

FEATURE ARTICLE

AN INQUIRY INTO THE RETAIL PETROL MARKET IN SINGAPORE

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EXECUTIVE SUMMARY

- This inquiry examines whether the retail petrol market in Singapore is competitive. In particular, it examines whether the petrol companies' retail petrol prices are the same and move in tandem ("price parallelism"), whether prices increase more or faster than they decrease ("rocket and feather" effect), and whether there is evidence of collusion between the players.
- Although the market structure and conditions of retail petrol in Singapore suggest a material risk of collusive or coordinated practices between the market players, based on current facts and data, there is no evidence that the petrol players are engaged in anti-competitive collusive behaviour.
- CCS continues to monitor developments in this sector.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry, the Competition Commission of Singapore or the Government of Singapore.

INTRODUCTION

There is a common public perception that the retail petrol market in Singapore, being an oligopoly between a few vertically-integrated petroleum enterprises, is uncompetitive or collusive. Some perceive retail petrol prices to be similar and move in tandem between competitors ("price parallelism"), and rise more or faster than they fall ("rocket-and-feather").

On the other hand, petrol market players have suggested that the shortage of land allocated for petrol stations is the main obstacle to making the retail petrol market more competitive in Singapore.

Using information obtained from market players¹, relevant government agencies and industry experts, we performed an assessment whether these perceptions are substantiated by facts.

INDUSTRY BACKGROUND

The petroleum industry is a supply chain of fossil fuel for various industrial and household purposes. It consists of extraction of crude oil, refinery of crude oil into distillate products (such as petrol), and the retailing of the distillate products. The retail petrol market refers to the sale of petrol to motorists via fuel pumps at petrol stations². It is at the downstream end of the petroleum supply chain³.

¹ The Competition Commission of Singapore (CCS) obtained commercially sensitive and confidential information from the four petrol retailers, pursuant to section 61A of the Competition Act.

² Otherwise known as the "pump" petrol market, so as to draw a distinction with bottled petrol, which is available for retail sale in many countries but prohibited in Singapore for safety reasons.

³ The terms "upstream" and "downstream" in this paper refer to their antitrust meanings, based on the relative positions of two markets along a supply chain, as opposed to their industry meanings, based on the direction of oil flow. For instance, refinery is a "downstream" business in the industry context, but it is an "upstream" market to retail petrol in the antitrust context.

There are four players in the petroleum industry in Singapore⁴. Each of them is vertically integrated, with a refinery plant⁵ and an island wide network of petrol stations⁶. Only about 20 per cent of petrol produced by their refineries is sold domestically. The remaining 80 per cent is exported through open-market trading⁷.

There is no dedicated sectoral regulator for retail petrol in Singapore. Petrol station operators are nonetheless subject to urban planning by the Urban Redevelopment Authority (URA) and Singapore Land Authority (SLA), competitive bidding of petrol station sites conducted by Housing Development Board (HDB), safety rules by Singapore Civil Defence Force (SCDF), excise duty on petrol imposed by the Singapore Customs (Customs), and indirectly, differential road taxes on petrol and diesel vehicles imposed by the Land Transport Authority (LTA)⁸. Lastly, business practices of the petrol players are subject to antitrust scrutiny by the Competition Commission of Singapore (CCS).

THE RETAIL PETROL MARKET IN SINGAPORE

We have observed the following features of the retail petrol market structure in Singapore:

Homogenous product

Petrol is largely a homogenous commodity. It is relatively easy for competitors to monitor each other's prices. Although petrol companies use additives to differentiate their products, consumers switch readily between competitors in response to price changes, suggesting high price elasticity of demand.

Lack of substitutes

There are different grades of petrol (e.g. RON 92, 95, 98 and Premium), as well as alternative vehicle fuels such as diesel. Due to vehicle engine specifications, petrol and diesel are generally not substitutable, and even the different grades of petrol may not be fully interchangeable⁹. Of the different grades, RON 95 accounts for the largest portion of petrol sales at 50-70 per cent of the market.

High market concentration

Based on market shares by sales value¹⁰, we found that market concentration¹¹ is high in Singapore. This is partly due to a lack of independent players which are not affiliated to the refineries.

⁴ Chevron Corporation (Chevron), ExxonMobil Asia Pacific Pte Ltd. (ExxonMobil), Shell Eastern Petroleum Pte Ltd. (Shell) and Singapore Petroleum Company (SPC).

⁵ Chevron and SPC co-own Singapore Refinery Company (SRC), a joint-venture refinery plant.

⁶ As of December 2010, there were 207 petrol stations between the players in Singapore

⁷ Refined petrol is priced based on the Means of Platts Singapore ("MOPS"), which is an average daily transacted price in Singapore as per Platts, a leading global provider of commodity market information.

⁸ As diesel is not subject to excise duty in Singapore (for commercial purposes), a special lump-sum road tax is imposed on diesel private vehicles to neutralize any unintended fuel cost advantage.

⁹ Technically, motorists can switch to a higher grade of petrol than the engine specifies, but in practice, many motorists do not do so.

¹⁰ Based on confidential information submitted by the petrol companies

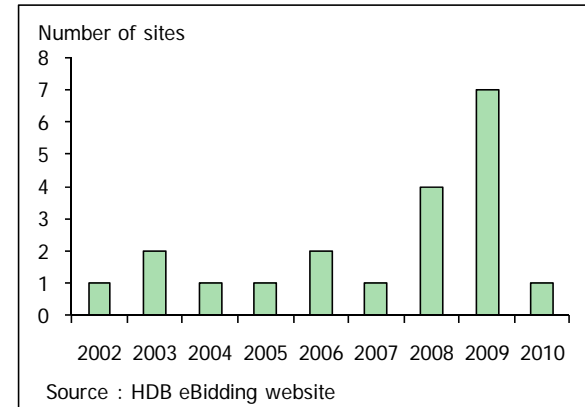
¹¹ The Herfindhal-Hirshman Index (HHI) index value is 3,104 for the retail petrol market in Singapore, which the United States Department of Justice classifies as highly concentrated ([Horizontal Merger Guideline](#)). HHI is calculated by summing the squared market shares of all individual players.

High barriers to entry

Land premiums paid for retail petrol sites are generally high because of site scarcity. The sites planned for petrol station use are specified in the URA Master Plan and tendered out by HDB. From 2001 to 2009, the number of new petrol station sites tendered averaged 2.4 per annum ([Exhibit 1](#)).

Given the mobility of vehicle traffic, a petrol retailer needs a critical number of petrol stations located throughout Singapore to be viable. At present, the four players have at least 30 petrol stations each. It would be difficult for new players to enter the market today, given the small number of new sites available each year, in planned locations only.

Exhibit 1: Number of Tender Sites Available



Vertically integrated players

All four players are vertically integrated with their refineries in Singapore. This brings about efficiency benefits such as savings in transportation costs. At the global level, however, the prices at which they purchase crude oil are still subject to the bargaining power of oil exporting countries.

At the refinery level, every distillate product, including petrol, is a “by-product” of a refinery operation. Depending on demand conditions of various distillate products from time to time, an individual refinery player may need to manage its inventory of petrol within a short period of time so as to avoid high storage costs. In such circumstances, coordination of petrol prices or output levels may be difficult to sustain between the refinery players.

Weak buyer power

The petrol market is characterized by a large number of motorists purchasing small amounts of petrol each time. Individual buyers do not have the bargaining power to negotiate prices with the sellers.

Obscure effective prices

Some petrol players display their listed prices prominently at their station entrances. They may also announce impending price changes through the media. While this may appear to indicate good price transparency, the players also offer promotions, discounts and rebates, making it difficult to compare effective prices between them. Although some consumer self-help initiatives have emerged in recent years¹², the information gap has not been fully bridged¹³.

In any case, pricing transparency can be a double-edged sword. If a cartel exists in the market, it is easier for cartel members to monitor one another’s compliance if prices are openly broadcasted. When a seller knows that its competitors are able to observe and respond quickly to any price reductions, the incentive to cut prices in the first instance is weakened, as the ability to gain market share is short-lived.

Conclusion

On balance, the market structure and conditions of retail petrol in Singapore suggest a material risk of collusive or coordinated practices between the market players. We next examine whether there is evidence that such anti-competitive behaviour is actually taking place, or is likely to be taking place.

¹² For example, [Petrolwatch](#) is a free service to motorists. It updates petrol prices promptly, sends SMS alerts to members on impending price changes, and attempts to monitor various discounts and promotion schemes. It has since become a popular website due to the fluctuations in petrol prices in recent years.

¹³ For example, Petrolwatch provides a “price board before and after house discounts”, which does not capture the full range of discounts and promotions.

OUR ASSESSMENT OF THE EVIDENCE

Listed prices are similar between competitors, but effective prices are not

We have adopted two different methodologies to compare the listed and effective prices of the petrol players¹⁴. As shown in [Exhibit 2 & 3](#)¹⁵, listed prices (the dark green band) ranged much narrower than effective prices (the light green band). This demonstrates that, while listed prices may be similar and move in tandem between the four players, the same is not true for effective prices. While listed petrol prices in Singapore are highly transparent and parallel, effective prices are quite varied. Price competition appears to take place at the effective price level, as buyers take advantage of the various promotion and loyalty schemes.

Exhibit 2: Listed Prices vs. Discounted Prices

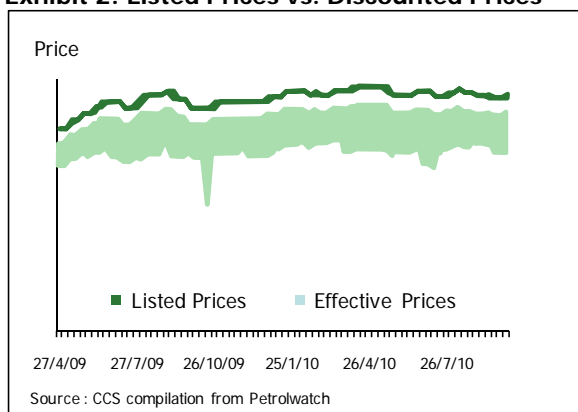
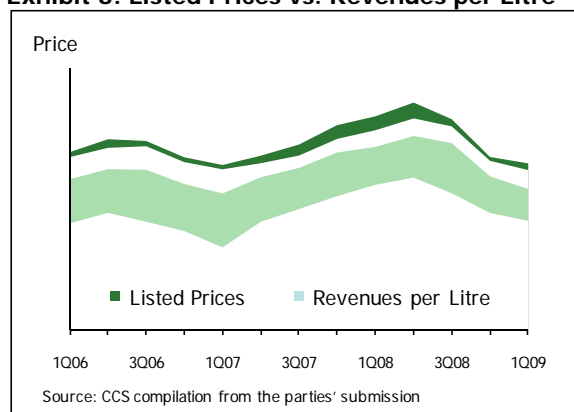


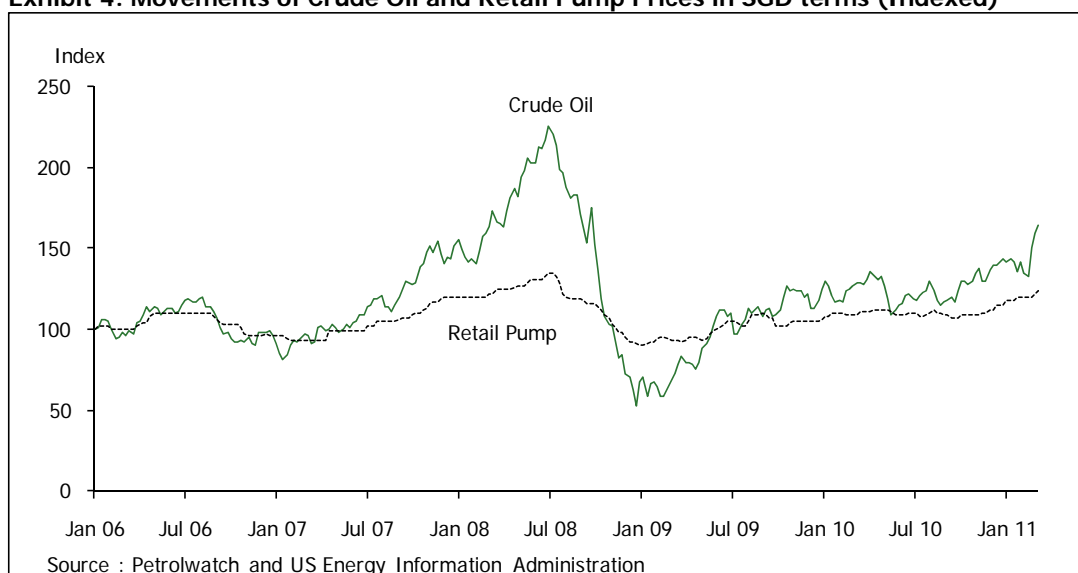
Exhibit 3: Listed Prices vs. Revenues per Litre



Pricing data does not exhibit a "rocket-and-feather" pattern

[Exhibit 4](#) plots retail and crude oil prices in Singapore Dollar (SGD) terms from 2006 to 2011, indexed. In general, crude prices were more volatile than pump prices, but over a full cycle (e.g. 2006-07, 2007-09), pump prices did not outpace crude prices, as would have been predicted by the "rocket-and-feather" hypothesis.

Exhibit 4: Movements of Crude Oil and Retail Pump Prices in SGD terms (Indexed)



¹⁴ The first methodology compares the displayed prices of RON 95 petrol against the discounted prices after various promotions. The second methodology compares the displayed prices of all grades of petrol against the actual revenue per litre of the petrol players. The first methodology is sensitive to the *eligibility* of individual consumers to various targeted discount schemes, while the second methodology is sensitive to the *product mix* of individual petrol players. However, the results are consistent.

¹⁵ The time periods covered under the two methodologies are different due to availability of data.

We have also reviewed the incidents of petrol price movements over the 12 month period from April 2010 to March 2011. As shown in the following table, there were 11 incidents of price increase (in **dark green**), 6 incidents of decrease (in **light green**), and 4 incidents of full or partial reversal¹⁶. During this period, crude oil price increased by 13.3 per cent in SGD terms, while retail petrol prices increased by 12.7 per cent on average.

Exhibit 5: Petrol Price Movements

Start date	Number of Players Involved	Direction	Magnitude	Time Span
5 Apr 2010	4	Increase	2~3 cents	48 hours
17 May 2010	4	Decrease	-4~5 cents	2.5 hours
24 May 2010	4	Decrease	-2 cents	2.5 hours
17 Jun 2010	4	Increase	3 cents	26 hours
6 Jul 2010	4	Decrease	-3~4 cents	20.5 hours
26 Jul 2010	4	Increase	3 cents	24.5 hours
5 Aug 2010	4	Increase	2~3 cents	28 hours
13 Aug 2010	4	Decrease	-3 cents	3.5 hours
25 Aug 2010	4	Decrease	-2 cents	1 hour
8 Sep 2010	4	Decrease	-2 cents	1.5 hours
14 Sep 2010	2	Full reversal	3 cents	49 hours
1 Oct 2010	2	Full reversal	3 cents	99.5 hours
7 Oct 2010	4	Increase	3 cents	5 hours
10 Nov 2010	4	Increase	2 cents	17 hours
29 Nov 2010	4	Increase	3 cents	21 hours
7 Dec 2010	4	Increase	5 cents	8 hours
24 Dec 2010	4	Increase	3~4 cents	23 hours
18 Jan 2011	1	Increase	3~4 cents	22.5 hours
23 Feb 2011	4 (1 reversed)	Partial Reversal	3 cents	72 hours
3 Mar 2011	4	Increase	2~4 cents	21 hours
21 Mar 2011	4 (2 reversed)	Partial Reversal	-1~+2.3 cents	51 hours

Source: [Petrol Watch](#)

We observe that it took 5 to 48 hours to complete a round of price increase (i.e. between the first and last players to increase price), compared to 1 to 20.5 hours for price decrease, and 49 to 99.5 hours for price reversal. There is no clear evidence from these observations that petrol prices increased faster than they decreased.

¹⁶ Full (or partial) reversal means that some players increased prices first, and subsequently reduced them back to the original level (or to somewhere still above the original level), because other players did not match (or did not increase prices by the same magnitude).

The table below zooms into the price movements of a particular incident – during the 50 hours 45 minutes from 21 to 23 March 2011:

Exhibit 6: Price Movements of a Particular Incident

Date	Time	Player	Grade	Old Price	New Price	Change	Remarks
21 Mar 2011	3:00pm	I	92	2.017	2.047	+0.030	Uniform price increase for all grades by one player
			95	2.077	2.107	+0.030	
			Premium	2.215	2.245	+0.030	
21 Mar 2011	6:00pm	II	95	2.077	2.097	+0.020	Lower and regressive price increases across different grades by the three other players
			98	2.150	2.160	+0.010	
			Premium	2.359	2.369	+0.010	
22 Mar 2011	10:00am	III	92	2.017	2.040	+0.023	
			95	2.077	2.090	+0.013	
			98	2.150	2.140	-0.010	
22 Mar 2011	12:00pm	IV	92	2.017	2.040	+0.023	
			95	2.077	2.090	+0.013	
			98	2.130	2.140	+0.010	
22 Mar 2011	1:00pm	I	92	2.047	2.047	0.000	Partial reversal of price increases by two players
			95	2.107	2.097	-0.010	
			Premium	2.245	2.225	-0.020	
23 Mar 2011	n.a.	I	92	2.047	2.040	-0.007	
			95	2.097	2.090	-0.007	
			Premium	2.225	2.225	0.000	
23 Mar 2011	5:45pm	II	95	2.097	2.090	-0.007	
			98	2.160	2.140	-0.020	
			Premium	2.369	2.349	-0.020	

Source: [Petrol Watch](#)

As shown in the table above, one player increased its prices by 3 cents uniformly across all grades. The three other players reacted with lesser and regressive (i.e. less increase for higher grades) increases. Later, the first two players who raised prices adjusted their prices downwards to match their competitors'. In the end, Grade 92 and 95 prices were increased by 2.3 and 1.3 cents respectively. For Grade 98 and Premium grade petrol, one player had reduced prices by 1 cent. These price movements did not appear to be highly coordinated between the players.

In addition, we have performed an econometric analysis to test whether the “rocket-and-feather” phenomenon exists, i.e. whether retail petrol prices in Singapore increase faster and larger in magnitude than they decrease, relative to fluctuations in crude oil prices.

In our analysis, we used a panel of 9 time series of retail petrol prices in Singapore¹⁷, weekly between January 2006 and June 2009. Crude oil prices were based on WTI spot prices, adjusted for SGD:USD exchange rates obtained from the US Federal Reserve. We ran a fixed-effects pooled regression on the panel data, according to the following model:

$$\Delta R_{it} = \alpha + \alpha_a D_a + \alpha_b D_b + \alpha_c D_c + \gamma TIME_t + \sum_{i=0}^4 \beta_i^+ \Delta C_{t-1}^+ + \sum_{i=0}^4 \beta_i^- \Delta C_{t-1}^- + \mu_{it}$$

Where:

- ΔR_{it} = changes in retail oil prices, where i denotes the different companies
- D = dummies for each petrol company denoted as a, b and c
- ΔC_{t-1}^- = decrease in crude price, zero if increase
- ΔC_{t-1}^+ = increase in crude price, zero if decrease
- $TIME_t$ = time trend to adjust for nominal price changes
- α = constant
- μ_{it} = error term

¹⁷ The 9 series are based on the respective RON 92, 95 and 98 prices of three petrol companies.

The regression results are displayed in the following table. The overall equation is F-significant at a 1 per cent confidence level. When crude oil prices increase, a two-week lag (the variable DCrude_up2) yielded the highest t-significance in explaining pump price movements. When crude oil prices decrease, a one-week lag (DCrude_dn1) yielded the highest t-significance.

Exhibit 7: Econometric Results

Results of Models ron98 95 and 92 using 4 lags			
	Ron98	Ron95	Ron92
Dcrude_up	0.022 (0.165)	0.04 (0.303)	0.031 (0.228)
Dcrude_up1	0.045 (0.411)	0.039 (0.355)	0.05 (0.455)
Dcrude_up2	0.649*** (4.458)	0.632*** (4.310)	0.633*** (4.279)
Dcrude_up3	0.259 (1.968)	0.247 (1.868)	0.257 (1.914)
Dcrude_up4	0.028 (0.235)	0.012 (0.096)	0.005 (0.044)
Dcrude_dn	0.195* (2.017)	0.186 (1.903)	0.191 (1.936)
Dcrude_dn1	0.454*** (5.848)	0.454*** (5.807)	0.441*** (5.601)
Dcrude_dn2	-0.089 (-0.894)	-0.085 (-0.845)	-0.109 (-1.069)
Dcrude_dn3	-0.031 (-0.388)	-0.025 (-0.312)	-0.022 (-0.276)
Dcrude_dn4	0.018 (0.189)	0.030 (0.301)	0.019 (0.195)
time	0.000 (0.820)	0.000 (0.928)	0.000 (0.894)
_cons	-0.004 (-1.068)	-0.004 (-0.987)	-0.004 (-1.087)
N	243	243	241
R-sq	0.302	0.294	0.285
adj. R-sq	0.262	0.254	0.244
F	8.996	8.682	8.220
T statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001			

Based on the results above, we tested the rocket-and-feather hypothesis, on a null hypothesis that the sum of exponentially discounted coefficients of lagged increases in crude oil prices is equal to that of decreases, i.e.:

$$H_0: \sum_{i=0}^4 \left(\frac{1}{e^{i\rho}}\right) \beta_i^+ = \sum_{i=0}^4 \left(\frac{1}{e^{i\rho}}\right) \beta_i^-$$

The results – F-values with a sensitivity analysis of various discount factors – are tabulated as follows. Given the low F-values, the null hypothesis cannot be rejected at a 10 per cent confidence level.

Exhibit 8: F-Value

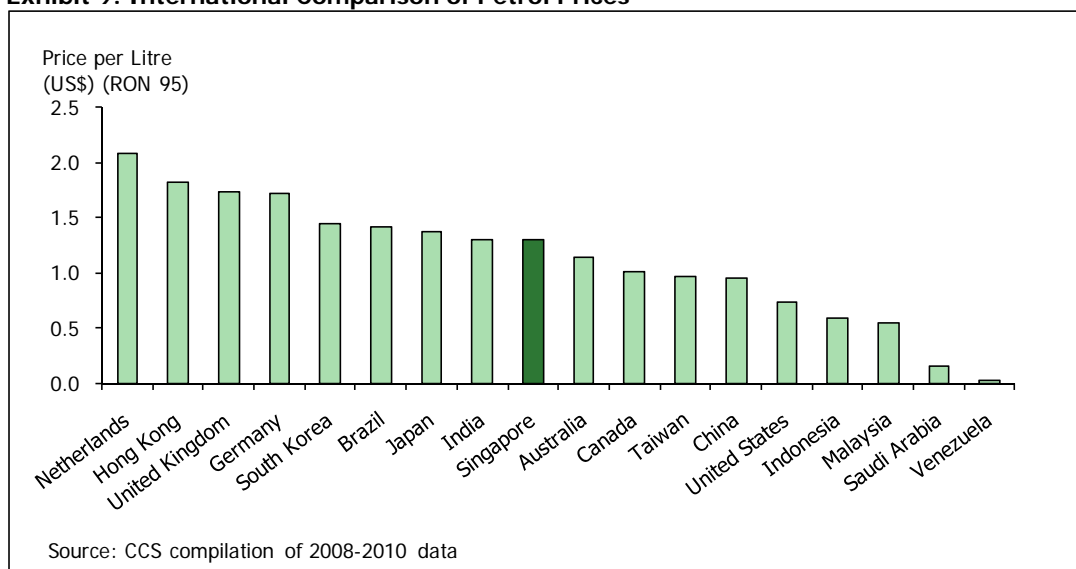
F-value	$e^{-\rho} = 1.00$	$e^{-\rho} = 0.99$	$e^{-\rho} = 0.95$	$e^{-\rho} = 0.90$
RON 98	0.17	0.18	0.22	0.31
RON 95	0.22	0.23	0.27	0.36
RON 92	0.17	0.18	0.22	0.30

As such, we conclude that, based on an econometric analysis on crude oil and retail petrol prices, the “rocket-and-feather” phenomenon did not exist at a statistically significant level.

Petrol prices in Singapore are competitive by international comparison

Exhibit 9 compares Singapore’s petrol prices with a sample of economies around the world:

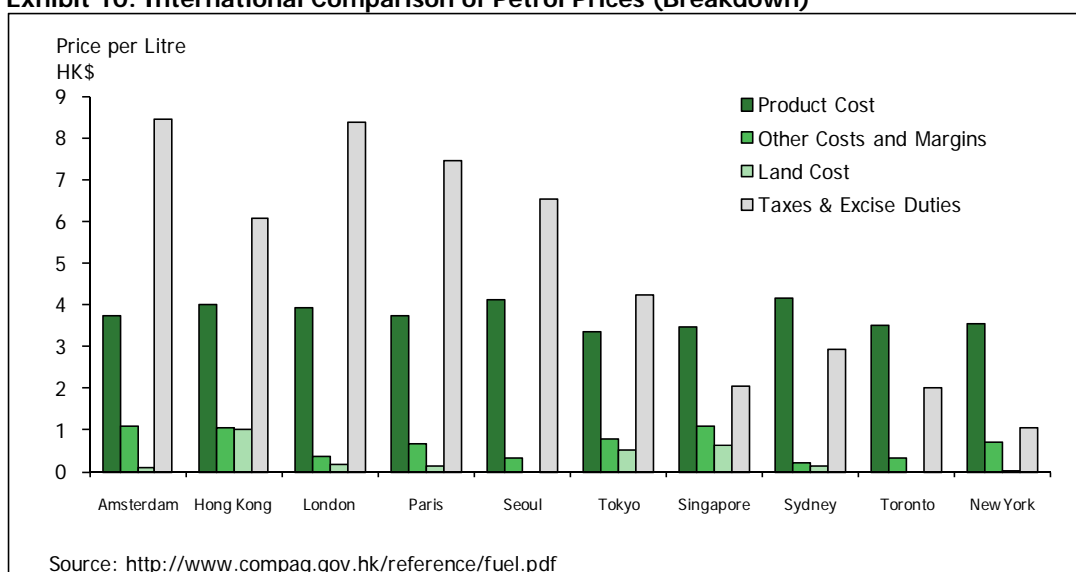
Exhibit 9: International Comparison of Petrol Prices



Singapore’s petrol prices compare favourably with many developed economies such as UK, Germany, Japan and Korea; large developing economies such as India and Brazil; as well as similar sized economies such as Hong Kong. Places with cheaper petrol prices than Singapore are either oil exporting countries such as Saudi Arabia and Venezuela; those whose authorities subsidizes petrol consumption such as Indonesia, Malaysia and Taiwan; those with low taxes such as the US; and those where input prices are regulated, such as China.

Exhibit 10 shows the breakdown of petrol prices in various countries into cost components – product cost, land cost, duty and taxes, as well as other costs and margins.

Exhibit 10: International Comparison of Petrol Prices (Breakdown)



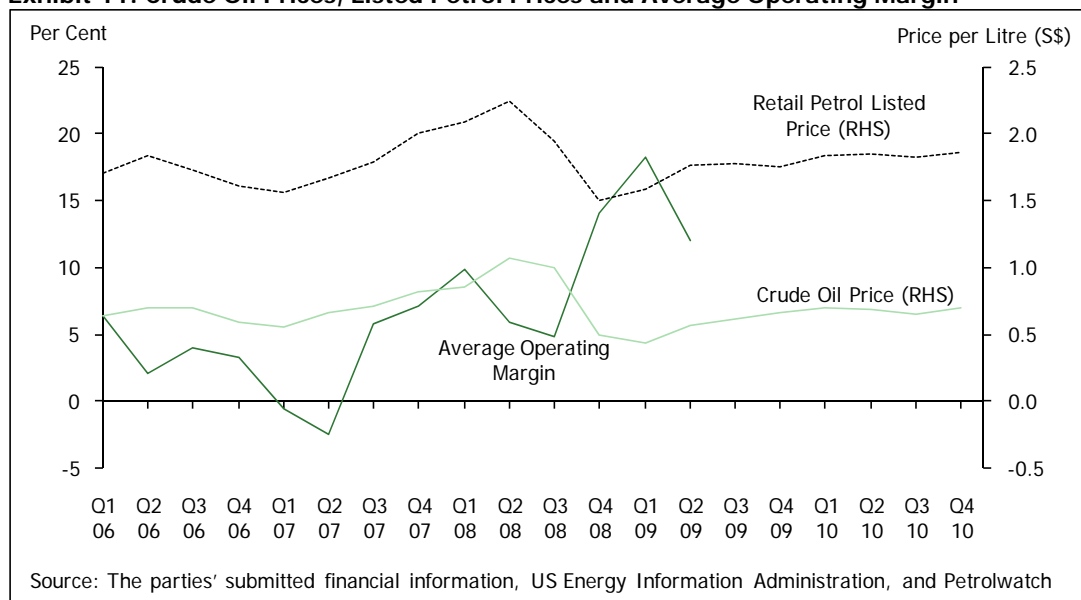
Amongst the 13 cities sampled, Singapore ranks 7th and 8th highest in terms of listed and effective petrol prices respectively. Its effective discount rate of 11.4 per cent on listed petrol prices is the widest of all. The swing factor for petrol prices is taxation, which Singapore ranks the 8th highest. Product cost is the 2nd lowest, largely due to transport cost savings, as all the petrol companies have refineries located in Singapore. Land cost in Singapore ranks the 2nd highest, but land cost itself is not a significant component of total petrol cost.

Operating profit margins are in single-digits

Based on the petrol companies’ submissions, the pre-tax operating profit margins¹⁸ of their retail petrol businesses in Singapore ranged 0-10 per cent during the period from 2006 to 2009. The profit margins exhibited high volatility and a counter-cyclical pattern¹⁹ (Exhibit 11), suggesting that the market players have not been able to stabilize or increase profit margins amidst input cost fluctuations.

One potential gap is whether the vertically-integrated players have been channelling their profits upwards to the refinery level, so that the effects of collusive activities at the retail level cannot be detected. In this regard, we note that all four players use the MOPS price to account for their internal sales of petrol between their refinery and retail arms. Given that MOPS prices are based on open trading records, of which 80 per cent are international transactions, there does not appear to be much room for manipulating profits between the refinery and retail levels.

Exhibit 11: Crude Oil Prices, Listed Petrol Prices and Average Operating Margin



¹⁸ Operating Margin is defined as total revenues less cost of goods sold, selling, general and administrative (SG&A) expenses as well as depreciation and amortization (i.e. both variable and fixed cost), divided by total revenues.

¹⁹ A counter cyclical pattern in this context means that the profit margins of retail petrol companies increase when crude oil price falls, and vice versa.

ASSESSMENT OF REGULATORY IMPACT ON COMPETITION

This section explores whether the three main aspects of regulation on retail petrol operations in Singapore – namely urban planning, bidding process and tax structure – may amount to obstacles for the market becoming more competitive.

Urban planning is necessary

The problem of land scarcity is inherent to Singapore. Therefore, careful urban planning is necessary. As only a few new petrol station sites are available every year, this makes it more difficult for new players to enter the market, with a critical scale of operations. However, it should be noted that land cost is not a significant cost driver, as it accounts for only 5-10 per cent of total petrol price.

The site allocation mechanism is competitive

HDB operates an eBidding mechanism for the allocation of petrol station sites. There is no pre-screening process to restrict the eligibility of bidders based on subjective criteria. The only substantial requirement is an upfront deposit²⁰. The bidding process is an open, anonymous and ascending auction. Such a bidding process generally produces smaller increments between bids than, say, sealed-bid tenders²¹. In particular, anonymity helps prevent bid-rigging between competitors. Sites are awarded to the highest bidder. HDB has informed us that the petrol companies do compete aggressively for new sites.

We considered whether the lease term of 30 years for new petrol station sites have contributed to the limited availability of new sites. However, we note that, in the context of land lease, 30 years is not long, compared to typical residential land leases of 99 to 999 years, and commercial ones of 99 years. In any case, the potential benefits of shorter lease terms are unclear, as each dollar invested would have to be amortized faster, leading to a tighter payback period which may affect investment incentives.

Singapore's petrol tax structure is internationally competitive

As noted above, taxation is the swing factor for total petrol prices across different countries. Although petrol and diesel are subject to different tax treatments at the moment, a special tax on owners of diesel private vehicles (a lump sum tax) is designed to offset the excise duty on petrol sales (a variable tax). It is unclear if a revamp of diesel tax structure would necessarily subject petrol to more competitive constraint²². After all, petrol and diesel are sold by the same four companies in Singapore, who would internalize their profits across different product lines.

Conclusion

It would appear that the overall regulation regime overseeing the retail petrol market in Singapore is generally pro-competitive. Land scarcity is a *natural* barrier to entry that cannot be overcome by regulation or deregulation. Our view is that regulation has not resulted in *incremental* impediment to competition.

²⁰ 10 per cent of site valuation, fully refundable.

²¹ In the Study of the Auto-Fuel Retail Market in 2005, the Economic Development and Labour Bureau of the Government of Hong Kong Special Administrative Region made a recommendation, for "Enhancing Competition", by replacing a "single-shot sealed tender", which "arguably can result in higher land premiums", with an "open, multi-round ascending auction".

²² In theory, if petrol and diesel are subject to the same tax treatment, motorists can choose between buying a petrol or diesel private car in the first instance, taking into account the relative costs of pumping petrol and diesel.

CONCLUSION

Our analysis shows that the structure of the retail petrol market in Singapore contains a risk of collusive or coordinated practices between competitors. However, based on current facts and data, there is no evidence that the petrol players are engaged in anti-competitive collusive behaviour.

This study also finds that the regulatory regime is generally pro-competitive. The natural barrier of land scarcity cannot be overcome by regulation or deregulation. Over the period of the market inquiry, petrol prices in Singapore appear to be competitive by international comparison.

Based on current information, there does not appear to be a case for CCS to intervene. CCS continues to monitor developments in the sector. If there is material new information suggesting that petrol players have breached the Competition Act, CCS will initiate an investigation.

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