

# **Understanding Gasoline Prices:**

*An examination of recent Canadian gasoline price increases*

Oil Division  
Natural Resources Canada

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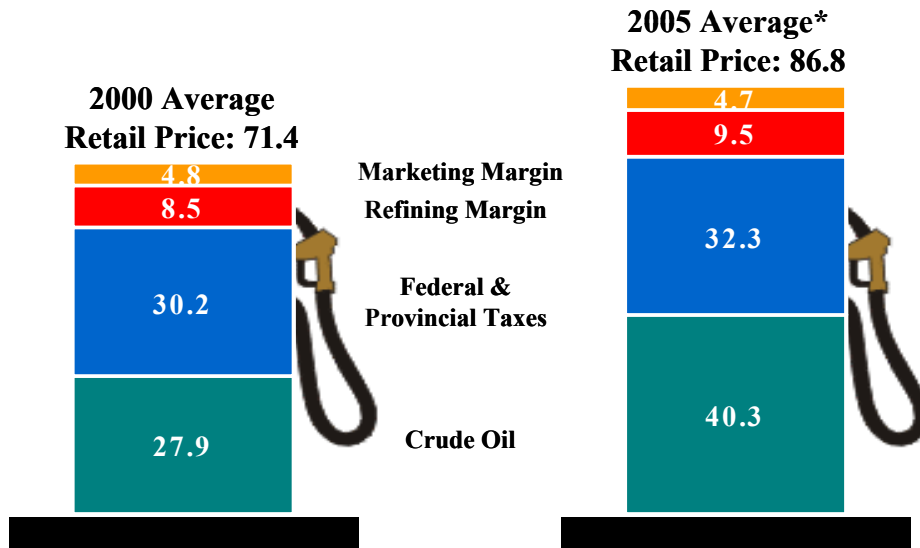
## **Introduction**

The Canadian oil industry often faces criticism from consumers and the media with respect to gasoline prices. Consumer frustration over frequent changes in pump prices is exacerbated by the fact that gasoline is the only commodity in our society where consumers can do their comparison shopping from the comfort of their automobile. This paper will examine the factors that influence gasoline prices in Canada. It will begin with an in depth look at each of the pump price components and discuss the factors that influence them. The paper will conclude with an examination of how some of the key factors, such as crude oil prices and exchange rates, have shaped gasoline prices over the past few years.

## Price Components

The retail price of gasoline can be broken into four key components: crude oil cost, wholesale margin, retail margin and taxes. Crude oil and taxes account for the majority of the cost of a litre of gasoline. In June 2005, the average price for a litre of regular unleaded gasoline in Canada was 92.1¢/L. Crude oil and taxes made up approximately 83%, or 76.8¢/L, of the cost. The remaining 17%, or 15.4¢/L of the price, represents the refining and retail margins.

## Canada Average Pump Price Components



\*January – June 2005  
Source: M.J. Ervin & Associates

## Crude Oil

Crude oil is the largest component of gasoline prices. Therefore, as crude oil prices change, so do gasoline prices. Much of the volatility in gasoline prices over the past five years has been a reflection of the volatility in world crude oil prices.

By agreement with the western provinces, the Government of Canada has been committed to a market-based energy policy since 1985. This means that Canada relies upon competitive markets to determine prices. The Government continues to consider that prices set in free and competitive markets represent the best signals to producers and to consumers with respect to their investment and consumption decisions. Rising prices send signals to producing countries to invest more in supply development, and to consuming countries to use oil more efficiently and, where possible, to change to other fuels. This market-determined pricing for oil helps to ensure that sufficient supplies are available at the most competitive price.

Regardless of the source of crude oil, the price is determined in the world market and both imported and domestic crude oil is priced according to the supply/demand balance and pricing dynamics on the world oil market. Because Canada produces only about 3% of the world's crude supply, Canadian companies have almost no influence on crude prices. In fact, Canada's largest integrated refiners<sup>1</sup> purchase more crude oil than they produce domestically. In this respect, Canadian refiners are "price takers" and have very little influence on the price they pay for crude oil.

Since 2000, the price of the light crude oil normally processed by Canadian refiners has been quite volatile. This is clearly indicated in the following table, which shows the average refinery acquisition cost for crude oil by year. Fluctuations in crude oil prices do not always result in product price changes of the same magnitude. Crude oil and product prices are subject to different pressures. In the short term, local market conditions may be more important than crude oil costs in determining petroleum product prices.

### Edmonton Par Crude Oil Price

Year	Average Cost		% of Average Retail Price
	US\$/barrel	¢/litre	
2000	\$29.88	27.9 ¢	39%
2001	\$25.32	24.7 ¢	36%
2002	\$25.45	25.1 ¢	36%
2003	\$30.79	27.1 ¢	37%
2004	\$40.36	33.0 ¢	41%
2005*	\$52.25	40.6 ¢	46%

\*January-June 2005  
Source: NRCan

### Gasoline Taxes

In June 2005, taxes averaged 36% of the cost of a litre of gasoline in Canada. Consequently, tax is one of the largest components in the price of gasoline. Gasoline taxes can vary by province, and in some cases, regionally. Taxation often squeezes the room for refiners to raise prices, especially in highly competitive markets, where price wars may result in the oil companies having to absorb a tax increase from their portion of the retail price.

The key taxes are shown in the following table. Federal taxes are comprised of the federal excise tax and the G.S.T. (10¢/L and 7% respectively). Provincial gasoline taxes vary considerably by province. Provincial taxes consist of provincial road taxes and

<sup>1</sup> Integrated refiners are firms that are involved in both the production and processing of crude oil. There are four integrated oil companies in Canada: Imperial Oil, Shell Canada, Petro-Canada and Suncor Energy. Only Imperial Oil, Shell and Petro-Canada operate more than one refinery and market products nationally.

retail sales taxes. In Newfoundland, New Brunswick and Nova Scotia, the G.S.T. and the retail sales taxes are replaced by a single harmonized, value-added sales tax (H.S.T.) of 15%. Quebec is the only other province with a retail sales tax (7.5%) that applies to gasoline sales. Provincial road taxes vary from a low of 6.2¢/L in the Yukon to a high of 16.5¢/L in Newfoundland.

### Gasoline Taxes in Canada – 2005

	Tax Rate	With Retail Gasoline Price of 90¢/L
<b><u>FEDERAL TAXES</u></b>		
EXCISE	10.0¢/L	10.0¢/L
G.S.T.	7.0%	5.89¢/L
<b><u>HARMONIZED TAXES</u></b>		
NEWFOUNDLAND	15%	11.74¢/L
NOVA SCOTIA	15%	11.74¢/L
NEW BRUNSWICK	15%	11.74¢/L
<b><u>PROVINCIAL TAXES</u></b>		
NEWFOUNDLAND	16.5¢/L	16.5¢/L
PRINCE EDWARD ISLAND	17.0¢/L	17.0¢/L
NOVA SCOTIA	15.5¢/L	15.5¢/L
NEW BRUNSWICK	14.5¢/L	14.5¢/L
QUEBEC	15.2¢/L	15.2¢/L
Quebec Sales Tax	7.5%	6.28¢/L
ONTARIO	14.7¢/L	14.7¢/L
MANITOBA	11.5¢/L	11.5¢/L
SASKATCHEWAN	15.0¢/L	15.0¢/L
ALBERTA	9.0¢/L	9.0¢/L
BRITISH COLUMBIA	14.5¢/L	14.5¢/L
YUKON	6.2¢/L	6.2¢/L
NORTHWEST TERRITORIES	10.7¢/L	10.7¢/L
NUNAVUT	10.7¢/L	10.7¢/L

Source: Oil Division, NRCan – April 1, 2005

In addition to Federal and provincial taxes, some municipalities impose transit taxes. In the Vancouver and Victoria areas a transit tax of 6.0¢/L and 2.5¢/L, respectively, is applied on all gasoline sales. In Montreal and its surrounding municipalities a transit tax of 1.5¢/L is imposed.



In some instances fuel taxes are waived or reduced. The federal government has waived the federal excise tax on the ethanol and methanol portions of blended fuels. The government of Saskatchewan has also announced an exemption on ethanol-blended gasoline. Gasoline taxes are also reduced in some remote areas and in areas within 20 kilometres of some provincial and U.S. borders.

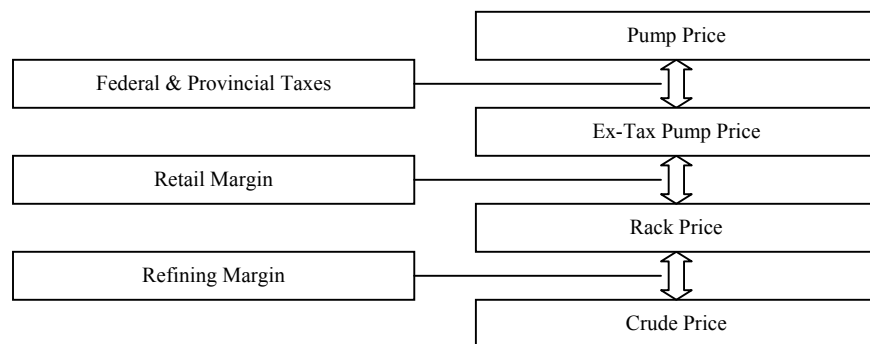
With the exception of modest tax increases in the Maritimes and British Columbia, gasoline tax rates in Canada have been stable over the past few years. However, because of the nature of some of the taxes, they too contribute to the volatility in gasoline prices. Although the actual rates may not change, when prices are rising or falling, gasoline price changes will be magnified by the changes in the total tax collected from the sale of a litre of gasoline, but this effect is quite small.

### Refining/Marketing

The downstream margin represents that portion of the price of gasoline over which the refiners/marketers have the ability to exercise some influence. This margin must cover the costs associated with refining the crude oil, transporting products throughout the distribution system and marketing the product, as well as providing the refiner and retailer with a reasonable rate of return on their capital. In June 2005, the downstream margin was 15.4¢/L or 17% of the price of gasoline.

The downstream margin can be broken into the refining margin and the retail margin. The refining margin, by definition, is the difference between the wholesale cost of gasoline (estimated by the posted rack prices<sup>2</sup> at bulk terminals) and the cost of crude oil. The retail margin is the difference between the ex-tax retail price and the wholesale price. Individual markets determine each individual margin and ultimately, the overall price of gasoline at the pump.

### Pump Price Margins and Components



<sup>2</sup> The posted rack price is often used as a proxy for wholesale gasoline prices in Canada. This rack price is the price paid by small independent customers at bulk fuel terminals in Canada and provides a reference for all other wholesale transactions.

## **Wholesale Markets**

Before discussing the factors that influence the size and variability of the wholesale margin, it may be useful to understand the structure of the wholesale market in Canada.

There are 16 refineries producing gasoline in Canada. The size and complexity of these refineries vary substantially from Husky's 1,600 m<sup>3</sup>/day refinery in Prince George to Irving's 44,500 m<sup>3</sup>/day refinery in St. John. Of these 16 refineries, 9 are owned and operated by three national companies (Imperial Oil, Petro-Canada and Shell). Regional operators own the remaining 7 gasoline producing refineries.

Since the 1970s, the Canadian wholesale gasoline market has undergone major changes. In the early 1970s, there were 40 refineries in Canada. Since that time a major rationalization of company operations has taken place. Several factors have contributed to this. Ultimately, these reductions were the result of a collapse in company profits. The oil price shocks in 1973 and 1979 led to improvements in the efficiency of vehicles and to fuel switching from oil to natural gas and electricity. This curbed the demand for crude oil and resulted in substantial under use of refining capacity. The spare capacity resulted in increased competition among refiners, which further eroded refining margins.

The desire to benefit from increasing economies of scale, in conjunction with weak economic conditions in the early 1980s, put additional pressure on the industry to rationalize their operations resulting in a significant number of refinery closures. Less efficient, smaller refineries were closed, sometimes in favor of new, larger facilities.

Demand for petroleum products has recovered in recent years and improved capacity utilization has increased operating efficiency and reduced refining costs per unit. In fact, due to expansions at the remaining refineries over the last decade, current refining capacity in Canada is greater than it was in the 1970s.

## **Wholesale Gasoline Prices**

The posted rack price is often used as a proxy for wholesale gasoline prices in Canada. This rack price is the price paid by small independent customers at bulk fuel terminals in Canada and provides a reference for all other wholesale transactions. There are usually between three and five companies that post rack prices at Canadian terminals. For the most part, very little gasoline is sold at this price.

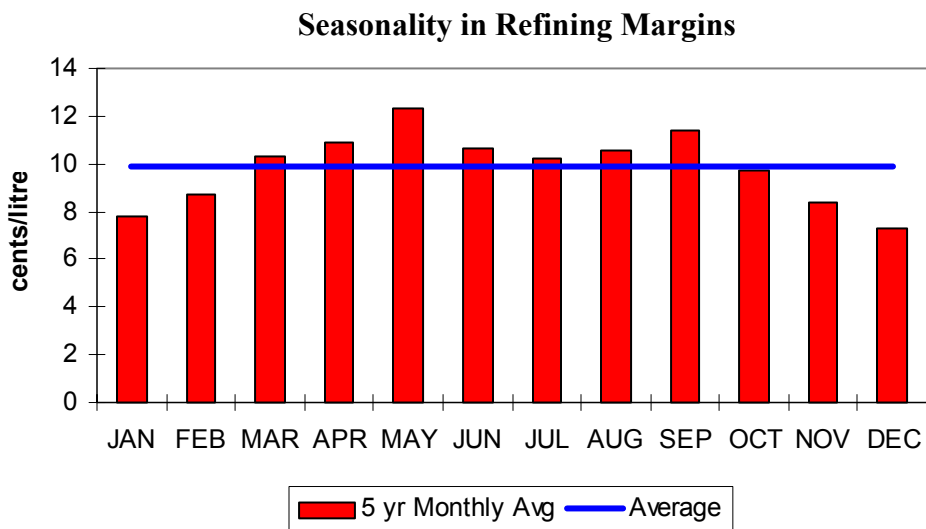
Refiners traditionally offer a discount from the posted rack price to their branded outlets and their largest customers. The size of the discount will vary according to the volume purchased and the negotiated long-term supply agreements. Delivery or transportation costs are added if the product is delivered to the consumer. A branded dealer, who will sell the product under a specific brand name, will pay an additional cost for the national advertising, credit card systems and name recognition. The purchase price of the product will reflect the various services and conditions. Although only relatively small volumes

of gasoline are actually sold at the rack price, rack prices are currently the only publicly available wholesale pricing information and do track the trends in wholesale price movements.

Typically the wholesale price of gasoline is similar in all regions of Canada, however, significant differences do sometimes occur. In some areas, refiners must compete with imported products from Europe or the United States. There are few barriers to importing products since they require only sufficient storage facilities for tanker or pipeline shipments. In areas close to the U.S. border, direct trucking to gasoline stations may also be available.

While the quantities of imports to Canada are not large, they can influence prices considerably. As a result, Canadian marketers that have import options may influence Canadian wholesale prices and, consequently, lower prices at the pumps. This local competition often leads to retail price wars. On the other hand, when competition for available supplies intensifies in the U.S. and other foreign markets, reducing the availability of imports, the price of Canadian refined products may increase considerably.

Ultimately, the wholesale margin will reflect the supply/demand balance in each individual region. When supply and demand conditions are tight, such as in the summer months when the demand for gasoline is at its peak, the refining margin will be higher than it is in the winter months. Currently, there is about a 4¢/L swing between summer and winter margins. This can be seen in the following graph. Refining margins are higher in the summer because summer-grade gasoline (with more stringent fuel specifications) costs more to make and demand significantly increases with the start of the summer driving season.



Source: MJ Ervin & Associates

Local market conditions can have a considerable impact on short-term wholesale prices. This is due to the very inelastic demand for gasoline<sup>3</sup>. Gasoline has very few substitutes, especially in the short term. Large price increases are sometimes necessary to balance supply and demand. These price increases will sometimes lead to a price discrepancy between regions, allowing wholesale marketers to profit by purchasing gasoline in one market and immediately reselling it in another, encouraging the transportation of product from other regions. However, it can sometimes take weeks to move product in from other locales.

Some regions in Canada are more suited than others to bringing in product from other regions. Atlantic Canada and Quebec have good access to supplies from the northeastern United States and Europe and their geographic situation provides them with very low cost transportation. Ontario also has access to supplies from large U.S. markets and can bring in product from Quebec. Logistical infrastructure however increases the cost of these supplies. Most of western Canada is landlocked, and as such, has very limited access to supplies from other regions. The current infrastructure was not designed to transport supplies to the prairies from other regions. However, the prairies supply a substantial volume of gasoline into the Vancouver market. In the event of a supply shortage in the prairies, refiners have the ability to balance supply and demand by importing gasoline into Vancouver from Washington, freeing up additional supplies produced by Edmonton area refiners for use elsewhere in the west.

The extent to which the availability of supplies from other regions affects the wholesale price of gasoline depends on the refining capacity and utilization rates of each individual region. Regions with very tight supply conditions (high utilization rates and limited access to supply from other regions) are quite vulnerable to short term price spikes. When supplies are tight, substantial price increases are sometimes necessary to prevent product shortages.

The following table shows the utilization rates of refining capacity regionally for Canada. It shows that refining facilities in all regions of Canada are currently utilized very close to capacity. When utilization rates approach 95%, a refinery is considered to be operating at maximum capacity as crude runs are sometimes constrained by the capacity of other units further along in the refining process. The lack of spare capacity reduces the flexibility of the refining system and makes it more vulnerable to unexpected disruptions. The lack of spare capacity in North America has substantially increased the volatility of gasoline prices in recent years.

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<sup>3</sup> In a 1999 fuel tax policies report prepared for Transport Canada, Hagler Bailly Canada estimated the short-run elasticity of demand for gasoline to be between -0.10 and -0.20 and the long-run elasticity of demand to be between -0.4 and -0.8.

## Canadian Refining Capacity and Utilization Rates – June 2005

	Refinery	Location	Capacity m <sup>3</sup> /day	Utilization* %
<b>ATLANTIC CANADA</b>	North Atlantic Refining	Come-By-Chance	16,700	
	Imperial Oil	Dartmouth	13,992	
	Irving Oil	Saint-John	44,517	
	<b>TOTAL ATLANTIC</b>		<b>75,209</b>	<b>95%</b>
<b>QUEBEC</b>	Petro-Canada	Montréal	20,580	
	Shell Canada	Montréal	20,700	
	Ultramar	St-Romuald	33,000	
	<b>TOTAL QUEBEC</b>		<b>74,358</b>	<b>99%</b>
<b>ONTARIO</b>	Imperial Oil	Nanticoke	17,800	
	Imperial Oil	Sarnia	19,200	
	Shell Canada	Sarnia	11,100	
	Suncor	Sarnia	13,500	
	Nova Chemicals	Sarnia	12,700	
	<b>TOTAL ONTARIO</b>		<b>74,300</b>	<b>91%</b>
<b>WESTERN CANADA</b>	Coop/Newgrade	Regina	13,500	
	MJ Asphalt	Moose Jaw	2,400	
	Husky	Lloydminster	4,000	
	Imperial Oil	Edmonton	28,600	
	Petro-Canada	Edmonton	21,929	
	Shell Canada	Scotford	17,840	
	Chevron	Burnaby	8,300	
	Husky	Prince George	1,800	
	<b>TOTAL WESTERN</b>		<b>100,529</b>	<b>90%</b>
<b>TOTAL CANADA</b>			<b>319,579</b>	<b>93%</b>

\*January 1-June 14,2005

Source: NRCan

All gasoline sold in Canada and the U.S. has to meet certain quality and environmental standards. Traditionally, the standards in Canada and the United States have been aligned. This has resulted in a fungible product. This fungibility has allowed product to be freely sold and traded among refiners in Canada and the U.S. This characteristic has resulted in the creation of a continental wholesale market. Although the introduction of new boutique fuels has reduced the availability of spot gasoline imports from adjacent U.S. markets, U.S. refiners still have the capability of specialty blending to meet Canadian standards if there is an incentive to do so.

The development of this market has enabled Canadians to enjoy the competitive influence of much larger U.S. markets. Because Canadian refiners must remain competitive with U.S. marketers, the rack price in many Canadian cities is set to keep imports out. Therefore, at the end of the day, U.S. rack prices are far more important to Canadian refiners than the cost of crude oil when setting prices. The fear of losing market share has forced Canadian refiners to accept the price of the import alternative as the wholesale price in many markets.

U.S. rack prices provide an upper and lower bound for Canadian wholesalers. When refiners set their rack price, they cannot set prices higher than U.S. rack prices plus transportation costs for fear of losing market share to U.S. competitors. On the other hand, rack prices would never be set lower than competing U.S. rack prices minus shipping costs (because the return would be higher if they exported all their product). Supply and demand conditions in each region will determine the upper and lower bounds that will be relevant when making pricing decisions.

Previous studies on the U.S. gasoline market have indicated that these U.S. rack prices are closely aligned to the spot price for regular unleaded gasoline at NY Harbour plus freight costs. At this level of supply, the market is very competitive. The existence of a viable futures market for gasoline on the New York Mercantile Exchange (NYMEX) enables rapidly changing market conditions, including changes in crude oil prices, to be reflected very quickly in spot gasoline prices. This data is immediately available and widely accessible and can be used by anyone buying and selling wholesale gasoline.

## **Retail Markets**

Like the wholesale markets, before discussing the factors that influence the size and variability of the retail margin, it may be useful to understand the state of the retail market in Canada.

The marketing and retailing of gasoline is carried out by many firms, which can generally be divided into two types. The first type are the integrated refiner-marketers who produce the gasoline, distribute it and market it, often through affiliate or licensed operators who own individual outlets. These companies provide gasoline to their own network and to other retailers under contract.

The second type are the independent marketers. They tend to operate small numbers of outlets in specific locales, but some large networks exist. Generally, the large independents have a 15-25% share of the sales volume in urban markets. They may purchase their gasoline supplies from Canadian refiners or from imported sources.

Imperial Oil is the largest retailer in Canada with a network of 1,978 Esso stations followed by Shell's 1,762 and Petro-Canada's 1,375 sites. In 2004, Esso and Petro-Canada service stations averaged sales of 5.6 million litres at their company owned and operated sites, while Shell's company owned sites had sales of 4.1 million litres.

Together, the three “major” oil companies have increased their average throughputs by more than 30% since 2000.

A large percentage of service stations using the “brand” of one of the major oil companies are owned and operated by individual proprietors. Often the major companies offer their branded logo and use of their marketing programs to independent marketers who purchase gasoline from them at the wholesale level. According to a recent report published by MJ Ervin and Associates, of the 14,034 service stations in Canada, only 16% of all gasoline stations come under the price control of one of the three majors and only 32% of service stations come under the price control of one of the 10 refiner-marketers. Independent proprietors operate the remaining 68% of Canadian service stations.

While the major and regional refiner marketers have been closing some of their low performance outlets, independent retailers have been increasing their presence in the gasoline market. The most notable new participants are supermarkets. Grocery chains such as Superstore and Safeway have entered the retail gasoline market. The supermarkets are known for their high-volume, low-margin retailing and are considered by many as an efficient and aggressive new source of competition in the industry.

### **Retail Gasoline Prices**

In 2004, the retail margin on regular unleaded gasoline in Canada averaged 4.5¢/L. This margin must cover the costs of marketing and distribution as well as provide the marketers with a reasonable rate of return on their capital. It can differ significantly from city to city in Canada. Although the retail margin represents a very small fraction of the cost of a litre of gasoline, it has attracted a great deal of attention in recent years because of consumer allegations of collusion and price fixing.

The Conference Board of Canada (2001) credits most of this attention to the fact that gasoline is the only commodity in our society for which the price is posted on large signs than can easily be read while driving by. They note that both motorists and other service station operators become aware almost immediately of price changes among their competitors. It is because of this visibility that Canadian motorists are very sensitive to gasoline prices and, to save a few cents on an average fill-up, will change service stations for price differences smaller than a penny. For this reason, gasoline retailers are concerned about losing sales and therefore reduce their prices almost immediately to match their competitors.

This type of behaviour leads to a continuous battle over market share in many Canadian cities. Gasoline prices change frequently as oil companies and distributors price their products to meet competition and maintain market share. The result of this competitive environment is that prices seem to move in unison, sometimes from very low to very high levels. As prices fall, the motorist benefits at the expense of the refiner and retailer whose margins are reduced. At the end of a price war, consumers will frequently see a

uniform and large price increase. Consumers typically view this as evidence that companies are acting in collusion.

Local market conditions in each city ultimately determine the retail pump price and the retail margin available to marketers. Recent studies have shown that one of the primary drivers for gasoline pricing is the average throughput, or sales per outlet in a particular market. This explains why prices may differ from area to area or outlet to outlet. An outlet with lower sale volumes may have to charge a higher price to generate sufficient revenue to cover the outlet's fixed operating costs. Cities with low average throughputs, such as Saint John, New Brunswick, have much larger retail margins than those that have a large average throughput, such as Toronto. Because the retailer with the lowest marginal cost often sets the price for a particular market, the average throughput helps to explain why outlets in small communities tend to have higher prices than retail outlets in large centres.

The number of outlets for a given population size can also be very important in determining the size of the retail margin in a particular market. Although, at first glance, one may anticipate that this is directly related to the average throughput, the number of outlets serving a given population adds another dimension to the analysis. More people visiting a retail outlet provide an opportunity to sell more ancillary products. This in turn reduces the retailer's dependence on gasoline sales to cover their operating costs. In fact, big box retailers such as Wal-Mart and Costco view low cost gasoline retailing as a way to attract customers to their stores and increase their ancillary sales. The emergence of these retailers has reduced the retail margin on gasoline in several Canadian cities.

The number of brands in a particular city or region is another contributing factor to the size and variability of the retail margin. Price wars are far more prevalent in markets with a greater concentration of small, independent firms and price fluctuations are accelerated and amplified in markets with lots of small firms. Stable pricing, on the other hand, is prevalent in markets with few small firms. Therefore, the number of brands in a particular market can have a significant influence on the retail margin.

Other prevailing conditions in a marketplace include the availability and proximity of supply, the different costs of operation and consumers' demands and preferences. These are also important factors in establishing the price at the pump. In each market, the price setter tends to be the lowest cost retailer.

Within local markets, the degree of competition is critical. Price wars, which indicate fierce competition, are most evident in areas where retailers are seeking to increase their market share. Prolonged price war activity often results in the closure of the less efficient service stations. In centres where equilibrium is reached (the players are comfortable with the size of their market share and their return on investment) price wars tend to be less frequent.



## **An Empirical Analysis of Gasoline Prices**

In the previous section, it was noted that there are numerous factors that influence gasoline prices in Canada. This section will focus only on those factors that have had the largest influence on prices over the past few years. It will look at the relationship between crude oil prices and Canadian gasoline prices as well as examine the impact that other key factors, such as exchange rates and taxes, have had on price at the pump over the past few years.

### **What is the relationship between Canadian gasoline prices and crude oil prices?**

Before examining the impact of the recent rise in crude oil prices on gasoline prices, it is useful to look at the historical relationship between gasoline prices and crude prices. Using weekly data from January 2000 to June 2005, an econometric analysis was performed to estimate the response pattern and adjustment time for a variation in crude oil prices to be passed through to wholesale gasoline prices in Canada.

A priori, one would expect that the eventual passthrough rate would exceed 100%. That is, it could be expected that a 1¢/L change in crude prices would result in slightly more than a 1¢/L change in gasoline prices. Crude oil is by far the largest input into the production of gasoline, but one barrel of crude oil does not produce one barrel of gasoline. Other by-products from the production process, such as heavy fuel oil and bunker fuel, sell at a discount to crude oil. Therefore, refiners must recover these losses when they sell high-value products such as gasoline and distillate (diesel fuel, jet fuel and heating oil).

As was expected, the results show that crude oil price changes have a very large influence on Canadian gasoline prices and these changes are passed quickly and completely through to gasoline prices. Over the past five years, a 1¢/L change in crude oil prices has resulted in a 1.17¢/L change in Canadian gasoline prices (ie. a \$1US/bbl change in crude oil prices has resulted in a 1.02¢/L change in Canadian gasoline prices). The adjustment time is very rapid with over 50% of the price adjustment occurring instantaneously following the change in crude oil prices with the adjustment process completed within a one-week period.

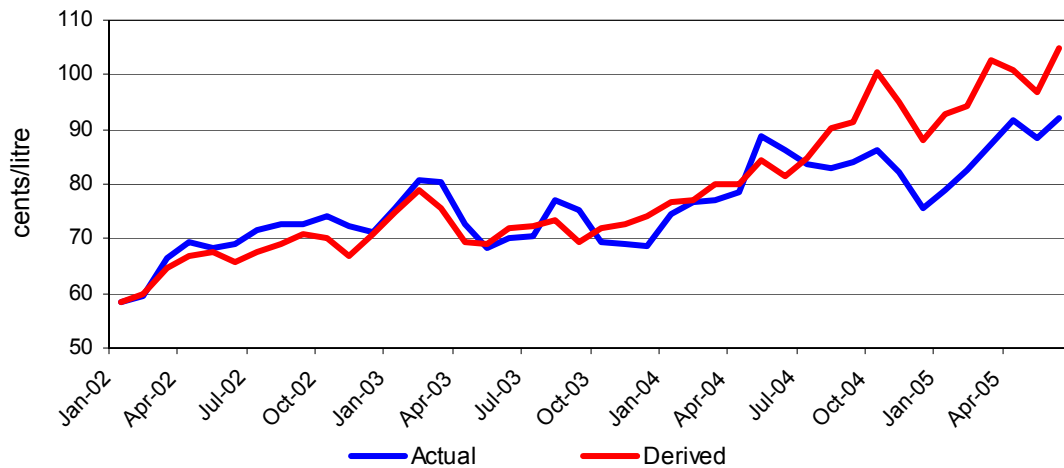
### **The Impact of Rising Crude Prices**

In January 2002, WTI prices average \$20.13/bbl and the Canadian average gasoline price was 58.3¢/L. Since that time, WTI prices have tripled to around \$60/bbl. If everything else remained constant, what would gasoline prices have looked like, if crude oil prices were the only driver behind prices at the pump?

Using the historical relationship between crude prices and gasoline prices and freezing refining margins, retail margins, tax rates and exchange rates at January 2002 levels, it is

possible to look at what gasoline prices in Canada could have been, if crude oil prices were the only factor influencing gasoline prices over this period. The chart below compares actual Canada average gasoline price to derived prices. As can be seen, gasoline prices in Canada would be substantially higher today had crude prices been the only factor influencing gasoline prices. In fact, if it weren't for the influence of other factors (mainly the dramatic appreciation of the Canadian dollar), today's gasoline prices could have been as much as 12.7¢/L higher than what we are actually experiencing.

Figure 1  
Actual vs. Derived Gasoline Prices



This estimate is probably a bit conservative, because by holding margins constant at January 2002 levels, we fail to account for the seasonal increase in refining margins, which has been estimated at approximately 4¢/L. Refiners costs have also increased during this time period, as new environmental regulations to reduce the sulphur content in gasoline have increased the costs of producing gasoline. A 2004 study by Purvin & Gertz Inc., sponsored by Natural Resources Canada, estimated the increased cost of producing low sulphur gasoline to be 1.27¢/L. If we account for these factors, the price of gasoline could have been as much as 18¢/L higher than what we are experiencing today.

It should be noted that not all of the difference shown in the above figure is directly associated to crude oil prices. Although tax rates were frozen at January 2002 levels, because of the nature of ad valorem taxes (taxes based on a percentage of the value of a good) such as the G.S.T., H.S.T and Q.S.T, the overall impact of changes in crude prices on prices at the pump have been magnified.

It is estimated that during the run up of crude prices since 2002, the G.S.T. on the crude portion of gasoline prices has increased by 3¢/L. This may not seem like a large increase, but if you consider that industry profits in the refining industry have averaged approximately 2¢/L over the past five years, it puts this number into perspective.

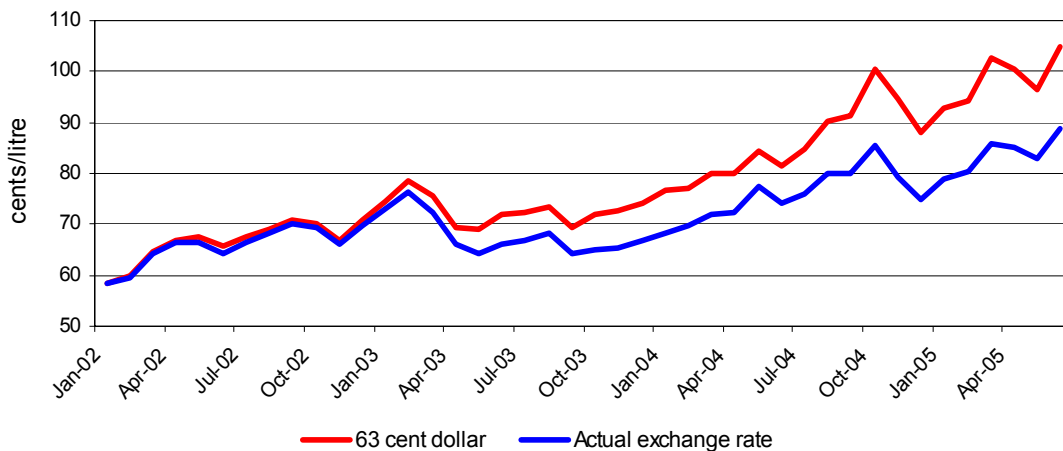
## The Influence of an Appreciating Dollar

Perhaps the only reason we are not paying \$1.10/litre for gasoline today is due to the dramatic appreciation of the Canadian dollar. Since 2002 the Canadian dollar has appreciated from a modest \$0.625 US to about \$0.82 US today. Much of the media attention around this increase has focused on the negative impact on Canadian exporters. However, the dramatic rise in the Canadian dollars has been a windfall for importers, and purchasers of goods priced in US dollars. This includes buyers of crude oil and consumers of refined petroleum products.

The price Canadians pay for crude oil and petroleum products is set in international markets and priced in US dollars. As the Canadian dollar has appreciated, this has significantly reduced the price of crude oil, gasoline and other petroleum products in Canadian dollar terms and this influence has been dramatic. Holding all other factors that influence gasoline prices constant at January 2002 levels, and looking only at the influence on crude prices in Canadian dollar terms, the appreciation of the Canadian dollar reduced gasoline prices by more than 16¢/L by June 2005.

Even though this is good news for consumers, the same is not true for refiners. Although crude costs have fallen in Canadian dollar terms, the price Canadian refiners can obtain for their product has also fallen, as Canadian wholesale prices must compete with neighbouring U.S. rack prices. Canadian refining margins are determined in U.S. dollars, and as the Canadian dollar has appreciated, this has reduced the netback to Canadian refiners.

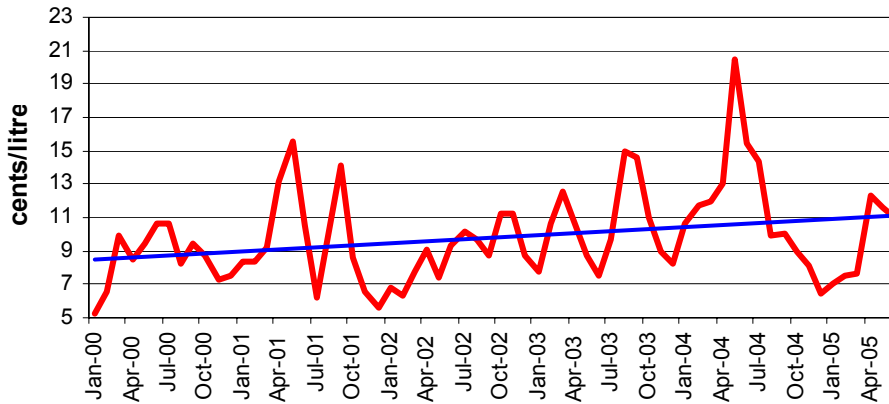
Figure 2  
Influence of Exchange Rates



## Increasing Refining Margins

Since 2000, despite downward pressure from the appreciation in the Canadian dollar, Canadian refining margins have increased. This is due to a number of factors, most significant of which is the increased demand for petroleum products in North America, which in turn has improved refinery utilization rates. During this period of time, the North American refining industry has been operating at rates above 90% of capacity<sup>4</sup>.

### Canadian Refining Margins



Source: MJ Ervin & Associates

Although margins have fluctuated widely during the past several years, refining margins in Canada averaged only 1¢/L more during the first six months of 2005 than they did in 2000, despite increasing demand, improved utilization rates and significant cost increases faced by refiners during this time period. If not for the appreciation in the Canadian dollar, refining margins would have improved considerably more than they we have seen. Therefore, aside from short-term spikes associated with tight supply conditions, overall refining margins have had very little impact on Canadian consumer prices during the recent run-up of gasoline prices.

### The Bottom Line

With gasoline prices already 30¢/L higher today than January 2002 levels, and with scenarios by investment banks like Goldman Sachs and CIBC World Markets of a super-spike in world crude oil prices to levels near \$100US/bbl, the weekend getaway has obviously become more expensive and this trend may continue, but will these price increases change consumers driving habits?

<sup>4</sup> Due to regularly scheduled maintenance shutdowns and other short-term unplanned events that reduce utilization, 95% is considered to be the optimum refinery utilization rate. However, because this number also takes into account normal refinery maintenance turnarounds, by delaying normal maintenance schedules, it is sometimes possible to achieve a utilization rate greater than 100% for a short period of time.

The following table shows, for a variety of car types, the increased fuel cost for consumers of a weekend getaway. Estimates of fuel cost are based on a driving distance of 1,000 km round trip. The base case includes gasoline prices of 60¢/L, approximately the level of January 2002 when crude oil prices were \$20US/bbl. The base case column shows the total fuel cost for the trip. Each 20¢/L increase in gasoline prices corresponds to an increase of approximately \$20US/bbl in world crude oil prices. As the table indicates, the increase in gasoline prices would not increase vacation costs substantially. Even an 80¢/L increase in gasoline prices (which would correspond to \$100US/bbl crude oil prices) would increase the cost of the trip for a driver of a Dodge Durango 4X4 by less than the cost of one nights accommodation in a hotel. For drivers of more economical vehicles, the impact is even less significant. Clearly, gasoline prices would not be the deal breaker in deciding whether or not to go away for a weekend.

### The Cost of Gasoline and the Incremental Cost of a Vacation

		Avg. Fuel Economy* litres/100km	Base Case \$0.60	Increased Fuel Cost			
				20c/l increase	40c/l increase	60c/l increase	80c/l increase
<b>Subcompact</b>	Toyota Echo	6.4	\$38	\$13	\$26	\$38	\$51
<b>Compact</b>	Honda Civic	7.0	\$42	\$14	\$28	\$42	\$56
<b>Mid-size</b>	Chevy Malibu	8.8	\$53	\$18	\$35	\$53	\$70
<b>Full-size</b>	Ford Five-Hundred AWD	10.6	\$64	\$21	\$42	\$64	\$85
<b>Van</b>	Dodge Caravan	10.4	\$62	\$21	\$42	\$62	\$83
<b>Pickup Truck</b>	Chevy C1500 Silverado	13.0	\$78	\$26	\$52	\$78	\$104
<b>SUV</b>	Dodge Durango 4X4	15.4	\$92	\$31	\$62	\$92	\$123

\*source: NRCAN's Energuide *Fuel Consumption Guide 2005*

Although the cost of gasoline may not deter people from heading out to the lake for the weekend, over the course of a year, gasoline price increases can have a large influence on the bottom line of many consumers.

The following table shows, for a variety of car types, the increased fuel cost for consumers over the course of a year. Estimates of fuel consumption and fuel cost are based on a driving distance of 20,000 km annually, with a mix of 55% city and 45% highway driving. As in the previous example, the base case includes gasoline prices of 60¢/L (approximately the level of January 2002 when crude oil prices were \$20US/bbl). The base case column shows the annual fuel cost for a variety of vehicles. Again, each 20¢/L increase in gasoline prices corresponds to an increase of approximately \$20US/bbl in world crude oil prices.

## The Impact of Rising Gasoline Prices on Annual Fuel Costs

	Avg. Fuel Economy* litres/100km	Base Case \$0.60	Increased Fuel Cost			
			20c/l increase	40c/l increase	60c/l increase	80c/l increase
<b>Subcompact</b> Toyota Echo	6.4	\$768	\$256	\$512	\$768	\$1,024
<b>Compact</b> Honda Civic	7.0	\$840	\$280	\$560	\$840	\$1,120
<b>Mid-size</b> Chevy Malibu	8.8	\$1,056	\$352	\$704	\$1,056	\$1,408
<b>Full-size</b> Ford Five-Hundred AWD	10.6	\$1,272	\$424	\$848	\$1,272	\$1,696
<b>Van</b> Dodge Caravan	10.4	\$1,248	\$416	\$832	\$1,248	\$1,664
<b>Pickup Truck</b> Chevy C1500 Silverado	13.0	\$1,560	\$520	\$1,040	\$1,560	\$2,080
<b>SUV</b> Dodge Durango 4X4	15.4	\$1,848	\$616	\$1,232	\$1,848	\$2,464

\*source: NRCan's Energuide *Fuel Consumption Guide 2005*

Rising gasoline prices increase annual fuel costs substantially, even for drivers of fuel-efficient vehicles. As illustrated by the above table, an increase of 80¢/L over 2002 levels (which would be associated with \$100/bbl crude prices), could add as much as \$2,500 to annual fuel costs for a vehicle. More moderate price increases (ie. more in line with what we are experiencing today), have increased vehicle operating expenses by between \$350 and \$900 depending on the type of vehicle driven. These increases could have a significant impact on the driving habits of Canadians, especially households with more than one automobile. If gasoline prices remain at today's levels, we may not see consumers immediately trade-in their large SUVs on smaller, more efficient vehicles, but as the automakers will attest to, this may start a slower process where consumers will begin to look at smaller, more efficient vehicles the next time they make a purchase decision.

### Conclusion

There are four key components that together combine to form the retail price of gasoline: crude oil costs, taxes, refining margins and marketing margins. While changes to any one of the gasoline price components can influence prices considerably, much of the volatility in gasoline prices over the past five years has mainly been a reflection of the volatility in world crude oil prices. World crude oil prices have tripled since early 2002 from approximately \$20US/bbl to around \$60US/bbl, increasing petroleum product prices worldwide, and Canada was no exception. Canadian average gasoline prices increased by more than 35¢/L during this time period. Although this price increase is substantial, it would have been worse for Canadian consumers, if not for the dramatic appreciation in the Canadian dollar. Estimates show that Canadian gasoline prices would have been as much as 16¢/L higher in June 2005, if the Canadian dollar had remained valued at \$0.62US. Nevertheless, consumers are starting to take notice of the impact of these price increases and, while not immediately evident, over the longer term will be reflected in consumer driving habits and vehicle purchase decisions.