Fraser Institute Digital Publication
February 2005

Canada's Drug Price Paradox

The Unexpected Losses Caused by Government Interference in Pharmaceutical Markets

Brett J. Skinner

Executive summary / 1
Background / 5
Data / 7
Methodology / 13
Findings / 15
Analysis / 19
Conclusions / 35
Appendix A: Verification of Canadian/US generic price differences / 37
Appendix B: Tables / 39
Notes / 70
References / 73
About this publication
About the author / 77
Acknowledgments & Disclosure / 78
Publishing information / 79
How to use the interactive features in this document / 80 [click here]
About The Fraser Institute / 81

Executive summary

Governments in Canada defend their interference in pharmaceutical markets by claiming such policies reduce prescription drug costs for Canadians. Yet, this study shows that Canadians pay much more than they should for generic drugs and that this is because of the very government policies that were supposed to make prescription medicines cheaper in the first place. This study also finds that price controls on patented drugs are unnecessary because market prices in Canada would often be nearly the same as government-imposed prices anyway. Even worse, price controls distort the pharmaceutical market in ways that harm Canadian consumers. In sum, government pharmaceutical policy is failing to provide better outcomes than competitive markets could. The cost of this government failure is significant: Canadians spent at least $2 billion more in 2003 than they would have if there were a competitive market for prescription drugs in Canada. In fact, if consumers' opportunity costs are included in the analysis, the losses could reach nearly $5 billion annually. These conclusions are drawn from some basic facts established by this study.

First, Canadian prices for generic prescription drugs are on average 78% higher than in the United States at the retail level. This is surprising because Canadian incomes are lower than US incomes and economic theory suggests our drug prices should be lower as well. One reason Canadian prices are so much higher is that the American market is far more competitive. The effect of Canadian policies has been to give established generic producers unfair advantages that they have exploited to establish individual product monopolies on pharmacy shelves through exclusive distribution agreements with retailers. By contrast, the US market is characterized by a large number of companies and healthy competition for sales of generic drugs, which leads to lower prices and higher voluntary rates of using generic drugs in the United States. *If our market were as competitive as that of the United States, we could expect our prices for generic drugs to fall to US levels and our rates of using generic drugs to increase to US levels.*

Second, only patented, brand-name drugs are subject to government-imposed price controls while non-patented, branded drugs have prices set by market forces. Yet, this study finds that market-priced brand drugs are at the same retail levels as price-controlled brand drugs (42% to 43% below US prices). Importantly, this remains true even when they have no generic competition: 30% of the top 100 brand-name drugs in this study were non-patented and 71% of these drugs had either no generic competitors at all or no generic competition over the biggest selling formulations. Therefore, these drugs enjoyed similar market exclusivity as patented drugs but without being subject to price controls. The prices for these drugs—prices set by the market—were 38% lower on average than the US prices for the same drugs. Additionally, 57% of these drugs had

no competition from either generics or from a price-controlled drug in the same therapeutic class. The Canadian prices of these drugs also averaged 38% less than prices for the same drugs in the United States. This suggests that if price controls on patented drugs were repealed, the price of patented drugs would not likely rise much higher than the current levels. *This analysis demonstrates that justifications for intervening in pharmaceutical markets through price controls based on the belief that market prices would be too high for people to afford are wrong. In a competitive market, lower average Canadian incomes will keep prices low relative to prices in the United States. Therefore, price controls in Canada are at best unnecessary.*

Theoretically, price controls can also artificially inflate the price of branded drugs even after their patents have expired. This is because Canada's price control mechanism mandates that the price charged for a newly patented drug cannot exceed the highest price already charged for previous drugs in the same therapeutic category. Thus, (in the absence of intervening factors like brand loyalty) once a branded drug comes off patent, the manufacturer has a disincentive to lower its price, even in the face of competition, so as not to inadvertently reduce the maximum entry price that can later be charged for a new drug in the same class. As mentioned in a previous study, **[Skinner, 2004]** the brand resistance to price reductions caused by the Canadian price-control mechanism also creates a higher price ceiling for generic competitors. If generics face less cost competition from brands, they can get away with charging a higher price. *This analysis suggests that price controls on patented drugs have created perverse incentives for both branded and generic drug pricing that encourage higher prices for all non-patented drugs (including both branded and generic drugs) than would occur in a competitive market.*

Too often, proponents of government interference in markets fail to count all of the costs of such policies. Once the findings from this study are projected either onto existing Canadian rates of use for brand and generic drugs, or also on to rates of use resembling the US experience, it is shown that Canadian pharmaceutical policies are costing Canadians nearly $2 billion directly in the price of generic drugs and perhaps up to $5 billion in total once all consumer opportunity costs from voluntary substitution are included. This does not even include the added opportunity costs Canadians suffer because of pharmaceutical policies that lead to lost investment and employment related to pharmaceutical R&D..

These findings support the conclusion that Canadian consumers would be better off if price controls on pharmaceutical drugs were abolished; if the federal government repealed policies that lead to a lack of competition in the generic drug industry; and if, as part of normal buyer-seller contract negotiations, third-party payers like provincial governments and private insurers demanded full disclosure of the rebates on generic drugs offered to pharmacy retailers in exchange for monopolies on pharmacy shelves.

Highlights

Findings

Adjusting for the purchasing power parity of the Canadian and US dollars, the retail price for Canadian generic drugs was 78% more on average than for the same generic drugs in the United States. Of the 100 top-selling generic drugs that were generically available in both markets:

- 74% were priced higher in Canada than in the United States: Canadian prices for these drugs averaged 116% higher than US prices
- 26% were priced lower in Canada: Canadian prices for these drugs averaged 33% lower than US prices
- Surprisingly, one drug that was available generically in Canada but not in the US was actually 14% more than the price of the US branded drug equivalent.

By comparison, brand-name drugs cost 43% less in Canada on average than in the United States. Of the 100 top-selling branded drugs common to both markets:

- 93% were less expensive in Canada than in the United States: Canadian prices for these drugs averaged 43% lower than US prices
- 7% were more expensive in Canada than in the United States: Canadian prices for these drugs averaged 31% higher than US prices
- 70% were patented and subject to price controls; 30% were non-patented and therefore not subject to price controls: patented drugs were 43% lower than US prices on average, while non-patented brand name drugs were 42% lower than US prices on average.
- 71% of the non-patented, non-price-controlled brand-name drugs had no competition from generic producers and were therefore enjoying the same market exclusivity as patented drugs. Prices for these market-priced brand-name drugs averaged 38% lower than US prices for the same branded drugs—and this was achieved without government-imposed price controls. By comparison, patented brand-name drugs (mentioned above) that were under government-imposed price controls were only 43% less expensive on average relative to the US price for the same drug.

Data

Data is based on a sample of retail prices, volumes, dosages, and formulations for the top 100 generic drugs with the highest prescription volumes in Canada in 2003 representing nearly ⅔ of the entire generic market as well as a sample of the top 100 brand-name drugs with the highest prescription volumes in Canada in 2003 representing

nearly ¾ of the entire brand name market. This dataset is matched to primary data gathered on actual US retail prices, which are verified as representative against list prices, known bulk discounts, and published third-party reimbursement prices for the same drugs.

Conclusion

If Canada eliminated price controls on patented medicines and achieved a pharmaceutical market that was as competitive as that of the United States, net savings for Canadians could reach $5 billion annually for total retail pharmacy sales of generic and brand-name drugs alone. The savings would result from greater competition for sales of non-patented drugs—especially generics—leading to much lower prices and greater voluntary use of generics as well as continued low prices for brand name drugs.

- Generic prescription drug prices would be expected to drop dramatically from current levels and generic substitution rates would increase considerably as they have in the United States.
- Prices for the 70% of brand-name prescription drugs that are patented drugs would remain near current levels, which are significantly lower than US prices because of lower average incomes in Canada. Prices for the remaining 30% of brand-name, prescription drugs that are non-patented and not under price controls would remain at current market levels, which are already nearly as low as price-controlled drugs even when they face no generic competition.

Background

In a recent study, *Generic Drugopoly: Why Non-patented Prescription Drugs Cost More in Canada than in the United States or Europe* [Skinner, 2004], I reviewed published research from authoritative government sources, including Canada's Patented Medicines Price Review Board (PMPRB) and the US Food and Drug Administration (FDA) comparing Canadian to US and international prices for prescription drugs. [PMPRB 2003; US FDA 2003] Using a large sample of drugs, the PMPRB study concluded that generic drugs were priced higher in Canada than in a group of comparison countries used for imposing price controls on patented drugs in Canada that included France, Germany, Italy, Sweden, Switzerland, the United Kingdom and the United States; as well as the additional countries of Australia and New Zealand. Most surprisingly, both the Canadian and US studies found that Canadian generic prescription drugs tended to be priced higher than their US equivalents. These findings confirmed earlier private-sector research that found Canadian generic drugs to be more expensive than US generic drugs on average. [Graham 2000; PDCI 2002]

Those findings were surprising because Canadian incomes are lower than incomes in many of the other countries studied, especially the United States. Therefore, one would expect to find lower average Canadian prices for products like generic drugs as well because the marginal, per-unit production costs of products like drugs are quite low while the average costs, which include research and development expenses, are much higher. This difference in average and marginal costs creates flexibility for the manufacturer to use price differentiation but only when markets that are less sensitive to price changes (usually high-income markets) can be segmented from markets that are more sensitive to price changes (usually low-income markets). When markets can be segmented, then prices can be set differently to maximize profits in each market. The fact that authoritative sources found that Canadians have lower incomes on average but pay higher prices on average for generic drugs than other countries was counter to economic theory and recommended further investigation into the reasons that this was occurring.

I examined this question and found that a lack of competition in the Canadian generic industry partly explained why prices were higher than expected in Canada. The Canadian generic drug industry was controlled by relatively few companies compared to countries like the United States, Germany, or France where generic drug prices are lower. An analysis of the generic market suggested that the low level of competition in Canada's generic drug industry permitted monopoly-style pricing power to be exercised by a few large companies. Further research revealed that this "generic drugopoly" had in fact been created by policies of the Canadian government that often accidentally, and sometimes intentionally, favoured the industry over its commercial competitors.

I calculated the difference between the international median price and the Canadian median price for generic prescription drugs based on the PMPRB's published data and found that Canadians pay at least 30% more than they would if the domestic drug industry was as competitive as other international markets. The study estimated that for consumers of generic drugs who made up 42% of the market in Canada, this amounted to a lost savings of at least $810 million in 2004, based on the expected value of sales revenues to generic manufacturers.

The findings of my review of the research in this area proved quite controversial. Therefore, in order to verify the findings of the PMPRB, the US FDA and others, I decided to undertake my own primary research into drug pricing, comparing prices in Canada and the United States and investigating the degree of competition in the Canadian generic drug industry. This new study examines prices over a larger market basket of drugs than has been previously studied and investigates competition for sales of generic drugs. Furthermore, the study recalculates the lost savings to Canadian consumers as a whole based on this additional research into generic drug prices and new research into the effect of price controls on patented and non-patented branded drug prices; and considers hypothetically the overall cost trade-offs to the total group of consumers on both sides of the border from the adoption of different pricing regimes and the associated differences in drug-use patterns.

Data

The data in this study refer only to prescription drugs in Canada and the United States. Non-prescription or over-the-counter (OTC) drugs are excluded. Prices and volumes apply to retail pharmacy sales only and include pharmacy mark-ups and professional fees unless otherwise stated. Direct government or institutional sales are excluded.

Canadian data

The Canadian dataset used for this study comprises the following three separate lists of drug products:

- the top 100 ***brand-name*** drug products in Canada ranked by the number of prescriptions dispensed, representing 72.9% of the total number of brand name prescriptions dispensed in the Canadian market;
- the top 100 ***generic*** drug products in Canada ranked by the number of prescriptions dispensed, representing 63.6% of the total number of generic prescriptions dispensed in the Canadian market for 2003;
- a separate list of all manufacturers in the Canadian generic market for each of the top 100 generic drug products in 2003 and their associated market shares defined by the number of prescriptions dispensed for each product.

All Canadian data were purchased directly from IMS Health Canada. Brand name and generic drug-product data was sourced from IMS Health's *CompuScript* database. According to IMS Health, the *CompuScript* database estimates the number of prescriptions dispensed by Canadian retail pharmacies. The *CompuScript* sample is drawn from a panel of over 4,700 pharmacies, which represents approximately two-thirds of all retail pharmacies in Canada. The sample, stratified by province, store type (chain or independent), and store size (large or small), comprises over 2,000 stores and is representative of the total number of stores in Canada. Records are collected electronically each month from participating pharmacies. After passing through various quality-control checks the sample data are projected to the total number of pharmacies in each province and provincial totals are summed to provide a national estimate. The data elements available include extended units. The extended unit may be pills (for oral solids), millilitres (for liquids), doses (for some inhalers) and grams (for powders). Also available is the cost of the prescription as dispensed. This includes all mark-ups and the pharmacist's professional fee. [IMS Health 2004d]

Specifically, the Canadian dataset included the following elements:

- drug product name
- active ingredient(s) (i.e. common drug name)
- manufacturer
- formulation (e.g. orals, solid)
- extended unit type (e.g. tablets)
- available dosage strengths per drug product (e.g. 50 mg tablets, 100 mg tablets, 120mg/5ml liquid)
- total prescriptions dispensed per drug product
- total prescriptions dispensed per drug product by dosage strength
- total extended units dispensed per drug product
- total extended units dispensed per drug product by dosage strength
- average extended units dispensed per prescription, per drug product by dosage strength
- total cost of dispensed prescriptions per drug product including all pharmacy mark-ups and professional fees
- average prescription cost per drug product including all pharmacy mark-ups and professional fees
- all manufacturers in the Canadian generic market for each of the top 100 generic drug products in 2003 and their associated market shares defined by the number of prescriptions dispensed for each product.

The data does not represent a random sample of the entire market for brand name and generic prescription drugs in Canada. However, with the *CompuScript* database representing two thirds of all pharmacies in Canada, and the datasets selected for this study representing between nearly two thirds and three quarters of the entire number of prescriptions dispensed for each of their respective classes of drugs, it is reasonably safe to extrapolate these findings to the total market for brand-name and generic prescription drugs in Canada.

Identification of the patent status of brand-name drugs and the number and types of competing manufacturers was also verified for accuracy and completeness against data accessible on the website of the Canadian federal government's Therapeutic Products Directorate (TPD). This site contains menu links to the Patent Registry, which lists currently patented prescription drug products and their expiry dates as well as already expired patents dating back to 2002. The TPD site also links to the Drug Products Database (DPD) which contains a list of active and inactive prescription drug products, showing all of the formulations, drug identification numbers (DIN), patent numbers, and every manufacturer. The site allows searches under manufacturer, drug product name, active ingredient, patent number and DIN.

US Data

Comparing Canadian drug prices with American drug prices is complicated by the lack of published data that identifies *actual* prices paid by consumers in the United States. Inquiries with IMS Health Canada indicate that there is no publicly accessible source of data on final retail consumer purchases for the entire market like that used by IMS Health in Canada to estimate sales volumes and spending. Further, IMS Health indicated that their American operation does not maintain a similarly structured set of US data comparable to the *Compuscript* database and, in any case, estimates of the costs for the US data that was available made obtaining it unaffordable for this project. Moreover, the reality is that retail prices vary significantly among retailers and geographic locations, making it difficult to extrapolate small samples across the entire market. [Graham 2001; US FDA 2003]

Estimating retail prices from manufacturers' direct price or wholesale price is also difficult because detailed data on actual prices paid to manufacturers and wholesalers by retailers varies widely depending on individually negotiated rebates. Detailed price and rebate data is kept private by retailers, wholesalers, and manufacturers because it is proprietary commercial information.

So, while IMS Health can reasonably estimate an average price for the Canadian market, it is difficult to obtain the same degree of accuracy when estimating average prices in the United States. Nonetheless, it is possible to derive a reasonable estimate of prices based on available data identifying manufacturers' list prices, *actual* published upper-limit prices for US government agencies, *actual* retail prices published online with major (national) US pharmacies, published research estimating the size of rebates offered to major third-party payers, and the percentage of retail sales affected by third-party reimbursement.

For this study, US data on drug prices, drug formulations, dosage strengths, and prescription sizes were obtained from the following sources.

2004 Thomson™ Red Book®

Average Wholesale Prices (AWP)

The *Red Book®* (RB) is the central source of data on manufacturers' list prices for the US pharmaceutical market. Prices listed in the RB are labelled as *Average Wholesale Price* (AWP). The RB bases its published AWP on the following:

- AWP as reported by the manufacturer.
- Or, AWP calculated based on a mark-up specified by the manufacturer (includes manufacturers, re-packagers and private labellers). This mark-up is typically based on the Wholesale Acquisition Cost (WAC) or Direct Price

(DP), as provided by the manufacturer, but may be based on other pricing data provided by the manufacturer.

- Or, when the manufacturer does not provide an AWP or mark-up formula from which AWP can be calculated, the AWP is calculated by applying a standard 20% mark-up over the manufacturer-supplied WAC. If a WAC is not provided, the standard mark-up is supplied to the DP.

According to the publisher, the data has not been subjected to any independent analysis to determine or calculate the *actual* AWP paid by providers (this includes retailers, hospitals, physicians, and others buying from the wholesaler or directly from the manufacturer for distribution to a patient) to wholesalers. The publisher also does not independently investigate the *actual* WAC paid by wholesalers to manufacturers or DP paid by providers to manufacturers but relies on the manufacturers to report the values for these categories as described above. **[*Red Book*, 2004: Foreword]**

For the purposes of researching US drug prices, it is especially important to note that RB-listed AWP is not reflective either of average prices or of the actual prices paid by wholesalers or pharmacies in the United States. This is because AWP is only used as a benchmark for calculating individually negotiated discounts and rebates to large government and private-sector third-party payers like Medicare, Medicaid, Veteran Affairs, Federal Supply Services, private insurers, health maintenance organizations (HMOs), and pharmacy benefit managers (PBMs), as well as bulk retail buyers. Therefore, AWP data does not provide a realistic picture of actual prices for drugs in the United States.

Nevertheless, it is possible to use AWP to make a rough estimate of actual prices in the market by first accounting for the proportion of the market for prescription drug sales in the United States that is affected by third-party payer rebates and discounts. For instance, there is data available that estimates the numbers of prescriptions that are reimbursed by third-party payers versus those that are paid for by cash customers. According to research published by Canada's Patented Medicines Price Review Board (PMPRB), the proportion of cash customers in the US market has been steadily decreasing in recent years, from 63% of retail prescriptions in 1990 to only 25% by 1998. **[PMPRB, 2003: 95]** Therefore, at least 75% of retail prescriptions in the United States are reimbursed by third-party payers, and are therefore sold at prices that are significantly lower than the RB prices.

Second, it is also possible to estimate the magnitude of the discounts achieved over the three quarters of the market for retail prescription drugs that is covered by third-party reimbursement. The size of the discount from AWP depends on the particular terms of the rebates negotiated by third-party payers and the class of drugs concerned. PMPRB research indicates that because of volume discounting, generic drug prices tend to be 50% to 60% below AWP, while branded drug prices are 13% to

15% below AWP. [PMPRB, 2003: 95] As mentioned above, these discounts apply to at least three quarters of the market.

The validity of the PMPRB's estimate of the size of the average discount is confirmed by comparing RB list prices with *actual* prices paid by US government agencies from the US Federal Supply Schedule (FSS). In the United States, prices for drugs purchased by federal agencies are set by the Federal Supply Schedule (FSS). FSS prices match the lowest price obtainable in the American market. According to the US General Accounting Office (GAO), average FSS prices for generic drugs are more than 50% below the RB price. Moreover, the US Department of Veteran Affairs (VA) has been able to negotiate prices even lower than FSS prices through purchase contracts for select drugs. [PMPRB, 2003: 95]

Because three quarters of the market obtains retail drug discounts that are similar in size to the FSS price, the average retail price for drugs in the United States is obviously much lower than the RB AWP price and, especially for generic drugs, may in fact be strongly skewed toward the lower FSS price. Inasmuch as the actual primary data on retail prices that was collected for this study approximates the kinds of discounts achieved by FSS and other third-party payers, it may be reasonably assumed that average prices are reflected in the retail price data presented here.

Federal Upper Limit (FUL) price

The RB also publishes the Federal Upper Limit (FUL) price for generic drugs when such a price is available. The FUL price is that reimbursed by Medicaid (the US Federally-funded, state-run, health insurance program for low-income people) for prescription drugs for its beneficiaries. According to the State Medicaid Manual, these reimbursement limits were established to ensure that the US Federal Government acts as a prudent payer by taking advantage of current market prices for multiple-source drugs. The RB provides a table of FUL discounts by State. [Table 1 (Appendix B)] [*Red Book*, 2004: 113] These data indicate that the FUL discounts are not as large on average as those of either FSS or other third-party payer prices.

This study will compare the AWP listed in the RB to the FUL price when available to establish the difference between listed AWP prices and this set of *actual* prices over the US sample of drugs that match the top 100 brand-name and top 100 generic drugs in Canada. The FUL prices represent a conservative estimate of *actual* prices because the discounts from AWP are smaller than those achieved by FSS and other third-party payers.

Nevertheless, neither AWP nor FUL prices are used to compare directly to IMS Health's Canadian retail price data. Instead, actual US retail pharmacy prices are used to compare to the actual Canadian retail pharmacy prices. AWP and FUL prices, estimates of third-party insurance coverage, and the magnitude of bulk discounts

achieved by insurers are merely used to verify that the US retail prices collected for this study can be reasonably generalized across the US market.

Costco® and Walgreen's® Actual Retail Prices (RP)

The resources available to this project did not permit the mass primary collection of US retail price data on a scale that would achieve a representative sample size that could be extrapolated to the entire market. Instead, the research design called for a comparison of AWP to FUL and at least one actual US retail price for each of the drugs in the Canadian sample. For ease of data collection and to make the sample as representative as possible, this study primarily used the online pharmacy drug-price information and ordering services of Costco® and Walgreen's®, two major US retail pharmacy chains, to obtain actual US price and other drug information for comparison to the Canadian data purchased from IMS Health. The Costco® price-search service was primarily used; Walgreen's® was used to supplement missing data. According to the retailers, pharmacies located in Costco® retail outlets nationwide offer pricing consistent with those listed on the website, which reflected the full-cash purchase price including pharmacy mark-ups and professional fees. **[Costco®, 2004]** Walgreen's® list prices also reflected the full cash purchase price. **[Walgreen's®, 2004]** The actual price data from Costco® and Walgreen's® was collected between July 12, 2004 and August 15, 2004 and verified as of October 15, 2004.

The data elements included in the US dataset are as follows:

- drug product name
- active ingredient (s) (i.e. common drug name)
- manufacturer
- formulation (e.g. orals, solid)
- extended unit type (e.g. tablets)
- available dosage strengths per drug product (e.g. 50 mg tablets, 100 mg tablets, 120mg/5ml liquid)
- standard extended units dispensed per prescription, per drug product by dosage strength
- prescription cost per drug product including all mark-ups and professional fees.

Table 2 (Appendix B) compares the Canadian and US data elements described above.

Methodology

The data sources used for this study listed drug dosage strengths and prescription sizes that sometimes differed between Canada and the United States for the same drug products. In order to make the data comparable between markets, all drug prices were converted to common dosage units. In almost all cases, this was measured in terms of a price per milligram of active ingredient. By converting to a price per dosage unit, prescriptions of various sizes and dosages could be made comparable for each drug product.

Canadian sales volumes per formulation and dosage for each drug product were available in the Canadian dataset. Unfortunately, the same level of detail was not available from the three sources of US price data. To improve comparability on average pricing, this study assumed that US sales volumes would follow Canadian patterns and made volume-weighted adjustments to the US data so that it would match Canadian sales volumes per drug formulation and dosage.

Data sources contained many entries for generic drug products as there are multiple manufacturers in the market producing the same active ingredient. Therefore, in the Canadian dataset, all generic manufacturers producing the same active ingredient were aggregated into one entry with a weighted average price based on actual sales volumes per product for all common dosage strengths and drug formulations. In the US data set, an average of all listed RB prices for generic manufacturers producing the same active ingredient was calculated and used to calculate a representative price based on Canadian volume weights.

In order to make prices comparable across currencies, the Canadian prices were converted to US dollars at the 2003 US-to-Canadian currency Purchasing Power Parity (PPP) rate of 1.21 Canadian dollars to the US dollar set by the Organisation for Economic Cooperation and Development (OECD). [OECD 2004] The PPP is used to reflect a currency's actual purchasing power relative to the same basket of goods in different countries. PPP is a useful measure for consumers who will only shop in their domestic markets because it should accurately reflect their transaction costs (excluding indirect costs) in their own country. [1]

The Canadian dataset is current through the full year 2003, representing the most recent full year of data available at the time of research. By necessity, actual US retail price data was obtained through primary research and was therefore current to the summer of 2004. In order to keep US data on AWP and FUL prices comparable to actual US retail price (RP) data, the 2004 edition of the *Red Book*® was used. The difference in years between the Canadian and US datasets required the US data to be adjusted to remove the effect of normal price inflation that occurred between 2003 and 2004. According to the US Bureau of Labor Statistics, the 2003 annual inflation

rate for pharmaceutical preparations averaged 4.5%. [US Bureau of Labor Statistics, 2004] This figure is conservative when compared to the claims made by drug-price advocacy groups like Families USA that have reported drug-price inflation rates as high as 6.5% in 2003. [Families USA, 2004] Therefore, US prices were adjusted to remove the 4.5% inflation that took place between 2003 and 2004 in order to make the Canadian and US prices comparable across time periods.

Due to the fact that all prices have been converted to US dollars,

- Canadian to US price differences are stated as a percentage of the US price: e.g., price difference = (CAD – US) / US;
- US domestic prescription-drug price differences are stated as a percentage of the AWP: e.g., price difference = (AWP – FUL) / AWP; price difference = (AWP – RP) / AWP.

Findings

Prices for generic drugs in Canada are higher on average than US prices

The findings of this study confirm earlier published research on Canadian and US generic prescription drug prices from the following chronologically listed sources:

- The Fraser Institute [Graham, 2000]
- Palmer D'Angelo Consulting International [PDCI, 2002]
- Patented Medicines Price Review Board of Canada [PMPRB, 2003]
- US Food and Drug Administration, Department of Health and Human Services [US FDA, 2003]
- US Food and Drug Administration [Associated Press, 2004]

All of these studies have found that prices for generic prescription drugs are higher on average in Canada than in the United States.

Only one published study in the literature, that by Danzon and Furukawa [2003], found that Canadian generic drug prices were on average lower than in the United States. However, that study included non-prescription (over-the-counter) drugs in its data sample and is, therefore, not comparable to the prescription-only prices studied here. Danzon and Furukawa also used data from the IMS Health Midas set, which is recorded at manufacturer-price levels, excluding wholesaler and pharmacy mark-ups and, therefore, is not comparable to the retail price data sets used in this study. Their study also used 1999 data, making the comparison to this one somewhat dated. In my opinion, Danzon and Furukawa also did not adequately adjust for the applicability of bulk discounts to the market. For instance, Canada's PMPRB cites US government estimates that more than 75% of the market is covered by third-party insurance and therefore obtains prices discounted below list prices. [PMPRB, 2003] Danzon and Furukawa do not indicate what percentage of the market is covered by third parties in their estimate. The discounts they discuss are even much smaller than the conservative standard 20% mark-up applied by the *Red Book*® to estimate AWP when a manufacturer does not supply the list price. [*Red Book*®, 2004] Their estimated discounts are also much smaller than those estimated by the PMPRB or the US government. Therefore, it is my opinion that Danzon and Furukawa's estimates of US price levels are significantly overstated at the retail level.

The top 100 generic drug products sold in Canada in 2003 measured by the number of prescriptions dispensed from retail pharmacies are ranked in Table 3 (Appendix B).

An analysis of the top 100 generic drug products sold in Canada in 2003 identified 59 separate generic active ingredients, which are listed in Table 4 (Appendix B). Of these 59 active ingredients, 16 were not at all available, or not yet generically available, in the United States. This left 43 active ingredient drug compounds that were generically available in both Canada and the United States.

Summary of findings on generic prices

- In a direct comparison between actual retail prices in Canada and the US for all 43 drugs that were generically available in both markets, the Canadian price averaged 78% higher than the US price for the same drugs.
- Of all 43 drugs that were generically available in both markets, 32 (74% of the sample) were more expensive in Canada. 11 (26%) were less expensive.
- For the generic drugs that were more expensive north of the border, Canadian prices averaged 116% higher than US prices. For the generic drugs that were less expensive in Canada, the Canadian price averaged 33% lower than US prices. [Table 5 (Appendix B)]

See [Appendix A] to this study for a discussion verifying these price comparisons.

Prices for branded drugs in Canada are lower on average than US prices

The price of brand-name drugs in Canada follows the pattern one would expect: Canadian prices are lower on average than US prices. There are two possible explanations for this. First, the findings are consistent with the fact that Canada, unlike the United States, imposes price controls on patented medicines and most of the 100 top-selling branded drugs are patented. Second, Canadian average incomes are lower than US incomes and, therefore, even without price controls, economic theory predicts that Canadian drug prices should be lower on average than US prices.

The top 100 brand name drug products sold in Canada in 2003 measured by the number of prescriptions dispensed are ranked in Table 6 (Appendix B). Of the top 100 brand-name drugs in Canada for 2003, eight (8) were either not available in the United States, not listed in the RB or an equivalent brand name could not be identified. This left 92 equivalent branded drugs available in both markets in the sample.

Summary of findings on brand-name prices

- The Canadian prices for the 92 drugs available in both markets averaged 43% lower than prices for the same drugs in the United States.

- Of these 92 drugs, 87 (95%) were less expensive in Canada than in the United States. The Canadian prices for these drugs averaged 48% lower than US prices for the same drugs. The remaining five (5%) were more expensive in Canada than in the United States. Canadian prices for these drugs averaged 31% higher than US prices for the same drugs.
- 70% (64) of the sample are patented drugs and are under government-imposed price controls in Canada. The prices for these drugs averaged 43% lower than for the same drugs in the United States.
- 30% (28) of the sample are non-patented and therefore not subject to price controls in Canada. The prices for these drugs averaged 42% lower than US prices for the same drugs.
- 71% (20) of the non-patented brand name drugs had no generic competitors. The prices for these drugs averaged 38% lower than prices for the same drugs in the United States.
- 57% (16) of the non-patented brand-name drugs had no generic competitors as well as no competition from patented brand-name drugs in the same therapeutic class. The prices of these drugs also averaged 38% lower than US prices for the same drugs.
- Five brand-name drugs were non-patented, had no generic competitors, and no competition from either patented or other non-patented brand-name drugs in the same therapeutic class. Canadian prices for three of these five single-source drugs ranged between 62% and 66% lower than US prices for the same drugs. [Table 6 (Appendix B)]

Verifying the reliability of the Data—comparing US AWP to FUL and RP

This study compared the AWP listed in the RB to the FUL price when available to establish the difference between listed AWP prices and this particular set of *actual* prices over the US sample of drugs that match the top 100 brand-name prescription drugs and the top 100 generic prescription drugs in Canada. By establishing this difference, we shall make it clear to the reader that the AWP is only a benchmark for negotiating purchase discounts and that any analyses citing AWP as an *actual* price are completely unreliable. Secondly, it will become apparent that the FUL prices used in this comparison are higher than those achieved by FSS and other private third-party payers, which the PMPRB has estimated to range between 50% and 60% below AWP and cover at least 75% of the market. [2] Third, comparing AWP to the actual retail price (RP) will make it apparent that a large percentage of the remaining 25% of the consumer market without third-party insurance coverage also obtains

prices for generic drugs that are similarly discounted from AWP because they make their drug purchases from large retail pharmacies that also negotiate bulk rebates from manufacturers.

Summary of findings for AWP, FUL, and RP prices

- For the 43 generic drugs that were available in both the United States and Canada from the list of the top 100 generic drugs in Canada, 36 had FUL price data available in the RB. Stated as a percentage of the AWP price, the published data indicates that for those 36 drugs the US FUL was 68% lower than the listed AWP on average.
- Actual retail prices were also obtained for the 43 generic drugs from the list of the top 100 generic drugs in Canada that were available in both the United States and Canada. Stated as a percentage of the AWP, the data showed that the US RP was 59% lower than the listed AWP on average. This is consistent with the size of the discounts obtained by third-party insurers and government agencies covering 75% the market.
- For the 92 branded drugs that were available in both Canada and the United States, the RP was 9% lower than the AWP on average. No FUL prices were available for brand-name drugs because they only apply to generic drugs.

What these comparisons illustrate is that the AWP cannot be relied upon as a representation of *actual* prices and that, for generic drugs in particular, a very high percentage of the market pays prices that are dramatically lower than AWP. Therefore, the average price in the market is heavily skewed toward the kinds of discounts described above, thus verifying the reliability of the retail price data collected for this study.

Analysis

Explaining high prices in the generic industry

Lack of serious competition

In my previous research [Skinner, 2004], I cited data available to the PMPRB that indicated the two largest generic companies in the industry accounted for 62% of the entire Canadian generic market by volume of sales in 1998/99. [PMPRB, 2003: 4] This figure is slightly higher than data from the Canadian Generic Pharmaceutical Association (CGPA) that reports the two largest companies in its membership accounted for 23.6% of the 356 million total prescriptions filled in Canada during 2003 or nearly 58% of the 145 million (40.6% of 356 million) generic prescriptions dispensed in Canada. [CGPA, 2004]

According to the data used for this study, the two largest companies in the generic industry accounted for more than 68% of the total number of prescriptions dispensed, and almost 64% of the total revenue from sales of the top 100 generic drugs in Canada. [Table 8 (Appendix B)] This is higher than both the PMPRB's and the CGPA's estimates of commercial concentration in the Canadian generic drug industry over the entire market basket.

It is also important to note that the CGPA claims that its 12 member companies made up 90% of the market for generic drug sales in Canada in 2003 based on volume of sales. [CGPA 2004] However, the data obtained by this study indicates that the largest five generic companies in the market accounted for almost all of the market—more than 95% of all prescriptions dispensed and all revenue from sales over the top 100 generic drugs [Table 9 (Appendix B)] in Canada for 2003.

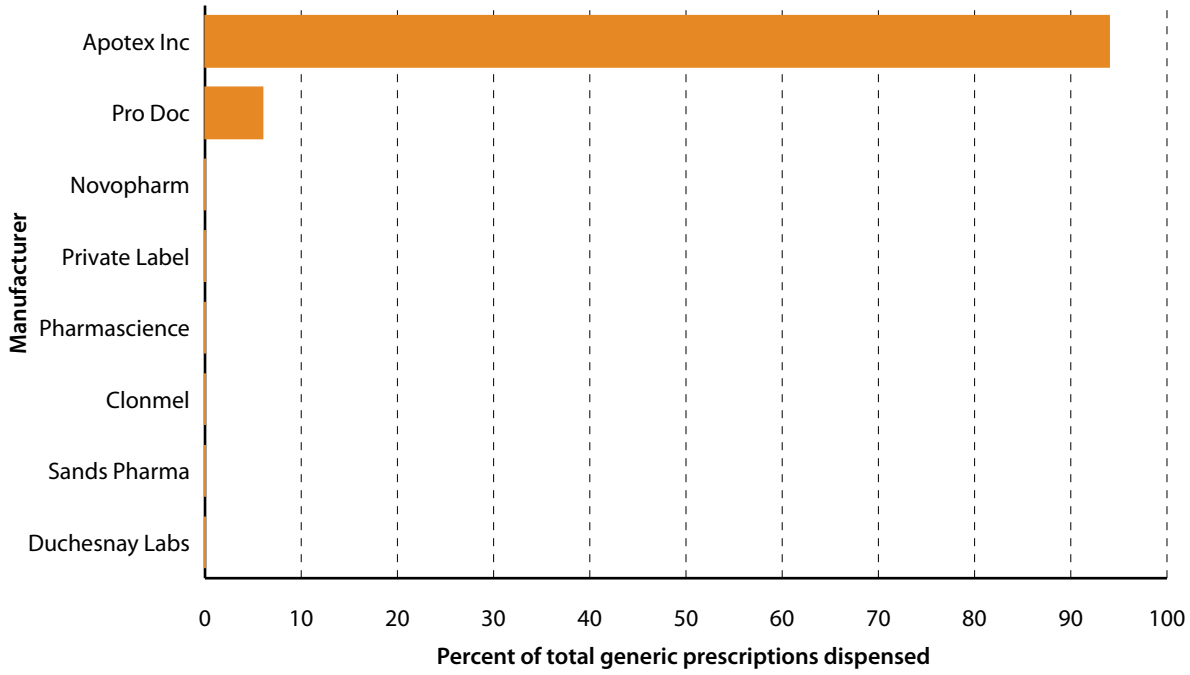
To provide a context for judging whether this represents a lack of a competitive market in Canada, it is useful to contrast these figures with markets in other countries where prices for generic prescription drugs are lower. In the United States for instance, it took 10 of the largest companies to account for approximately 60% of the generics industry in 1998/99—roughly equal to the percentage controlled by only two companies in Canada. [PMPRB, 2003: 44–45] During the same period, in France the 10 major suppliers represented only 20% of the generic drugs market and in Germany the largest 17 major generic manufacturers represented a total market share of only 28%. [PMPRB, 2003: 43–45]

Furthermore, relatively few generic companies control almost the entire market for public spending on generic drugs in Canada. My previous research reviewed a PMPRB analysis of the distribution of market share by company for public expenditures on generic drugs in selected provincial programs over the 100 top-selling drug products on the market during 1999/2000. The data indicated that one company

alone captured 50% of all public spending for drugs in these provinces while the top three companies captured 82% of the market for publicly funded sales of drugs. [Skinner, 2004]

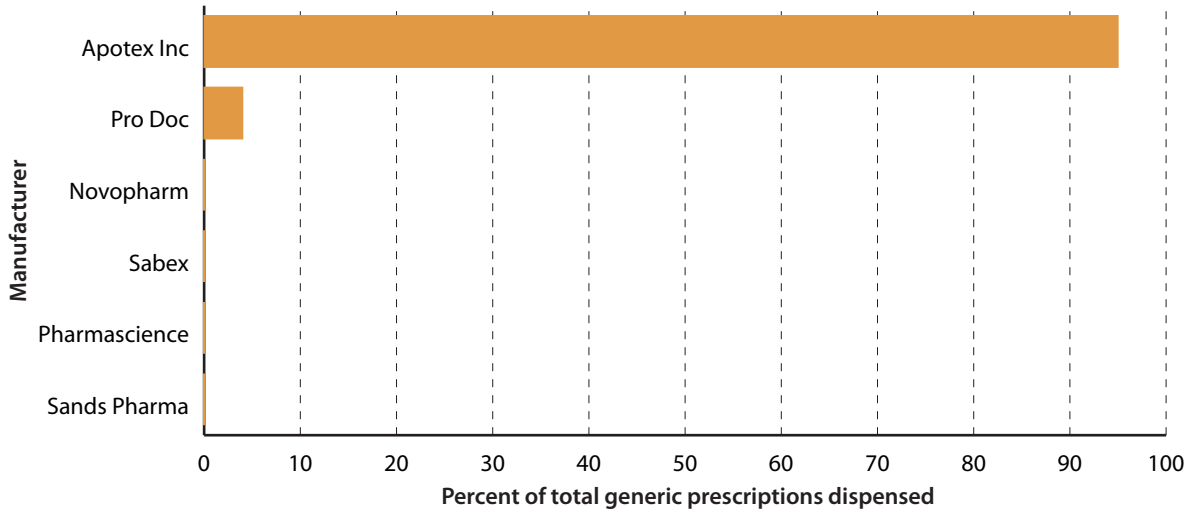
Yet even these startling figures do not indicate the full degree of commercial concentration in the Canadian generic industry. If commercial concentration in the Canadian generic drug industry is studied on a product-by-product basis, the virtual monopoly (or duopoly) position some companies enjoy over certain product markets is made more obvious. This study obtained a separate dataset from IMS Health showing the market share of all generic competitors in the market for each of the 100 top-selling generic active ingredients in Canada defined by the number of prescriptions dispensed in 2003. Due to its length, the data is presented in **Table 10 (Appendix B)**. Reading through the table, it becomes evident that there are many cases where only only two companies control almost 100% of the market for a generic product. In a significant number of cases, this occurs with only a single generic company accounting for virtually 100% of all prescriptions dispensed. **Figures 1, 2, 3 and 4** illustrate the way in which some generic companies monopolize the market on a product-by-product basis.

Figure 1: Market-share by manufacturer for generic drug, Amitryptyline, 2003



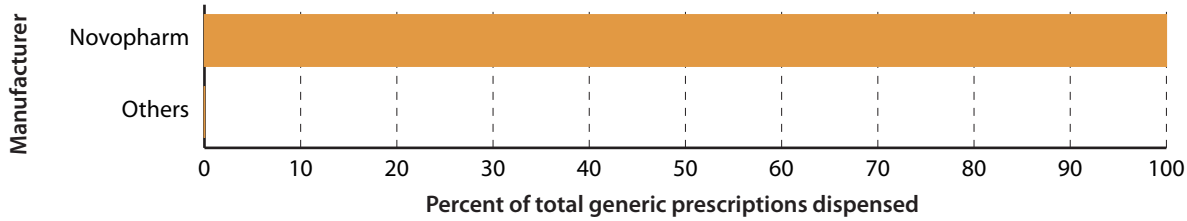
Source: IMS Health, 2004d.

Figure 2: Market-share by manufacturer for generic drug, Diazepam, 2003



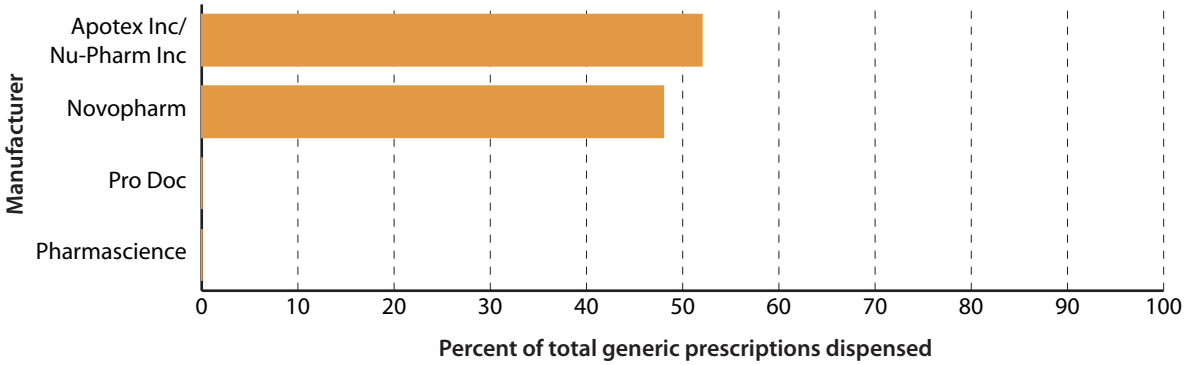
Source: **IMS Health, 2004d**.

Figure 3: Market-share by manufacturer for generic drug, Spironolactone, 2003



Source: **IMS Health, 2004d**.

Figure 4: Market-share by manufacturer for generic drug, Divalproex, 2003



Source: **IMS Health, 2004d**.

Rebates and exclusive distribution agreements

It is difficult to document just how the big, established, generic companies might be able to erect barriers to entry in the Canadian market. In an attempt to discover the answer, I conducted a series of qualitative interviews with pharmaceutical pricing policy analysts from government agencies in Canada, with various experts from the private sector who have had broad-ranging experience in the branded and generic drug industries, as well as with major retail pharmacy chain stores. [3] Expert opinion suggested that the dominant established generic companies might be negotiating exclusive retail distribution agreements to achieve local monopolies on pharmacy shelves for their products. Specifically, it is alleged that the dominant generic companies offer to retailers rebates that are "bundled" across many products in exchange for exclusive distribution rights, resulting in a monopoly on the pharmacy shelf for their particular generic brand.

The pharmacies have a huge incentive to accept these arrangements because the retailer allegedly keeps the difference between the rebate offered by the generic manufacturer and the reimbursement paid by the provincial drug-benefit plan. The difference can be substantial with some estimating that generic rebates might amount to nearly 60% off the public reimbursement rate. Given that nearly half (47%) [CIHI, 2004] of all prescriptions dispensed are paid for through public drug-benefit plans, this represents a huge windfall to the pharmacies and provides the generic companies with a virtual monopoly of the market for those drugs matching their product lines—all at the expense of taxpayers. The experts I talked to suspected that similar arrangements might apply to private insurance drug-plan reimbursement as well, thus making the scope of the issue even larger and potentially inflating costs for insurers and insured as well as employers that provide drug benefits for their employees.

The Canadian Press has corroborated that these types of deals actually exist between generic companies and pharmacies. A 2003 report contained details of how the government of Quebec intended to launch court proceedings later in 2004 to demand compensation from Canadian generic drug manufacturers for allegedly paying kickbacks to 85% of provincial pharmacies worth 30% to 50% of the value of the medicines sold and totalling $500 million annually. The report also indicated that a class-action lawsuit by a Montreal law firm is also being pursued on behalf of consumers who paid inflated prices for generic drugs because of such arrangements. [Canadian Press, 2003] In spite of this attention to the issue, it still remains difficult to document the scope and scale of manufacturer-to-retailer rebates because they are held as proprietary commercial secrets. The ability to conduct a rebates-for-monopoly strategy depends on third-party insurers not being aware of the *actual* manufacturer's price.

Certainly, if Canadian health ministries and private insurers were aware of discounts larger than those used for setting reimbursement rates, they would act to reduce the reimbursement price to match the actual rebate offered by manufacturers

(plus a standard mark-up and dispensing fee for the pharmacy). In turn, if pharmacies had to disclose and thus pass along generic discounts instead of keeping the difference then they would have no incentive to accept rebates that were bundled across broad product lines. Instead they would negotiate based on the best price for each individual product. Thus the big generic companies would not be able to insist on monopoly distribution of their products in exchange for rebates.

This is the way the system is supposed to work. However the lack of publicly available rebate information makes it impossible to know whether the reimbursement price paid by public drug-benefit programs and private insurers is based on accurate estimates of the actual discounts being traded between generic manufacturers and pharmacies.

The experts with whom I discussed these issues also suggested that giving rebates in exchange for monopoly product distribution might violate federal laws against business collusion. This prompted a search of cases before Canada's federal Competition Bureau. However, this research did not reveal any record of specific actions taken to investigate the issue of commercial concentration in the generic industry or the retail pharmacy industry. Nonetheless, the Competition Bureau's investigation process is only initiated in response to a formal complaint from the public and I could find no record of a complaint about generic industry concentration or collusion being registered with the Bureau.

First-mover structural advantages as barriers to entry

This still leaves open the question why potential competitors have not attempted to buy the same retail monopoly-distribution position as the big established Canadian generic firms. There are a couple of possible explanations for this. First, newer, smaller generic companies would have difficulty achieving the same sorts of monopoly arrangements with pharmacies because they do not offer product lines that are broad enough to offer the same volume discount across as many products as the big players. Therefore, they do not have the product capacity to compete with the negotiating power of the big firms.

Second, foreign competitors might simply have had difficulty overcoming the initial structural advantages that accrued to established Canadian generic companies from favourable government policies since the late 1960s. This may explain why a gigantic Israeli-owned multinational generic drug maker like Teva decided in 2001 to buy the second-largest generic firm in Canada (Novopharm) instead of competing on a product-by-product basis in the Canadian market. [Skinner, 2004]

In my previous research, I briefly outlined the ways in which pharmaceutical policies in Canada have at one time or another favoured the special commercial interests of the domestic generic-drug industry against both foreign competition and its brand-name rivals. [Skinner, 2004] The fact that public policy in Canada has tended

to favour the special commercial interests of established generic drug companies was thoroughly documented in my previous research and confirmed by the statements of several Federal Cabinet Ministers and senior civil servants. [Skinner, 2004] Based on this research, it seems reasonable to speculate that established Canadian companies have likely used the cumulative sum of both permanent and temporary [4] advantages created by various public policies [5] over time to entrench dominant positions in the market regarding product distribution networks.

For instance, Canadian companies could have used first-mover advantages to entrench relationships with physicians, who through their prescribing habits can direct demand to their products. Importantly, physician-directed demand is facilitated only when patients are immune from any direct cost for their personal drug consumption. Coincidentally, consumer immunity from costs is the primary feature of full insurance schemes like those of the various government drug-benefit programs in Canada. Such first-mover advantages would allow companies to build brand-style consumer loyalties to particular generic labels that foreign competitors would have difficulty competing against unless they could engage in a massive campaign to sway physicians to alternative products.

Forcing generic substitution

Government decisions to mandate generic substitution for filling prescriptions can also contribute to artificially inflated prices for generic products. According to recent research comparing pharmacare programs in Canada, nine out of 10 provincial governments mandate that pharmacists fill prescriptions with generic versions of non-patented brand-name medicines, unless the physician specifies otherwise. [Graham & Tabler, forthcoming]

Forced generic substitution means that generic companies do not need to compete on price against consumer loyalties toward brand drugs, relying on increased volumes for profit maximization. Instead, they can benefit from consumer demand that is less sensitive to higher prices because of government-imposed substitution rules. This allows them to obtain high sales volumes at premium prices, counter to what would occur in a competitive market.

In a competitive market for drugs, the only mechanism for increasing sales volumes and obtaining higher prices at the same time is through direct-to-consumer (DTC) advertising. However, DTC advertising preserves the voluntary exchange mechanism of market transactions and leaves consumer choice intact. Because consumers can satisfy their individual preferences in the market, allowing DTC to compete with price as an influence on consumer demand results in superior outcomes to government-imposed generic substitution, which denies such freedom.

For instance, while many public and private third-party payers in the United States also use forced generic substitution to contain costs, competition among insurers

means that many customers prefer insurers who offer choice, and forced substitution is therefore not as widespread. This in turn has meant that generic drugs in the United States have had to compete on price more aggressively to overcome brand loyalties that are further fortified by aggressive direct-to-consumer advertising by brand companies. This has resulted in much lower prices for generic drugs relative to non-patented branded drugs in the United States than in Canada.

Price control paradox

The findings of this study clearly show the perverse effects that price controls have on the Canadian drug market, leading ironically to higher instead of lower prices for both brand name and generic drugs.

To begin, this study confirms that all branded prescription drugs are significantly cheaper in Canada than in the United States (43% on average); whether they are patented or non-patented. But, it is important to note that only patented drugs are subject to government-imposed price controls while non-patented, brand drugs have market prices. Looked at separately, 70% of the top 100 brand-name drugs in Canada are patented and are, therefore, under government-imposed price controls. By comparison, 30% of the top 100 brand-name drugs are non-patented and therefore not subject to price controls. Notably, the group of patented, *price-controlled* drugs cost 43% less on average than the same drugs in the United States, while the non-patented, brand-name drugs *priced on the competitive market* cost 42% less on average than the same drugs in the United States. Ironically, brand-name, *non-patented* drugs that were not under price controls were priced at nearly the same discount from US prices as the brand-name, *patented* drugs that were under price controls. [6]

Importantly, this remains true even when the latter have no generic competition [7] and even when they do not also compete with a price-controlled drug. Recall that 30% of the top 100 brand-name drugs in this study were non-patented. Of these drugs, 71% (24) had either no generic competitors at all or no generic competition over the biggest selling formulations. **[Health Canada, Therapeutic Products Directorate, Drug Product Database, 2004]** Therefore, these drugs enjoyed similar market exclusivity as patented drugs but without being subject to price controls. These market-priced drugs were 38% lower on average than the US price for the same drug. Additionally, 57% (16) of these drugs had no competition from either generics or a price-controlled patented branded drug in the same therapeutic class. **[Health Canada, Patent Register, 2004; Health Canada, Therapeutic Products Directorate, Drug Product Database, 2004]** These market-priced drugs also averaged 38% less in Canada than in the United States. Meanwhile, 70% of the 100 top-selling brand-name drugs were patented and therefore subject to government-imposed price controls. These price-controlled drugs averaged

43% lower than US prices for the same drugs—very near to the same price relative to US prices on average when compared with market-priced drugs. This suggests that, if price controls on patented drugs were repealed, the price of patented drugs would not likely rise much higher than current levels. This analysis demonstrates that government justifications for intervening in pharmaceutical markets through price controls based on the belief that market prices would be too high for people to afford are wrong. Therefore, *price controls in Canada are at best unnecessary*.

Theoretically, price controls can also artificially inflate the price of branded drugs even after their patents have expired. This is because Canada's price control mechanism also mandates that the price charged for a newly patented drug cannot exceed the highest price already charged for previous drugs in the same therapeutic category. Thus (in the absence of intervening factors like brand loyalty), once a branded drug comes off patent, it has a disincentive to lower its price, even in the face of generic competition so as not to reduce inadvertently the maximum entry price that can later be charged for a new drug in the same class. The resistance to price reductions caused by the Canadian price-control mechanism also creates a higher price ceiling for generic competitors. As mentioned in my previous study [Skinner, 2004], the lack of competitive incentives for brands caused by the price-control rules theoretically creates an artificially high price ceiling for generic drugs. If generics face less cost competition from brands, they can get away with charging a higher price. This analysis suggests that *price controls on patented drugs have created perverse incentives for both branded and generic drug pricing that encourage higher prices for all non-patented drugs (including both branded and generic drugs)* than would occur in a competitive market.

Hypothetical policy analysis—what if Canadians and Americans swapped pharmaceutical policies?

It is probably safe to assume that many Canadians and Americans believe that a Canadian-style pharmaceutical policy ultimately means more savings for Canadians and that the United States could benefit from adopting such policies. This section will hypothetically estimate the potential costs and benefits from Canada adopting policies permitting a competitive market for drugs similar to those of the United States, and of the United States adopting interventionist, Canadian-style drug policies.

Canadian cost/benefit analysis

This analysis assumes that, if Canadians adopted American-style, pharmaceutical policies that allow drug prices to be set in the competitive market, this would eventually lead to US-style prices and patterns of use. [8]

Canada/US drug spending and price differences

According to the 2003 data obtained for this study, the total value of the retail brand-name prescription drug market in Canada was $12.2 billion CAD or $10.1 billion US (using 2003 US$ PPP) over 198.7 million (61%) prescriptions dispensed. The retail market for generic prescription drugs in Canada was worth $3.1 billion CAD or $2.6 billion US over 127.8 million (39%) prescriptions dispensed. Taken together, the total retail market for prescription medicines in Canada equaled $15.3 billion CAD or $12.6 billion US over 326.5 million prescriptions.

The data also indicated that the average Canadian prescription price for all branded drugs was $55.34 CAD or $45.74 US; $60.19 CAD or $49.75 US for non-patented brand-name drugs without generic competition; and $23.40 CAD or $19.34 US for generic drugs.

The average US prescription price for brand-name and generic drugs was not determined directly from the price data collected for this study, which was converted to an averaged price per dosage unit before being recorded. Nevertheless, for the purpose of the rough calculation used in this analysis, a reasonably accurate estimate can be quickly derived by applying the actual Canadian/US retail price differences observed in this study to the known average Canadian prescription prices for brand-name and generic drugs. Recall that after currency equalization using 2003 US$ PPP, this study found Canadian prices for generic drugs to be 78% higher (1.78 times the US price) on average than US prices for the same drugs and the prices for Canadian brand name drugs to be 43% lower (0.57 times the US price) on average than the US price for the same drugs. Therefore, 2003 average US prescription prices were approximately $10.87 US for generics and $80.25 US for brand name drugs.

Expected prices for branded and generic drugs in a competitive market

An accurate cost/benefit analysis of Canada adopting American-style, pharmaceutical policies that allow drug prices to be set in the competitive market must account not only for existing price differences, which reflect US market prices, but also for the expected behaviour of Canadian prices for branded and generic drugs in a competitive market given lower Canadian average incomes. This is important because it is not necessarily true that prices for both generic and branded drugs in Canada would automatically migrate to American levels if Canada adopted US-style pharmaceutical policies. While this could be reasonably expected to occur for generic drugs, given that the US generic industry is far more competitive than Canada's, the same could not be said for branded drugs. In fact, as long as the US and Canadian markets remain segmented, the Canadian prices for branded drugs are likely to remain dramatically lower than US prices because of lower average Canadian incomes. This means that, if Canada adopted a more competitive market in pharmaceuticals, Canadians could

continue to enjoy significantly lower branded drug prices (both patented and non-patented) and also have the benefit of dramatically lower generic prices.

Recall that overall the top 100 Canadian brand-name drugs averaged 43% less expensive than the same drugs in the United States. Looked at again in more detail, 70% of these are patented and are, therefore, subject to government price controls. This separate group of price-controlled drugs also averaged 43% lower than in the United States. The remaining 30% of the top 100 brand-name drugs sold in Canada are not patented and therefore not subject to price controls. As a separate group, these drugs priced on the competitive market averaged 42% lower than US prices for the same branded drugs. Further, 71% of these non-patented drugs had no generic competition; thus they enjoyed de facto market exclusivity equivalent to patented drugs. The prices set in a competitive market for these single-source drugs were 38% lower on average than the same drugs in the United States—almost as low as price-controlled drugs but without government-imposed prices. Additionally, even those drugs that faced no competition from either generics or a price-controlled patented drug in the same therapeutic class were priced 38% lower on average than the same drugs in the United States.

Remember also that price controls on patented drugs have the unintended consequence of dissuading branded drugs from competing with generic drugs on price by creating a disincentive to reduce the price when a patent expires. In the absence of price controls, non-patented branded drugs would be expected to compete more aggressively with generic drugs on price because they would no longer risk undermining the introductory price of new drugs in the same therapeutic class. Therefore, prices for non-patented brand-name drugs should theoretically be under pressure to decline even further if there were a competitive market in pharmaceutical pricing, i.e., no price controls on patented medicines. However, the downward pressure on prices can be countered by the effects of consumer loyalties to branded drugs that are reinforced by direct-to-consumer (DTC) advertising. In the United States, for instance, there is some evidence that brands do not reduce prices very much after patents expire. This is likely due to the widespread use of strategies like DTC advertising to develop brand loyalty in the United States. [Frank, 2003] Therefore, in order to be conservative, this analysis assumes that branded drug prices will not decline in the absence of price controls but will simply stay roughly the same as the actual experience of non-patented, non-price-controlled brand drugs without generic competition in Canada.

These observations mean two things:

1 It is reasonable to assume that in the absence of price controls, Canadian prices for both patented and non-patented brand drugs would remain roughly as low as current levels for those non-patented brand-name drugs that have no generic competition and do not compete with a price-controlled patented drug in the same therapeutic class.

2 In a free and competitive market, Canadian generic drug prices would gradually become at least as low as US prices for the same drugs.

Expected use of branded and generic drugs in a competitive market

A complete estimate of the full costs and benefits of Canadians adopting American-style, pharmaceutical policies that allow drug prices to be set in the competitive market also requires that adjustments be made for expected changes to patterns of use associated with branded and generic drugs in a competitive market. It is reasonable to assume that lower US prices for generic drugs relative to their branded equivalents account for the higher rates of generic substitution observed in that market relative to Canada. Therefore, if Canadian generic drug prices fell to US levels or below, this would likely lead to an increase in Canadian generic drug substitution to US levels as well. [9]

Recall that the data used in this study indicated that the number of Canadian generic prescriptions dispensed in Canada is currently 39% of the 326.5 million prescriptions dispensed in 2003. [IMS Health, 2004d] Now consider that in fact the US pattern of using generic and brand-name drugs is virtually the reciprocal of the Canadian pattern of use: in the United States, generic drugs accounted for about 51% of the total number of prescriptions dispensed in 2002 [GPhA, 2004a] and this is predicted to grow to 60% by 2005. [Saftlas, 2004] If, in response to lower generic US-style prices, Canadian generic substitution levels reached the expected 2005 American rate of 60% of total retail prescriptions dispensed in the market, then a different picture emerges of costs and benefits from adopting US pharmaceutical policies.

If the Canadian generic substitution rate equaled 60% of the total market, then approximately 195.9 million prescriptions of the 326.5 million total number of prescriptions dispensed in 2003 would be accounted for by sales to generic manufacturers, leaving 130.6 million prescriptions accounted for by branded drug sales. If these adjusted levels of use are multiplied by average US prices for generic and branded prescriptions, an estimate of the costs and benefits from adopting US pharmaceutical policies in Canada can be calculated.

Cost/Benefit Calculation

The analysis presented above indicates that in a market equally as free and competitive as that in the United States:

1 Canadian prices for both patented and non-patented brand drugs would remain close to current levels; and Canadian generic drug prices would fall to US levels.
2 The pattern of Canadian use of branded and generic drugs would mimic the patterns of use in the United State's competitive market.

Based on the assumptions that arise from the data and analysis presented in this paper, an estimate can be made of the savings Canadians could achieve by adopting a more competitive market in pharmaceuticals.

If Canadian prices for both patented and non-patented branded drugs would remain near current levels in the absence of price controls, then the 2003 average Canadian branded drug prescription price would be expected to go no higher than $49.75 US, which is approximately the Canadian current average market prescription price for non-patented brand drugs without either generic competition or competition from a price-controlled patented drug in the same therapeutic class. If generic prices would fall to US levels, then the average generic prescription price would be expected to be at least as low as $10.87 US, which is already the current average generic drug price in the United States. If the Canadian brand/generic ratio of use approximated the expected US ratio, then brands would account for 40% (130.6 million) of the 326.5 million prescriptions dispensed in Canada in 2003, while generics accounted for 60% (195.9 million).

Using expected Canadian brand-name and generic drug prices, as well as expected brand versus generic rates of use yields a total market value of $8.4 billion US or *$10.4 billion CAD* for retail prescription drug sales for the year 2003. This is approximately $4.9 billion (32%) *less* than the actual 2003 $15.3 billion CAD total for retail sales of branded and generic drugs together.

Calculation 1: Total Canadian spending on prescription drugs under expected prices and use

CAD Brand = $49.75 US per R_x * 130.6m = $6.5b US
CAD Gen = $10.87 US per R_x * 195.9m = $2.1b US
CAD Total R_x Cost: Expected Pricing and Use = $6.5b + $2.1b = $8.6b US = $10.4b CAD
Current CAD Total R_x Cost: $15.3b
Total Savings: $15.3b – $10.4b = $4.9b

According to this final analysis, Canadians could save approximately $5 billion CAD annually from adopting pharmaceutical policies that allow drug prices to be set in the competitive market. Looked at another way, Canadians currently suffer economic losses amounting to nearly $5 billion annually over total retail sales of brand-name and generic pharmaceuticals because of government interference in the competitive market that leads to a lack of competition in the generic drug industry and higher prices for non-patented drugs—especially generic drugs.

In fact, if this same analysis is performed under the same price assumptions, but using existing Canadian brand/generic patterns of use, Canadians still come out ahead by nearly $2 billion annually from the removal of government interference in pharmaceutical markets.

Calculation 2: Total Canadian spending on prescription drugs under expected prices and current Canadian use

CAD Brand = $49.75 US per R_x * 195.9m = $9.7b US
CAD Gen = $10.87 US per R_x * 130.6m = $1.4b US
CAD Total R_x Cost: Expected Pricing and Use = $9.7b + $1.4b = $11.1b US = $13.4b CAD
Current CAD Total R_x Cost: $15.3b
Total Savings: $15.3b – $13.4b = $1.9b

American cost/benefit analysis

Based on the data supplied for this study, the 2003 average Canadian brand-name prescription price is $45.79 US and the generic price is $19.34 US. Using the average drug-price differences between Canada and the United States found in this study, it was estimated that the actual 2003 average US brand-name prescription price was approximately $80.25 US, while the average generic prescription price was about $10.87 US. [10]

Applying Canadian prices and brand/generic rates of use to the total size of the US market permits an analysis of the costs and benefits to Americans from adopting Canadian-style pharmaceutical policies, which it is assumed will eventually lead to Canadian-style prices and patterns of use. However, it should be noted that the normal Canadian market price is substantially lower than the normal US market price because Canadian average incomes are so much lower than US incomes. Nonetheless, if it was unconcerned with negative consequences, the US government could impose prices that matched the current Canadian levels if it desired. For the purpose of estimating the total trade-off from the US adopting Canadian drug policies, this analysis assumes that any attempt at US price controls would adopt the current Canadian price.

As mentioned above, the US brand/generic ratio of use is expected to be 40:60 as of next year. The Canadian brand/generic ratio of use based on the 2003 data used for this study was 61:39, approximately reciprocal. Additionally, the estimated total number of retail prescriptions that will be dispensed in the United States by the end of this year is 3.5 billion. [IMS Health, 2004a] Therefore, the current number of prescriptions dispensed in the US market for branded drugs was approximately 1.4 billion and for generic drugs, 2.1 billion.

Calculation 1 under current US prices and use

US Brand = $80.25 * 1.4b = $112.4b
US Generic = $10.87 * 2.1b = $22.8b
US Total Retail R_x Cost: US Pricing and Use = $112.4b + $22.8b = $135.2b US [11]

Calculation 2 under Canadian prices and use

US Brand = $45.74 * 2.1b = $96.1b

US Generic = $19.34 * 1.4b = $27.1b

US Total Retail R_x Cost: CAD Pricing and Use = $96.1b + $27.1b = $123.2b US

This means Americans would save *$12 billion (9%)* off the current total retail pharmacy market cost of all prescription drugs by adopting policies that led to Canadian-style prices, or about *$3.42 per prescription* on average. However, imposing price controls would undoubtedly lead to other indirect, and more significant, costs that are harder to quantify but should be included in this analysis if the total real costs from such a policy are to be fully understood.

For instance, price controls on branded drugs could theoretically achieve some savings ($3.42 US per prescription on average) but only for those drugs currently on the market. The effect that price controls would have on the development of new drugs would likely be to curtail the number of new medicines being brought to market. This is because bringing a new medicine to market costs on average over $800 million US, and only 1 in 10,000 drug compounds discovered are finally approved for sale on the market. [DiMasi 2003; 2001] Therefore, innovative drug makers need to obtain the highest price that each of their markets will bear in order to fund the research costs and investment risks associated with inventing new medicines. The opportunity cost from the US government imposing below-market prices for drugs that, in turn, led to a reduction in the development of new medicines is extremely difficult to quantify and so will not be fully attempted in this analysis. Nevertheless, one can quickly appreciate the relative scope of this lost value if even a single therapeutic class of medicines would not have been brought to market.

For example, according to IMS Health, cholesterol-reducing drugs used to combat heart disease earned revenues of $13.9 billion US in 2003; this figure represents the quantifiable value of this medicine to consumers. [IMS Health, 2004b] If price controls had discouraged the research and development of this single drug therapy alone, the entire initial savings from imposing Canadian-style price controls on US sales of pharmaceuticals would be wiped out in the form of lost treatment options for heart disease. Thought of in different terms, if only the top three drug products sold in the United States in 2003 (Lipitor + Zocor + Prevacid = $15.2 billion) had not been developed, then any theoretical savings from price controls would be similarly cancelled by the fact that the drugs would never have been developed in the first place—the market value of which exceeds the value of price reductions from Canadian-style price controls. [IMS Health, 2004b]

Price controls would also no doubt affect investment and employment in the industry leading to general economic losses and job losses among a significant number of highly skilled, highly paid workers. According to a study by the Milken Institute [DeVol et al., 2004]:

- the US biopharmaceutical sector employed over 406,000 people in 2003
- each job directly created by biopharmaceutical companies created an additional 5.7 jobs spin-off jobs in the overall economy
- biopharmaceutical jobs paid over $72,000 US per year on average.

It is also important to note that the pricing of drugs on the competitive market in the United States also attracts the world's highest level of investment in pharmaceuticals. According to the PMPRB (Canada's federal price-control agency), spending on pharmaceutical research and development in the United States was the highest in the world among the group of countries (including Canada, France, Germany, Italy, Sweden, Switzerland, the United Kingdom and the United States) used for setting price controls in Canada. In fact, spending on pharmaceutical R&D in the United States for the year 2000 accounted for 61% of the total spent by this group of countries: 156% more than the other seven countries combined. In contrast, the Canadian government's intrusions in the market are associated with levels of pharmaceutical investment that are among the lowest in the developed world. For instance, the same PMPRB study found that spending on R&D in Canada was only 1.8% of the total for the same group of countries. [PMPRB, 2002]

Looking at these comparisons, it becomes apparent that the United States, with its relatively more competitive pharmaceutical market, enjoys greater overall societal benefits than countries where citizens permit their governments to interfere in markets. Pharmaceutical investment adds billions to the American economy and provides thousands of highly skilled, highly paid jobs as well. Adding this to the analysis would certainly raise the costs of the United States adopting Canadian-style pharmaceutical policies far above those estimated here.

Additionally, one should not forget that countries that impose price controls currently get away with paying artificially lower government-controlled prices for patented drugs by "free riding" on the fact that American consumers pay higher prices for patented drugs, thereby subsidizing the cost of innovation for the rest of the world. This is because the United States is the only market that currently allows manufacturers to adjust prices freely based on consumer demand in order to recover the cost of bringing new medicines to market. Other countries prevent this through price controls. However, if the United States also adopted price controls and this led to a global slow-down in developing innovative new drugs, then the free ride would be over; countries like Canada could not count on paying government-controlled prices (even though, as this study shows, for relatively lower income countries such savings are illusory when markets can be segmented anyway) and still benefit from global innovation in pharmaceuticals. Thus, it is not even in the interest of Canadians to encourage their American neighbours to adopt Canada's current interventionist policies.

Therefore, instead of adopting Canadian-style price controls that would achieve only insignificant direct savings and would likely lead to the decline of global pharmaceutical development, US policy makers should be encouraging their trading partners to abandon government interference in pharmaceutical markets, including the lifting of price controls in those countries. Such a change in the global market would take some pressure off US patented drug prices and more fairly distribute the global costs of bringing new medicines to market; and as the Canadian cost/benefit analysis shows, would also lead to greater overall benefits for non-American consumers as well.

Conclusions

Governments in Canada defend their interference in pharmaceutical markets by claiming such policies reduce prescription drug costs for Canadians. Yet this study shows that Canadians pay much more than they should for generic drugs and that this is because of the very government policies that were supposed to make prescription medicines cheaper in the first place. This study also finds that price controls on patented drugs are unnecessary because market prices in Canada would often be nearly the same as government-imposed prices anyway. Even worse, price controls distort the pharmaceutical market in ways that harm Canadian consumers. In sum, government pharmaceutical policy is failing to provide better outcomes than competitive markets could. The cost of this government failure is significant: Canadians spent at least $2 billion more in 2003 than they would have if there were a competitive market for prescription drugs in Canada. In fact, if consumers' opportunity costs are included in the analysis, the losses could reach nearly $5 billion annually. These conclusions are drawn from some basic facts established by this study.

First, Canadian prices for generic prescription drugs are on average 78% higher than in the United States at the retail level. This is surprising because Canadian incomes are lower than US incomes and economic theory suggests our drug prices should be lower as well. One reason Canadian prices are so much higher is that the American market is far more competitive. The effect of Canadian policies has been to give established generic producers unfair advantages that they have exploited to establish individual product monopolies on pharmacy shelves through exclusive distribution agreements with retailers. By contrast, the US market is characterized by a large number of companies and healthy competition for sales of generic drugs, which leads to lower prices and higher voluntary rates of using generic drugs in the United States. *If our market were as competitive as that of the United States, we could expect our prices for generic drugs to fall to US levels and our rates of using generic drugs to increase to US levels.*

Second, only patented, brand-name drugs are subject to government-imposed price controls while non-patented, branded drugs have prices set by market forces. Yet, this study finds that market-priced brand drugs are at the same retail levels as price-controlled brand drugs (42% to 43% below US prices). Importantly, this remains true even when they have no generic competition: 30% of the top 100 brand-name drugs in this study were non-patented and 71% of these drugs had either no generic competitors at all or no generic competition over the biggest selling formulations. Therefore, these drugs enjoyed similar market exclusivity as patented drugs but without being subject to price controls. The prices for these drugs—prices set by the market—were 38% lower on average than the US prices for the same drugs. Additionally, 57% of these drugs had

no competition from either generics or from a price-controlled drug in the same therapeutic class. The Canadian prices of these drugs also averaged 38% less than prices for the same drugs in the United States. This suggests that if price controls on patented drugs were repealed, the price of patented drugs would not likely rise much higher than the current levels. *This analysis demonstrates that justifications for intervening in pharmaceutical markets through price controls based on the belief that market prices would be too high for people to afford are wrong. In a competitive market, lower average Canadian incomes will keep prices low relative to prices in the United States. Therefore, price controls in Canada are at best unnecessary.*

Theoretically, price controls can also artificially inflate the price of branded drugs even after their patents have expired. This is because Canada's price control mechanism mandates that the price charged for a newly patented drug cannot exceed the highest price already charged for previous drugs in the same therapeutic category. Thus, (in the absence of intervening factors like brand loyalty) once a branded drug comes off patent, the manufacturer has a disincentive to lower its price, even in the face of competition, so as not to inadvertently reduce the maximum entry price that can later be charged for a new drug in the same class. As mentioned in a previous study, **[Skinner, 2004]** the brand resistance to price reductions caused by the Canadian price-control mechanism also creates a higher price ceiling for generic competitors. If generics face less cost competition from brands, they can get away with charging a higher price. *This analysis suggests that price controls on patented drugs have created perverse incentives for both branded and generic drug pricing that encourage higher prices for all non-patented drugs (including both branded and generic drugs) than would occur in a competitive market.*

Too often, proponents of government interference in markets fail to count all of the costs of such policies. Once the findings from this study are projected either onto existing Canadian brand and generic rates of use, or also on to rates of use resembling the US experience, it is shown that Canadian pharmaceutical policies are costing Canadians nearly $2 billion directly in the price of generic drugs and perhaps up to $5 billion in total once all consumer opportunity costs from voluntary substitution are included. This does not even include the added opportunity costs Canadians suffer because of pharmaceutical policies that lead to lost investment and employment related to pharmaceutical R&D..

These findings support the conclusion that Canadian consumers would be better off if price controls on pharmaceutical drugs were abolished; if the federal government repealed policies that lead to a lack of competition in the generic drug industry; and if, as part of normal buyer-seller contract negotiations, third-party payers like provincial governments and private insurers demanded full disclosure of the rebates on generic drugs offered to pharmacy retailers in exchange for monopolies on pharmacy shelves.

Appendix A: Verification of Canadian/US generic price differences

The Canadian/US generic drug price differences found in this study are given added weight when compared to a rough calculation of average US generic prescription costs derived from data published by The US Generic Pharmaceutical Association (GPhA). This quick calculation confirms the external validity of the size of the price differences found in this study.

The GPhA claims total revenue from sales of generic drugs in 2003 equaled $16 billion US not including pharmacy mark-ups and dispensing fees. [12] GPhA also claims to have accounted for 51% of all prescriptions dispensed in 2002. [GPhA, 2004a] In fact, some economists predict the generic share of the US market will reach nearly 60% by 2005. [Saftlas, 2004] If this estimate is accurate, then generic prescription volumes will grow by 3% per year on average between 2002 and 2005, thus reaching roughly 54% of the total market in 2003.

Additionally, IMS Health reports that total prescription volumes in the US market are expected to reach approximately 3.5 billion by the end of 2004 growing 3% over 2003 volumes. [IMS Health, 2004a] Therefore, the estimated 2003 generic prescription volume was approximately $3.4 billion and the generic share of the 2003 total volume of prescriptions was 1.8 billion (54% of 3.4 billion).

If the US generic industry's 2003 total revenue from sales of $16 billion US is divided by the total number of generic prescriptions dispensed in 2003 of 1.8 billion, then the average price per generic prescription in the United States would be approximately $8.89 US. This price does not include pharmacy dispensing fees and mark-ups. In order to estimate the US average prescription price based on the data published by the generic industry itself, the pharmacy mark-up must be included.

Data exists that permits the Canadian pharmacy mark-up to be estimated and this can be used to estimate an approximate US pharmacy mark-up. According to the dataset used for this study, the total value of retail sales in the Canadian generic drug market is more than $3.1 billion CAD. The CGPA claims $2.2 billion CAD in total sales revenue for the generic manufacturers. This implies that the Canadian pharmacy mark-up is at least 41% over manufacturers' prices. If the US pharmacy mark-up is similar to the Canadian rate, then the average US generic prescription price is $8.89 + 54% = $12.53 US.

Now consider that the average Canadian prescription price based on the dataset used for this study was $23.40 CAD or $19.34 US using 2003 US$ PPP for currency equalization. This means the average Canadian generic prescription price ($19.34 US) is at least 54% higher than the US price ($12.53 US) based on this rough alternative analysis.

This estimate adds weight to the overall findings of this study, which also found Canadian generic drug prices to be significantly higher on average than US prices. And, even though the size of the price difference is somewhat smaller than the estimates drawn from my data, this should not be seen as a contradiction of the findings from this study because, unlike the calculation above, the price comparisons conducted in this study are not calculated on a per prescription basis. Instead, this study converted drug prices to a price per dosage unit that was common to both markets making the final drug price truly comparable across markets; a necessary methodological step because drug formulations, dosage strengths, and prescription sizes vary between prescriptions in the US and Canadian markets.

The difference in methodology likely accounts for the difference in average prices encountered here, with the study's finding of an average difference of 78% being a more accurate estimate of actual average price differences between the United States and Canada per common unit of active ingredient.

Appendix B: Tables

Table 1: State Medicaid drug discounts from average wholesale price (AWP)

State	Generic	Brand	State	Generic	Brand
Alabama	10.00%	10.00%	Montana	15.00%	15.00%
Alaska	5.00%	5.00%	Nebraska	11.00%	11.00%
Arizona	15.00%	15.00%	Nevada	15.00%	15.00%
Arkansas	20.00%	14.00%	New Hampshire	12.00%	12.00%
California	5.00%	5.00%	New Jersey	10.00%	10.00%
Colorado	35.00%	13.50%	New Mexico	12.50%	12.50%
Connecticut	40.00%	12.00%	New York	10.00%	10.00%
Delaware	15.00%	15.00%	North Carolina	10.00%	10.00%
District of Columbia	10.00%	10.00%	North Dakota	10.00%	10.00%
Florida	13.25%	13.25%	Ohio	12.80%	12.80%
Georgia	10.00%	10.00%	Oklahoma	12.00%	12.00%
Hawaii	10.50%	10.50%	Oregon	13.00%	13.00%
Idaho	12.00%	12.00%	Pennsylvania	10.00%	10.00%
Illinois	25.00%	12.00%	Rhode Island	—	—
Indiana	20.00%	13.50%	South Carolina	10.00%	10.00%
Iowa	10.00%	10.00%	South Dakota	10.50%	10.50%
Kansas	27.00%	13.00%	Tennessee	13.00%	13.00%
Kentucky	12.00%	12.00%	Texas	15.00%	15.00%
Louisiana	14.25%	14.25%	Utah	15.00%	15.00%
Maine	13.00%	13.00%	Vermont	11.90%	11.90%
Maryland	10.00%	10.00%	Virginia	10.25%	10.25%
Massachusetts	—	—	Washington	26.00%	19.00%
Michigan	14.30%	14.30%	West Virginia	12.00%	12.00%
Minnesota	14.00%	14.00%	Wisconsin	11.25%	11.25%
Mississippi	12.00%	12.00%	Wyoming	11.00%	11.00%
Missouri	10.43%	10.43%	AVERAGE ALL	13.92%	11.96%

Source: *Red Book*, 2004: 113

Table 2: Comparison of Canadian and US data elements

Canadian data elements	*US data elements*
Drug product name	Drug product name
Active ingredient(s) (i.e. common drug name)	Active ingredient(s) (i.e. common drug name)
Manufacturer	Manufacturer
Formulation (e.g. orals, solid)	Formulation (e.g. orals, solid)
Extended unit type (e.g. tablets)	Extended unit type (e.g. tablets)
Available dosage strengths per drug product (e.g. 50 mg tablets, 100 mg tablets, 120mg/5ml liquid)	Available dosage strengths per drug product (e.g. 50 mg tablets, 100 mg tablets, 120mg/5ml liquid)
Total prescriptions dispensed per drug product	
Total prescriptions dispensed per drug product by dosage strength	
Total extended units dispensed per drug product	
Total extended units dispensed per drug product by dosage strength	
Average extended units dispensed per prescription, per drug product by dosage strength	Standard extended units dispensed per prescription, per drug product by dosage strength
Total cost of dispensed prescriptions per drug product	
Average prescription cost per drug product	Prescription cost per drug product
All manufacturers in the Canadian generic market for each of the top 100 generic drug products in 2003 and their associated market shares defined by the number of prescriptions dispensed for each product	

Table 3: Top 100 generic prescription drug products in Canada for 2003 ranked by number of prescriptions dispensed

Rank	Manufacturer	Active ingredient(s)	Estimated number of dispensed prescriptions
1	APOTEX	FUROSEMIDE	3,355,457
2	RATIOPHARM	SALBUTAMOL	3,261,456
3	APOTEX	HYDROCHLOROTHIAZIDE	3,021,329
4	APOTEX	LORAZEPAM	2,448,783
5	APOTEX	AMITRIPTYLINE	2,396,882
6	NOVOPHARM	HYDROCHLOROTHIAZIDE	2,289,147
7	APOTEX	AMOXICILLIN	2,151,947
8	APOTEX	OXAZEPAM	1,964,162
9	NOVOPHARM	AMOXICILLIN	1,891,898
10	GENPHARM	METFORMIN	1,630,440
11	APOTEX	PREDNISONE	1,544,769
12	RATIOPHARM	OXYCODONE/ACETAMINOPHEN	1,369,411
13	APOTEX	METOPROLOL	1,153,268
14	APOTEX	ALLOPURINOL	1,124,954
15	APOTEX	RANITIDINE	1,113,166
16	APOTEX	LISINOPRIL	1,106,160
17	APOTEX	NAPROXEN	1,072,054
18	NOVOPHARM	METOPROLOL	1,069,522
19	NOVOPHARM	METFORMIN	1,063,115
20	APOTEX	SIMVASTATIN	1,042,448
21	GENPHARM	GLYBURIDE	1,028,836
22	APOTEX	SALBUTAMOL	1,000,089
23	PHARMASCIENCE	CLONAZEPAM	968,526
24	TARO	WARFARIN	956,000
25	APOTEX	DIAZEPAM	943,841
26	APOTEX	WARFARIN	943,398
27	APOTEX	ATENOLOL	929,227
28	APOTEX	PRAVASTATIN	926,209
29	APOTEX	TRIAMTERENE/HYDROCHLOROTHIAZIDE	921,848
30	NOVOPHARM	LORAZEPAM	901,330
31	APOTEX	SERTRALINE	863,412
32	RATIOPHARM	ATENOLOL	857,530
33	APOTEX	PENICILLIN V	835,657
34	GENPHARM	RANITIDINE	821,414
35	APOTEX	GLYBURIDE	815,568

Table 3 (continued): Top 100 generic prescription drug products in Canada for 2003 ranked by number of prescriptions dispensed

Rank	Manufacturer	Active ingredient(s)	Estimated number of dispensed prescriptions
36	RATIOPHARM	MEDROXYPROGESTERONE	805,098
37	NOVOPHARM	FUROSEMIDE	795,709
38	NOVOPHARM	GLYBURIDE	783,708
39	ICN	ESTROGENIC SUBCONJUGATED	762,080
40	NOVOPHARM	CEPHALEXIN	742,734
41	APOTEX	CLONAZEPAM	740,627
42	APOTEX	FOLIC ACID	736,169
43	NOVOPHARM	ATENOLOL	712,525
44	GENPHARM	ZOPICLONE	710,123
45	GENPHARM	SIMVASTATIN	687,774
46	NOVOPHARM	RANITIDINE	670,192
47	NOVOPHARM	SPIRONOLACTONE	651,010
48	APOTEX	METFORMIN	639,745
49	APOTEX	TRIMETHOPRIM/SULFAMETHOXAZOLE	634,928
50	GENPHARM	AMOXICILLIN	623,548
51	RATIOPHARM	ACETAMINOPHEN/CODEINE	615,112
52	LINSON	PRAVASTATIN	614,039
53	PHARMASCIENCE	GABAPENTIN	611,580
54	PHARMASCIENCE	CLONAZEPAM	602,000
55	PHARMASCIENCE	METFORMIN	599,634
56	APOTEX	DILTIAZEM	597,784
57	APOTEX	TEMAZEPAM	584,916
58	APOTEX	DIVALPROEX	563,285
59	PHARMASCIENCE	METOPROLOL	540,334
60	PHARMASCIENCE	ATENOLOL	536,472
61	NOVOPHARM	DIVALPROEX	528,275
62	APOTEX	CEPHALEXIN	520,608
63	PHARMASCIENCE	METHYLPHENIDATE	512,263
64	RATIOPHARM	METFORMIN	511,527
65	RATIOPHARM	DILTIAZEM	500,518
66	APOTEX	FLUCONAZOLE	486,515
67	APOTEX	IBUPROFEN	466,346
68	NOVOPHARM	QUININE	457,543
69	APOTEX	FLURAZEPAM	449,894
70	APOTEX	METRONIDAZOLE	415,193

Table 3 (continued): Top 100 generic prescription drug products in Canada for 2003 ranked by number of prescriptions dispensed

Rank	Manufacturer	Active ingredient(s)	Estimated number of dispensed prescriptions
71	APOTEX	HYDROXYZINE	406,428
72	GENPHARM	ALPRAZOLAM	406,303
73	APOTEX	PROPRANOLOL	406,246
74	PHARMASCIENCE	INDAPAMIDE	401,789
75	GENPHARM	INDAPAMIDE	399,503
76	APOTEX	ALPRAZOLAM	392,567
77	PRODOC	OXAZEPAM	392,352
78	APOTEX	TRAZODONE	391,471
79	PHARMASCIENCE	LITHIUM	385,908
80	RATIOPHARM	ACETAMINOPHEN/CODEINE/CAFFEINE	379,383
81	APOTEX	ZOPICLONE	379,118
82	NOVARTIS	TEMAZEPAM	378,973
83	APOTEX	DOMPERIDONE	378,282
84	NOVARTIS	CARBAMAZEPINE	356,320
85	GENPHARM	ATENOLOL	356,171
86	TARO	BETAMETHASONE	356,150
87	RATIOPHARM	BETAMETHASONE	356,145
88	GENPHARM	CLONAZEPAM	353,835
89	NOVOPHARM	PENICILLIN V	348,287
90	NOVOPHARM	TRIAMTERENE/HYDROCHLOROTHIAZIDE	347,877
91	RATIOPHARM	CODEINE	336,017
92	PHARMASCIENCE	PROCYCLIDINE	334,739
93	APOTEX	TETRACYCLINE	330,663
94	APOTEX	METOPROLOL	329,499
95	GENPHARM	VERAPAMIL	315,646
96	GENPHARM	METOPROLOL	311,846
97	NOVOPHARM	CYCLOBENZAPRINE	309,173
98	NOVOPHARM	NAPROXEN	307,231
99	APOTEX	CARBAMAZEPINE	303,566
100	APOTEX	FLUOXETINE	302,329

Source: **IMS Health, 2004d**

Table 4: Separate generic active ingredients within the top 100 generic drug products sold in Canada in 2003

Rank	Active ingredient (S)	Not available generically in the United States
1	FUROSEMIDE	
2	SALBUTAMOL	X
3	HYDROCHLOROTHIAZIDE	
4	LORAZEPAM	
5	AMITRIPTYLINE	
6	AMOXICILLIN	
7	OXAZEPAM	
8	METFORMIN	
9	PREDNISONE	
10	OXYCODONE/ ACETAMINOPHEN	
11	METOPROLOL	
12	ALLOPURINOL	
13	RANITIDINE	
14	LISINOPRIL	
15	NAPROXEN	
16	SIMVASTATIN	X
17	GLYBURIDE	
18	CLONAZEPAM	
19	WARFARIN	
20	DIAZEPAM	
21	ATENOLOL	
22	PRAVASTATIN	X
23	TRIAMTERENE/ HYDROCHLOROTHIAZIDE	
24	SERTRALINE	X
25	PENICILLIN V	X
26	MEDROXYPROGESTERONE	
27	ESTROGENIC SUB CONJUGATED	X
28	CEPHALEXIN	
29	FOLIC ACID	X
30	ZOPICLONE	X
31	SPIRONOLACTONE	
32	TRIMETHOPRIM/ SULFAMETHOXAZOLE	
33	ACETAMINOPHEN/ CODEINE	
34	GABAPENTIN	X
35	DILTIAZEM	
36	TEMAZEPAM	
37	DIVALPROEX	X
38	METHYLPHENIDATE	X
39	FLUCONAZOLE	X
40	IBUPROFEN	
41	QUININE	

Table 4 (continued): Separate generic active ingredients within the top 100 generic drug products sold in Canada in 2003

Rank	Active ingredient (S)	Not available generically in the United States
42	FLURAZEPAM	
43	METRONIDAZOLE	
44	HYDROXYZINE	
45	ALPRAZOLAM	
46	PROPRANOLOL	
47	INDAPAMIDE	
48	TRAZODONE	
49	LITHIUM	
50	ACETAMINOPHEN/ CODEINE/ CAFFEINE	X
51	DOMPERIDONE	X
52	CARBAMAZEPINE	
53	BETAMETHASONE	
54	CODEINE	X
55	PROCYCLIDINE	X
56	TETRACYCLINE	
57	VERAPAMIL	
58	CYCLOBENZAPRINE	
59	FLUOXETINE	

Source: **IMS Health, 2004d**

Table 5: Price differences between US AWP, US FUL, US RP and CAD RPover the 43 active drug ingredients available in both Canada and the US in 2003

Rank	Active ingredient(s)	Generic not available in United States	US AWP to US FUL difference as percent of FUL	US FUL to US RP difference as percent of US RP	US AWP to US RP difference as % of US RP	CAD to US RP difference as percent of US RP @ 2003 US$ PPP
1	FUROSEMIDE		170.0%	–33.5%	79.5%	90.7%
2	SALBUTAMOL/ SEREVENT DISKUS	X				
3	HYDROCHLOROTHIAZIDE				37.3%	180.1%
4	LORAZEPAM		58.7%	184.4%	351.2%	–8.5%
5	AMITRIPTYLINE		427.7%	-47.0%	179.7%	48.8%
6	AMOXICILLIN		291.7%	-68.5%	23.5%	–23.5%
7	OXAZEPAM		37.5%	13.7%	56.4%	–72.3%
8	METFORMIN				317.9%	–2.0%
9	PREDNISONE				–9.0%	162.2%
10	OXYCODONE/ ACETAMINOPHEN		381.9%	–63.5%	75.7%	–39.2%
11	METOPROLOL		656.7%	–37.2%	374.9%	88.3%
12	ALLOPURINOL		267.2%	–31.1%	153.0%	–19.6%
13	RANITIDINE		380.1%	85.9%	792.4%	179.0%
14	LISINOPRIL		66.8%	319.6%	600.0%	438.7%
15	NAPROXEN		596.7%	–44.5%	286.3%	20.7%
16	SIMVASTATIN	X			13.7%	
17	GLYBURIDE				230.4%	–47.1%
18	CLONAZEPAM		203.4%	48.3%	349.9%	50.7%
19	WARFARIN				164.0%	13.9%
20	DIAZEPAM		152.4%	–7.3%	133.9%	100.5%
21	ATENOLOL		789.6%	–4.7%	747.5%	363.0%
22	PRAVASTATIN	X			10.0%	
23	TRIAMTERENE/ HYDROCHLOROTHIAZIDE		542.2%	–11.2%	470.1%	75.7%
24	SERTRALINE	X			14.8%	
25	PENICILLIN V	X			11.2%	
26	MEDROXYPROGESTERONE		45.2%	–14.1%	24.7%	16.2%
27	ESTROGENIC SUB,CONJUGATED	X			8.9%	
28	CEPHALEXIN		331.0%	37.9%	494.4%	43.9%
29	FOLIC ACID	X			202.2%	
30	ZOPICLONE	X				
31	SPIRONOLACTONE		38.3%	7.6%	48.7%	–50.0%
32	TRIMETHOPRIM/ SULFAMETHOXAZOLE		605.8%	–16.3%	491.0%	148.0%

Table 5 (continued): Price differences between US AWP, US FUL, US RP and CAD RP over the 43 active drug ingredients available in both Canada and the US in 2003

Rank	Active ingredient(s)	Generic not available in United States	US AWP to US FUL difference as percent of FUL	US FUL to US RP difference as percent of US RP	US AWP to US RP difference as % of US RP	CAD to US RP difference as percent of US RP @ 2003 US$ PPP
33	ACETAMINOPHEN/ CODEINE		65.6%	35.3%	124.1%	73.9%
34	GABAPENTIN	X			8.8%	
35	DILTIAZEM		206.4%	–37.0%	92.9%	104.7%
36	TEMAZEPAM		397.4%	–25.3%	271.6%	47.8%
37	DIVALPROEX	X			10.0%	
38	METHYLPHENIDATE	X	8.4%	9.0%	18.1%	
39	FLUCONAZOLE	X			16.7%	
40	IBUPROFEN		377.1%	–36.3%	204.1%	118.8%
41	QUININE				198.3%	83.0%
42	FLURAZEPAM		187.2%	–34.2%	88.8%	72.2%
43	METRONIDAZOLE		402.6%	–56.7%	117.8%	33.0%
44	HYDROXYZINE		1056.3%	–86.9%	51.5%	–64.1%
45	ALPRAZOLAM		1089.5%	–52.6%	463.4%	39.5%
46	PROPRANOLOL		515.1%	–39.6%	271.8%	–20.8%
47	INDAPAMIDE		644.4%	–74.5%	90.0%	–19.4%
48	TRAZODONE		802.3%	–32.7%	506.9%	229.8%
49	LITHIUM				103.7%	41.3%
50	ACETAMINOPHEN/ CODEINE/ CAFFEINE	X				
51	DOMPERIDONE	X				
52	CARBAMAZEPINE		175.2%	6.9%	194.0%	61.6%
53	BETAMETHASONE		37.6%	104.4%	181.2%	25.2%
54	CODEINE	X			75.0%	
55	PROCYCLIDINE	X			2.2%	
56	TETRACYCLINE		40.1%	–41.2%	–17.6%	56.0%
57	VERAPAMIL		434.8%	–54.8%	141.6%	111.1%
58	CYCLOBENZAPRINE		260.3%	25.8%	353.2%	149.7%
59	FLUOXETINE		320.6%	227.3%	1276.5%	455.3%

Source: author's calculation based on study data.

Table 6: Top 100 brand-name drug products in Canada for 2003 ranked by the number of prescriptions dispensed

Rank	Product Name	Manufacturer	Active ingredient(s)	Estimated number of dispensed prescriptions	Label not available in United States	Patented in Canada
1	LIPITOR	PFIZER	ATORVASTATIN	8,548,624		X
2	SYNTHROID	ABBOTT PPD	LEVOTHYROXINE	7,935,461		
3	ALTACE	AVENTIS	RAMIPRIL	6,411,104		X
4	TYLENOL W/COD #3	JANSSEN-ORTHO	ACETAMINOPHEN/ CODEINE/CAFFEINE	4,569,380		
5	NORVASC	PFIZER	AMLODIPINE	4,355,057		X
6	LOSEC	ASTRAZENECA	OMEPRAZOLE	4,302,519		X
7	EFFEXOR XR	WYETH	VENLAFAXINE	3,723,402		X
8	PAXIL	GLAXOSMITHKLINE	PAROXETINE	3,494,708		X
9	VIOXX	FROSST	ROFECOXIB	3,366,202		X
10	PREMARIN	WYETH	ESTROGENIC SUB CONJUGATED	3,344,110		
11	CELEXA	LUNDBECK	CITALOPRAM	3,048,233		X
12	CELEBREX	PFIZER	CELECOXIB	2,961,856		X
13	PANTOLOC	SOLVAY PHARMA	PANTOPRAZOLE	2,858,771		X
14	ATIVAN	WYETH	LORAZEPAM	2,482,273		
15	ADALAT XL	BAYER	NIFEDIPINE	2,477,039		X
16	FLOVENT HFA	GLAXOSMITHKLINE	FLUTICASONE	2,247,377		X
17	TRI-CYCLEN	JANSSEN-ORTHO	ETHINYLESTRADIOL/ NORGESTIMATE	2,237,859		X
18	VASOTEC	FROSST	ENALAPRIL	2,236,200		X
19	ALESSE	WYETH	ETHINYLESTRADIOL/ LEVONORGESTREL	2,211,041		
20	FOSAMAX	MERCK SHARP & DOHME	ALENDRONATE	2,052,759		X
21	ELTROXIN	GLAXOSMITHKLINE	LEVOTHYROXINE	1,979,366	X	
22	RISPERDAL	JANSSEN-ORTHO	RISPERIDONE	1,930,438		X
23	LANOXIN	VIRCO	DIGOXIN	1,840,968		
24	ZOCOR	FROSST	SIMVASTATIN	1,778,128		
25	CIPRO	BAYER	CIPROFLOXACIN	1,597,533		X
26	PREVACID	ABBOTT PPD	LANSOPRAZOLE	1,572,293		X
27	ZITHROMAX	PFIZER	AZITHROMYCIN	1,552,844		X
28	ZYPREXA	LILLY	OLANZAPINE	1,551,972		X
29	MARVELON	ORGANON	ETHINYLESTRADIOL/ DESOGESTREL	1,476,025		
30	PLAVIX	BMS-SANOFI	CLOPIDOGREL	1,445,184		X
31	COUMADIN	BRISTOL-MYERS SQUIBB	WARFARIN	1,368,056		
32	TRIPHASIL	WYETH	ETHINYLESTRADIOL/ LEVONORGESTREL	1,359,234		
33	NITRO-DUR	SCHERING	NITROGLYCERIN	1,356,708		
34	BIAXIN BID	ABBOTT PPD	CLARITHROMYCIN	1,338,130		X
35	NASONEX	SCHERING	MOMETASONE	1,267,908		X

Table 6 (continued): Top 100 brand-name drug products in Canada for 2003 ranked by the number of prescriptions dispensed

Rank	Product Name	Manufacturer	Active ingredient(s)	Estimated number of dispensed prescriptions	Label not available in United States	Patented in Canada
36	NEXIUM	ASTRAZENECA	ESOMEPRAZOLE	1,221,562		X
37	FLONASE	GLAXOSMITHKLINE	FLUTICASONE	1,215,547		X
38	SEROQUEL	ASTRAZENECA	QUETIAPINE	1,171,489		X
39	VIAGRA	PFIZER	SILDENAFIL	1,167,666		X
40	MONOPRIL	BRISTOL-MYERS SQUIBB	FOSINOPRIL	1,144,060		X
41	AVAPRO	BMS-SANOFI	IRBESARTAN	1,122,606		X
42	DIDROCAL	PROCTER & GAMBLE	ETIDRONIC ACID/ CALCIUM	1,102,139		X
43	COZAAR	FROSST	LOSARTAN	1,092,374		X
44	XALATAN	PFIZER	LATANOPROST	1,084,970		X
45	MOBICOX	BOEHRINGER INGELHEIM	MELOXICAM	1,041,710		
46	ADVAIR	GLAXOSMITHKLINE	FLUTICASONE/ SALMETEROL	1,037,013		X
47	ACCUPRIL	PFIZER	QUINAPRIL	1,009,817		X
48	COMBIVENT	BOEHRINGER INGELHEIM	SALBUTAMOL/ IPRATROPIUM	998,506		
49	FLOMAX	BOEHRINGER INGELHEIM	TAMSULOSIN	994,695		X
50	ACTONEL	PROCTER & GAMBLE	RISEDRONATE	981,322		X
51	DIOVAN	NOVARTIS	VALSARTAN	967,620		X
52	ATACAND	ASTRAZENECA	CANDESARTAN	940,919		X
53	WELLBUTRIN	BIOVAIL	BUPROPION	925,557		X
54	DILANTIN SODIUM	PFIZER	PHENYTOIN	924,910		
55	TIAZAC	BIOVAIL	DILTIAZEM	919,293		X
56	CORTATE	SCHERING	HYDROCORTISONE	884,382	X	
57	PARIET	JANSSEN-ORTHO	RABEPRAZOLE SODIUM	800,256		X
58	LIPIDIL SUPRA	FOURNIER	FENOFIBRATE	773,367		X
59	MONOCOR	BIOVAIL	BISOPROLOL	766,297		
60	ARTHROTEC	PFIZER	DICLOFENAC/ MISOPROSTOL	762,780		X
61	AVANDIA	GLAXOSMITHKLINE	ROSIGLITAZONE	755,519		X
62	ATROVENT	BOEHRINGER INGELHEIM	IPRATROPIUM	755,138		
63	DIANE-35	BERLEX	CYPROTERONE/ ETHINYLESTRADIOL	740,593	X	
64	FUCIDIN	LEO	FUSIDIC ACID	729,570	X	
65	CEFZIL	BRISTOL-MYERS SQUIBB	CEFPROZIL	668,931		X
66	CELESTODERM-V	SCHERING	BETAMETHASONE	660,105		
67	ELOCOM	SCHERING	MOMETASONE	656,552		X
68	HUMULIN N	LILLY	INSULIN	644,590		
69	OXYCONTIN	PURDUE PHARMA	OXYCODONE	641,212		X
70	PROMETRIUM	SCHERING	PROGESTERONE	640,947		

Table 6 (continued): Top 100 brand-name drug products in Canada for 2003 ranked by the number of prescriptions dispensed

Rank	Product Name	Manufacturer	Active ingredient(s)	Estimated number of dispensed prescriptions	Label not available in United States	Patented in Canada
71	DEPO-PROVERA	PFIZER	MEDROXYPROGESTERONE	625,886		
72	TYLENOL W/COD #2	JANSSEN-ORTHO	ACETAMINOPHEN/ CODEINE/CAFFEINE	618,132	X	
73	COVERSYL	SERVIER	PERINDOPRIL	612,515		X
74	SINGULAIR	MERCK SHARP & DOHME	MONTELUKAST	598,965		X
75	IMDUR	ASTRAZENECA	ISOSORBIDE-5-MONONITRATE	581,459		
76	ESTRACE	SHIRE CANADA	ESTRADIOL	576,287		
77	AVALIDE	BMS-SANOFI	IRBESARTAN/ HYDROCHLOROTHIAZIDE	566,606		X
78	ARICEPT	PFIZER	DONEPEZIL	552,838		X
79	IMOVANE	AVENTIS	ZOPICLONE	546,391	X	
80	ZITHROMAX PEDIATRI	PFIZER	AZITHROMYCIN	534,981		X
81	PULMICORT	ASTRAZENECA	BUDESONIDE	520,484		
82	REMERON	ORGANON	MIRTAZAPINE	517,190		
83	MICARDIS	BOEHRINGER INGELHEIM	TELMISARTAN	500,330		X
84	TRIQUILAR	BERLEX	ETHINYLESTRADIOL/ LEVONORGESTREL	491,942		
85	LAMISIL	NOVARTIS	TERBINAFINE	478,037		X
86	DIOVAN HCT	NOVARTIS	VALSARTAN/ HYDROCHLOROTHIAZIDE	469,679		X
87	IMITREX	GLAXOSMITHKLINE	SUMATRIPTAN	465,433		X
88	INHIBACE	ROCHE	CILAZAPRIL	448,920	X	X
89	NOVOLIN GE NPH	NOVO NORDISK	INSULIN	440,329		X
90	CYCLEN	JANSSEN-ORTHO	ETHINYLESTRADIOL/ NORGESTIMATE	440,070		
91	MACROBID	PROCTER & GAMBLE	NITROFURANTOIN	421,726		X
92	LEVAQUIN	JANSSEN-ORTHO	LEVOFLOXACIN	421,695		X
93	ZOVIRAX	GLAXOSMITHKLINE	ACYCLOVIR	417,643		X
94	CRESTOR	ASTRAZENECA	ROSUVASTATIN	416,660		X
95	TOPAMAX	JANSSEN-ORTHO	TOPIRAMATE	416,406		X
96	COSOPT	FROSST	TIMOLOL/ DORZOLAMIDE	413,363		X
97	LOPRESOR SR	NOVARTIS	METOPROLOL	409,799		
98	SERC	SOLVAY PHARMA	BETAHISTINE	405,085	X	
99	BIAXIN PEDIATRIC	ABBOTT PPD	CLARITHROMYCIN	404,326		X
100	ZESTORETIC	ASTRAZENECA	LISINOPRIL/ HYDROCHLOROTHIAZIDE	398,907		X

Source: **IMS Health, 2004d; Health Canada, Patent Register, 2004.**

Table 7: Price differences between US AWP, US RP and CAD RP over the 43 active drug ingredients available in both Canada and the US in 2003

Rank	Brand product name	Brand label not available in United States	US AWP to US RP difference as percent of US RP	CAD to US RP difference as percent of US RP @ 2003 US$ PPP
1	LIPITOR		14%	–28%
2	SYNTHROID		21%	–56%
3	ELTROXIN	X		
4	ALTACE		11%	–37%
5	TYLENOL W/COD #3		6%	–62%
6	NORVASC		15%	–2%
7	LOSEC		19%	–43%
8	EFFEXOR XR		44%	–29%
9	PAXIL		13%	–33%
10	VIOXX		9%	–47%
11	PREMARIN		5%	–71%
12	CELEXA		9%	–40%
13	CELEBREX		–3%	–57%
14	PANTOLOC		12%	–39%
15	ATIVAN		0%	–82%
16	ADALAT XL		14%	–28%
17	FLOVENT HFA		52%	–72%
18	TRI-CYCLEN		8%	–55%
19	VASOTEC		9%	–21%
20	ALESSE		–3%	–54%
21	FOSAMAX		4%	–39%
22	RISPERDAL		6%	–62%
23	LANOXIN		92%	92%
24	ZOCOR		12%	–41%
25	CIPRO		7%	–46%
26	PREVACID		14%	–49%
27	ZITHROMAX		7%	–19%
28	ZYPREXA		3%	–41%
29	MARVELON		6%	–44%
30	PLAVIX		15%	–34%
31	COUMADIN		10%	–46%
32	TRIPHASIL		19%	–41%
33	NITRO-DUR		–25%	–77%
34	BIAXIN BID		4%	–47%

Table 7 (continued): Price differences between US AWP, US RP and CAD RP over the 43 active drug ingredients available in both Canada and the US in 2003

Rank	Brand product name	Brand label not available in United States	US AWP to US RP difference as percent of US RP	CAD to US RP difference as percent of US RP @ 2003 US$ PPP
35	NASONEX		13%	–94%
36	NEXIUM		11%	–45%
37	FLONASE		8%	–94%
38	SEROQUEL		–7%	–56%
39	VIAGRA		6%	28%
40	MONOPRIL		–2%	–32%
41	AVAPRO		5%	–29%
42	DIDROCAL		9%	–94%
43	COZAAR		8%	–28%
44	XALATAN		7%	–38%
45	MOBICOX		5%	–66%
46	ADVAIR		79%	6%
47	ACCUPRIL		10%	–21%
48	COMBIVENT		5%	–62%
49	FLOMAX		12%	–41%
50	ACTONEL		106%	22%
51	DIOVAN		11%	–28%
52	ATACAND		0%	–22%
53	WELLBUTRIN		11%	–54%
54	DILANTIN SODIUM		21%	–62%
55	TIAZAC		11%	–16%
56	CORTATE	X		
57	PARIET		238%	–63%
58	LIPIDIL SUPRA		6%	–55%
59	MONOCOR		6%	–62%
60	ARTHROTEC		8%	–57%
61	AVANDIA		9%	–31%
62	ATROVENT		–2%	19%
63	DIANE-35	X		
64	FUCIDIN	X		
65	CEFZIL		7%	–84%
66	CELESTODERM-V		1%	–98%
67	ELOCOM		–13%	–69%
68	HUMULIN N		–5%	16%

Table 7 (continued): Price differences between US AWP, US RP and CAD RP over the 43 active drug ingredients available in both Canada and the US in 2003

Rank	Brand product name	Brand label not available in United States	US AWP to US RP difference as percent of US RP	CAD to US RP difference as percent of US RP @ 2003 US$ PPP
69	OXYCONTIN		–3%	–58%
70	PROMETRIUM		–5%	–28%
71	DEPO-PROVERA		–1%	–43%
72	TYLENOL W/COD #2	X		
73	COVERSYL		9%	–39%
74	SINGULAIR		3%	–30%
75	IMDUR		7%	–59%
76	ESTRACE		–13%	–64%
77	AVALIDE		–3%	–46%
78	ARICEPT		8%	–2%
79	IMOVANE	X		
80	ZITHROMAX PEDIATRI		–6%	–85%
81	PULMICORT		5%	–52%
82	REMERON		3%	–53%
83	MICARDIS		–4%	–34%
84	TRIQUILAR		20%	–40%
85	LAMISIL		–4%	–65%
86	DIOVAN HCT		13%	–32%
87	IMITREX		11%	–12%
88	INHIBACE	X		
89	NOVOLIN GE NPH		109%	–2%
90	CYCLEN		12%	–53%
91	MACROBID		6%	–52%
92	LEVAQUIN		3%	–42%
93	ZOVIRAX		8%	–77%
94	CRESTOR		11%	–35%
95	TOPAMAX		–6%	–39%
96	COSOPT		0%	–43%
97	LOPRESOR SR		–1%	–76%
98	SERC	X		
99	BIAXIN PEDIATRIC		15%	–85%
100	ZESTORETIC		77%	–18%

Source: author's calculation based on study data.

Table 8: Distribution of the market for the top 100 generic drugs in Canada for 2003

Generic company	Number of drug products among the top 100 generics
APOTEX	44
NOVOPHARM	17
GENPHARM	12
PHARMASCIENCE	10
RATIOPHARM	10
NOVARTIS	2
TARO	2
ICN	1
LINSON	1
PRODOC	1
Total	100

Source: IMS Health, 2004d

Table 9: Competition in the generic industry for retail sales in 2003

Company	Prescription volumes	Percent of total volume for top 100 drugs	Value of sales in ($000s)	Percent of total value of sales for top 100 drugs
APOTEX	42,130,807	51.4%	$892,208	50.5%
NOVOPHARM	13,869,276	16.9%	$230,877	13.1%
RATIOPHARM	8,992,197	11.0%	$175,475	9.9%
GENPHARM	7,645,439	9.3%	$247,152	14.0%
PHARMASCIENCE	5,493,245	6.7%	$130,761	7.4%
TARO	1,312,150	1.6%	$24,173	1.4%
ICN	762,080	0.9%	$12,040	0.7%
NOVARTIS	735,293	0.9%	$16,041	0.9%
LINSON	614,039	0.7%	$34,589	2.0%
PRODOC	392,352	0.5%	$3,354	0.2%
Grand Total	81,946,878		$1,766,670	

Source: IMS Health, 2004d

Table 10: Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
HYDROCHLOROTHIAZIDE			
	APO-HYDRO 1074 ATX	APOTEX INC	55%
	NOVO-HYDRAZIDE 0170 NVP	NOVOPHARM	42%
	HYDROCHLORTHIAZIDE 0175 PDO	PRO DOC	3%
	BIO-HYDROCHLOROTHI 0803 P8I	PHARMASCIENCE	1%
	HYDROCHLOROTHIAZID 0178 DUC	DUCHESNAY LABS	0%
	HYDROCHLOROTHIAZID 0172 SAN	SANDS PHARMA	0%
			100%
CODEINE			
	RATIO-CODEINE 0282 RAT	RATIOPHARM	58%
	CODEINE CONTIN 1095 PUF	PURDUE PHARMA	29%
	CODEINE PHOSPHATE 0378 AAS	ABBOTT PPD*	6%
	CODEINE 0795 TRI	TRIANON	5%
	LINCTUS W/COD 0178 AAS	ATLAS	1%
	CODEINE 0102 P8I	PHARMASCIENCE	1%
	CODEINE PHOS 0151 GSK	GLAXOSMITHKLINE*	0%
	CODEINE PHOSPHATE 1094 SBX	SABEX	0%
	CODEINE PHOSPHATE 0177 NVR	NOVARTIS*	0%
	CODEINE PHOS 0579 AHP	ABBOTT HPD*	0%
	CODEINE 1284 STY	STANLEY	0%
	CODEINE 0151 PFZ	PFIZER*	0%
			100%
SALBUTAMOL			
	RATIO-SALBUTAMOL H 0202 RAT	RATIOPHARM	72%
	APO-SALVENT CFC FR 1102 ATX	APOTEX INC/NU-PHARM INC**	23%
	GEN-SALBUTAMOL PF 0393 GN3	GENPHARM PHARMA	2%
	PMS-SALBUTAMOL 1094 P8I	PHARMASCIENCE	1%
	NOVO-SALMOL 1084 NVP	NOVOPHARM	0%
	RHOXAL-SALBUTAMOL 1095 RXP	RHOXALPHARMA	0%
	SALBUTAMOL 0300 PL/	PHARMEL	0%
	SALBUTAMOL 0396 PDO	PRO DOC	0%
			100%
LORAZEPAM			
	APO-LORAZEPAM 1185 ATX	APOTEX INC/NU-PHARM INC	69%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	NOVO-LORAZEM 0485 NVP	NOVOPHARM	25%
	PMS-LORAZEPAM 1089 P8I	PHARMASCIENCE	4%
	PRO-LORAZEPAM 0786 PDO	PRO DOC	1%
	DOM-LORAZEPAM 1102 DMI	DOMINION PHARMACAL	1%
	SAB-LORAZEPAM 0701 SBX	SABEX	0%
			100%
AMOXICILLIN			
	APO-AMOXI 0884 ATX	APOTEX INC/NU-PHARM INC	47%
	NOVAMOXIN 0179 NVP	NOVOPHARM	37%
	GEN-AMOXICILLIN 0898 GN3	GENPHARM PHARMA	12%
	LIN-AMOX 0296 LSN	LINSON PHARMA INC	3%
	PRO-AMOX 1185 PDO	PRO DOC	0%
	PMS-AMOXICILLIN 1102 P8I	PHARMASCIENCE	0%
	SCHEIN AMOXICILLIN 0800 SEI	SCHEIN PHARMA	0%
			100%
METFORMIN			
	GEN-METFORMIN 0495 GN3	GENPHARM PHARMA	32%
	NOVO-METFORMIN 0494 NVP	NOVOPHARM	21%
	APO-METFORMIN 0995 ATX	APOTEX INC/NU-PHARM INC	14%
	PMS-METFORMIN 0297 P8I	PHARMASCIENCE	12%
	RATIO-METFORMIN 0601 RAT	RATIOPHARM	10%
	RHOXAL-METFORMIN 1297 RXP	RHOXALPHARMA	5%
	RIVA-METFORMIN 0400 RVA	RIVA	3%
	METFORMIN 1296 PDO	PRO DOC	1%
	RHOXAL-METFORMIN F 1297 RXP	RHOXALPHARMA	1%
	DOM-METFORMIN 0101 DMI	DOMINION PHARMACAL	0%
	METFORMIN 0497 PP4	PREMPHARM	0%
	METFORMIN 0201 ZYP	ZYP	0%
	PHL-METFORMIN 0203 PL/	PHARMEL	0%
			100%
FUROSEMIDE			
	APO-FUROSEMIDE 0676 ATX	APOTEX INC	78%
	NOVO-SEMIDE 0876 NVP	NOVOPHARM	18%
	FUROSEMIDE 0680 PDO	PRO DOC	4%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	BIO-FUROSEMIDE 0803 P8I	PHARMASCIENCE	0%
	FUROSEMIDE 0583 SBX	SABEX	0%
	FUROSEMIDE 0983 AHP	ABBOTT HPD*	0%
	RATIO-FUROSEMIDE 0492 RAT	RATIOPHARM	0%
			100%
ESTROGENIC SUB,CONJUGATED			
	PMS-CONJUGATED EST 1083 P8I	PHARMASCIENCE	62%
	CONGEST 0891 TRI	TRIANON*	38%
	RATIO-OESTRILIN 0151 RAT	RATIOPHARM	0%
			100%
METOPROLOL			
	APO-METOPROLOL-L 0587 ATX	APOTEX INC/NU-PHARM INC	41%
	NOVO-METOPROL 0386 NVP	NOVOPHARM	30%
	PMS-METOPROLOL-L 1097 P8I	PHARMASCIENCE	17%
	GEN-METOPROLOL-L 0796 GN3	GENPHARM PHARMA	9%
	METOPROLOL 1285 PDO	PRO DOC	3%
	DOM-METOPROLOL-B 0696 DMI	DOMINION PHARMACAL	2%
			100%
ATENOLOL			
	APO-ATENOL 0888 ATX	APOTEX INC/NU-PHARM INC	26%
	RATIO-ATENOLOL 0396 RAT	RATIOPHARM	23%
	NOVO-ATENOL 0291 NVP	NOVOPHARM	19%
	PMS-ATENOLOL 1198 P8I	PHARMASCIENCE	14%
	GEN-ATENOLOL 0795 GN3	GENPHARM PHARMA	9%
	DOM-ATENOLOL 1198 DMI	DOMINION PHARMACAL	4%
	RHOXAL-ATENOLOL 1297 RXP	RHOXALPHARMA	2%
	RIVA-ATENOLOL 1001 RVA	RIVA	1%
	PRO-ATENOLOL 0489 PDO	PRO DOC	1%
	SCHEIN ATENOLOL 0896 SEI	SCHEIN PHARMA	0%
	PHL-ATENOLOL 0399 PL/	PHARMEL	0%
	ATENOLOL 0497 PP4	PREMPHARM	0%
	ATENOLOL 0799 FPI	FC PHARMA INC	0%
	MED-ATENOLOL 0696 M.P	MEDICAN PHARMACEUTICALS	0%
			100%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
SIMVASTATIN			
	APO-SIMVASTATIN 0103 ATX	APOTEX INC	59%
	GEN-SIMVASTATIN 0203 GN3	GENPHARM PHARMA	39%
	RIVA-SIMVASTATIN 0303 RVA	RIVA	1%
	PREM SIMVASTATIN 0603 PP4	PREMPHARM	1%
			100%
GLYBURIDE			
	GEN-GLYBE 0191 GN3	GENPHARM PHARMA	31%
	APO-GLYBURIDE 1191 ATX	APOTEX INC/NU-PHARM INC	27%
	NOVO-GLYBURIDE 1191 NVP	NOVOPHARM	24%
	RATIO-GLYBURIDE 0492 RAT	RATIOPHARM	6%
	PMS-GLYBURIDE 0498 P8I	PHARMASCIENCE	8%
	GLYBURIDE 0998 PL/	PHARMEL	2%
	GLYBURIDE 0792 PDO	PRO DOC	2%
	DOM-GLYBURIDE 0698 DMI	DOMINION PHARMACAL	0%
	GLYBURIDE 0497 PP4	PREMPHARM	0%
	PENTA-GLYBURIDE 0797 PT9	PENTAPHARM	0%
	RIVA-GLYBURIDE 1101 RVA	RIVA	0%
			100%
CLONAZEPAM			
	PMS-CLONAZEPAM-R 0396 P8I	PHARMASCIENCE	50%
	APO-CLONAZEPAM 0995 ATX	APOTEX INC/NU-PHARM INC	24%
	GEN-CLONAZEPAM 0597 GN3	GENPHARM PHARMA	11%
	NOVO-CLONAZEPAM 0899 NVP	NOVOPHARM	5%
	RHOXAL-CLONAZEPAM 1297 RXP	RHOXALPHARMA	4%
	CLONAZEPAM 1296 PDO	PRO DOC	2%
	RATIO-CLONAZEPAM 1294 RAT	RATIOPHARM	2%
	DOM-CLONAZEPAM-R 0996 DMI	DOMINION PHARMACAL	2%
	RIVA-CLONAZEPAM 1101 RVA	RIVA	1%
	PHL-CLONAZEPAM 0296 PL/	PHARMEL	0%
			100%
WARFARIN			
	TARO-WARFARIN 1000 TAR	TARO PHARMA	50%
	APO-WARFARIN 1200 ATX	APOTEX INC	49%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	GEN-WARFARIN 0802 GN3	GENPHARM PHARMA	1%
			100%
RANITIDINE			
	APO-RANITIDINE 0387 ATX	APOTEX INC/NU-PHARM INC	43%
	GEN-RANITIDINE 0396 GN3	GENPHARM PHARMA	27%
	NOVO-RANIDINE 0789 NVP	NOVOPHARM	22%
	RATIO-RANITIDINE 0190 RAT	RATIOPHARM	4%
	PMS-RANITIDINE 1000 P8I	PHARMASCIENCE	2%
	RHOXAL-RANITIDINE 1001 RXP	RHOXALPHARMA	1%
	RANITIDINE 1087 PDO	PRO DOC	1%
	SCHEIN RANITIDINE 0500 P8I	PHARMASCIENCE	0%
	RIVA-RANITIDINE 1102 RVA	RIVA	0%
	RANITIDINE 0497 PP4	PREMPHARM	0%
	MED-RANITIDINE 0599 M.P	MEDICAN PHARMACEUTICALS	0%
			100%
BETAMETHASONE			
	BETADERM 0879 TAR	TARO PHARMA	48%
	RATIO-ECTOSONE 0285 RAT	RATIOPHARM	52%
	BETAMETHASONE 0187 PMC	PHARMACO	0%
	RIVASONE 0694 RVA	RIVA	0%
	BETAPRONE 0795 NE1	NEOLAB	0%
	OCCLUCORT 0890 MCD	MEDICIS CANADA	0%
			100%
AMITRIPTYLINE			
	APO-AMITRIPTYLINE 0675 ATX	APOTEX INC	94%
	AMITRIPTYLINE 1076 PDO	PRO DOC	6%
	NOVO-TRIPTYN 0172 NVP	NOVOPHARM	0%
	AMITRIPTYLINE 1077 PRL	PRIVATE LABEL	0%
	AMITRIPTYLINE 1289 P8I	PHARMASCIENCE	0%
	AMITRIPTYLINE 0596 CN.	CLONMEL	0%
	AMITRIPTYLINE 1073 SAN	SANDS PHARMA	0%
	AMITRIPTYLINE 1087 DUC	DUCHESNAY LABS	0%
			100%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
DILTIAZEM			
	APO-DILTIAZ CD 1196 ATX	APOTEX INC/NU-PHARM INC	46%
	RATIO-DILTIAZEM CD 1296 RAT	RATIOPHARM	33%
	NOVO-DILTAZEM CD 1000 NVP	NOVOPHARM	15%
	RHOXAL-DILTIAZEM C 0201 RXP	RHOXALPHARMA	3%
	DILTIAZEM CD 0998 PDO	PRO DOC	2%
	GEN-DILTIAZEM 0296 GN3	GENPHARM PHARMA	1%
	DILTIAZEM HCL 0502 SBX	SABEX	0%
	DILTIAZEM 0497 PP4	PREMPHARM	0%
	MED-DILTIAZEM 0197 M.P	MEDICAN PHARMACEUTICALS	0%
			100%
MEDROXYPROGESTERONE			
	RATIO-MPA 0796 RAT	RATIOPHARM	62%
	GEN-MEDROXY 0497 GN3	GENPHARM PHARMA	21%
	NOVO-MEDRONE 1296 NVP	NOVOPHARM	11%
	APO-MEDROXY 0702 ATX	APOTEX INC	5%
	DOM-MEDROXYPROGEST 0603 DMI	DOMINION PHARMACAL	0%
	PMS-MEDROXYPROGEST 0103 P8I	PHARMASCIENCE	0%
	PENTA-MEDROXYPROGE 0998 PT9	PENTAPHARM	0%
			100%
OXAZEPAM			
	APO-OXAZEPAM 0979 ATX	APOTEX INC	83%
	OXAZEPAM 0180 PDO	PRO DOC	17%
	NOVOXAPAM 1282 NVP	NOVOPHARM	0%
	PMS-OXAZEPAM 0295 P8I	PHARMASCIENCE	0%
	BIO-OXAZEPAM 0803 B02	BIOMED 2002 INC	0%
			100%
NAPROXEN			
	APO-NAPROXEN 0882 ATX	APOTEX INC/NU-PHARM INC	68%
	NOVO-NAPROX 0982 NVP	NOVOPHARM	22%
	GEN-NAPROXEN EC 1199 GN3	GENPHARM PHARMA	4%
	RATIO-NAPROXEN 0484 RAT	RATIOPHARM	3%
	NAPROXEN 0683 PDO	PRO DOC	3%
	PMS-NAPROXEN 0394 P8I	PHARMASCIENCE	0%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	RIVA-NAPROXEN 0300 RVA	RIVA	0%
	NAPROXEN 1097 SBX	SABEX	0%
	RHODIAPROX 0198 RXP	RHOXALPHARMA	0%
			100%
LISINOPRIL			
	APO-LISINOPRIL 1296 ATX	APOTEX INC	100%
			100%
ZOPICLONE			
	GEN-ZOPICLONE 0898 GN3	GENPHARM PHARMA	49%
	APO-ZOPICLONE 1196 ATX	APOTEX INC/NU-PHARM INC	26%
	PMS-ZOPICLONE 0999 P8I	PHARMASCIENCE	13%
	RATIO-ZOPICLONE 0601 RAT	RATIOPHARM	8%
	DOM-ZOPICLONE 1299 DMI	DOMINION PHARMACAL	2%
	RIVA-ZOPICLONE 0702 RVA	RIVA	1%
	ZOPICLONE 0197 PDO	PRO DOC	0%
			100%
PRAVASTATIN			
	APO-PRAVASTATIN 0301 ATX	APOTEX INC/NU-PHARM INC	57%
	LIN-PRAVASTATIN 0700 LSN	LINSON PHARMA INC	36%
	NOVO-PRAVASTATIN 0103 NVP	NOVOPHARM	6%
	RATIO-PRAVASTATIN 0203 RAT	RATIOPHARM	0%
	PRAVASTATIN 0103 PDO	PRO DOC	0%
	PMS-PRAVASTATIN 0803 P8I	PHARMASCIENCE	0%
	BIO-PRAVASTATIN 0701 BIH	BIOENHANCE	0%
	RHOXAL-PRAVASTATIN 0903 RXP	RHOXALPHARMA	0%
			100%
SERTRALINE			
	APO-SERTRALINE 0999 ATX	APOTEX INC/NU-PHARM INC	54%
	GEN-SERTRALINE 1100 GN3	GENPHARM PHARMA	18%
	NOVO-SERTRALINE 0899 NVP	NOVOPHARM	17%
	PMS-SERTRALINE 0802 P8I	PHARMASCIENCE	5%
	DOM-SERTRALINE 0702 DMI	DOMINION PHARMACAL	2%
	RHOXAL-SERTRALINE 0802 RXP	RHOXALPHARMA	1%
	RATIO-SERTRALINE 1002 RAT	RATIOPHARM	1%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	RIVA-SERTRALINE 1002 RVA	RIVA	1%
	SERTRALINE 1201 PDO	PRO DOC	0%
			100%
PREDNISONE			
	APO-PREDNISONE 0382 ATX	APOTEX INC	87%
	NOVO-PREDNISONE 0172 NVP	NOVOPHARM	7%
	PREDNISONE 0159 PDO	PRO DOC	6%
	RATIO-PREDNISONE 0684 RAT	RATIOPHARM	0%
			100%
TRAZODONE			
	APO-TRAZODONE 0595 ATX	APOTEX INC/NU-PHARM INC	37%
	PMS-TRAZODONE 0993 P8I	PHARMASCIENCE	21%
	NOVO-TRAZODONE 0295 NVP	NOVOPHARM	17%
	GEN-TRAZODONE 1197 GN3	GENPHARM PHARMA	11%
	RATIO-TRAZODONE 0694 RAT	RATIOPHARM	11%
	TRAZODONE 0496 PDO	PRO DOC	1%
	DOM-TRAZODONE 0696 DMI	DOMINION PHARMACAL	1%
	TRAZODONE 1098 PL/	PHARMEL	0%
	SCHEIN TRAZODONE 1000 SEI	SCHEIN PHARMA	0%
			100%
TEMAZEPAM			
	APO-TEMAZEPAM 0996 ATX	APOTEX INC/NU-PHARM INC	46%
	PMS-TEMAZEPAM 1096 NVR	NOVARTIS	27%
	NOVO-TEMAZEPAM 0597 NVP	NOVOPHARM	9%
	GEN-TEMAZEPAM 0797 GN3	GENPHARM PHARMA	7%
	CO TEMAZEPAM 1002 CBT	COBALT LABS	4%
	TEMAZEPAM 0797 PDO	PRO DOC	3%
	RATIO-TEMAZEPAM 0401 RAT	RATIOPHARM	3%
			100%
ALLOPURINOL			
	APO-ALLOPURINOL 0681 ATX	APOTEX INC	81%
	NOVO-PUROL 1081 NVP	NOVOPHARM	15%
	ALLOPURINOL 0282 PDO	PRO DOC	4%
			100%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
CEPHALEXIN			
	NOVO-LEXIN 0280 NVP	NOVOPHARM	55%
	APO-CEPHALEX 0888 ATX	APOTEX INC/NU-PHARM INC	44%
	PRO-CEPHALEXIN 0489 PDO	PRO DOC	0%
	PMS-CEPHALEXIN 1295 P8I	PHARMASCIENCE	0%
	PENTA-CEPHALEXIN 0797 PT9	PENTAPHARM	0%
			100%
PENICILLIN V			
	APO-PEN-VK 0186 ATX	APOTEX INC/NU-PHARM INC	68%
	NOVO-PEN-VK 0170 NVP	NOVOPHARM	28%
	PEN-VEE 0356 PE7	PE7	3%
	PENICILLIN V 0179 PDO	PRO DOC	1%
	RATIO-NADOPEN V 0160 RAT	RATIOPHARM	0%
	PENICILLIN V POT 0172 SAN	SANDS PHARMA	0%
	PVF-500 1272 LIH	LIOH INC	0%
			100%
ALPRAZOLAM			
	APO-ALPRAZ 1090 ATX	APOTEX INC/NU-PHARM INC	58%
	GEN-ALPRAZOLAM 0495 GN3	GENPHARM PHARMA	56%
	NOVO-ALPRAZOL 0991 NVP	NOVOPHARM	26%
	RATIO-ALPRAZOLAM 0790 RAT	RATIOPHARM	13%
	ALPRAZOLAM 0791 PDO	PRO DOC	5%
	ALPRAZOLAM 0497 PP4	PREMPHARM	0%
			100%
INDAPAMIDE			
	PMS-INDAPAMIDE 0499 P8I	PHARMASCIENCE	38%
	GEN-INDAPAMIDE 0495 GN3	GENPHARM PHARMA	38%
	APO-INDAPAMIDE 1096 ATX	APOTEX INC/NU-PHARM INC	7%
	RATIO-INDAPAMIDE 0396 RAT	RATIOPHARM	7%
	NOVO-INDAPAMIDE 1097 NVP	NOVOPHARM	4%
	RIVA-INDAPAMIDE 0302 RVA	RIVA	3%
	DOM-INDAPAMIDE 0999 DMI	DOMINION PHARMACAL	2%
	INDAPAMIDE 0697 PDO	PRO DOC	1%
			100%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
DIVALPROEX			
	APO-DIVALPROEX 0599 ATX	APOTEX INC/NU-PHARM INC	52%
	NOVO-DIVALPROEX 0499 NVP	NOVOPHARM	48%
	DIVALPROEX 1201 PDO	PRO DOC	0%
	PMS-DIVALPROEX 0202 P8I	PHARMASCIENCE	0%
			100%
FLUOXETINE			
	APO-FLUOXETINE 0496 ATX	APOTEX INC/NU-PHARM INC	32%
	NOVO-FLUOXETINE 0396 NVP	NOVOPHARM	20%
	PMS-FLUOXETINE 1295 P8I	PHARMASCIENCE	16%
	RATIO-FLUOXETINE 0300 RAT	RATIOPHARM	13%
	CO FLUOXETINE 0500 CBT	COBALT LABS	10%
	GEN-FLUOXETINE 0898 GN3	GENPHARM PHARMA	7%
	RHOXAL-FLUOXETINE 0401 RXP	RHOXALPHARMA	2%
	DOM-FLUOXETINE 0696 DMI	DOMINION PHARMACAL	1%
	FLUOXETINE 1296 PDO	PRO DOC	1%
	RIVA-FLUOXETINE 0302 RVA	RIVA	0%
	PHL-FLUOXETINE 0499 PL/	PHARMEL	0%
			100%
METHYLPHENIDATE			
	PMS-METHYLPHENIDAT 0790 P8I	PHARMASCIENCE	85%
	RATIO-METHYLPHENID 0896 RAT	RATIOPHARM	15%
	METHYLPHENIDATE 0296 PL/	PHARMEL	0%
			100%
CYCLOBENZAPRINE			
	NOVO-CYCLOPRINE 0694 NVP	NOVOPHARM	30%
	GEN-CYCLOBENZAPRIN 0697 GN3	GENPHARM PHARMA	23%
	APO-CYCLOBENZAPRIN 0995 ATX	APOTEX INC/NU-PHARM INC	20%
	PMS-CYCLOBENZAPRIN 0796 P8I	PHARMASCIENCE	16%
	RATIO-CYCLOBENZAPR 0196 RAT	RATIOPHARM	8%
	CYCLOBENZAPRINE 1296 PDO	PRO DOC	2%
	RIVA-CYCLOPRINE 1201 RVA	RIVA	1%
	DOM-CYCLOBENZAPRIN 1198 DMI	DOMINION PHARMACAL	0%
			100%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
DOMPERIDONE			
	APO-DOMPERIDONE 1297 ATX	APOTEX INC/NU-PHARM INC	36%
	RATIO-DOMPERIDONE 0293 RAT	RATIOPHARM	23%
	NOVO-DOMPERIDONE 0997 NVP	NOVOPHARM	23%
	PMS-DOMPERIDONE 0898 P8I	PHARMASCIENCE	12%
	DOMPERIDONE 0698 PDO	PRO DOC	3%
	DOM-DOMPERIDONE 0599 DMI	DOMINION PHARMACAL	3%
	PHL-DOMPERIDONE 0299 PL/	PHARMEL	0%
			100%
GABAPENTIN			
	PMS-GABAPENTIN 0201 P8I	PHARMASCIENCE	72%
	NOVO-GABAPENTIN 0702 NVP	NOVOPHARM	19%
	APO-GABAPENTIN 1101 ATX	APOTEX INC	9%
	DOM-GABAPENTIN 0402 DMI	DOMINION PHARMACAL	1%
	PHL-GABAPENTIN 0203 PL/	PHARMEL	0%
			100%
DIAZEPAM			
	APO-DIAZEPAM 0679 ATX	APOTEX INC	95%
	DIAZEPAM 0678 PDO	PRO DOC	4%
	NOVO-DIPAM 1073 NVP	NOVOPHARM	0%
	STRESS-PAM 0177 SBX	SABEX	0%
	PMS-DIAZEPAM 0994 P8I	PHARMASCIENCE	0%
	DIAZEPAM 0174 SAN	SANDS PHARMA	0%
			100%
CARBAMAZEPINE			
	PMS-CARBAMAZEPINE 1098 NVR	NOVARTIS	43%
	APO-CARBAMAZEPINE 0680 ATX	APOTEX INC/NU-PHARM INC	38%
	NOVO-CARBAMAZ 1088 NVP	NOVOPHARM	8%
	GEN-CARBAMAZEPINE 0400 GN3	GENPHARM PHARMA	7%
	TARO-CARBAMAZEPINE 0994 TAR	TARO PHARMA	2%
	CARBAMAZEPINE 0583 PDO	PRO DOC	1%
	PHL-CARBAMAZEPINE 0399 PL/	PHARMEL	0%
			100%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
SPIRONOLACTONE			
	NOVO-SPIROTON 0284 NVP	NOVOPHARM	100%
			100%
METRONIDAZOLE			
	APO-METRONIDAZOLE 0682 ATX	APOTEX INC	81%
	TRIKACIDE 0584 P8I	PHARMASCIENCE	14%
	METRONIDAZOLE 0178 PDO	PRO DOC	4%
	NOVO-NIDAZOL 0571 NVP	NOVOPHARM	1%
	METRONIDAZOLE 0486 AHP	ABBOTT HPD*	0%
			100%
LITHIUM			
	PMS-LITHIUM CARBON 0796 P8I	PHARMASCIENCE	88%
	APO-LITHIUM CARBON 0301 ATX	APOTEX INC	12%
	LITHIUM CARBONATE 0100 PL/	PHARMEL	0%
	PAL-LITHIUM CARBON 0400 PDN	PALADIN	0%
			100%
VERAPAMIL			
	GEN-VERAPAMIL SR 0396 GN3	GENPHARM PHARMA	60%
	NOVO-VERAMIL SR 0696 NVP	NOVOPHARM	16%
	PMS-VERAPAMIL SR 0999 P8I	PHARMASCIENCE	12%
	APO-VERAP 0789 ATX	APOTEX INC/NU-PHARM INC	8%
	DOM-VERAPAMIL SR 0500 DMI	DOMINION PHARMACAL	3%
	RIVA-VERAPAMIL SR 0902 RVA	RIVA	1%
	VERAPAMIL 0791 PDO	PRO DOC	0%
	VERAPAMIL 1095 SBX	SABEX	0%
	RATIO-VERAPAMIL 0890 RAT	RATIOPHARM	0%
	TARO-VERAPAMIL 0595 TAR	TARO PHARMA	0%
	VERAPAMIL 1093 AHP	ABBOTT HPD*	0%
	MED-VERAPAMIL 0700 M.P	MEDICAN PHARMACEUTICALS	0%
	PENTA-VERAPAMIL 0797 PT9	PENTAPHARM	0%
			100%
PROPRANOLOL			
	APO-PROPRANOLOL 0380 ATX	APOTEX INC/NU-PHARM INC	72%
	NOVO-PRANOL 1081 NVP	NOVOPHARM	20%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	DOM-PROPRANOLOL 0296 DMI	DOMINION PHARMACAL	3%
	PROPRANOLOL 0180 PDO	PRO DOC	3%
	PMS-PROPRANOLOL 0684 P8I	PHARMASCIENCE	2%
	PROPRANOLOL 1196 SBX	SABEX	0%
			100%
FOLIC ACID			
	APO-FOLIC 0678 ATX	APOTEX INC	100%
	NOVO-FOLACID 0170 NVP	NOVOPHARM	0%
	FOLIC ACID 1190 SBX	SABEX	0%
	FOLIC ACID 0159 STY	STANLEY	0%
	FOLIC ACID 0784 ADA	ADAMS	0%
	FOLIC ACID 0174 VLT	VALEANT	0%
	FOLIC ACID 1091 P/P	PHARMA PARTNERS	0%
	FOLIC ACID 0163 GSK	GLAXOSMITHKLINE*	0%
			100%
FLUCONAZOLE			
	APO-FLUCONAZOLE-15 0400 ATX	APOTEX INC	86%
	GEN-FLUCONAZOLE 0702 GN3	GENPHARM PHARMA	9%
	NOVO-FLUCONAZOLE-1 0802 NVP	NOVOPHARM	5%
	PMS-FLUCONAZOLE 0602 P8I	PHARMASCIENCE	0%
			100%
HYDROXYZINE			
	APO-HYDROXYZINE 0187 ATX	APOTEX INC	64%
	NOVO-HYDROXYZIN 0387 NVP	NOVOPHARM	23%
	PMS-HYDROXYZINE 0589 P8I	PHARMASCIENCE	7%
	PRO-HYDROXYZINE 1087 PDO	PRO DOC	5%
	RIVA-HYDROXYZIN 0300 RVA	RIVA	1%
	HYDROXYZINE HCL 0488 SBX	SABEX	0%
	HYDROXYZINE 0997 CYT	CYTEX	0%
			100%
FLURAZEPAM			
	APO-FLURAZEPAM 0382 ATX	APOTEX INC	79%
	FLURAZEPAM 0583 PDO	PRO DOC	21%
	NOVO-FLUPAM 0280 NVP	NOVOPHARM	0%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	PMS-FLURAZEPAM 0589 P8I	PHARMASCIENCE	0%
	SOM-PAM 0182 VLT	VALEANT	0%
			100%
IBUPROFEN			
	APO-IBUPROFEN 1183 ATX	APOTEX INC/NU-PHARM INC	89%
	IBUPROFEN 0685 PDO	PRO DOC	9%
	NOVO-PROFEN 0885 NVP	NOVOPHARM	2%
	RATIO-IBUPROFEN 1183 RAT	RATIOPHARM	0%
			100%
QUININE			
	NOVO-QUININE 0166 NVP	NOVOPHARM	95%
	QUININE SULFATE 1099 ODA	ODAN LABS	5%
	QUININE SULFATE 0157 STY	STANLEY	0%
	QUININE SULFATE 0584 PFZ	PFIZER*	0%
			100%
PROCYCLIDINE			
	PMS-PROCYCLIDINE 1184 P8I	PHARMASCIENCE	100%
	PROCYCLIDINE 0798 PL/	PHARMEL	0%
			100%
TETRACYCLINE			
	APO-TETRA 0383 ATX	APOTEX INC/NU-PHARM INC	96%
	TETRACYCLINE 0162 PDO	PRO DOC	3%
	NOVO-TETRA 0165 NVP	NOVOPHARM	0%
	TETRACYCLINE 0596 PRL	PRIVATE LABEL	0%
	TETRACYCLINE 0894 DIL	DIOPTIC LABS	0%
			100%
TRIMETHOPRIM W. SULFAMETHOXAZOLE			
	APO-SULFATRIM DS 0179 ATX	APOTEX INC/NU-PHARM INC	77%
	NOVO-TRIMEL 0177 NVP	NOVOPHARM	23%
	PROTRIN DF 0180 PDO	PRO DOC	1%
	RIVA-SEP DS 0400 RVA	RIVA	0%
			100%
HYDROCHLOROTHIAZIDE W. TRIAMTERENE			
	APO-TRIAZIDE 0484 ATX	APOTEX INC/NU-PHARM INC	71%

Table 10 (continued): Share of the generic market per active ingredient drug product by manufacturer over the 100 top-selling generic drugs in 2003

Generic active ingredient	Drug product	Manufacturer	Percent share of total R_xs dispensed in 2003
	NOVO-TRIAMZIDE 1281 NVP	NOVOPHARM	25%
	PRO-TRIAZIDE 0985 PDO	PRO DOC	4%
	RIVA-ZIDE 0300 RVA	RIVA	1%
			100%
ACETAMINOPHEN W. OXYCODONE			
	RATIO-OXYCOCET 0484 RAT	RATIOPHARM	82%
	ENDOCET 0987 LSN	LINSON PHARMA INC	18%
	RIVACOCET 1201 RVA	RIVA	0%
	PMS-OXYCODONE-ACET 1002 P8I	PHARMASCIENCE	0%
			100%
ACETAMINOPHEN W. CODEINE W. CAFFEINE			
	RATIO-LENOLTEC #3 1185 RAT	RATIOPHARM	72%
	ACETAMINOPHEN W/CO 1192 WSC	WESTCAN	24%
	ACETAMINOPHEN W/CO 0178 PE7	PENDOPHARM	2%
	NOVO-GESIC CODEINE 0686 NVP	NOVOPHARM	1%
	ACETAMINOPHEN W/CO 1192 STY	STANLEY	1%
	ACETAMINOPHEN W/CO 0795 TRI	TRIANON	0%
	ACET-2 0395 P8I	PHARMASCIENCE	0%
			100%
ACETAMINOPHEN W. CODEINE			
	RATIO-EMTEC 0484 RAT	RATIOPHARM	96%
	PMS-ACET W/COD 1194 P8I	PHARMASCIENCE	4%
	ACET-CODEINE 30 0594 PMQ	PMS CONS PRODS	0%
			100%

Source: **IMS Health, 2004d**

Notes: * Brand name companies competing as generics. ** Apotex and Nu-pharm are commercially affiliated. **See Skinner, 2004.**

Notes

1 For this study, price comparisons were also calculated using current market exchange rates. However, because the US$ exchange rate is applicable only to a very small percentage of consumers who are willing or able to shop in both countries, the PPP conversion should be considered the more accurate currency adjustment measure for general comparisons. Economists also universally accept PPP conversion as the most accurate way to make average prices in different markets truly comparable. (Advice courtesy of Dr. Mark Mullins, PhD Economics, Director of Ontario Policy Studies, The Fraser Institute.) Furthermore, the use of straight US-to-Canadian 2003 market exchange rates did not significantly affect the number of drugs that were more or less expensive in Canada but affected only the magnitude of price differences. Nonetheless, present market exchange rates virtually match the PPP between the Canadian and US dollars used for this study.

2 See earlier section describing US data and Appendix A for a further discussion verifying the reliability of the data used in this study.

3 These experts insisted on anonymity because of the risk to their employment.

4 For instance, some policies that gave domestic generic companies advantages over their foreign-owned rivals like "early working exceptions" to patent laws have been removed by subsequent regulation in the form of Health Canada's "notice of compliance" requirements. Nonetheless, first-mover advantages established before the rules changed persist in some markets.

5 One obvious example is Health Canada's prohibition against the import of cheaper generic drug products from other countries. Part of the justification for this non-tariff barrier to trade was contained in the following excerpt from a Health Canada enforcement directive: "There is also evidence of patients ordering prescription drugs directly from foreign suppliers as a means of avoiding the higher costs of the same drugs available from Canadian suppliers. This situation results in a competitive disadvantage to domestic companies who are compliant with product and establishment regulations in addition to fee regulations." [Health Canada, 2002]

6 It is important to point out that other studies have also found that the prices for branded drugs that are not patented and are, therefore, not under price controls in either the United States or Canada, have been found to be much cheaper in Canada

than in the United States. The average US price on the competitive market for these drugs was 96% higher than the Canadian price on the competitive market for the same drugs. [Conference of Federal/Provincial/Territorial Deputy Ministers of Health, 1999]

7 Meaning no generic competition at all, for most or all of 2003; or no generic competition over the biggest selling formulations that accounted for almost all the sales for particular products in 2003. Derived from Health Canada, Patent Register. (2004) and Health Canada, Therapeutic Products Directorate, Drug Products Database. (2004).

8 This assumption is also dependent on a further assumption that the Canadian price elasticity of demand for drugs will mimic US patterns under similar policies. Given the similarity of the markets, there is little reason to doubt that this in fact would be the case. If anything, the presence of direct-to-consumer advertising in the United States and its effect in generating brand loyalty likely makes US consumer demand less price elastic than Canadian, thus reinforcing the main assumption as conservative.

9 Please refer again to note 8.

10 The GPhA website contains data showing the average branded prescription price to be $84.21 US in 2003. This is very close to the estimate derived from observed Canada-US retail price differences found in this study, which was $80.25 US for 2003. However, the GPhA website had some problematic data that is sourced to the US National Association of Chain Drug Stores showing the 2003 average generic prescription price to be $30.56. However, this number is highly suspect for error. When average prescription price data is projected over the total number of prescriptions dispensed in the market, it produces a generic market value that exceeds GPhA claims about total revenue from sales for their industry by over 240%. For instance, if the average prescription costs provided by GPhA are multiplied by the number of generic prescriptions dispensed in the US market (51%), the total value of generic prescription sales would be $54.55 billion in 2003. Yet the GPhA website claims only 8% of total revenue from sales (or $16 billion in 2003) of prescription drugs in the US was accounted for by generic drugs. Part of the difference between the two estimates of the total value of US sales for generic drugs could be accounted for because the larger figure includes pharmacy dispensing fees and mark-ups. However this would mean that pharmacies typically add 240% to the price of generic drugs in the United States, which is a highly unlikely mark-up. Similar data on Canadian generic sales indicates a difference between industry revenues and final pharmaceutical sales of only about 41%. The difference between the GPhA claims of industry revenues of $16 billion in 2003 and the $22.8 billion in final retail sales calculated in this section is 43%. This is close enough to the Canadian pharmacy mark-up to verify the reliability of the average US prescription prices established by this

study's calculations. It appears that the GPhA has either cited incorrect data for average prescription prices or is seriously understating the generic industry's revenue from sales on its website. Inquiries with GPhA on this issue (October 21, 2004) provided partial explanations but did not fully resolve the discrepancy. In a written reply, a senior policy advisor stated: "My best guess at this point—and it is only conjecture—is that the discrepancy relates to a combination of: (a) different years for the data sources, (b) dispensing fees, and (c) other as yet unknown factors." [GPhA, 2004b]

11 IMS Health reports the total US retail pharmacy market to be worth $169.8b at wholesale prices, over the 12 months ending July 2004, which does not include discounts to retailers. The entire US market including non-federal hospitals, clinics, federal facilities, home healthcare, HMO's, and miscellaneous as well as the retail pharmacy market equalled $216.4 billion in 2003. [IMS Health, 2004c]

12 IMS Health reports that generic prescriptions captured 8% ($17.3 billion of $216.4 billion total) of total sales revenue for prescription drugs in the United States in 2003. [IMS Health, 2004b]

References

A

Associated Press (2004). "Task Force: Drug Bargains in US Surgeon General Group: Savvy Shoppers Can Find Cheaper Drugs." Washington, DC: AP. Appeared at CNN.com, October 6, 2004. Archived at <http://edition.cnn.com/2004/HEALTH/10/06/drug.imports.shop.ap/index.html>.

B

Bank of Canada (2004). "Year Average of Exchange Rates." Ottawa: Bank of Canada, Financial Markets Department.

C

Canadian Generic Pharmaceutical Association [CGPA] (2004). *Market Trends 2003*. Toronto and Montreal. <www.canadiangenerics.ca/en/resource_trends> (as of October 2004).

Canadian Institute for Health Information [CIHI] (2004). *Drug Expenditure in Canada*. Data Table A.1—Part 1: Expenditure on Drugs by Type, by Source of Finance, and as a Share of Public, Private and Total Health Expenditures, Canada, 1985–2003. Ottawa: Canadian Institute for Health Information.

Canadian Press. (2003). "Quebec Targets Generic Drug Makers." Appeared in the *Globe and Mail*, National online, Friday, February 28, 2003. Toronto.

Clever, Linda Hawes, et al. (1997). Additional Statements from the International Committee of Medical Journal Editors. *Canadian Medical Association Journal* 156, 4: 571–74.

Conference of Federal/Provincial/Territorial Deputy Ministers of Health (1999). "Top Selling Non-Patented Single Source Drug Products, 1996: International Price Comparison." Charlottetown Federal/Provincial/Territorial Task Force on Pharmaceutical Prices (April, 1999)

Costco® (2004). <http://www.costco.com/>.

D

Danzon, P.M., and M.F. Furukawa (2003). "Prices and Availability of Pharmaceuticals: Evidence From Nine Countries." *Health Affairs: Web Exclusive* (October 29, 2003), web pages W3-521–W3-536, <http://www.healthaffairs.org/>.

Davidoff, Frank, et al. (2001). Sponsorship, Authorship and Accountability. *Canadian Medical Association Journal* 165, 6: 786–87.

DeVol, R., et al. (2004) *Biopharmaceutical Industry Contributions to State and US Economies*. Santa Monica, CA: Milken Institute.

DiMasi, J.A. (2001). "Risks in New Drug Development: Approval Success Rates for Investigational Drugs." *Clinical Pharmacology & Therapeutics* 69, 5 (May): 297–307.

DiMasi, J.A., et al. (2003). "The Price of Innovation: New Estimates of Drug Development Costs." *Journal of Health Economics* 22, 2 (3): 151–85.

F

Families USA (2004). "Sticker Shock: Rising Prescription Drug Prices for Seniors." Washington, DC: Families USA. <http://www.familiesusa.org>.

Frank, R.G. (2003). The Impact of Direct-to-Consumer Advertising on Prescription Drug Spending. Menlo Park, CA: Kaiser Family Foundation. <http://www.kff.org>

G

Generic Pharmaceutical Association [GPhA] (2004a). *Generic Pharmaceutical Facts at a Glance*. <http://www.gphaonline.com/aboutgenerics/factsabout.html>.

Generic Pharmaceutical Association [GPhA] (2004b) Response to a personal inquiry about data accuracy on the GPhA website from Dick Hegner, Senior Policy Advisor, GPhA. October 21, 2004.

Graham, John (2000). *Prescription Drug Prices in Canada and the United States—Part 2: Why the Difference?* Public Policy Sources 43. Vancouver, BC: The Fraser Institute.

Graham, John (2001). *Prescription Drug Prices in Canada and the United States—Part 3: Retail Price Distribution*. Public Policy Sources 50. Vancouver, BC: The Fraser Institute.

Graham, John, and Tanya Tabler (forthcoming). *Canadian Pharmacare: Performance, Incentives, and Insurance*. Vancouver, BC: The Fraser Institute.

H

Health Canada (2002). *Importation of Human-Use Drugs for Personal Use Enforcement Directive*. Health Products and Food Branch Inspectorate (1998; revised 2002).

Health Canada, Patent Register (2004). <http://www.patentregister.ca>.

Health Canada, Therapeutic Products Directorate, Drug Product Database (2004). <http://www.hc-sc.gc.ca/hpfb-dgpsa/tpd-dpt/index_drugs_dpd_e.html>.

I

IMS Health (2004a). *US Prescription Activity by Channel, MAT** September 2004*. IMS Health, National Prescription Audit® Plus, 10/2004. <http://www.imshealth.com>, "Press Room" (October 19, 2004).

IMS Health (2004b). *IMS Reports 11.5 Percent Dollar Growth in '03 US Prescription Sales*. <http://www.imshealth.com>, "Press Room" (October 21, 2004).

IMS Health (2004c). *Retail Pharmacy Sales, 12 Months to July 2004*. <http://www.imshealth.com> (October 22, 2004).

IMS Health (2004d). "CompuScript database description." Special data request.

O

Organisation for Economic Cooperation and Development [OECD] (2004). *Purchasing Power Parities (PPPs) for OECD Countries, 1980–2004*. Paris: OECD. <www.oecd.org/std/ppp/>.

P

Palmer D'Angelo Consulting Inc. [PDCI] (2002). *Generic Drug Prices: A Canada-US Comparison*. PDCI Report Series. Ottawa, ON: PDCI.

Patented Medicine Prices Review Board [PMPRB] (2002). *A Comparison of Pharmaceutical Research and Development Spending in Canada and Selected Countries (2002)*. PMPRB Study Series S-0217. Ottawa: Government of Canada.

Patented Medicine Prices Review Board [PMPRB] (2003). *A Study of the Prices of the Top Selling Multiple Source Medicines in Canada*. Ottawa: Government of Canada.

R

Red Book® (2004) Reference. New Jersey: Thomson PDR®.

S

Saftlas, H. (2004). "S&P Pharmaceutical Analyst Herman Saftlas' 2001–2005 Forecasts Based on a Regression Line Calculation by National Economic Research Associates." As cited on the website of the Pharmaceutical Research Manufacturers' Association (PhRMA), <http://www.phrma.org>.

Skinner, Brett J. (2004) *Generic Drugopoly: Why Non-patented Prescription Drugs Cost More in Canada than in the United States and Europe*. Toronto and Vancouver: The Fraser Institute.

U

US Bureau of Labor Statistics (2004). Data Series ID WPU0638. Washington DC: US Department of Labor.

US Food and Drug Administration (US FDA), Department of Health and Human Services (2003). *Generic Drug Prices in the US Are Lower than Drug Prices in Canada*. White paper. Washington, DC: US FDA Office of Planning.

W

Walgreen's® (2004). Website. <http://www.walgreens.com/library/finddrug/druginfosearch>.

About the author

Brett J. Skinner is Acting Director of Pharmaceutical and Health Policy Research for The Fraser Institute and works from the Institute's Toronto office. He is a Ph.D. candidate in Public Policy and Political Science specializing in health policy at the University of Western Ontario (London) where he has lectured in both the Faculty of Health Sciences and the Political Science Department. He earned a B.A. (Hon) from the University of Windsor (Ontario) and an M.A. in Public Policy and Political Science through joint studies at the University of Windsor and Wayne State University (Michigan). Mr Skinner has also worked as a Consultant and Policy Analyst for the Insurance Bureau of Canada's (IBC) National Health Issues Program in Toronto, Ontario.

Recent Fraser Institute publications

- *Generic Drugopoly: Why Non-patented Prescription Drugs Cost More in Canada than in the United States and Europe* (2004).
- *Paying More, Getting Less: Ontario's Health Premium and Sustainable Health Care* (2004).
- "The Problem with Public Health Insurance" (2004). *Fraser Forum* (February).

Other publications

- "Ontario's Health Premium Is Not the Answer" (2004). *National Post* (August 4).
- "The Cross-border Internet Drug Trade and Access to Medicines in Canada" (2004). Toronto: 50Plus.
- *Definitely Not the Romanow Report: Achieving Equity, Sustainability, Accountability and Consumer Empowerment in Canadian Health Care* (2002). Halifax: Atlantic Institute for Market Studies (AIMS).
- *Improving Canadian Health Care: Better Ways to Finance Medicare* (2002). Halifax: AIMS.
- *The Non-Sustainability of Health Care Financing under the Medicare Model* (2002). Halifax: AIMS.
- *The Benefits of Allowing Business Back into Canadian Health Care* (2002). Halifax: AIMS.
- *Medicare, the Medical Brain Drain, and Human Resource Shortages in Health Care* (2002). Halifax: AIMS.

Acknowledgments

The author would like to acknowledge with gratitude the comments and suggestions of Dr. Michael Walker, Executive Director, The Fraser Institute, Dr. Mark Mullins, Director of Ontario Policy Studies, The Fraser Institute, and Nadeem Esmail, Senior Health Policy Analyst and Manager of Health Data Systems, The Fraser Institute; as well as the external members of the peer review panel selected for this paper. The views expressed by the author are not necessarily those of The Fraser Institute, its supporters and members, nor those colleagues gratefully acknowledged here.

Disclosure

Because the author's employer receives charitable donations from research-based pharmaceutical manufacturers, the author has chosen to disclose financial relationships in accordance with the policies of the International Committee of Medical Journal Editors. [Clever et al., 1997; Davidoff et al., 2001] The author acknowledges with gratitude those who financially support The Fraser Institute and this research including research-based pharmaceutical companies (whose contributions make up less than 5% of The Fraser Institute's budget) as well as the general membership and other supporters of the Institute. With respect to this manuscript, no drug-maker or other donor had any input into the collection, analysis, or interpretation of the research, nor in the manuscript's writing. Nor did any drug-marker or other donor preview this manuscript before publication.

Publishing information

Fraser Institute Digital Publications are published from time to time by The Fraser Institute (Vancouver, British Columbia, Canada) to provide, in a format easily accessible on-line, timely and comprehensive studies of current issues in economics and public policy.

Distribution

These publications are available from <http://www.fraserinstitute.ca> in Portable Document Format (PDF) and can be read with Adobe Acrobat® or with Adobe Reader®, which is available free of charge from Adobe Systems Inc. To down-load Adobe Reader, go to this link: <http://www.adobe.com/products/acrobat/readstep2.html> with your Browser. We encourage you to install the most recent version.

Disclaimer

Copyright

ISSN

1714–6739

Date of issue

February 2005 (version 1.0)
April 2005 (version 1.1)
May 2005 (version 1.2)

Editing, design, and production

Lindsey Thomas Martin

How to use the interactive features in this document

These publications are available from <http://www.fraserinstitute.ca> in Portable Document Format (PDF) and can be read with Adobe Acrobat® or with Adobe Reader®, which is available free of charge from Adobe Systems Inc. To down-load Adobe Reader, go to this link: <http://www.adobe.com/products/acrobat/readstep2.html> with your Browser. We encourage you to install the most recent version.

When you read this document on screen in Adobe Acrobat® or Adobe Reader®, references in the text to tables, figures, notes, and hyperlinks that display in blue and a distinct typeface (e.g., [Table 3] or [12]) are active links. Clicking on them will take you to the item to which they refer. To return to the passage you were reading, click the button  at the bottom the window, or type **Alt + Left Arrow** if you use Microsoft Windows® or **Command + Left Arrow** if you use Apple Mac OS X or earlier. If you have questions or comments about the interactive features, please contact Lindsey Thomas Martin via e-mail: lindseym@fraserinstitute.ca.

About The Fraser Institute

The Fraser Institute is an independent Canadian economic and social research and educational organization. It has as its objective the redirection of public attention to the role of competitive markets in providing for the well-being of Canadians. Where markets work, the Institute's interest lies in trying to discover prospects for improvement. Where markets do not work, its interest lies in finding the reasons. Where competitive markets have been replaced by government control, the interest of the Institute lies in documenting objectively the nature of the improvement or deterioration resulting from government intervention. The work of the Institute is assisted by an Editorial Advisory Board of internationally renowned economists. The Fraser Institute is a national, federally chartered, non-profit organization financed by the sale of its publications and the tax-deductible contributions from its members, from foundations, and from other supporters; it receives no government funding.

Membership

For information about membership, please write to:

Development Department, The Fraser Institute,
Fourth Floor, 1770 Burrard Street,
Vancouver, British Columbia, V6J 3G7 Canada;

or contact the Development Department:

in **Vancouver**

- via telephone: 604.688.0221 ext. 586; via fax: 604.688.8539
- via e-mail: membership@fraserinstitute.ca

in **Calgary**

- via telephone: 403.216.7175 or, toll-free 1.866.716.7175;
- via fax: 403.234.9010; via e-mail: barrym@fraserinstitute.ca.

in **Toronto**

- via telephone: 416.363.6575;
- via fax: 416.934.1639.

Media

For Media enquiries, please contact Suzanne Walters, Director of Communications, via e-mail: suzannew@fraserinstitute.ca; via telephone: 604.714.4582.

Ordering publications

For information about ordering the printed publications of The Fraser Institute, please contact the publications coordinator via e-mail: sales@fraserinstitute.ca; via telephone: 604.688.0221 ext. 580 or, toll free, 1.800.665.3558 ext. 580; via fax: 604.688.8539.