student interns to the IAEE Council for the year 2001. From October 2000 to April 2001, he was a visiting scholar at the Energy Institute of the University of Houston where this work was prepared. This is an abridged version of a paper that was presented at the 24th International Meeting of IAEE, April 25-27 in Houston, TX.

Methodology

We make use of the "five forces" model to study changes in the dynamics of competition after restructuring in the Mexican natural gas industry. According to this approach, the state or dynamics of competition in an industry depends on five basic forces: (1) the threat of new entrants, (2) the threat of substitute products or services, (3) the bargaining power of suppliers, (4) the bargaining power of buyers, and (5) the rivalry among the existing competitors. The five competitive forces determine industry profitability because they shape the prices firms can charge, the costs they have to bear, and the investment required to compete in the industry. Buyer power influences the prices that firms can charge, for example, as does the threat of substitution. The strength of each of these forces is a function of industry structure, or the underlying economic and technical characteristics of an industry, and can change as an industry involves. The threat of entry, for example, depends on the strength of barriers to entry, such as economies of scale and government policies. Industry structure is relatively stable, but can change over time as an industry evolves. Structural change can cause shifts in the overall and relative strength of the competitive forces, and can thus positively or negatively influence industry profitability. Firms, through their strategies, can also influence the five forces for better or for worse. According to Porter (1980), for purposes of analysis it is usually more illuminating to consider how government affects competition through the five competitive forces than to consider it as a force in and of itself.

Porter's approach is used in this work for three main reasons. First, it allows us to analyze simultaneously competition in three phases of the natural gas value chain (production, transportation and distribution). Second, as competition is being introduced for the first time in the Mexican natural gas industry, this model is more appropriate for our study because it examines extended competition (potential entrants, substitutes…) rather than just competition among existing rivals. Third, it is relatively easy to use and widely accepted.[1]

As the determinants of the five competitive forces change with time, the intensity of these forces also varies with time. We studied post-restructuring changes in the forces that drive Mexico's natural gas industry following the gas value chain (Figure 1). The participants involved in the Mexican gas market are shown in Figure 2. The major player in the market is Pemex. As part of the drive to streamline and make it more competitive, Pemex was reorganized in January 1992. Pemex assets, personnel, and financial resources are now divided between four subsidiaries or operating companies: Pemex Exploration and Production (PEP), Pemex Gas and Basic Petrochemicals (PGBP), Pemex Petrochemicals (PP) and Pemex Refining (PR).

Results

For the three industry segments studied (production, transportation an distribution), the three most significant determinants of each competitive force were analyzed in detail. Table 1 shows the influence of these determinants on the competitive forces before and after restructuring. The detailed analysis of the influence of each determinant can be obtained from the full text of the paper (elizaalb@hotmail.com).

(continued on page 22)

[1] See footnotes at end of text.

Figure 1
Forces Driving Industry Competition in the Mexican Natural Gas Market.
(Based on Porter's "Five Forces" model)

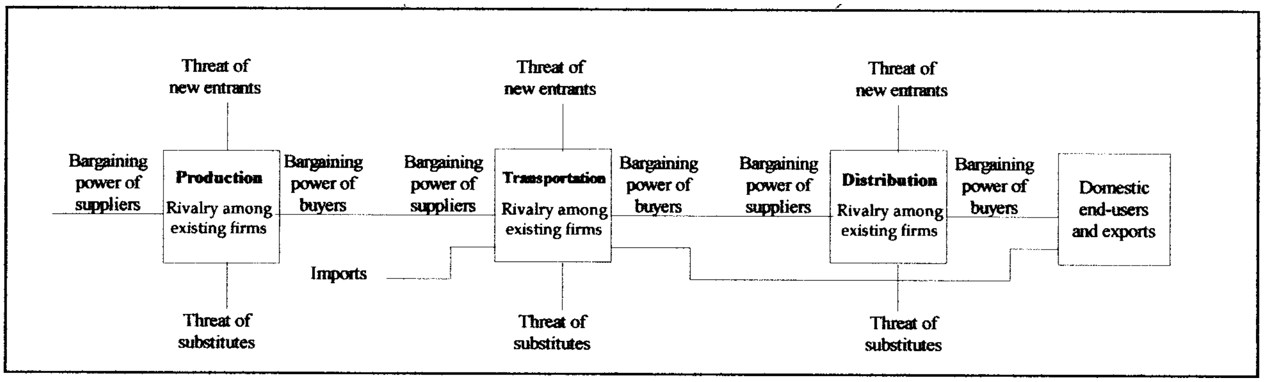
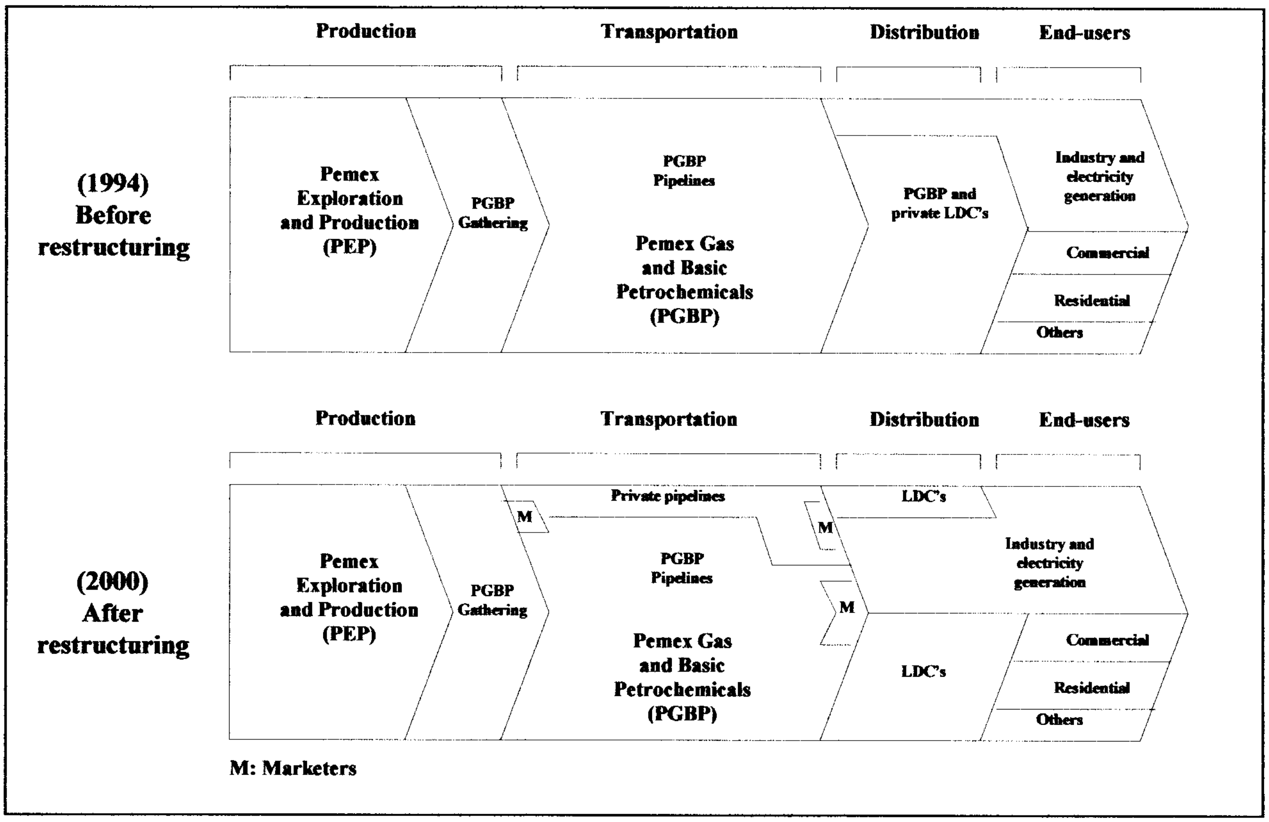


Figure 2
Participants in the Mexican Natural Gas Value Chain.



Mexico's Natural Gas Industry *(continued from page 21)*

Conclusions

We have analyzed changes occurring in the dynamics of competition in the Mexican natural gas value chain since the beginning of the restructuring process (1995). From this analysis we made using the "five forces" approach, some conclusions have been drawn.

- As shown in Table 1, the five forces have in general evolved towards a more competitive natural gas industry in those portions of the natural gas value chain that have been opened to competition through government policy.
- Rivalry among existing competitors has been the force experiencing the most change since the appearance of new competitors and expectations of high growth in the industry for the next 10 years. According to the Energy Ministry (SE, 2000), it is expected that domestic gas demand and production, respectively, will increase at 10 and 7 percent per year between 2000-2009. Imports of gas will be required to grow unless Pemex is able to expand natural gas production commensurate with demand. The threat of new entrants has radically increased in strength since 1995 regulations allowed new private firms to participate in midstream and downstream operations. Under recent environmental regulations encouraging gas use, the pressure from substitute products has decreased mostly in urban zones. For other regions, the current high natural gas prices create pressure from competing substitute fuels. A

Table 1
Dynamics of Competition in Mexico's Natural Gas Industry:
Competitive Forces Before and After Restructuring.

Determinants of five forces		Influence on competitive forces in the natural gas industry value chain*					
Forces	**Determinants**	**Production**		**Transportation**		**Distribution**	
		1994	**2000**	**1994**	**2000**	**1994**	**2000**
1. Rivalry among existing Competitors	Number and diversity of competitors	- - -	- - -	- - -	+	- -	-
	Industry growth	+	+ + +	+	+ + +	+	+ + +
	High fixed costs	+	+	+	+	+	+
2. Threat of new entrants	Capital requirements	-	-	-	-	-	-
	Economies of scale	-	-	- - -	- - -	- - -	- - -
	Government policy	- - -	- - -	- - -	+ + +	- - -	+ +
3. Pressure from substitute products	Relative price performance of substitutes	- - -	- - -	+	+ +	+ +	+ + +
	Switching costs	- - -	- - -	-	-	- -	- -
	Government policy	- - -	- - -	-	- - -	-	- - -
4. Bargaining power of suppliers	Supplier concentration	-	-	- - -	- -	- - -	-
	Importance of inputs to the buyer's business	-	-	-	-	-	-
	Threat of forward integration	-	-	- - -	+	- - -	+
5. Bargaining power of buyers	Buyer concentration	- -	-	- -	-	+	+
	Price sensitivity/total costs	- -	-	- -	-	- -	-
	Threat of backward integration	- - -	- - -	- - -	+ +	- - -	+

* "+" means that the determinant strengthens the competitive force in question. "−" means that the determinant weakens the competitive force in question.

smaller supplier and buyer concentration has reduced its bargaining power, while the threat of forward and backward integration increases it.

- Transportation and distribution have been the segments experiencing most changes, as these segments and natural gas storage are the components of Mexico's natural gas system that were opened to private ownership and investment. For these sectors, all the competitive forces have changed. Gas production has remained the activity showing very low competitive forces even though it has a considerable profit potential. This is because the regulatory law of Article 27 of Mexico's constitution continues to protect Pemex as the only entity with the rights to explore for and produce natural gas (and petroleum) resources.
- For the future, the Mexican natural gas industry must still follow a long restructuring process if it wants to be a competitive industry. The most significant step to be taken will be, however, to allow new competitors in the production segment. We believe that the current changing times in Mexico are a propitious opportunity to make this decision. In making this crucial decision, the Mexican government, as the representative of Mexican people, will decide between continuing to give to the property of hydrocarbons a sovereignty and political cachet or to inject more economic sense. Another issue to be considered is the emergence of crucial innovations, like natural gas market centers and hubs that facilitate price discovery, transportation and ancillary services and, importantly, price risk management.[2] Whatever the decision, the future of the Mexican natural gas industry remains very exciting to study. Many industry analysis studies, such as this work, will be necessary to support decision makers.

Acknowledgements

This research has been supported in part by the corporate sponsors of the Energy Institute, Bauer College of Business, University of Houston; IFP and University of Paris-Dauphine; and TotalFinaElf.

Footnotes

[1] Its (relative) ease of application inspired numerous companies as well as business schools to adopt its use. A survey by the consulting firm Bain suggested a 25% usage rate in 1993 (Rigby, 1994 cited by Ghemawat et alii, 1999).

[2] From public comments submitted by Dr. Michelle Michot Foss on behalf of the Energy Institute to the Comisión Reguladora de Energía (CRE), January 31, 2001 (www.cre.gob.mx).

References

Contact the author.