



MSAR Liquid Fuels Sector Market Performance and Monitoring Study Report

Summary



November 2006



MACAU SAR LIQUID FUELS SECTOR MARKET PERFORMANCE AND MONITORING STUDY REPORT

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1. INTRODUCTION AND BACKGROUND

Liquid fuels are a major component of the energy balance of Macau Special Administrative Region (“MSAR”), accounting for over 50 percent of final energy consumption in 2004. Accordingly their availability and price have a significant impact on the welfare of Macau consumers.

Nexant Inc., an international energy consultancy, was retained by the Office for the Development of the Energy Sector (GDSE) to undertake a study of the performance of the petroleum product markets in the Macau. The study was conducted during the second half of 2005.

This study includes major liquid fuels more commonly used in Macau, namely gasoline, auto diesel and liquefied petroleum gas (LPG). The purpose of this study was twofold: First, to review and assess competition in the liquid fuels market and the operating environment for the fuel companies to insure that these markets are performing efficiently thereby providing consumers with liquid products that are competitively priced; Second, to provide guidance on processes for monitoring the liquid fuels market in order to provide GDSE with the needed tools to assess the liquid fuels market and thereby promote the transparency of these markets. The study was based on interviews with key stakeholders in the sector, publicly available information and Nexant’s industry experience.

2. INDUSTRY STRUCTURE

Macau is totally dependent on imported petroleum products. Nearly all of the petroleum products supplied to Macau are shipped to it from storage terminals in either Hong Kong (which receives it from refineries located in Singapore) or Mainland China. The product supply sources are different for the various products primarily because of product availability, the nature of the companies supplying the oil, as well as the specific product quality characteristics required.

Currently, the principle suppliers to Macau are Nam Kwong Petroleum and Chemicals Ltd, Caltex (i.e. Chevron), Shell, ExxonMobil, China Resources (CRC) and Sinopec. Nam Kwong sources its product principally from Mainland China, relying on its supply network there. In contrast, the major international brands with service stations in Macau (i.e., Shell, Mobil and Caltex) dominate the gasoline market and these companies source gasoline from their affiliated Hong Kong terminals. Most of the supplies for these terminals originate in Singapore, a major regional refining center.

3. COMPETITIVE ASSESSMENT

We addressed the following areas in order to gauge the competitive nature of the petroleum market in Macau:

- Market concentration
- Barriers to entry
- Price and non-price competition

Market Concentration

Market concentration is a measure used to gauge the relative market dominance of the sector by its participants. As such, market dominance may, in certain cases, convey the power to alter prices profitably away from competitive levels particularly if there is some type of collusion among the participants. We addressed the issue of how concentrated the market is, the factors affecting this concentration and what administrative measures, if any, are needed to insure market power is kept in check.

One widely used measure of industry concentration is the Herfindahl-Hirschman Index (HHI) which is based on estimated market share data. Table 1 below sets out the HHI for the Macau petroleum market.

Table 1 HHI Estimates for Petroleum Market

Market Segment	HHI*	Indication
Total Market	3,821	Highly concentrated
Gasoline Retail	1,811	Moderate to high
LPG Wholesale supply	2,600	Highly concentrated
LPG Retail	1,680	Moderately concentrated

*HHI < 1000: low concentration; $1000 \leq \text{HHI} \leq 1800$: moderate; HHI > 1800: high

The results of this analysis indicate a market highly concentrated in term of wholesale supply and moderately concentrated in terms of retail supply. Thus the wholesale supply could be characterized as having a limited number of participants. The key issue is what has contributed to this market structure, and whether this market power is being used to prevent entry of new entrants, set prices and earn excessive profits and what if any measures should be taken to mitigate this market power.

The assessment shows that Macau is a very small market. Auto fuel (i.e. gasoline and diesel) consumption in Macau was 73 million liters (ML) compared to Hong Kong with 1,500 ML, Singapore with 1,100 ML and Australia with 17,000 ML. The implications are significant in that it limits the number of potential entrants into the market at all levels. Market size impacts the ability to operate at minimum economic size. If this cannot be achieved immediately, then there should be the potential to increase market share and eventually attain and surpass minimum economic size criteria. Thus, the ability to achieve profitable operations can be accomplished by either attaining a certain level of profitability per unit sold or alternatively through selling larger volumes at lower profits per unit. Market size has an important if not critical bearing on pricing and price structure. Accordingly, the current market structure is a direct result of this market calculus.

Based on the above, we can say that market size is a clear contributing factor to the current market structure. Accordingly, the market can accommodate only a limited number of suppliers. This would suggest that, at best, the petroleum market in Macau could become moderately less concentrated over time with the introduction of new suppliers. In fact, this has already happened. The Government's decision in 2001 to allow new entrants into the retail auto fuels market has created an initial market opening and increased competition. Thus if the market operates efficiently and there are no major barriers to entry, the new entrants will most likely look to increase their market share by expanding into other market segments.

Barriers to Entry

The market for petroleum products may be influenced by factors which inhibit new entrants into the market. These are referred to as barriers to entry. Our findings with regard to the key barriers, namely market size, regulations, entry costs, product specifications and operational requirements, are as follows:

Market Size: As indicated previously, the Macau market is very small, and, as such, this probably creates the most significant entry barrier for the reasons identified above. The end result is that the potential for reducing market concentration is limited as the market will accommodate only so many participants who can operate efficiently

Governmental Regulations: Based on interviews conducted with market participants and a review of government regulations there do not appear to be significant barriers from the perspective of obtaining a petroleum product supply or retail license. The major impediment to new entrants appears to be in the retail gasoline market, which depends on the availability of suitable sites for leasing.

Entry Level Costs: The costs of entering the market include initial investments in land, retail and service equipment. The requirements here are in line with requirements in other markets with two key exceptions. First, given Macau's rapid development and limited space the cost of land may increasingly add to the cost through the premiums bid for tendered leases. In addition, the small market size strongly suggests that it will be very difficult to achieve the economy of scale for an efficient operation, contributing to higher than normal per unit costs.

Product Specifications: Macau's product specifications are in line with international standards. As such they do not impose barriers to entry.

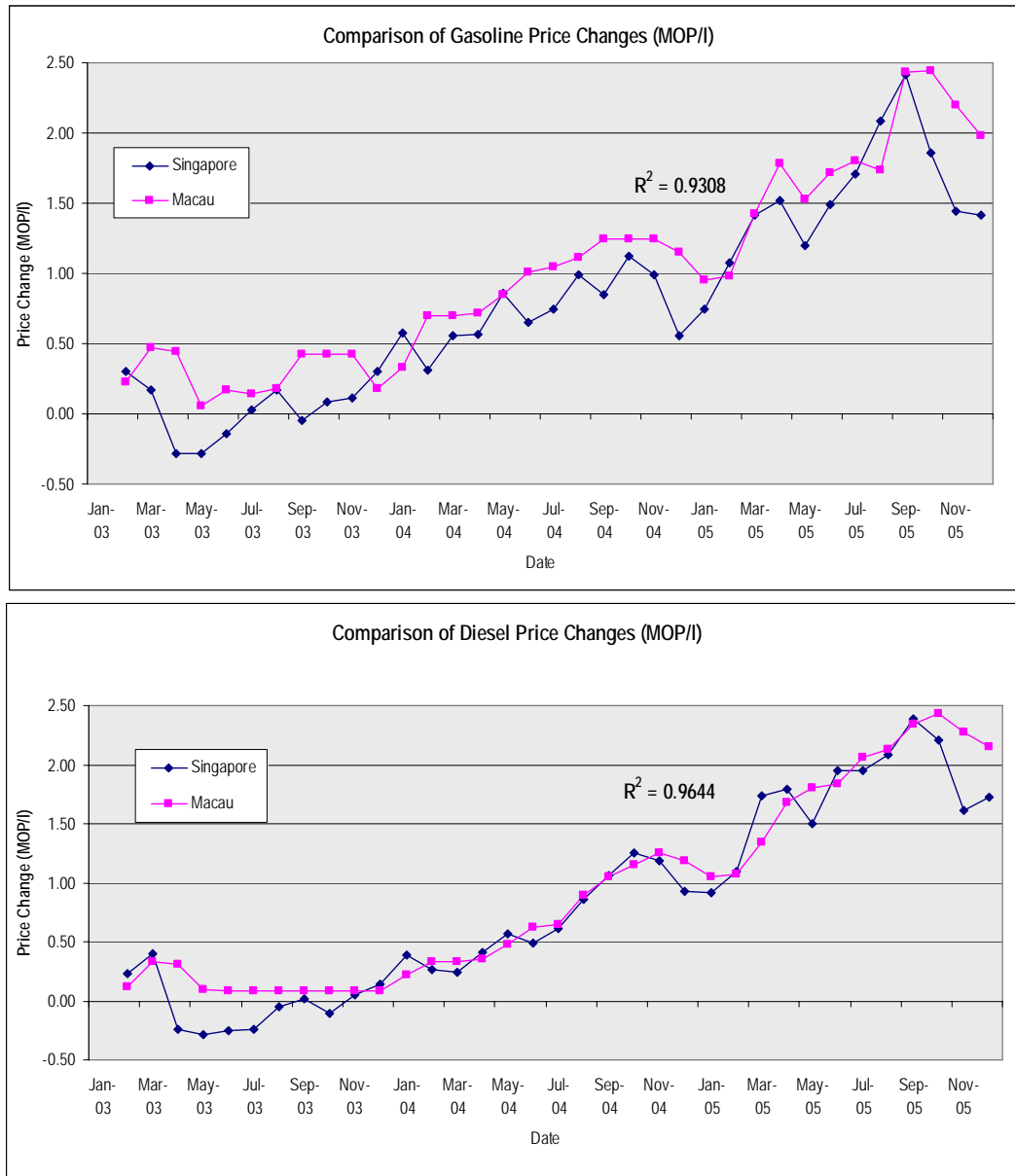
Operational Requirements: This includes requirements to operate in an efficient and low cost manner. For the most part, at present, there are no major barriers in the market with regard to operational requirements.

Price and Non-Price Competition

Nexant assessed whether the prices in the petroleum sector were being set in a competitive and economically efficient manner. In other words, are prices reflective of costs and are profit levels reasonable. In general, price setting in Macau is related to prices in Hong Kong as they both rely on the same sources of supply and have basically the same suppliers. Typically, when prices change in Hong Kong they also change in Macau. However, on a broader measure, the originating source of most of the supply for Hong Kong and hence Macau is Singapore, which is a major regional

refining center. Accordingly, if the market is operating efficiently, Macau petrol and diesel prices should reflect price movements in Singapore. In order to assess this issue we compared the changes in the Singapore FOB spot price for unleaded gasoline and diesel with changes in the Macau retail price of these products. Figure 1 sets out the this comparison of price changes from 2003 to 2005.

**Figure 1 Historical Comparison of Fuel Price Changes
(based on January 2003 prices)**



Source: Platt's Oil Price Service and Shell Oil Co.

The Macau price changes are based on the retail prices for each fuel at the service station. The FOB Singapore price changes are based on the gasoline and diesel spot prices at the refinery gate, based on product loadings within a specified time period (i.e., within 15-30 days of the date when the price quotation is published). Most refinery gate sales occur at prices close to or equal to these spot prices. Thus the

Singapore price is reflective of changing global market conditions in the petroleum market.

As seen in the above graphs there is a very high correlation - the correlation coefficients (or R^2) are close to 1 between price changes in Macau prices and price changes in Singapore. (see graphs) Thus we can conclude that petrol price setting in Macau does reflect regional as well as international petroleum market conditions.

We also examined whether prices in Macau are reflective of costs. The key issue is whether excess margins inclusive of profits are being made by suppliers serving the Macau market. The gross margin must cover the following costs, where applicable:

- Working capital carrying costs
- Transportation/trucking cost from terminal to retail site or fuel consumer
- Dealer commissions and/or service station operating costs
- Advertising and promotional expenses
- Return on capital invested in service station sites

The gross margin, and thus the price paid by liquid fuel consumers, also reflects the volume of fuel being purchased and the level of service being provided. It should be recognized that margins vary significantly from country to country, reflecting competitive factors, market size and geographical considerations. Table 2 compares retail prices and gross margins for product sales in Macau with those in other cities before applicable discounts off of the pump price are applied, as of October 2005.

Table 2 Comparative Petroleum Product Prices and Gross Margins

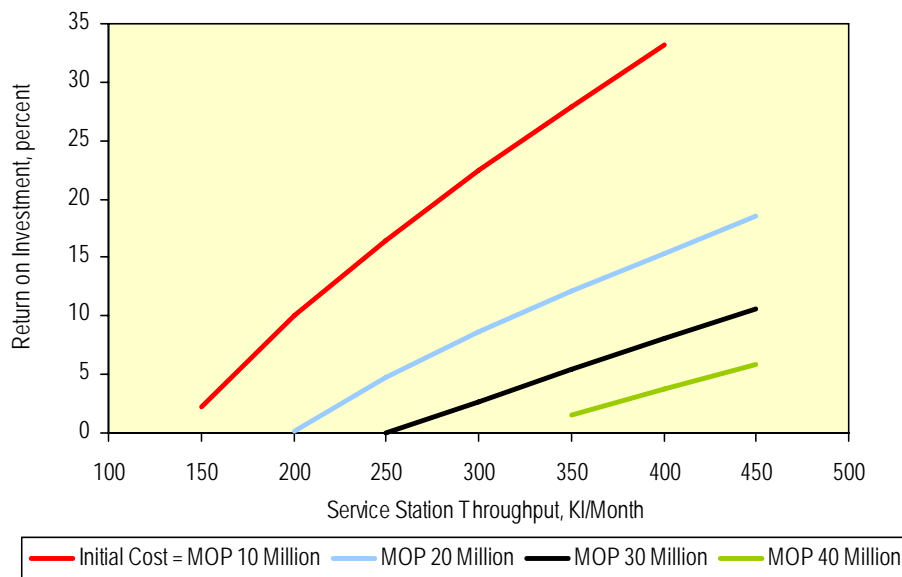
Product	Macau	Hong Kong	Singapore	Tokyo	Hawaii	New York	London	Amsterdam
Gasoline (MOP/liter)								
Retail Price (Oct. 2005)	9.23	13.47	8.44	9.39	6.56	5.63	13.36	13.83
Taxes	1.00	6.24	2.11	4.36	1.08	1.09	8.62	8.68
Price ex Taxes	8.23	7.23	6.33	5.03	5.48	4.54	4.74	5.15
Gross Margin (GM)	1.81	2.15	1.81	1.34	0.82	0.77	0.57	1.21
GM as % of Price ex Tax	22.0%	29.7%	28.6%	26.6%	15.0%	17.0%	12.0%	23.5%
Diesel (MOP/liter)								
Retail Price (Oct. 2005)	7.64	8.52	5.64	7.64	5.41	5.09	13.71	10.82
Taxes	0.08	1.15	0.24	2.75	1.06	1.34	8.68	5.28
Price ex Taxes	7.56	7.37	5.40	4.89	4.35	3.75	5.03	5.54
Gross Margin (GM)	1.51	1.81	0.88	0.91	1.74	0.86	0.70	1.14
GM as % of Price ex Tax	20.0%	24.6%	16.3%	18.6%	40.0%	22.9%	13.95	20.6%

Source: Macau: Macau Statistics and Census Department, Shell Oil Co, Nexant estimates; Other cities: Government of Hong Kong Report: Study of the Auto Fuel Retail Market, 2005

As shown in the above table, gross margins, on a MOP/l basis, for gasoline are lower in Macau than Hong Kong and comparable to Singapore. When gross margins are viewed relative to the retail price after taxes, on a percentage basis, Macau is approximately midway with four cities higher and three lower than Macau. For diesel the results are similar.

As mentioned previously, the gross margin encompasses the profit or return the station owner earns from the sale of these products. While we did not have access to company financial reports for operations in Macau, we did undertake an alternative assessment which estimated the returns for a typical new retail petrol station in Macau, based on survey data. The results are set out in Figure 2.

Figure 2
Estimated Profitability of Macau Service Stations, 2005



Based on the results of our survey, the initial investment cost of service station in Macau is approximately MOP 20 million, which includes the land premium, and associated construction and other capital costs. According to the survey result that the average throughput is approximately 300 thousand liters per month, our assessment indicates that the owner of a retail station in Macau could expect to earn approximately 8 percent on his investment. Based on our experience and judgment we believe the estimated return to be reasonable.

Lastly our assessment concerning price and non-price competition indicated that non-price competition in Macau is widely prevalent in the liquid fuels market. All suppliers appear to be competing on the basis of service, quality or are offering some type of promotion. Price discounting is universal in the auto fuel market, and large buyers of fuel are able to secure large discounts through competitive tendering. It appears that when one supplier adopts some form of differentiation it is adopted by the other suppliers in due course. This is not surprising given the relatively high concentration in the market where each supplier can easily monitor what the others are doing. It is a characteristic of competitive markets.

4. MONITORING OF THE PETROLEUM SECTOR

Most of the sector's current regulations relate to safety, technical, and construction procedures applicable to storage, handling, transportation, and retail stations for liquid fuels and LPG. Prices are set by the private sector and are not controlled or influenced by the Government. As regards competitive safeguard, Macau's Commercial Code sets out what are considered normative business practices. Accordingly, if a party believes they have been injured by non-competitive commercial practices they can adjudicate through the courts and seek retribution.

In order to give additional insight to the MSAR Government for evaluation of its current fuels monitoring program, the monitoring programs of four other regions: Hong Kong, Singapore, Australia, and the United States, were examined. Each analysis provided a broad overview of the fuels market, the major government groups involved in the monitoring process, the policy environment for all stages of the supply chain, an analysis of the monitoring efforts for price, quality, and sales, a description of the information provided to consumers, and the quality specifications required by each region. No one scheme is deemed to be "best"; each region has its own unique attributes that leads to different monitoring programs.

5. KEY FINDINGS

Based on the foregoing assessment the following observations can be made about the petroleum market in Macau:

Market Structure:

- The petroleum product wholesale supply market is highly concentrated however we found no evidence that the high concentration has resulted in market abuse and unfair competition
- The retail market for gasoline and diesel is moderately to highly concentrated reflecting the impact of new entrants into the market
- The retail LPG market is moderately concentrated reflecting the number of sellers in this market
- This market structure is a direct result of the small size of the Macau market.
- The introduction of alternative fuels should also provide more choices for consumers.

Market Performance:

- Petroleum product prices in Macau in general efficiently reflect the cost of the source of supply and the added costs of transshipment.
- Petrol prices in Macau reflect movements in regional as well as international prices as indicated by their relationship to the prices in Singapore .
- Discounting of Petrol and LPG prices is widely prevalent. This has been facilitated by the Government's tender for new retail stations which require all bidders to offer discounts from the "average retail price" for at least two years

- Gross margins per unit sold are considered reasonable by international standards
- Overall, given the size and structure of the market, economic performance has been reasonable.

Market Monitoring:

- The structure and characteristics of the liquid fuels sector in the MSAR allow market forces to generally work in a fair and reasonable manner, minimizing the need for regulation of the sector.
- Petroleum product prices in Macau are determined by the private sector. In Nexant's opinion, Government regulations applicable to liquid fuel pricing are not needed in Macau since all segments of its liquid fuel markets are open enough to rely upon competition to limit profits from becoming excessive.
- The Macau Government indirectly promotes competition among service stations by controlling the number of service station sites that are made available to the industry through a tendering process. In Nexant's opinion, this is the most effective means to modify and improve market concentration. Accordingly, regulating competition in other ways is not necessary at this time.
- Nexant's survey of other regions reveals that the degree of market monitoring varies among countries with Australia having the most comprehensive set of laws and requirements for industry compliance, reporting and monitoring. Hong Kong and Singapore tend to be similar in their monitoring of the sector, with less direct controls.

RECOMMENDATIONS

The following recommendations are made based on the above findings:

- In the near term the most appropriate action would be to provide for the continuous monitoring of the sector to insure consumers' interests are protected.
- The MSAR should insure transparency of the petroleum sector by periodically making available information on market performance.
- Given our findings, we see no need to introduce additional players into the retail petrol market at this time; however, the government should continue to monitor this situation
- The MSAR should insure that the Ka Ho Terminal continues to operate in a fair and transparent manner
- Longer term, given the current performance of the sector, the Government should continue to maintain and promote an open and competitive market with minimal government interference.
- Longer term the MSAR should continue to promote greater fuel diversity such as the introduction of natural gas to provide consumers with greater choice