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Understanding Variations in International Drug Prices

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Understanding Variations in International Drug Prices

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Understanding Variations in International Drug Prices

Rapidly rising prescription drug prices have caused many consumers, third-party payers, and policymakers to look for ways to lower their drug costs. One strategy that many have seen as a potential solution is to import drug products from countries where drug prices are lower than those in the United States – commonly called reimportation. This report focuses on the differences between prices in the United States and Canada, and seeks to create an "apples-to-apples" comparison of the prices consumers might face for a specific market basket of drugs in each country, taking into account any insurance coverage they might have. We make this comparison for fifteen different market baskets of drugs, to test the sensitivity of results to the drugs selected.

Across the different market baskets, Canadian prices were about one-third lower on average than the prices charged to insured Americans. Because those without coverage in the United States do not have access to the discounts negotiated by third-party payers, these individuals would find that typical prices in Canada are about half of those they face in the United States. Overall, differences are larger for brand-name drugs, and much smaller for generic drugs. In fact, prices for generic drugs are likely to be higher in Canada, at least compared to the prices charged to people in the United States with insurance coverage.

Background

While Canada offers universal access to health insurance, that insurance covers only acute hospital and physician services, and does not provide coverage for outpatient prescription drugs. Most Canadians receive prescription drug coverage through their employers. The federal government offers drug coverage to some populations, including veterans and First Nations and Inuit people, and there are publicly funded provincial programs that pay a substantial share of drug costs for older, disabled, and low-income Canadians (Gross, 2003). These provincial programs cover 42 percent of all national drug expenditures (Morgan, 2003).

Prices for newly-patented drugs are controlled by federal regulation in Canada. Prices for new brand drugs are limited to the median of prices for the new drug in France, Germany, Italy, Sweden, Switzerland, England, and the United States. Limits for "me-too" drugs are based on the breakthrough brand's price; most new drugs cannot cost more than the other drugs in the same therapeutic class. Annual increases in prices for existing on-patent drugs are limited by the consumer price index (CPI): in a single year, prices cannot rise more than 1.5 times the CPI (PMPRB, 2006). This limit is lower than recent increases in prices for many on-patent drugs in the United States (Gross et al, 2006).

The provinces all use formularies to keep prices low for the drugs they cover, and new drugs that are equivalent to already listed drugs are added only if they do not increase program costs. Some provinces take further measures. Ontario has instituted price freezes; British Columbia uses reference pricing; and Quebec requires manufacturers to give the province the best price given to any other province (Morgan, 2003).

Legislative and regulatory price controls in the United States apply only to drugs purchased by the Medicaid program, the Department of Veterans Affairs, and the Federal Supply Schedule, which is used by the health programs run by the Department of Defense and other eligible entities (e.g., certain community health centers and public hospitals). However, insurers and pharmacy benefit managers (PBMs) are also able to negotiate substantial discounts and rebates from retail prices.

These discounts take two forms. First, third-party payers are able to negotiate discounts with pharmacies on the prices they charge at the pharmacy counter. These discounts are typically taken off the pharmacy's markup over their acquisition cost for the drug, and the effect of the discount is seen at the time an insured customer purchases a drug.

The second type of discount is negotiated directly between third-party payers and manufacturers. Typically, rebates are paid by the manufacturers of on-patent drugs in exchange for giving preferential status to a drug and demonstrating a shift of market share away from competing products. These rebates are separate from the pharmacy transaction. A 2000 ASPE study cited evidence that average rebates tend to be about 5 to 7 percent of drug prices, but can be as high as 35 percent on selected drugs (HHS, 2000). Research by the Congressional Budget Office, in connection with the Medicaid drug rebate, found that price discounts including rebates generally range as high as about 20 percent (CBO, 1996).

Uninsured individuals typically do not have access to negotiated prices of either kind. These individuals have been at the forefront of the push to import drugs from Canada. Some third-party purchasers, including several municipal government employee plans, have also begun to explore the possibility of savings for their insured employees from reimportation.

Previous studies have found that prices for prescription drugs are frequently lower in Canada than in the United States, as detailed in Appendix B. The literature also includes critiques of some of these studies (for example, Danzon and Kim). We have attempted to address several of the concerns raised in these critiques with the approach taken in this report. In particular, we explore two factors that could influence these observed differences between U.S. and Canadian prices: the market basket of drugs selected for comparison, and whether the purchaser has third-party coverage for the prescription at the time of purchase.

Methodology

The goal of this study is to determine the difference between U.S. and Canadian prices at the retail point of sale for the prescription drugs that are purchased by U.S. customers. Our primary question was, what would U.S. customers pay if they were able to purchase their drugs at Canadian prices? Throughout the design of the project, we have used this research question to help shape our methodology.

Price comparisons can be sensitive to the market basket of drugs included in the study. In particular, generic drugs and brand-name drugs tend to have quite different pricing patterns, which can affect the outcome of a price comparison. Our goal in this study was to test a variety of market baskets, but to make each of them representative of the drugs used by a subpopulation in the United States. We selected fifteen groups based on age, gender, race, and insurance status, which were

identified from a larger set of groups as those with distinctive patterns of drug use. For each group, we selected the most commonly used drugs accounting for a third of that population's prescriptions in the 2003 Medical Expenditure Panel Survey (MEPS). We then identified the most commonly used form and strength of each drug for each group, so that we could limit our data collection to a precisely specified set of drugs. The resulting market baskets each had from 8 to 32 drugs, with a total of 106 drugs across the 15 groups. These drug lists are included at the end of Appendix A.

Although some drugs are included in at least half of all the market baskets, the mix of drugs varies considerably. The market baskets for those over age 65 are dominated by treatments for the chronic conditions that accompany older ages, whereas market baskets for children include a mix of antibiotics, behavioral medications, and asthma drugs. Those for young women include various contraceptive drugs.

For these commonly used drugs, we then sought to find their counterparts in Canada. We tried to assure that the match between our U.S. market baskets and Canadian market baskets is as close as possible, while still representing the utilization of the population groups we identified. We first looked for an exact match by drug name, form, and strength between the United States and Canada. When an exact match was not available in Canada, we sought to match drugs by chemical entity, and when possible, by patent and trademark status and/or manufacturer. There were several drugs on our list at a dosage level not available in Canada. When possible, we used another dosage level that is available in both countries as a substitute in both the U.S. and Canada market baskets; otherwise, we used the dosage available in Canada closest to the most common U.S. dosage. More information on this matching process is available in Appendix A.

Once we had specified our list of drugs for the United States and Canada, we then used data collected by IMS Health to identify the average price per pill (or, for other forms such as liquids and inhalers, the average price for a set amount) for each drug in both countries. The IMS prescription databases represent very large, non-probability samples of prescriptions dispensed at retail pharmacies in the United States and in Canada. The data are representative of prescription transactions for both large retail pharmacy chain organizations and small independent pharmacies.

In the United States, the IMS sample is geographically representative of all 50 states plus the District of Columbia and Puerto Rico. The databases include all prescriptions dispensed at over 35,000 retail pharmacies in the United States, representing two-thirds of all U.S. retail pharmacies and an estimated 70 percent or more of all prescription transactions in the retail pharmacy sector.

In Canada, the IMS sample includes over 4,300 retail pharmacies, representing 60 percent of all Canadian retail pharmacies and an estimated 70 percent of all prescription transactions. However, we used data only from Ontario and Quebec, which make up nearly three fourths of the overall IMS sample (3,100 pharmacies). These two provinces are the only ones for which IMS collects data on the type of payer, a critical part of our analysis. In addition, IMS has determined that in other provinces, pharmacies frequently report list prices rather than actual prices. Prior IMS work with Canadian prescription data, in conjunction with understanding of pharmaceutical price controls in

effect in Canada, suggest that there is little variation in prices between these two provinces and the rest of Canada.[1]

Using data from MEPS about the most common prescription size, we standardized the IMS per-pill price to represent an average per-prescription price for each drug. This method allowed us to eliminate any price disparities that might result from practice patterns or prescription-filling behavior that would lead to price differences caused by prescriptions covering different periods of time (e.g., 30 vs. 90 days) in the two countries. From these standardized per-prescription prices, we calculated an index price for each market basket, weighting based on utilization of each drug within the market basket for each population.

While in Canada there is little variation in the prices paid by different payers, in the United States the cost of drugs can vary widely according to who is purchasing drugs. Individuals paying cash pay the highest price, while insurers, managed care plans, and government programs can negotiate pharmacy discounts and manufacturer rebates because they represent large numbers of customers. One goal of this report is to explore the effect of these intra-country price differences on cross-country comparisons. In this report, we separate the prices paid by individuals who had a third-party payment from the prices paid by those who paid the entire cost of a prescription themselves.[2]

In identifying the third-party prices, we have no access to proprietary rebate amounts and have not attempted to estimate them.[3] The prices reported in this paper likely reflect the discounts that insurers have negotiated with pharmacies, but not the additional discounts they have received from manufacturers separate from the pharmacy transaction. The effect of including these rebates, if they were available, would be to reduce the overall amount paid by third-party insurers for brand name drugs and to reduce the difference between the United States and Canada for the prices of these drugs.

There are several issues that are beyond the scope of this paper. We do not address here the safety or legality of importing drugs to the United States from Canada. Likewise, we do not estimate the shifts in manufacturer pricing behavior that would likely occur if reimportation became widespread, or if policy changes in the United States attempted to force manufacturers to provide drugs to customers at Canadian prices. HHS addressed many of these issues in its 2004 report to Congress on prescription drug importation.

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[1] In particular, it is likely that customers without third-party coverage are paying prices close to the national limits set by the Patented Medicine Prices Review Board. In this study, we find that in Canada, third-party prices are extremely close to the prices paid by individuals without third-party coverage. Third-party payers in these provinces appear to be getting little additional discount despite the extra limits set by the provincial governments for drugs purchased through provincial programs.

[2] We report prescriptions as "with third-party coverage" if a third party was involved at the time of the pharmacy transaction, including prescriptions that were only discounted. (e.g., because the customer had a discount card). We report prescriptions as "without third-party coverage" if a third party was not involved in the transaction at the pharmacy counter. It is possible that some of these latter customers may be submitting receipts to an insurer for reimbursement. However, without the involvement of an insurer at the time of the transaction, we assume the price paid for these prescriptions is not discounted.

[3] Other authors, including the HHS Task Force on Drug Importation (*Report on Prescription Drug Importation*, p. 115), have attempted to estimate the rebates paid from manufacturers to pharmacies and wholesalers. We do not consider these rebates here as we are studying prices paid by customers at the pharmacy counter, not pharmacy acquisition prices.

Results

For each of our fifteen market baskets of drugs, the total price paid for drugs in Canada is consistently lower than the total price paid in the United States. This is true for individuals with and without third-party coverage. However, the difference is greater for individuals without third-party coverage.

Differences in U.S. and Canadian Prices for Individuals with Third-Party Coverage

For prescriptions filled by individuals with third-party coverage, the difference between Canadian and U.S. prices ranges from about 30 percent lower for the market basket that represents the drugs most commonly used by girls under 12, to as much as 47 percent lower for the market basket of drugs that represents the drugs most commonly used by women ages 25 to 39 (Figure 1). Both the average and the median of the differences for all fifteen market baskets are about 36 percent.[4]

These observed price differences are in the general range of those found in the literature (see Appendix B). Several of the studies described in the Appendix found differences in the range of 30 to 50 percent (with at least one considerably higher and one considerably lower). This consistency of results provides some reassurance that the methodology used in this study is not creating unexpected results. The consistency of results across market baskets is also significant. Although there is variation, the price difference for most market baskets are remarkably consistent despite differences in drug mix. As discussed below, the main difference results from the mix of brand and generic drugs.

Differences in U.S. and Canadian Prices for Individuals without Third-Party Coverage

For those without third party coverage, the prices reported are the total price paid by the individual to the pharmacy. There is an even larger difference between U.S. and Canadian prices for these customers (Figure 1). The market basket for drugs commonly taken by men aged 65 and over has the smallest difference, with prices in Canada 38 percent lower than in the United States. The market basket for the drugs commonly taken by women aged 25-39 again has the highest difference, with Canadian prices 54 percent lower than U.S. prices. Both the average and the median of the differences for all fifteen market baskets are about 45 percent.

[4] For those with third-party coverage, the prices presented here include the total price paid at the pharmacy, including both the insurance payment and any copayment made by the patient.

Figure 1. Weighted Average Price Per Prescription, by Market Basket and Payment Type

Market Basket: Drugs Taken By...	With Third-Party Coverage			Without Third-Party Coverage		
	U.S.	Canada	Difference	U.S.	Canada	Difference
Females under 12	$31.44	$21.99	-30.1%	$41.43	$22.70	-45.2%
Females 12-24	$45.93	$27.60	-39.9%	$54.69	$28.56	-47.8%
Females 25-39	$48.47	$25.69	-47.0%	$57.05	$26.44	-53.6%
Females 40-64	$51.78	$30.61	-40.9%	$59.66	$31.00	-48.0%
Females 65+	$45.44	$28.48	-37.3%	$50.82	$29.01	-42.9%
Males under 12	$39.07	$26.96	-31.0%	$50.17	$27.64	-44.9%
Males 12-24	$70.48	$46.94	-33.4%	$84.95	$47.85	-43.7%
Males 25-39	$68.04	$39.41	-42.1%	$80.28	$40.06	-50.1%
Males 40-64	$57.24	$36.72	-35.9%	$65.42	$37.50	-42.7%
Males 65+	$41.80	$28.99	-30.6%	$47.46	$29.45	-37.9%
Insured	$52.94	$31.60	-40.3%	$61.24	$32.15	-47.5%
Uninsured	$37.59	$25.80	-31.4%	$43.47	$26.19	-39.8%
Whites	$47.19	$28.80	-39.0%	$54.49	$29.30	-46.2%
African Americans	$47.16	$30.72	-34.9%	$54.17	$31.19	-42.4%
Hispanics	$36.84	$24.47	-33.6%	$43.83	$24.75	-43.5%

Notes: Index price is a weighted average of the prices of the most common form and strength of the most commonly used drugs for each population group.

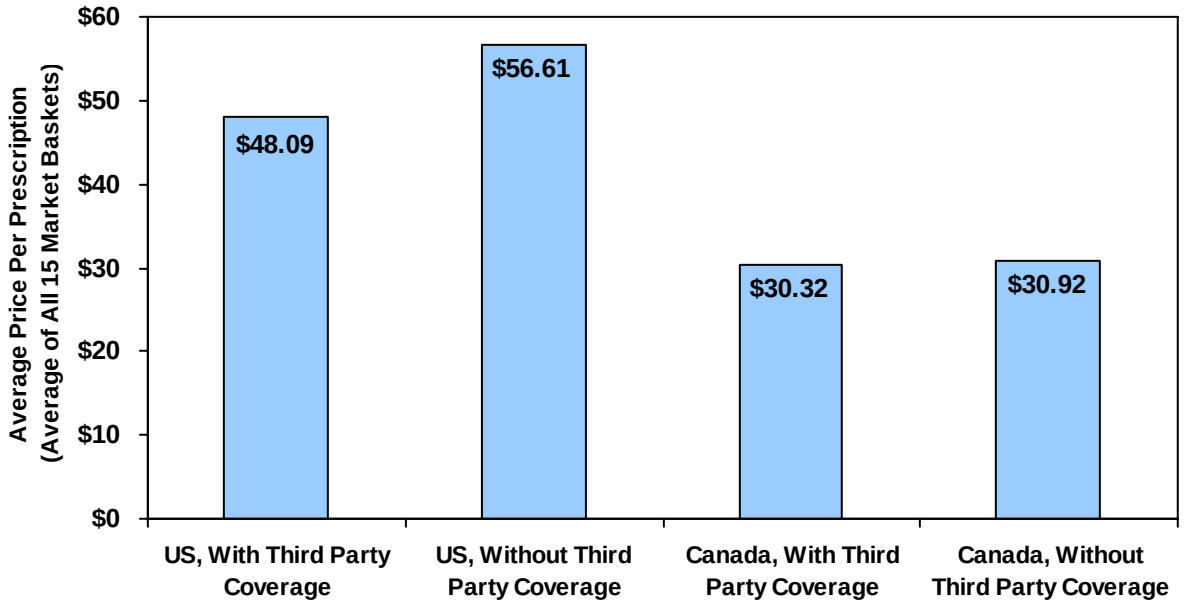
Prices are in U.S. dollars, using the average exchange rate for the period of data collection.

Difference between U.S. and Canada prices calculated as (Canada price-U.S. price)/U.S. price.

Market baskets include the drugs most commonly used by individuals in each population group. Prices reflect the prices paid by all individuals, not restricted to the population group. For example, the insured market basket includes the drugs most commonly used by people with insurance. The price indices for that market basket use data for all people who bought the drugs in that market basket, so it is possible to have a price index for uninsured individuals who purchased the drugs in the insured market basket.

The higher differential between U.S. and Canadian prices for customers without third-party insurance appears to be due largely to the difference between the prices paid by customers with and without insurance within the United States (Figure 2). For any given market basket, the index price in Canada is only 1 percent to 4 percent higher for customers without third-party insurance compared to customers with insurance – when the market basket index prices are averaged, the difference is less than a dollar. In contrast, uninsured customers in the United States pay 12 percent to 32 percent more for a market basket of drugs than the cost of the same drugs for customers with insurance, a difference of about $8.50 across all market baskets. The latter result is consistent with findings from earlier work by ASPE in 2000 (HHS, 2000).

Figure 2. Average of Per-Prescription Prices for All 15 Market Baskets, by Type of Coverage



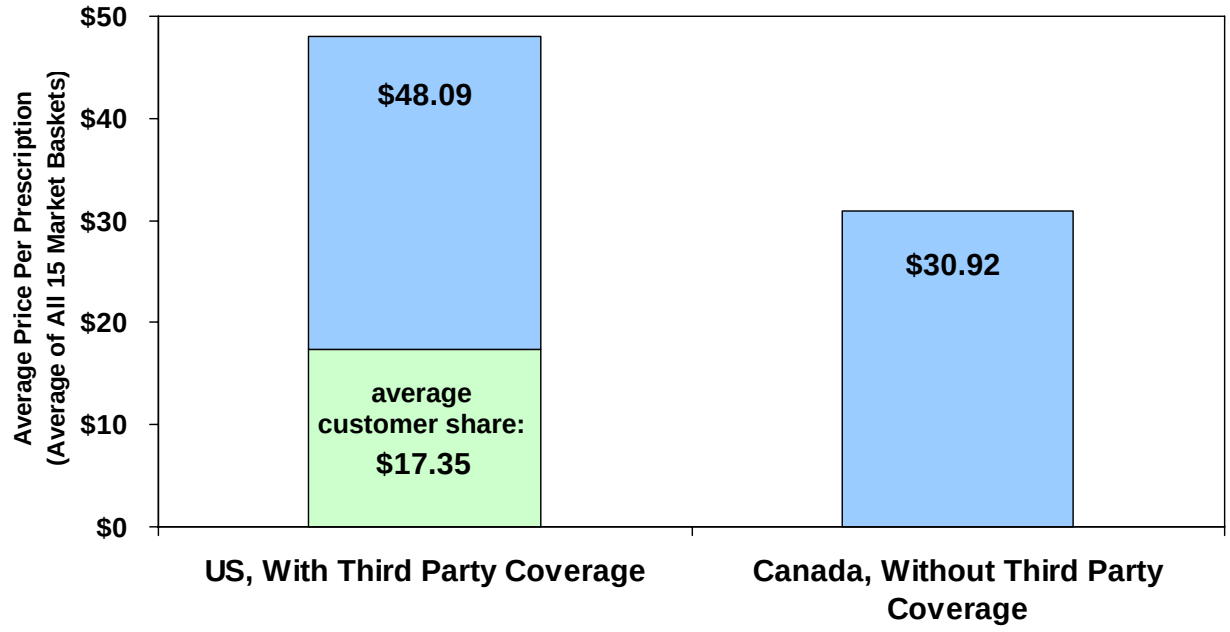
Comparing U.S. Copayments to the Full Cost of Drugs in Canada

The price comparisons for the full cost of drugs are the most relevant for many U.S. citizens without insurance coverage for their drugs who seek savings by getting drugs in Canada. By contrast, most individuals with coverage will not achieve savings unless their third-party agent is involved in the transaction. Insured consumers considering drug purchases in Canada may find their insurance coverage is not applicable for purchases from Canadian pharmacies. Thus, the relevant comparison for these customers is between the copayment they are charged at their U.S. pharmacy and the full cost of the drug in Canada.

In fact, individuals with insurance are unlikely to be able to find prices in Canada that are lower than the copayments they pay for drugs that are covered by their insurance. On average across our market baskets, the Canadian price is about 78 percent higher than the out-of-pocket cost to a person in the United States with third party coverage (Figure 3), with a range from 31 percent to 141 percent higher. This result is not surprising given that insured consumers are paying only a share of the total drug cost out of pocket.

There may be situations in which these individuals could achieve savings with Canadian drug prices. For example, if their coverage includes a cap with an annual or quarterly spending limit (such as in some Medicare Advantage plans prior to 2006), a gap in coverage (such as that faced in the new Medicare drug benefit), or a limit on the number of monthly prescriptions, individuals may find that it would be less expensive to buy drugs in Canada than to pay the full cost of a drug in the United States. Those who want to take a particular drug that is not covered by their insurer's formulary might also benefit from the price differential by making purchases in Canada.

Figure 3. Copayments in the United States vs. Full Price of Drugs in Canada



Price Differences by Patent and Trademark Status

There is a dramatic variation in the differential between U.S. prices and Canadian prices depending on the patent and trademark status of drugs. When generics and brand name drugs are identified separately, brand name drugs show even larger differences between U.S. and Canadian prices. Generics show smaller differences, or the direction of the difference changes, depending on the type of payer.

The on-patent brand name drugs in our market baskets cost 43 percent less for individuals with insurance and 50 percent less for individuals without insurance in Canada compared to U.S. prices (Figure 4). The absolute price differences are also largest for brand name drugs, particularly the on-patent brands in our market baskets.

As with the results for the overall market baskets, the variation in differences based on insurance coverage appears to be because in the United States, transactions with third-party involvement cost about 14 percent less than transactions without third-party coverage. Again, this is likely because of discounts that third-party payers have negotiated with pharmacies. However, even after this third-party discount, the difference between prices in the United States and Canada is substantial. The remaining difference likely results from a combination of regulatory measures in Canada and the market decisions made by manufacturers.

The availability of manufacturer rebates could further mute some of the difference between the United States and Canada for third-party payers. Typically, rebates are only available for brand-name drugs, and mostly for those that remain on patent. Previous studies have found that rebates can be as high as 20 percent (CBO, 1996) to 35 percent (HHS, 2000) on selected drugs. Even if amounts toward the higher end of these estimates were appropriate for most of the drugs in our market baskets, the differences would fall short of the 43 percent average differential observed for on-patent brand drugs.

Figure 4. Average Total Price Per Prescription, by Product Type and Payment Type

Product Type	Number of Drugs	With Third-Party Coverage			Without Third-Party Coverage		
		U.S.	Canada	Difference	U.S.	Canada	Difference
Generic	27	$10.75	$14.75	37%	$15.49	$14.92	-4%
Branded Generic	10	$25.79	$22.83	-11%	$30.81	$23.45	-24%
Off-Patent Brand	19	$37.01	$17.10	-54%	$42.65	$17.32	-59%
On-Patent Brand	38	$125.36	$71.37	-43%	$145.91	$73.08	-50%

Notes: Index price is a non-weighted average of the prices for each type of drug included in any market basket for this study.

Prices are in U.S. dollars, using the average exchange rate for the period of data collection.

Difference between U.S. and Canada prices calculated as (Canada price-U.S. price)/U.S. price.

Generic drugs follow a much different pattern. For customers with insurance coverage, the full cost of the generic drugs in our market baskets is actually higher in Canada than in the United States (Figure 4). For customers without insurance coverage, generics are only 4 percent less expensive in Canada than in the United States.

ASPE's 2000 study showed relatively little price difference for generic drugs between the prices paid by customers with a third-party payer and prices paid by those without coverage (HHS, 2000). That does not appear to be the case for the generic drugs selected for our market baskets. The average price of these drugs is about a third lower for customers with third-party coverage in the United States compared to those without coverage. This third-party discount appears to be what is causing U.S. generic prices to be lower than Canadian generic prices, for the drugs selected.

Previous studies have found more variability in the prices of generic drugs than in the prices of generics. Possibly related to this general variation, we found variation from market basket to market basket in the difference between U.S. and Canadian prices for generic drugs (Figure 5). For customers with third-party coverage, we consistently find that U.S. prices are lower than Canadian prices, but the difference ranges from 23 to 63 percent. For customers without third-party coverage, Canadian prices are nearly 20 percent lower for some market baskets and over 20 percent higher for other market baskets. The range in variation in the prices of brand name drugs among our market baskets is only half as large.

Figure 5. Variation in Relative Difference of Generic Prices

Market Basket: Drugs Taken By...	Number of Generic Products in Market Basket	Relative Difference Between Canadian and U.S. Price	
		With Third-Party Coverage	Without Third-Party Coverage
Females under 12	2	53.6%	-18.6%
Females 12-24	3	47.0%	-18.1%
Females 25-39	4	42.8%	-19.6%
Females 40-64	8	78.5%	24.0%
Females 65+	7	59.8%	21.2%
Males under 12	2	47.9%	-19.8%
Males 12-24	3	23.0%	-10.7%
Males 25-39	5	75.7%	6.8%
Males 40-64	9	60.7%	9.3%
Males 65+	11	49.4%	8.0%
Insured	8	53.6%	2.7%
Uninsured	11	46.0%	-1.0%
Whites	10	62.5%	8.6%
African Americans	8	53.6%	6.5%
Hispanics	14	49.5%	-4.8%

Notes: Index price is a non-weighted average of the prices for each type of drug included in any market basket for this study.
Difference between U.S. and Canada prices calculated as (Canada price-U.S. price)/U.S. price.

Figure 6 shows the proportion of each market basket that is made up of brand and generic drugs. The market baskets we have selected have non-trademark generic use ranging from a low of 15 percent for females 25-39 to a high of 54 percent for males aged 65 and over. Including branded generics, the generic rate ranges from 21 percent to 57 percent. This variation in generic use is consistent with the wide variation in the types of drugs taken by these groups. For example, the drugs in our market basket for young women include many on-patent birth control pills, while the market basket for older men includes more generic heart medications.[5]

Figure 6. Relationship Between Makeup of Market Basket and Relative Prices

	Proportion of Market Basket, Weighted by Utilization				Difference in Price Per Prescription, Canada vs. U.S.	
	Brand		Generic			
Market Basket: Drugs Taken By...	On Patent	Off Patent	Trademark (Branded Generic)	Non-Trademark	With Third-Party Coverage	Without Third-Party Coverage
Females under 12	22%	28%	8%	41%	-30%	-45%
Females 12-24	60%	15%	4%	21%	-40%	-48%
Females 25-39	52%	23%	10%	15%	-47%	-54%
Females 40-64	45%	27%	3%	25%	-41%	-48%
Females 65+	45%	18%	4%	33%	-37%	-43%
Males under 12	25%	18%	15%	42%	-31%	-45%
Males 12-24	50%	8%	20%	23%	-33%	-44%
Males 25-39	57%	22%	0%	21%	-42%	-50%
Males 40-64	52%	13%	0%	36%	-36%	-43%
Males 65+	34%	12%	0%	54%	-31%	-38%
Insured	50%	18%	2%	29%	-40%	-48%
Uninsured	32%	16%	3%	50%	-31%	-40%
Whites	48%	18%	3%	31%	-39%	-46%
African Americans	40%	16%	0%	44%	-35%	-42%
Hispanics	32%	15%	2%	51%	-34%	-44%
Correlation with Proportion of Market Basket On Patent					-0.79	-0.52
Correlation with Proportion of Market Basket Non-Trademark Generic					0.82	0.84

Note: Difference between U.S. and Canada prices calculated as (Canada price-U.S. price)/U.S. price.

[5] Nationally, both Express Scripts and the Generic Pharmaceutical Association reported that generics accounted for just over half of all prescriptions in 2003. It may be that the bottom two-thirds of drugs used by each population group are slightly more likely to be generics than the drugs we selected for our market baskets. (see Express Scripts, "Geographic Variation in Generic Fill Rate", http://www.express-scripts.com/ourcompany/news/outcomesresearch/onlinepublications/study/regionalgenericvariation.pdf, and GPhA "Statistics," http://www.gphaonline.org/Content/NavigationMenu/AboutGenerics/Statistics/Statistics.htm)

Consistent with the findings in Figure 4, market baskets with a higher proportion of generic drugs tend to show lower differences between Canadian and U.S. prices (correlation is .82 for third-party and .84 without third-party coverage). Likewise, market baskets with a higher proportion of on-patent brand drugs tend to show higher differences between Canadian and U.S. prices (correlation is -.79 for third-party and -.52 without third-party coverage). For example, the drugs taken by young adults (women 25-39 and men 25-39) have the largest differential between U.S. and Canadian prices, and both have market baskets with a high proportion of brand-name drugs.

The use of multiple market baskets allows us to see a range of possible effects while still basing measurements on actual utilization instead of an arbitrarily selected set of drugs. It is notable that despite this variation, the difference between Canadian and U.S. prices remains within a fairly small range.

Testing the Impact of Substituting Drugs Without a Direct Equivalent in Canada

Two drugs included in our market baskets had unusual circumstances that resulted in higher-than-average differences between the U.S. price and Canadian price. Zyrtec (cetirizine hydrochloride), an on-patent brand name prescription drug in the United States, is available over-the-counter in Canada as Reactine. We included this medication in our Canadian market baskets, utilizing data on prescription transactions for Reactine. Toprol XL (metoprolol succinate), another on-patent brand name drug, is not available in Canada. We included a close substitute, Lopressor SR (metoprolol tartrate), in the relevant Canadian market baskets. In both cases, we were following the principle that we were seeking to find the drugs that U.S. customers would find in Canada as the closest match for the drugs they take.

In all market baskets, excluding these two brand-name drugs makes the difference between the two countries' prices smaller (Figure 7). In thirteen of the fifteen market baskets, the difference is 2.2 percentage points or less (regardless of payer). The exception is the market baskets for children under 12. Zyrtec accounts for about a tenth of the prescriptions included in each of these market baskets, and its exclusion gives generic drugs a larger share of each market basket. The result is a more notable drop in the relative difference between U.S. and Canadian prices for these two groups. The change is particularly notable for prescriptions purchased with third party coverage, where the difference between United States and Canada for these two groups of drugs falls to 21.5 percent for girls and 23.5 percent for boys. While these results show that the selection of individual drugs for a market basket can affect the magnitude of the results, the change is not enough to affect the overall result that prices in Canada are substantially lower than prices in the United States.

Figure 7. Sensitivity of Average Difference Between U.S. and Canadian Price to Inclusion of Zyrtec and Toprol XL

	With Third-Party Coverage	Without Third-Party Coverage
Including Zyrtec and Toprol XL	-36.5%	-46.2%
Excluding Zyrtec and Toprol XL	-34.1%	-44.2%

Note: Unweighted average of results for 15 market baskets.

Conclusion

This report finds differences between Canadian and U.S. drug prices that are generally consistent with the existing literature on international drug pricing. Uninsured customers in the United States would find Canadian prices to be about half the prices they pay in the United States. Insured consumers seeking to buy the drugs they currently buy in Canada would find, on average, prices that are about a third lower than the total cost of their drugs, but higher than the copays they currently pay. These findings are somewhat sensitive to different market baskets. While the overall result that prices are lower in Canada is fairly consistent, the inclusion of more generic drugs can decrease the difference between Canadian prices and U.S. prices.

The differing spread in prices depending on patent and trademark status is a result worth emphasizing. Generic drug prices are mostly equivalent or higher in Canada, whereas brand drugs are substantially less expensive in Canada. Because on-patent brand name drugs have the highest prices, they also are the products with the largest absolute difference between Canadian and U.S. prices.

There are several issues related to these questions that are beyond the scope of this paper. We do not address here the safety or legality of importing drugs to the United States from Canada. Likewise, we do not estimate the shifts in manufacturer pricing behavior that would likely occur if reimportation became widespread, or if policy changes in the United States attempted to force manufacturers to provide drugs to customers at Canadian prices. HHS addressed many of these issues in its 2004 report to Congress on prescription drug importation (HHS, 2004).

Absent these widespread market shifts and other concerns, individuals without insurance coverage can find substantial savings in Canada for the commonly used drugs included in this study. Third-party insurers face a more complicated arithmetic. For generic drugs, third-party payers seem to be able to achieve enough savings through pharmacy discounts so that they would not save by steering their enrollees to Canada. For brand-name drugs, however, there is a large difference in prices between the United States and Canada even after these discounts. Whether third party payers could do better by purchasing drugs at Canadian prices largely depends on whether the additional manufacturer rebates they receive on brand-name drugs are larger than the differences reported here.

Appendix A: Methodology

This appendix describes our methodology for selecting market baskets of drugs and identifying prices for those market baskets of drugs in the United States and Canada. To explore possible market baskets, we selected the top third of drugs for several potential population groups and compared them. Age had the most differentiating effect on which drugs a population group uses; we used age, gender, race/ethnicity, and insurance status to create market baskets. The first section of this appendix documents this process in more detail.

For each market basket, we identified prices for the most common form and strength of each drug. We weighted prices in each market basket index according to overall use of each drug for that population. The second section of this appendix documents our methodology for working with drug price data.

Selecting Population Groups and Their Market Baskets

In selecting potential population groups, we started with a list of attributes available in the Medical Expenditure Panel Survey (MEPS) that could be reasonably expected to lead to differences in drug use. These included age, gender, race, income, obesity, smoking, and insurance status. We identified the drugs most commonly used by each of these groups, then compared them to identify groups that would lead to a set of diverse market baskets. The data on utilization by these groups became the basis for the market baskets of drugs used in this analysis.

One issue we identified in our literature review was the idea that when comparing Canadians' drug costs to U.S. costs, it might be more appropriate to determine drugs that are most commonly used by Canadians and compare their prices to prices of drugs most commonly used in the United States. The research question for this project, however, concerns the prices that United States consumers would pay for their drugs if they bought the same drugs in Canada. For this reason, we focused on identifying the drugs, forms, and strengths that are most commonly used in the United States.

Identifying Potential Market Baskets

As potential market baskets, we selected a group of drugs that represent a third of the prescriptions for each potential population group. Because this list of drugs is based on prescription volume, not total costs, inexpensive drugs will count as heavily as higher-priced drugs. Selecting a consistent percentage of utilization across all population groups will allow for the most consistent comparisons across population groups. We selected the cutoff of one third of prescriptions because of sample size considerations.

MEPS collects information on prescriptions at two different levels of detail. The most aggregated information collected is the drug name. In addition, MEPS collects for many (but not all) prescriptions the NDC code. NDC codes specify not only the drug but also the manufacturer, the form and the strength of a drug. There can be many NDC codes for an individual drug name, particularly for generic drugs with multiple manufacturers.

To select the top third of drugs for each population group, we chose to rank drugs by number of prescriptions at the drug name level. Before doing this, we cleaned drug names in MEPS to make them more consistent, and to remove any differentiation between forms and strengths that were included in the reported drug name (e.g., amoxil and amoxil bubblegum).

We considered but rejected the option of using NDC codes to rank-order the drugs. Because generic drugs have multiple manufacturers as well as multiple strengths, the use of any one generic drug is diluted across many different NDCs. Ranking by NDCs would disproportionately place brand-name drugs in the top third of utilization. In addition, the number of observations at the NDC level is much smaller than the number of observations at the drug name level. This makes it more likely that drugs could make it into the top third by random chance.

Selecting Population Groups

Using the top-ranked drug names that add up to one third of total prescriptions for that group, we ran correlations among the drugs that were common to any two subpopulations. Where correlations are not high, it suggests that two subpopulations are using a substantially different set of drugs. Overall, we found that age groups provided the most diverse set of drugs. In other words, the drugs used by children are different from those used by middle-aged individuals, which are in turn different from those used by seniors. For the other variables we tested, the differences were generally less striking.

Age

We divided the population into six age categories: under 12, 12 to 24, 25 to 39, 40 to 54, 55 to 64, and 65 and up. In general, there was relatively high correlation between adjoining age categories – and lower correlations as the age separation became greater.

Figure A-1. Rank Order Correlation of Drugs Used, by Age Group

	Under 12	**12-24**	**25-39**	**40-54**	**55-64**	**65 and up**
Under 12						
12-24	0.77					
25-39	0.25	0.50				
40-54	-0.23	-0.34	0.09			
55-64	-0.31	-0.48	-0.17	0.83		
65 and up	-0.38	-0.53	-0.29	0.58	0.81	

Based on these correlations, we used age as a primary basis for our market baskets. We combined two age groups (40-54 and 55-64) since their correlation is quite high (0.83). The correlation between the 55-64 and the over 65 group is also high, but because the latter group is mostly covered by Medicare, we kept it as a separate group. We also considered combining the two youngest groups. However, because further examination suggests that the under 12 group often uses different forms of drugs (e.g., liquids instead of tablets or capsules), we kept this group as a separate market basket.

Sex

The pattern of drug use between males and females was moderately correlated (0.61). There are biologically driven differences between some of the drugs used by males versus those used by females. For example, the market baskets for women of childbearing age include multiple birth control pills. As a result, we divided all the age groups described above into separate market baskets for males and females.

Race

We established four race categories: Non-Hispanic White, African American, Hispanic, and Other. The correlations among the patterns of drug utilization for these groups were only modest.

Figure A-2. Rank Order Correlation of Drugs Used, by Race

	White	African American	Hispanic	Other
White				
African American	0.46			
Hispanic	0.55	0.46		
Other	0.64	0.43	0.81	

Based on these results, we created three market baskets: one based on the utilization of the African American population, one based on the Hispanic population, and one based on the non-Hispanic white population. The "other" race group is too small to provide reliable estimates (and is relatively highly correlated with the Hispanic group).

Income

We divided the population into five income groups. Generally, drug use for the four lowest groups was fairly highly correlated. The one outlier group is the high-income population. We did not use this group as a separate market basket.

Figure A-3. Rank Order Correlation of Drugs Used, by Income

	Poor	Near poor	Low	Medium	High
Poor					
Near poor	0.90				
Low	0.83	0.78			
Medium	0.74	0.81	0.86		
High	0.44	0.59	0.58	0.85	

Insurance Status

We created five categories of insurance status: (1) Uninsured (not covered by insurance during the year); (2) Private insurance (covered by private insurance during the entire year); (3) Medicare (covered by Medicare during the entire year); (4) Medicaid (covered by Medicaid during the entire year); and (5) Medicaid/other (covered by Medicaid during the entire year and also covered by some other insurance for at least part of the year). The patterns of drug use are only moderately correlated across these categories. The most distinct pattern is for those who are uninsured, presumably because they cannot afford some of the more expensive drugs and because their health needs are different. We created two market baskets based on these groups: one for people who had drug insurance all year, and one for people who did not have drug insurance for any part of the year.

Figure A-4. Rank Order Correlation of Drugs Used, by Insurance Status

	Uninsured	Private	Medicare	Medicaid	Medicaid/other
Uninsured					
Private	0.37				
Medicare	0.21	0.67			
Medicaid	0.43	0.46	0.48		
Medicaid/other	0.12	0.60	0.79	0.65	

Health Indicators

We chose two health indicators as possible influences on drug use: obesity and smoking. For each indicator, the sets of drugs used are similar across the two categories. Drugs used by those who are obese are highly correlated (0.87) with drugs utilization by the non-obese. The correlation of drug use between smokers and non-smokers is nearly as high (0.79). As a result, we did not create any market baskets based on these groupings.

Population Groups

Based on the above analysis, we created 15 market baskets:

- Females under 12
- Females 12-24
- Females 25-39
- Females 40-64
- Females 65+
- Males under 12
- Males 12-24
- Males 25-39
- Males 40-64
- Males 65+
- Insured
- Uninsured
- Whites
- African Americans
- Hispanics

The resulting market baskets each included from 8 to 32 drugs. We have included the list of drugs that make up the market basket for each of these groups at the end of this appendix. In addition, we have included a consolidated list of all 106 drugs included in any market basket, with a count of the market baskets in which each drug is included.

Working with Price Data

For each market basket, we identified prices for the most common form and strength of each drug. Identifying prices in Canada required a matching process to ensure that we found prices for the drug a U.S. consumer would find as the closest match for his or her drug. We then calculated a per-prescription weighted average price for each market basket. This section provides more detail on this process.

Matching Drug Names to Prices

Although utilization can be summarized at the drug name level, price varies by form, strength, and manufacturer. Even when two population groups have the same drug name in their market baskets, they will often have different usage patterns for that drug. For example, many drugs have different dosage recommendations for children and the elderly. In addition, children are more likely than other populations to use drugs in a liquid form.

We identified the form and strength most commonly used by each population group for each drug in a market basket. IMS then extracted all retail prescription transactions occurring in Oct-Dec 2005 for all NDC codes associated with that form and strength of the drug for which valid price and quantity information was reported. We used these data to calculate an average price per pill (or, for drugs that are not in pill form, the price per unit), defined as summed price across all dispensed prescription transactions divided by summed quantity.

We then converted these per-unit prices into per-prescription prices, in order to standardize across different drugs that have different numbers of pills or other units per prescription. To do this, we used MEPS to determine the median number of pills (or other units) in a prescription for the selected form and strength of each drug for each population group. We then multiplied the price per unit by the median units per prescription to arrive at a standardized per-prescription price.

In the case of drugs sold in inhalers, we did not use this standardization process. Instead, we defined the per-prescription price as summed price across all dispensed prescription transactions divided by total number of dispensed prescriptions.

Matching with Canadian Drugs

We have tried to assure that the match between our U.S. market baskets and Canadian market baskets is as close as possible, while still representing the utilization of the population groups we identified. In the majority of cases, we were able to find an exact match by drug name, form, and strength between the United States and Canada. There are four general categories of cases for which that was not possible: 1) Drugs sold under a different name in Canada; 2) Drugs with

different brand/generic status; 3) Drugs sold in different dosages or release forms; and 4) drugs not marketed in Canada.

Drugs sold under a different name

We first looked for an exact match by drug name, form, and strength between the United States and Canada. When an exact match by drug name was not available in Canada, we looked to match drugs by chemical entity, brand-name status, and in the case of brand name drugs, by manufacturer. Figure A-5 shows the seven brand name drugs that match by all factors except trade name.

Figure A-5. On-Patent Drugs with Same Manufacturers but Different Names

Chemical ingredient	U.S. Product (from MEPS)	Canadian Product
Amoxicillin and clavulanate potassium	Augmentin	Clavulin
Desloratadine	Clarinex	Aerius
Divalproex sodium	Depakote	Epival
Ethinyl estradiol and norelgestromin	Ortho-Evra	Evra
Ethinyl estradiol and norethindrone	Ortho-Novum	Ortho 1/35
Escitalopram	Lexapro	Cipralex
Certirizine	Zyrtec	Reactine[6]

For six generic drugs and branded generics, we were able to find a Canadian match with the same active ingredient but with different names and manufacturers. Figure A-6 shows the Canadian products we used as matches for these drugs.

Figure A-6. Generic Drugs with Different Names and Manufactures in the U.S. and Canada

Chemical ingredient	U.S. Product (from MEPS)	Canadian Product
Albuterol	Albuterol	Salbutamol[7]
Spironolactone	Spironolactone	Novo-Spiraton
Ethinyl estradiol and desogestrel	Apri	Ortho-cept
Ethinyl estradiol and norethindrone	Necon	Brevicon, Loestrin, Minestrin[8]
Amoxicillin	Trimox	Amoxicillin
Levothyroxine	Levoxyl	Eltroxin[9]

[6] Reactine is available over-the-counter in Canada.
[7] Salbutamol sulfate is the name recommended by the World Health Organization for the drug known as Albuterol sulfate in the U.S.
[8] These three drugs all have the same ingredients as Necon and all have very similar prices in Canada. We propose to use a simple average of their prices.
[9] In the United States, branded generic versions of levothyroxine include Levoxyl, Unithroid, Levo-T, Levolet, and Novothyrox. In the United States, Levoxyl is the only one common enough to appear in our market baskets. In

We consider all of these matches to be extremely close matches that are equivalent across the two countries' market baskets.

Drugs with different generic status

We found one drug that is available as a generic in the United States and not in Canada: Enalapril. For this drug, we kept the generic version in the U.S. market baskets, but substituted the brand-name equivalent (Vasotec) in the Canadian market baskets. This is a less equivalent match than the cases describe above, because generics and brand drugs tend to have different pricing strategies within each country, and price comparisons between the two countries behave differently for brands and generics. Specifically, the ratio between the Canadian price and the U.S. price tends to be higher for generics than for brands. However, because Vasotec is the closest possible match that a U.S. consumer would find if they looked for Enalapril in Canada, we believe using it is the best strategy in this case. This drug is included in one market basket.

In MEPS, all insulin appears to be labeled as insulin, regardless of manufacturer. We have used Humulin to represent insulin in both the U.S. and Canadian market baskets.

Drugs sold in different dosages or release forms

There were several drugs on our list at a dosage level not available in Canada. When possible, we used another dosage level that is available in both countries as a substitute in both the U.S. and Canada market baskets.

For the five cases shown in Figure A-7, we were able to substitute the same dosage levels for both U.S. and Canadian market baskets.

Figure A-7. Dosage Levels Substituted in U.S. and Canadian Market Baskets

Drug	Original Strength as determined by MEPS (not available in Canada; not used in either market basket)	Substitution Strength (both U.S. and Canada)	Market Baskets Affected
Allegra	180 mg	60 mg	10
Ibuprofen	800 mg	600 mg	2
Levoxyl/Eltroxin	0.125 mg	0.15 mg	1
Prednisone	10 mg	5 mg	5
Prednisone	20 mg	50 mg	1

Canada, versions of levothyroxine include Euthyrox, Eltroxin, and Levo-T. Eltroxin is the most commonly used of these three Canadian drugs.

For four drugs, there is no dosage that is available in both countries. For these drugs, we used the original strength in the U.S. market baskets and substituted the closest strength available in Canada in the Canadian market baskets, as shown in Figure A-8.

Figure A-8. Dosage Levels Substituted in Canadian Market Baskets Only

Drug	Original Strength as determined by MEPS (not available in Canada; used in U.S. market basket)	Substitution Strength (only in Canada)	Market Baskets Affected
Amoxil	400 mg/5ml	250mg/5ml	1
Flonase	.05%	50 mcg	5
Flovent	44 mcg	50 mcg	1
Albuterol	90 mcg	100 mcg	14

In general, the relationship between dosage and price is not linear. That is, the price of a single 100 mg pill is rarely equal to the price of two 50 mg pills of the same drug. The differences in dosage for these drugs should not substantially affect the price comparisons between the two countries. Again, if a U.S. consumer were looking for these drugs, these dosages are the options they would have in Canada.

Drugs not available in Canada

There were five drugs on our list from the United States that are not available in Canada: Toprol XL, Glucotrol, hydrocodone with acetaminophen, Lotrel, and Vicodin. We propose dropping all of these drugs except Toprol XL from the U.S. market baskets because no close match is available. In addition, we propose dropping Softclix, a testing device that was listed in the MEPS drug data that is not available in Canada. An alternative would be to include the U.S. price in the Canadian market basket, because consumers seeking these drugs would have to buy them in the United States. This strategy would decrease any potential differences between the two market baskets. In the case of Toprol XL (metoprolol succinate), we have substituted Lopressor SR (metoprolol tartrate) in the Canadian market baskets.

Figure A-9. Drugs Not Available in Canada

Drug or Device	Market Baskets Affected
Toprol XL	9
Glucotrol	1
Hydrocodone and Acetaminophen	3
Lotrel	2
Vicodin	1
Softclix	10

Weighting

The process outlined above provides a representative price per prescription for each drug name in a population group's market basket. We then combined these prices into a single index value for each market basket. We calculated each population group's index as the average price per prescription, weighted by the volume of prescriptions for that group, as determined by MEPS data.

Because the research question for this project concerns the prices that U.S. customers would pay if they bought their drugs in Canada, we used these U.S.-based volume weights for both U.S. prices and Canadian prices.

Currency conversion

To convert Canadian prices into U.S. dollars, we used the average exchange rate for the fourth quarter of 2005, which was $1.1732 Canadian for $1.00 U.S..[10] Because the focus of this project is on the prices that U.S. customers would face in Canada, we did not consider using purchasing power parity or other measures that would better represent the cost of Canadian drugs to Canadian consumers.

Sensitivity to Drug Substitutions

To explore the sensitivity of our results to the substitution we made in the market baskets, we calculated what the differences between U.S. and Canada prices would have been if we had excluded two drugs: Zyrtec and Toprol XL. Zyrtec is a on on-patent prescription drug in the United States that is available over-the-counter in Canada as Reactine, and Toprol XL is a drug for which we used a close substitute, Lopressor SR, as the Canadian match.

In all market baskets, excluding these two drugs makes the difference between the two countries' prices smaller. In thirteen of the fifteen market baskets, the difference is 2.2 percentage points or less (regardless of payer). The exception is the market baskets for children under 12. Because children take fewer drugs, these market baskets are smaller than the other market baskets – the lists of the top third of drugs include just ten drugs for girls and eight drugs for boys. Zyrtec accounts for about a tenth of the prescriptions included in each of these market baskets, and its exclusion gives generic drugs a larger share of each market basket. The exclusion of Zyrtec causes the average U.S. price per prescription for these market baskets to fall by about three dollars (6 to 10 percent), while the average Canadian price per prescription rises slightly (1 to 4 percent). The result is a larger drop in the relative difference between U.S. and Canadian prices for these two market baskets. This is particularly notable for prescriptions purchased with third party coverage, where the difference between the United States and Canada falls to 21.5 percent for girls and 23.5 percent for boys.

[10] http://www.bankofcanada.ca/en/rates/exchange.html

Figure A-10. Sensitivity of Difference Between U.S. and Canadian Price to Inclusion of Zyrtec and Toprol XL

	With Third-Party Coverage		Without Third-Party Coverage	
	Including Toprol, Zyrtec	Excluding Toprol, Zyrtec	Including Toprol, Zyrtec	Excluding Toprol, Zyrtec
Females under 12	-30.1%	-21.5%	-46.9%	-41.5%
Females 12-24	-39.9%	-38.6%	-49.5%	-48.4%
Females 25-39	-47.0%	-46.0%	-55.0%	-54.1%
Females 40-64	-40.9%	-39.5%	-48.7%	-47.4%
Females 65+	-37.3%	-36.0%	-44.0%	-42.7%
Males under 12	-31.0%	-23.5%	-46.3%	-41.1%
Males 12-24	-33.4%	-31.5%	-44.7%	-43.1%
Males 25-39	-42.1%	-40.8%	-50.9%	-49.7%
Males 40-64	-35.9%	-34.8%	-43.9%	-42.9%
Males 65+	-30.6%	-29.0%	-38.9%	-37.4%
Insured	-40.3%	-38.7%	-48.4%	-46.9%
Uninsured	-31.4%	-29.9%	-40.6%	-39.3%
White	-39.0%	-37.1%	-47.2%	-45.4%
African Americans	-34.9%	-32.9%	-43.3%	-41.5%
Hispanics	-33.6%	-31.3%	-44.2%	-42.3%
mean	-36.5%	-34.1%	-46.2%	-44.2%
median	-35.9%	-34.8%	-46.3%	-42.9%

Figure A-11. Zyrtec And Toprol XL as Share of Utilitzation Included in Market Baskets

	Zyrtec	Toprol XL
F 12U	9.4%	-
F 12-24	3.2%	-
F 25-39	3.6%	-
F 40-64	2.3%	2.8%
F 65+	-	4.9%
M 12U	10.7%	-
M 12-24	6.0%	-
M 25-39	5.3%	-
M 40-64	-	4.8%
M 65+	-	4.6%
Insured	2.9%	3.1%
Uninsured	-	3.9%
White	2.5%	3.7%
African Americans	2.6%	2.6%
Hispanics	2.2%	2.1%

Changes in Drug Use Since 2003

The MEPS data we used are from 2003. Because there are so many ongoing changes in the market, and because more recent data are not available for all the specific subpopulations, it is impossible to thoroughly update our sample to reflect current drug utilization. Rather than tinkering with some drugs and leaving others untouched, we kept utilization as-is in the MEPS data. The exception is drugs that are no longer on the market. We removed one off-market drug, Vioxx, from our market baskets and adjusted weights accordingly.

Figure A-12 gives a snapshot of how rankings changed in IMS data for the most popular drugs from 2003 to 2005. Our market baskets include most of these top drugs -- 18 of the 20 top drugs in 2005, and 19 of the top 20 drugs in 2003. Levothyroxine is one top 20 drug in 2005 that is not in any of our market baskets. It was not on the top 20 in 2003, and in fact saw nearly 200 percent growth in utilization between 2004 and 2005 alone. Because of this recent rapid growth, it seems reasonable that levothyroxine was not in the top third of prescriptions for any of our groups in 2003.

Ambien is the one drug on both years' top 20 lists that is not in any of our market baskets. Utilization for Ambien was not high enough to be included in the top third of drugs for any single population group in the 2003 MEPS data.

Figure A-12. Top 20 Drugs in 2003 and 2005

2005 Rank	2003 Rank	Product	Market Baskets Including this Drug
1	1	Lipitor	10
2	3	Hydrocodone and Acetaminophen (Mallinckrodt)	3
3	4	Norvasc	9
4	6	Toprol-XL	9
5	2	Synthroid	11
6	5	Zoloft	7
7	7	Hydrocodone and Acetaminophen (Watson)	3
8	10	Amoxicillin	9
9	>20	Lexapro	2
10	11	Albuterol	14
11	8	Zocor	9
12	>20	Nexium	6
13	>20	Levothyroxine	0
14	18	Ambien	0
15	>20	Singulair	7
16	9	Prevacid	8
17	>20	Plavix	2
18	12	Zithromax Z-Pak	11
19	19	Fosamax	4
20	14	Zyrtec	11
>20	13	Premarin	7
>20	15	Atenolol	10
>20	16	Levoxyl	8
>20	17	Celebrex	9
>20	20	Allegra	10

Source: IMS 2003a and IMS 2005.

Prescriptions vs. Spending

We used the number of prescriptions for each drug in each population group to determine the most popular drugs and to weight the results. We selected this measure because we wanted our market baskets to include both inexpensive and expensive drugs, as long as they were widely used. Another option would have been to use total spending for each drug. Our concern was that this would skew our sample to include more costly drugs, with disproportionately large price differences.

Figure A-13 gives an illustrative example of how spending-based market baskets might differ from our utilization-based market baskets. Of the 20 drugs that had the most prescriptions in the United States in 2003, over half were not on the list of the top 20 drugs with the highest spending, and vice versa. However, many of the drugs on the highest spending list were still included in at least one market basket. The exceptions are Epogen, Oxycontin, Procrit, Protonix, and Zyprexa.

Figure A-13. Top 20 Drugs in 2003, by Prescriptions and Spending

Rank by Prescriptions	Rank by Spending	Product	Market Baskets
1	1	Lipitor	10
2	>20	Synthroid	11
3	>20	Hydrocodone and Acetaminophen (Mallinckrodt)	*
4	13	Norvasc	9
5	8	Zoloft	7
6	>20	Toprol-XL	9
7	>20	Hydrocodone and Acetaminophen (Watson)	*
8	2	Zocor	9
9	3	Prevacid	8
10	>20	Amoxicillin	9
11	>20	Albuterol	14
12	>20	Zithromax Z-Pak	11
13	>20	Premarin	7
14	>20	Zyrtec	11
15	>20	Atenolol	10
16	>20	Levoxyl	7
17	9	Celebrex	9
18	>20	Ambien	0
19	18	Fosamax	4
20	>20	Allegra	10
>20	11	Advair Diskus	5
>20	14	Effexor XR	6
>20	6	Epogen	0
>20	10	Neurontin	2
>20	7	Nexium	6
>20	17	Oxycontin	0
>20	12	Plavix	2
>20	15	Pravachol	4
>20	4	Procrit	0
>20	19	Protonix	0
>20	16	Risperdal	1
>20	20	Vioxx	N/A
>20	5	Zyprexa	0

Source: IMS 2003a and IMS 2003b.

*Hydrocodone and Acetaminophen was dropped from the study because it is not available in Canada.

Payer Type and Retail vs. Total Price

This project is more detailed than many in our literature review because of our ability to collect data by payer type. This allows for a level of standardization that is rare in many comparable studies. It does not allow us, however, to look at total price for cases with third party payers. There are likely additional transactions between manufacturers and third party payers, such as rebates, that affect total price but that are not reflected in our data.

The prescriptions identified in this paper as having third-party coverage are those for which a customer had some sort of third party involvement at the pharmacy counter. These transactions include customers who presented an insurance card at the time of the transaction. They also include customers using discount cards. Although these customers do not receive insurance coverage for their prescription drugs, they have access to negotiated discounts that make their prices similar to the prices paid for drugs that are covered by insurance.

The prescriptions identified in this report as being without third-party coverage are those for which a customer did not have third-party involvement at the pharmacy counter. While we expect that most of these customers do not have insurance, it is possible that some have indemnity-type insurance. These customers may be paying the full cost of drugs out-of-pocket at the drugstore, but submitting receipts for reimbursement. However, without the involvement of an insurer at the time of the transaction, the full price paid for these prescriptions is not discounted.

Market Baskets

Figure A-13. Market Basket for Females Under 12

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.162
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		LIQ	250/5			0.252
AMOXIL	Off Patent Originator		LIQ	400/5		250/5	0.058
AUGMENTIN	Off Patent Originator	Clavulin	LIQ	400/5			0.064
CONCERTA	Off Patent Non-Originator Trademark		TAB	18			0.042
FLOVENT	On Patent		INH	44		50	0.043
SINGULAIR	On Patent		ORA	4			0.080
TRIMOX	Off Patent Non-Originator Trademark	Amoxicillin	LIQ	250/5			0.042
ZITHROMAX	Off Patent Originator		LIQ	200/5			0.163
ZYRTEC	On Patent	Reactine	TAB	10			0.094

Figure A-14. Market Basket for Females 12-24

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ADVAIR	On Patent		DSK	100/50			0.038
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.085
ALESSE	Off Patent Originator		TAB	0.02/0.1			0.035
ALLEGRA	On Patent		TAB	180	60	60	0.062
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		CAP	500			0.091
APRI	Off Patent Non-Originator Trademark	Ortho-Cept	TAB	0.15/0.03			0.035
PLAN B	On Patent		TAB	0.75			0.054
CELEXA	Off Patent Originator		TAB	20			0.043
FLONASE	On Patent		INH	0.05%		50 Mcg	0.032
IBUPROFEN	Off Patent Non-Originator Non-Trademark		TAB	600			0.031
ORTHO EVRA	On Patent	Evra	TDM	20/150/24			0.031
ORTHO TRI-CYCLEN	On Patent		TAB	-9			0.224
PAXIL	On Patent		TAB	20			0.038
SINGULAIR	On Patent		TAB	10			0.037
ZITHROMAX	Off Patent Originator		TAB	250			0.076
ZOLOFT	On Patent		TAB	50			0.057
ZYRTEC	On Patent	Reactine	TAB	10			0.032

Figure A-15. Market Basket for Females 25-39

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.062
ALLEGRA	On Patent		TAB	180	60	60	0.060
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		CAP	500			0.034
APRI	Off Patent Non-Originator Trademark	Ortho-Cept	TAB	0.15			0.041
PLAN B	On Patent		TAB	0.75			0.042
CELEXA	Off Patent Originator		TAB	20			0.027
EFFEXOR	On Patent		TAB	75			0.032
FLONASE	On Patent		INH	0.05%		50 Mcg	0.033
IBUPROFEN	Off Patent Non-Originator Non-Trademark		TAB	800	600	600	0.028
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.15			0.029
LEXAPRO	On Patent	Cipralex	TAB	10			0.028
NECON	Off Patent Non-Originator Trademark	Brevicon, Loestrin, Minestrin	TAB	35/1			0.029
ORTHO EVRA	On Patent	Evra	TDM	20/150/24			0.027
ORTHO TRI-CYCLEN	On Patent		TAB	-9			0.131
ORTHO-NOVUM	Off Patent Originator	Ortho 1/35	TAB	1/35			0.038
PAXIL	On Patent		TAB	20			0.051
PREDNISONE	Off Patent Non-Originator Non-Trademark		TAB	10	5	5	0.025
SYNTHROID	Off Patent Originator		TAB	0.075			0.085
WELLBUTRIN	Off Patent Originator		TAB	150			0.029
YASMIN	On Patent		TAB	3/0.03			0.039
ZITHROMAX	Off Patent Originator		TAB	250			0.049
ZOLOFT	On Patent		TAB	100			0.043
ZYRTEC	On Patent	Reactine	TAB	10			0.036

Figure A-16. Market Basket for Females 40-64

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.030
ALLEGRA	On Patent		TAB	180	60	60	0.037
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.046
CELEBREX	On Patent		CAP	200			0.030
CELEXA	Off Patent Originator		TAB	20			0.026
EFFEXOR	On Patent		CAP	150			0.029
FLUOXETINE	Off Patent Non-Originator Non-Trademark		CAP	20			0.024
FOSAMAX	On Patent		TAB	70			0.027
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.023
GLUCOPHAGE	Off Patent Originator		TAB	500			0.025
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.044
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.1			0.033
LIPITOR	On Patent		TAB	10			0.082
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.032
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.024
NEURONTIN	On Patent		CAP	300			0.023
NEXIUM	On Patent		CAP	40			0.027
NORVASC	On Patent		TAB	5			0.032
PAXIL	On Patent		TAB	20			0.034
PREMARIN	Off Patent Originator		TAB	0.625			0.077
PREVACID	On Patent		CAP	30			0.034
SOFTCLIX	On Patent	Not Included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.090
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.028
TRAZODONE	Off Patent Non-Originator Non-Trademark		TAB	50			0.022
ZITHROMAX	Off Patent Originator		TAB	250			0.027
ZOCOR	On Patent		TAB	20			0.030
ZOLOFT	On Patent		TAB	100			0.042
ZYRTEC	On Patent	Reactine	TAB	10			0.023

Figure A-17. Market Basket for Females 65+

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.061
CELEBREX	On Patent		CAP	200			0.040
DIOVAN	On Patent		TAB	160			0.037
EVISTA	On Patent		TAB	60			0.024
FOSAMAX	On Patent		TAB	70			0.066
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.078
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.054
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.1			0.037
LIPITOR	On Patent		TAB	10			0.099
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.049
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.026
METOPROLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.038
NORVASC	On Patent		TAB	5			0.068
PLAVIX	On Patent		TAB	75			0.031
PREMARIN	Off Patent Originator		TAB	0.625			0.048
PREVACID	On Patent		CAP	30			0.026
SOFTCLIX	On Patent	Not included					
SPIRONOLACTONE	Off Patent Non-Originator Non-Trademark	Novo-Spiroton	TAB	25			0.025
SYNTHROID	Off Patent Originator		TAB	0.1			0.086
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.049
ZOCOR	On Patent		TAB	20			0.058

Figure A-18. Market Basket for Males Under 12

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ADDERALL	Off Patent Non-Originator Trademark		TAB	10			0.056
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.214
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		LIQ	250/5			0.203
AUGMENTIN	Off Patent Originator	Clavulin	LIQ	400/5			0.055
CONCERTA	Off Patent Non-Originator Trademark		TAB	18			0.094
SINGULAIR	On Patent		ORA	5			0.144
ZITHROMAX	Off Patent Originator		LIQ	200/5			0.127
ZYRTEC	On Patent	Reactine	TAB	10			0.107

Figure A-19. Market Basket for Males 12-24

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ADDERALL	Off Patent Non-Originator Trademark		CAP	30			0.094
ADVAIR	On Patent		DSK	100/50			0.041
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.100
ALLEGRA	On Patent		TAB	180	60	60	0.089
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		CAP	500			0.078
CLARINEX	On Patent	Aerius	TAB	5			0.037
CONCERTA	Off Patent Non-Originator Trademark		TAB	54			0.101
EFFEXOR	On Patent		TAB	75			0.061
MINOCYCLINE	Off Patent Non-Originator Non-Trademark		CAP	100			0.047
NASONEX	On Patent		INH	50			0.047
RISPERDAL	On Patent		TAB	0.5			0.065
SINGULAIR	On Patent		TAB	10			0.052
STRATTERA	On Patent		CAP	40			0.043
ZITHROMAX	Off Patent Originator		TAB	250			0.083
ZYRTEC	On Patent	Reactine	TAB	10			0.060

Figure A-20. Market Basket for Males 25-39

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ACETAMINOPHEN HYDROCODONE	Off Patent Originator	Not on market					
ADVAIR	On Patent		DSK	100/50			0.038
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.047
ALLEGRA	On Patent		TAB	180	60	60	0.094
ALLOPURINOL	On Patent	Dropped due to small sample size.					
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		CAP	500			0.052
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.036
CELEBREX	On Patent		CAP	200			0.026
CLARITIN	Off Patent Originator		LIQ	10/10			0.033
DEPAKOTE	Off Patent Originator	Epival	TAB	500			0.039
EFFEXOR	On Patent		TAB	75			0.027
FLONASE	On Patent		INH	0.05%		50 Mcg	0.035
IBUPROFEN	Off Patent Non-Originator Non-Trademark		TAB	800	600	600	0.037
LEVOXYL	Off Patent Non-Originator Trademark	Dropped due to small sample size.					
LEXAPRO	On Patent	Cipralex	TAB	10			0.040
LIPITOR	On Patent		TAB	10			0.066
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.035
NEURONTIN	On Patent		TAB	600			0.033
NEXIUM	On Patent		CAP	40			0.063
PAXIL	On Patent		TAB	20			0.047
ROXICODONE	On Patent	Dropped due to small sample size.					
SOFTCLIX	On Patent	Not Included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.045
VICODIN	Off Patent Non-Originator Trademark	Not on market					
WELLBUTRIN	Off Patent Originator		TAB	150			0.031
ZITHROMAX	Off Patent Originator		TAB	250			0.069
ZOLOFT	On Patent		TAB	50			0.053
ZYRTEC	On Patent	Reactine	TAB	10			0.053

Figure A-21. Market Basket for Males 40-64

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ACCUPRIL	Off Patent Originator		TAB	20			0.026
ACETAMINOPHEN HYDROCODONE	Off Patent Originator	Not on market					
ACTOS	On Patent		TAB	45			0.026
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.028
ALLEGRA	On Patent		TAB	180	60	60	0.030
ALPRAZOLAM	Off Patent Non-Originator Non-Trademark		TAB	0.5			0.025
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.061
CELEBREX	On Patent		CAP	200			0.024
DIOVAN	On Patent		TAB	80			0.027
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.028
GLUCOPHAGE	Off Patent Originator		TAB	500			0.029
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.054
LIPITOR	On Patent		TAB	10			0.162
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.068
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.037
METOPROLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.029
NEXIUM	On Patent		CAP	40			0.036
NORVASC	On Patent		TAB	5			0.050
PAXIL	On Patent		TAB	20			0.026
PRAVACHOL	On Patent		TAB	40			0.032
PREVACID	On Patent		CAP	30			0.034
RANITIDINE	Off Patent Non-Originator Non-Trademark		TAB	150			0.027
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.112			0.023
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.048
VIOXX	Off Patent Non-Originator Trademark		TAB	25			0.000
ZOCOR	On Patent		TAB	20			0.070

Figure A-22. Market Basket for Males 65+

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.029
ASPIRIN	Off Patent Non-Originator Non-Trademark		TAB	325			0.028
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.075
COUMADIN	Off Patent Originator		TAB	5			0.042
DOXAZOSIN	Off Patent Non-Originator Non-Trademark		TAB	2			0.038
FLOMAX	On Patent		CAP	0.4			0.039
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.080
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.053
LIPITOR	On Patent		TAB	10			0.113
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.088
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.028
METOPROLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.047
NORVASC	On Patent		TAB	10			0.046
PLAVIX	On Patent		TAB	75			0.034
PRAVACHOL	On Patent		TAB	40			0.033
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.032
TERAZOSIN	Off Patent Non-Originator Non-Trademark		CAP	5			0.033
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.046
WARFARIN	Off Patent Non-Originator Non-Trademark		TAB	5			0.039
ZOCOR	On Patent		TAB	20			0.077

Figure A-23. Market Basket for Insured

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ADVAIR	On Patent		DSK	100/50			0.022
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.064
ALLEGRA	On Patent		TAB	180	60	60	0.037
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		CAP	500			0.031
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.045
CELEBREX	On Patent		CAP	200			0.025
EFFEXOR	On Patent		CAP	150			0.021
FLONASE	On Patent		INH	0.05%		50 Mcg	0.020
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.029
GLUCOPHAGE	Off Patent Originator		TAB	500			0.021
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.037
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.1			0.024
LIPITOR	On Patent		TAB	10			0.093
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.041
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.023
NEXIUM	On Patent		CAP	40			0.025
NORVASC	On Patent		TAB	5			0.036
ORTHO TRI-CYCLEN	On Patent		TAB	-9			0.021
PAXIL	On Patent		TAB	20			0.027
PRAVACHOL	On Patent		TAB	40			0.019
PREDNISONE	Off Patent Non-Originator Non-Trademark		TAB	10			0.019
PREMARIN	Off Patent Originator		TAB	0.625			0.034
PREVACID	On Patent		CAP	30			0.030
SINGULAIR	On Patent		TAB	10			0.025
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.060
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.031
VIOXX	Off Patent Non-Originator Trademark		TAB	25			0.000
ZITHROMAX	Off Patent Originator		TAB	250			0.037
ZOCOR	On Patent		TAB	20			0.042
ZOLOFT	On Patent		TAB	100			0.030
ZYRTEC	On Patent	Reactine	TAB	10			0.029

Figure A-24. Market Basket for Uninsured

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ACCUPRIL	Off Patent Originator		TAB	20			0.021
ACETAMINOPHEN HYDROCODONE	Off Patent Originator	Not on market					
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.041
ALPRAZOLAM	Off Patent Non-Originator Non-Trademark		TAB	0.25			0.024
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.057
CELEBREX	On Patent		CAP	200			0.023
DIOVAN	On Patent		TAB	160			0.029
FOSAMAX	On Patent		TAB	70			0.027
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.064
GLYBURIDE	Off Patent Non-Originator Non-Trademark		TAB	5			0.027
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.060
HUMULIN	Off Patent Non-Originator Non-Trademark		INJ	100			0.033
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.05			0.030
LIPITOR	On Patent		TAB	10			0.076
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.057
LOTREL	Off Patent Non-Originator Non-Trademark	Not on market					
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.030
METOPROLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.051
NORVASC	On Patent		TAB	10			0.049
PAXIL	On Patent		TAB	20			0.023
PREDNISONE	Off Patent Non-Originator Non-Trademark		TAB	10			0.028
PREMARIN	Off Patent Originator		TAB	0.625			0.034
PREVACID	On Patent		CAP	30			0.023
RANITIDINE	Off Patent Non-Originator Non-Trademark		TAB	150			0.029
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.061
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.039
ZOCOR	On Patent		TAB	20			0.043
ZOLOFT	On Patent		TAB	50			0.022

Figure A-25. Market Basket for Non-Hispanic Whites

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.032
ALLEGRA	On Patent		TAB	180	60	60	0.034
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		CAP	500			0.028
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.048
CELEBREX	On Patent		CAP	200			0.025
DIOVAN	On Patent		TAB	80			0.021
EFFEXOR	On Patent		CAP	75			0.022
FLONASE	On Patent		INH	0.05%		50 Mcg	0.019
FOSAMAX	On Patent		TAB	70			0.025
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.040
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.037
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.1			0.027
LIPITOR	On Patent		TAB	10			0.095
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.044
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.020
METOPROLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.025
NEXIUM	On Patent		CAP	40			0.024
NORVASC	On Patent		TAB	5			0.035
ORTHO TRI-CYCLEN	On Patent		TAB	-9			0.021
PAXIL	On Patent		TAB	20			0.029
PREDNISONE	Off Patent Non-Originator Non-Trademark		TAB	10			0.020
PREMARIN	Off Patent Originator		TAB	0.625			0.035
PREVACID	On Patent		CAP	30			0.028
RANITIDINE	Off Patent Non-Originator Non-Trademark		TAB	150			0.019
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.071
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.037
VIOXX	Off Patent Non-Originator Trademark		TAB	25			0.000
ZITHROMAX	Off Patent Originator		TAB	250			0.033
ZOCOR	On Patent		TAB	20			0.047
ZOLOFT	On Patent		TAB	100			0.031
ZYRTEC	On Patent	Reactine	TAB	10			0.025

Figure A-26. Market Basket for African Americans

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ADVAIR	On Patent		DSK	100/50			0.026
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.075
ALLEGRA	On Patent		TAB	180	60	60	0.024
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.053
CELEBREX	On Patent		CAP	200			0.023
CLONIDINE	Off Patent Non-Originator Non-Trademark		TAB	0.2			0.027
DIOVAN	On Patent		TAB	160			0.031
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.063
GLUCOPHAGE	Off Patent Originator		TAB	500			0.035
GLUCOTROL	Off Patent Originator	Not on market					
HUMULIN	Off Patent Originator		LIQ	100			0.022
HUMULIN	Off Patent Non-Originator Non-Trademark		INJ	100			0.032
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.087
LIPITOR	On Patent		TAB	10			0.069
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.050
LOTREL	Off Patent Non-Originator Non-Trademark	Not on market					
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.030
NORVASC	On Patent		TAB	10			0.081
PRAVACHOL	On Patent		TAB	40			0.030
PREDNISONE	Off Patent Non-Originator Non-Trademark		TAB	10			0.024
PREMARIN	Off Patent Originator		TAB	0.625			0.024
PREVACID	On Patent		CAP	30			0.028
SINGULAIR	On Patent		TAB	10			0.032
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.025
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.026
ZITHROMAX	Off Patent Originator		TAB	250			0.024
ZOCOR	On Patent		TAB	20			0.033
ZYRTEC	On Patent	Reactine	TAB	10			0.026

Figure A-27. Market Basket for Hispanics

Drug Name	Status	Substitute In Canada	Most Common Form And Strength		Strength Substituted In U.S.	Strength Substituted In Canada	Weight
ALBUTEROL	Off Patent Non-Originator Non-Trademark	Salbutamol	INH	90		100	0.075
ALLEGRA	On Patent		TAB	180	60	60	0.030
AMOXICILLIN	Off Patent Non-Originator Non-Trademark		LIQ	250/5			0.046
ASPIRIN	Off Patent Non-Originator Non-Trademark		TAB	325			0.026
ATENOLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.043
CELEBREX	On Patent		CAP	200			0.036
ENALAPRIL	Off Patent Non-Originator Non-Trademark	Vasotec	TAB	10			0.020
FUROSEMIDE	Off Patent Non-Originator Non-Trademark		TAB	40			0.020
GLUCOPHAGE	Off Patent Originator		TAB	500			0.031
GLYBURIDE	Off Patent Non-Originator Non-Trademark		TAB	5			0.029
HYDROCHLOROTHIAZIDE	Off Patent Non-Originator Non-Trademark		TAB	25			0.035
IBUPROFEN	Off Patent Non-Originator Non-Trademark		TAB	600			0.037
HUMULIN	Off Patent Non-Originator Non-Trademark		INJ	100			0.021
LEVOXYL	Off Patent Non-Originator Trademark	Eltroxin	TAB	0.125	0.15	0.15	0.019
LIPITOR	On Patent		TAB	10			0.064
LISINOPRIL	Off Patent Non-Originator Non-Trademark		TAB	10			0.043
METFORMIN	Off Patent Non-Originator Non-Trademark		TAB	500			0.045
METOPROLOL	Off Patent Non-Originator Non-Trademark		TAB	50			0.022
NAPROXEN	Off Patent Non-Originator Non-Trademark		TAB	500			0.019
NEXIUM	On Patent		CAP	40			0.022
NORVASC	On Patent		TAB	10			0.029
PAXIL	On Patent		TAB	20			0.030
PREDNISONE	Off Patent Non-Originator Non-Trademark		TAB	20	50	50	0.028
PREMARIN	Off Patent Originator		TAB	0.625			0.022
PREVACID	On Patent		CAP	30			0.023
SINGULAIR	On Patent		TAB	10			0.035
SOFTCLIX	On Patent	Not included					
SYNTHROID	Off Patent Originator		TAB	0.1			0.037
TOPROL XL	Off Patent Originator	Lopressor SR	TAB	50			0.021
ZITHROMAX	Off Patent Originator		LIQ	200/5			0.044
ZOCOR	On Patent		TAB	20			0.027
ZYRTEC	On Patent	Reactine	TAB	10			0.022

Figure A-28. Summary of Drugs Included in Market Baskets

Drug /Canadian Drug	Form	Strength (Canadian)	Market Baskets
Accupril	TAB	20	2
Actos	TAB	45	1
Adderall	CAP	30	1
Adderall	TAB	10	1
Advair	DSK	100/50	5
Albuterol/Salbutamol	INH	90 (100)	14
Alesse	TAB	0.02/0.1	1
Allegra	TAB	60	10
Alprazolam	TAB	0.25	1
Alprazolam	TAB	0.5	1
Amoxicillin	CAP	500	6
Amoxicillin	LIQ	250/5	3
Amoxil	LIQ	400/5 (250/5)	1
Apri/Ortho-cept	TAB	0.15	1
Apri/Ortho-cept	TAB	0.15/0.03	1
Aspirin	TAB	325	2
Atenolol	TAB	50	10
Augmentin/ Clavulin	LIQ	400/5	2
Plan B	TAB	0.75	2
Celebrex	CAP	200	9
Celexa	TAB	20	3
Clarinex/Aerius	TAB	5	1
Claritin	LIQ	10/10	1
Clonidine	TAB	0.2	1
Concerta	TAB	18	2
Concerta	TAB	54	1
Coumadin	TAB	5	1
Depakote/Epival	TAB	500	1
Diovan	TAB	160	3
Diovan	TAB	80	2
Doxazosin	TAB	2	1
Effexor	CAP	150	2
Effexor	CAP	75	1
Effexor	TAB	75	3
Enalapril/Vasotec	TAB	10	1
Evista	TAB	60	1
Flomax	CAP	0.4	1
Flonase	INH	0.05% (50 mcg)	5
Flovent	INH	44 (50)	1
Fluoxetine	CAP	20	1
Fosamax	TAB	70	4
Furosemide	TAB	40	9
Glucophage	TAB	500	5
Glyburide	TAB	5	2
Humulin Insulin	LIQ	100	1
Humulin Insulin	INJ	100	3
Hydrochlorothiazide	TAB	25	9
Ibuprofen	TAB	600	2
Ibuprofen	TAB	600	2
Levoxyl/Eltroxin	TAB	0.05	1
Levoxyl/Eltroxin	TAB	0.1	4
Levoxyl/Eltroxin	TAB	0.15	2
Lexapro/Cipralex	TAB	10	2
Lipitor	TAB	10	10
Lisinopril	TAB	10	10
Metformin	TAB	500	9
Metoprolol	TAB	50	6
Minocycline	CAP	100	1
Naproxen	TAB	500	1
Nasonex	INH	50	1
Necon/Brevicon, Loestrin, Minestrin	TAB	35/1	1
Neurontin	CAP	300	1
Neurontin	TAB	600	1
Nexium	CAP	40	6
Norvasc	TAB	10	4
Norvasc	TAB	5	5
Ortho Evra/Evra	TDM	20/150/	2
Ortho Tri-cyclen	TAB	-9	4
Ortho-Novum/ Ortho 1/35	TAB	12785	1
Paxil	TAB	20	9
Plavix	TAB	75	2
Pravachol	TAB	40	4
Prednisone	TAB	5	5
Prednisone	TAB	50	1
Premarin	TAB	0.625	7
Prevacid	CAP	30	8
Ranitidine	TAB	150	3
Risperdal	TAB	0.5	1
Singulair	ORA	4	1
Singulair	ORA	5	1
Singulair	TAB	10	5
Spironolactone/ Novo-Spiraton	TAB	25	1
Strattera	CAP	40	1
Synthroid	TAB	0.075	1
Synthroid	TAB	0.1	9
Synthroid	TAB	0.112	1
Terazosin	CAP	5	1
Toprol	TAB	50	9
Trazodone	TAB	50	1
Trimox/Amoxicillin	LIQ	250/5	1
Vioxx	TAB	25	3
Warfarin	TAB	5	1
Wellbutrin	TAB	150	2
Yasmin	TAB	3/0.03	1
Zithromax	LIQ	200/5	3
Zithromax	TAB	250	8
Zocor	TAB	20	9
Zoloft	TAB	100	4
Zoloft	TAB	50	3
Zyrtec/Reactine	TAB	10	11

Appendix B: Literature Review

Rapidly rising prescription drug prices have caused many consumers, third-party payers, and policymakers to look for ways to lower their drug costs. One strategy that many have seen as a potential solution is to import drug products from countries where drug prices are lower than those in the United States—commonly called reimportation.

Prices for on-patent drugs are controlled by federal regulation in Canada. New brand drugs are limited to the median of prices for the new drug in France, Germany, Italy, Sweden, Switzerland, the UK, and the United States. Limits for drugs that are modifications of existing drugs (usually known as "me-too" drugs) are based on the breakthrough brand's price; most new drugs cannot cost more than the other drugs in the same therapeutic class. Increases in prices for existing on-patent drugs are linked to a multiple of the consumer price index, often resulting in a lower rate of increase than the drug inflation rate in the United States.

Other price controls for a significant portion of the Canadian market take place at the provincial level. The Canadian provinces cover 42 percent of all national drug expenditures through their coverage of prescription drugs for the elderly. The provinces all use formularies to keep prices low for the drugs they cover, and some take further measures. Ontario has instituted price freezes; British Columbia uses reference pricing; and Quebec requires companies to give the province the best price given to any other province.

Legislative and regulatory price controls in the United States apply to drugs purchased through the federal supply schedule (for sales to certain federal purchasers and other entities, such as community health centers, that are by law authorized to use the federal supply schedule) and drugs purchased by the Medicaid program, the Veterans Administration, and the Department of Defense. However, insurers and pharmacy benefit managers (PBMs) are also able to negotiate substantial discounts and rebates from retail prices. Uninsured individuals in the United States do not have access to these lower prices, and they typically pay retail prices that are about 15 percent above those paid by people with insurance. As a result, those without insurance have been at the forefront of the push to import drugs from Canada. Some purchasers, including several municipal government employee plans, have also begun to explore the possibility of savings for their insured employees from reimportation, seeking to get better prices than those normally obtained by insurers and PBMs.

The Canadian Pricing System

While Canada does offer universal access to health insurance, that insurance covers only acute hospital and physician services, and does not provide coverage for outpatient prescription drugs. Most Canadians receive prescription drug coverage through their employers, although the federal government offers coverage to some populations, including veterans and First Nations and Inuit people, and there are publicly funded provincial programs that pay a substantial share of the costs for older, disabled, and low-income Canadians (Gross, 2003).

Graham (2000) provides an explanation of how prescription drug prices are regulated in Canada. Canada's Patented Medicine Prices Review Board (PMPRB), established in 1987, regulates the prices

of newly patented drugs. The PMPRB controls the price at which drug manufacturers sell to wholesalers. Drugs are divided into three categories by the PMPRB when they are introduced:

Category 1, or "line extension," drugs are drugs that are a new strength of an existing drug. Prices of new drugs in this category must bear a "reasonable relationship" to the average price of the same medicine in the same or comparable dosage forms.
Category 2 is composed of "breakthrough" drugs, which produce a substantial improvement over older drugs. These drugs may not exceed the higher of the cost of therapy with medicines in the same therapeutic class and the median of prices of the same drugs in the United States, United Kingdom, Switzerland, Sweden, Italy, Germany, and France.
Category 3 drugs, or "me-too" drugs provide moderate, little, or no improvement over existing medications and introductory prices is presumed excessive if the cost of therapy with the new drug is higher than the cost of therapy with comparable drugs in the same therapeutic class.

After drugs are first introduced, price increases are limited by the Consumer Price Index: single year increases are limited to 1.5 times the forecast change in the annual index, and in periods when inflation is greater than 10 percent, price increases are limited to five percentage points more than the forecast change in the CPI.

The PMPRB has the power to order price reductions, if it considers that a price is excessive, and it can also order rebates to customers, a payment to the Crown, a temporary reduction below the assessed fair price, or a temporary price reduction of another patented drug manufactured by the same company (Graham, 2000).

The PMPRB only has the power to control manufacturers' "gate prices," or the price at which manufacturers sell to wholesalers. Wholesale price, retail margin, pharmacists' dispensing fees, and other distribution costs are not subject to federal regulations. Some provincial governments, however, set policies that affect the prices paid by consumers.

Because provincial governments finance 42 percent of national prescription drug expenditures, the provincial drug benefit plans have the ability to influence the prescription drug marketplace, but these plans do not generally negotiate prices with suppliers. Instead, some provincial governments set policies for the overall prices they will pay for drugs. In Quebec, the government requires manufacturers to charge it no more than the best available price in the rest of Canada. The government of Ontario has frozen the retail price it will pay for all drugs listed on its formulary (Morgan et al., 2003). British Columbia uses "reference-based pricing," in which the province's drug benefits program only reimburses for the cost of the drug in a therapeutic class with the lowest price (Menon, 2001).

In addition to these direct controls on prices, the formularies of provincial prescription drug benefit plans also play an important role in keeping drug prices low. The provincial plans only cover a set list of drugs, and manufacturers must submit new drugs to provincial programs to be reviewed for inclusion on the plan formulary. Drugs are reviewed for their effectiveness in relation to their costs, and drugs that are equivalent to already listed drugs are added only if they do not increase program costs (Menon, 2001).

The prices paid by individuals, private insurers, and health care institutions are not regulated in Canada. However, the prices that these groups pay are influenced by the prices set by the provincial

governments. Individuals paying retail prices likely face the highest drug costs, while third-party payers and hospitals may have the buying power to negotiate discounts, as they do in the United States.

Methodology of Price Comparisons

While there is a general agreement that prescription drugs cost less in Canada than in the United States, there is less agreement on the magnitude of the difference. Several important methodological issues are raised by international price comparisons, for example, which drugs are included in the study sample and at which point in the chain of distribution prices are measured. These issues can affect the results of such comparisons.

Level of distribution

Comparisons of international drug prices must select a point in the chain of distribution at which to measure the price of drugs. Previous studies have looked at the price charged by drug manufacturers, the prices charged by drug wholesalers, and the prices charged by retail pharmacies (Gross, 2000). While studies that compare any of these points in the chain of distribution may have valid results, studies must use apples-to-apples comparisons, comparing the prices at the same level of the distribution chain for all countries in the analysis (Danzon, 1999). In the following analysis, we have separated studies by whether they work with manufacturer or wholesale prices or with retail prices.

Data sources

Measuring prices accurately at a single of level of distribution also proves difficult. Reliance on list prices published by the manufacturer can be particularly problematic (Wagner and McCarthy, 2004). Wagner and McCarthy argue the upward bias in list prices is a particular issue in the U.S., where reimbursements by the Medicaid program and other payers create incentives for high list prices with discounts to pharmacies, so that prices for generic multi-source and brand single-source drugs are, on average, 78 percent and 22 percent lower, respectively, than list prices. The list prices used in some of the studies cited here include Medi-Span and Redbook prices.

More realistic prices are available from transaction data collected by organizations like IMS Health. The IMS MIDAS database includes invoice data on transactions between manufacturers and wholesalers, pharmacies, hospitals, and other large purchasers in over 60 countries. IMS also collects data from pharmacy transactions in several countries, including the U.S. and Canada.

Other studies have directly contacted pharmacies to determine prices, either by phone or internet. The prices obtained in this manner likely reflect prices charged to individuals without insurance, and may be higher than the prices that third-party insurers pay. Studies using this method also tend to have far smaller sample sizes than IMS databases, which collect data from thousands of pharmacies.

Drug sample

Studies comparing different countries' pharmaceutical prices vary in which drugs they select for analysis. Some studies may select only a few drugs. Several studies attempt to make broad comparisons among all commonly used drugs (Gross, 2003). Many international price comparisons look only at brand-name prescription drugs, while several other comparisons include generic drugs as well. Danzon (1999) argues that international drug price comparisons must include a representative random sample of drugs, and that in order to be representative, the market basket must include generic drugs. In addition, she states that studies that consider drugs with high sales volumes are biased if the products are chosen by those with the highest volume by dollar value, not by number of prescriptions, as products with relatively high prices will be more likely to be selected.

Danzon and Kim (1998) argue that valid measures of average price levels can only be obtained from comparisons based on a comprehensive or representative sample of products, appropriately weighted, following standard index number methods. Researchers must accept trade-offs between the ability to compare identical products and the need to examine a representative sample of a country's pharmaceutical market. There is wide variation between countries not only in the range of compounds available, but also in the dosage forms, strengths, and pack sizes available. If comparisons are made only among products that are the same molecule, manufacturers, strength, and pack size, only a very small and unrepresentative sample will available. Danzon and Kim maintain that requirements that products be identical should be dropped in favor of broad representation for each country's market basket of products, which should include generics and over-the-counter products that are good substitutes for branded prescription drugs, with all forms, strengths, and package sizes.

Price indices and weights

Researchers conducting international comparisons of prescription drug prices should choose appropriate weights for each drug's price difference in the process of calculating an average price difference for a market basket of products (Gross, 2003). However, many published comparisons do not weight their samples. Danzon (1999) argues that studies that use unweighted averages of price ratios violate standard principles of price comparisons and lead to results that are extremely sensitive to the sample used. Wagner and McCarthy (2004) support weighting by the quantity of each drug dispensed to develop a comparative index of price levels, although the country whose quantity weights used as the basis for comparison can influence the resulting index of relative prices.

In an analysis summarized in more detail below, Danzon and Kim (1998) report the results of three different price indices to demonstrate the effects that weighting has on comparison results: the Laspeyres index, which uses the base country quantity weights, the Paasche index, which uses the comparison country quantity weights, and the Fisher index, which uses an average of the observed quantities as weights. Danzon and Kim contend that the Laspeyres index has advantages for use in price comparisons, because accurate data for the country selected as the base are more likely to be available if it is the country undertaking the study. In addition, the Laspeyres index does not assume, as the Paasche and Fisher indices do, that consumption patterns would be identical in two countries if they both faced the same prices. This can be important when drug consumption has low price elasticity due to the role of medical norms.

Whose price

The results of international pharmaceutical price comparisons will also differ with regard to which payer's price is being measured. While in Canada there is little variation in the prices paid by different payers, in the United States the cost of drugs can vary widely according to who is purchasing drugs: individuals paying cash pay the highest price, while insurers, managed care plans, and government programs can negotiate discounts and manufacturer rebates by buying drugs in large quantities (CBO, 2004; Hollis, 2004; Gross, 2003; Morgan et al., 2003). A 2000 study by the Department of Health and Human Services found that U.S. senior citizens paying for their own prescription drugs pay about 15 percent more for those drugs (excluding the effect of rebates) than individuals with health insurance. In addition, this 2000 study and a 1999 analysis by the House of Representatives Committee on Government Reform found that favored customers, such as health maintenance organizations, and the federal government obtain even lower prices than individuals with insurance.

Danzon (1999) argues that these differences in prices are not a matter of discrimination, but an issue of different market segments. She maintains that the difference in prices does not imply cost shifting, but simply that a manufacturer serving two separate markets rationally determines the price to charge in each market independently. As with other methodological issues, it is important that price comparisons use the prices of similar payers in both countries under consideration.

Currency conversion

In addition to methodological issues in selecting a sample and choosing which prices to use, international pharmaceutical price comparisons must choose an exchange rate to use in analyses. The exchange rate should not be sensitive to day-to-day currency fluctuations, but should be able to capture the cost to citizens in one country of buying drugs in another country (Gross, 2003). Danzon and Furukawa (2003) found that currency conversion can contribute greatly to measured price differences: converting currencies using purchasing power parities (PPPs) based on an economy-wide market basket of goods (GDP) or on a basket of medical goods or services, rather than on the current exchange rate, can drastically change the results of a price comparison.

Price Comparisons

As a result of these methodological challenges, the results of previous studies that compare the prices of prescription drugs in Canada and the United States vary. Figure B-1 summarizes comparisons of manufacturer or wholesale prices; Figure B-2 summarizes comparisons of retail prices. More details about the analyses follow.

Figure B-1. Summary of U.S./Canada Prescription Drug Price Comparisons: Studies of Manufacturer or Wholesale Prices

Study	Data source, year	Drug sample	Matching	Key findings
HHS Task Force on Drug Importation, 2004	IMS MIDAS database for 10 countries, 2003	54 top-selling brands and 29 top-selling generics	Excluded drugs not available in all 10 countries and drugs that could not find a match in the National Sales Perspective database.	Brand prices are typically 60% lower in other countries; generic prices are lower in the U.S. Prices were adjusted to reflect rebates at the wholesale level (rebated prices on generic drugs were 24 percent lower than IMS prices).
Hollis, 2004	Ontario Drug Benefit Plan (Canada) and Federal Supply Schedule (U.S.), 2003	16 of the top 50 prescribed brand drugs measured by expenditures	Not defined by author	The prices paid by the United States government for drugs are 2.5% higher than the prices paid by the Ontario provincial government.
Anderson et al., 2004	IMS Health MIDAS database, 2003	30 drugs (brand and generic) with highest total spending in the US that were available in study countries	Matched by manufacturer, compound, and form. Included all available dosage strengths. Excluded drugs not available in Canada, France, or the UK.	Canadian prices were 52% lower than prices in the United States.
Danzon and Furukawa, 2003	IMS Health MIDAS database, 1992 and 1999	Brand, generic, and OTC	Matched by molecule, and including all products with that active ingredient and all doses	Canada's prices were 33% lower than prices in the U.S. net of discounts, and 40% lower ignoring discounts.
Graham and Robson, 2000	Red Book (U.S.) and Ontario Drug Benefit Program, 1998	45 brand and generic drugs	Identical in chemical name, dosage, strength, and form	Wholesale prices are 42% lower in Canada than in the U.S. (72% higher in the United States than in Canada). Two generic drugs were cheaper in the U.S.
Danzon and Chao, 2000	IMS, 1992	171 brand and generic drugs available in all seven countries; up to 438 drugs for bilateral comparisons	Matched by active ingredient and therapeutic category.	Canada and Germany have prices 2% and 25% higher than the U.S., respectively, while prices for drugs are lower in Japan (12%), Italy (13%), the U.K. (17%), and France (67%).
Danzon and Kim, 1998	IMS Health MIDAS database, 1992	Brand, generic, and OTC	Matched first by chemical composition and brand name or manufacturer. Second analysis matching by active ingredient and therapeutic class (MOL/ATC).	Canadian prices were 6.2% higher than U.S. prices when matched by brand name or manufacturer, but with the larger sample obtained by matching by MOL/ATC, U.S. prices were 16.6% higher than in Canada.
GAO, 1992	Medi-Span Master Drug Database-Select, 1991	121 of the 200 brand and genericdrugs most commonly dispensed in U.S.	Matched by brand name, manufacturer, dosage strength, dosage form, and whether available only prescription in both the United States and Canada.	The entire sample of drugs would cost 32 percent more in the United States than in Canada. Drug-by-drug, the median price differential per package between the United States and Canada was 43 percent.

Figure B-2. Summary of U.S./Canada Prescription Drug Price Comparisons: Studies of Retail Prices

Author(s)	Data source, year	Drug sample	Matching	Key findings
Quon et al., 2005	Prices obtained by authors from three U.S. pharmacies 12 Canadian internet pharmacies, 2004	Brand 44 of the 50 most common drugs by sales volume	Matched by brand name	The authors found that Americans could save about 24% by purchasing drugs from Canadian internet pharmacies. Only three drugs were cheaper in the United States than in Canada.
Minority Staff, Committee on Government Reform, 2005	Prices from the top 10 Medicare drug plans (U.S.), 2005 Canadian price source not defined by author, 2004	Brand 10 drugs with highest sales to United States Medicare beneficiaries	Not defined by author	The prices offered by the Medicare drug plans on average were 61% higher than the Canadian prices, and one plan's price was 73% higher than the Canadian prices. Prices for individual drugs in the United States approached or even exceeded 100% more than the Canadian prices in some cases.
Task Force on Drug Importation, 2004	Prices from PharmacyChecker.com (30 Canadian and 6 U.S. online pharmacies), 2004	Brand and generic 22 top-selling brands and 5 top-selling generics	Matched by ingredient, dosage form, strength, and package size. Excluded drugs not available in Canada or available OTC in Canada.	Branded drugs are about 37% less at Canadian internet pharmacies, while generics are about 32% less at U.S. internet pharmacies, net of shipping costs.
Graham and Tabler, 2001	50 pharmacies randomly selected in six areas (3 in Canada, 3 in the United States), 2001	Brand 3 drugs that many patients use for a long period of time	Not defined by author	For all three drugs, the prices at Canadian pharmacies were significantly lower than the prices at pharmacies in the United States, but there was also substantial variation in prices across areas within the same country and even within an individual region.
Graham and Robson, 2000	Costco pharmacies in both countries, 2000	Brand and generic 45 drugs	Identical in chemical name, dosage, strength, and form	Retail prices are 28% lower in Canada than in the United States (39% higher in the United States than in Canada).
Minority Staff, Committee on Government Reform, 1998	Prices obtained by authors phone calls to pharmacies, 1998	Brand 10 drugs with the highest dollar sales to the elderly in the United States	Matched by dosage, form, and package size used in GAO report, or most common dosage, form, and package size according to the *Drug Topics Red Book,* for drugs not included in GAO report	On average, retail prices in United States were 72 percent more than the average prices in Canada.

Studies of Wholesale or Manufacturer Prices

In 1992, the GAO examined manufacturers' prices to wholesalers for a market basket of drugs most frequently dispensed by U.S. drug stores.

> *Drug selection and matching:* Using a list of the 200 drugs most frequently dispensed in U.S. drug stores, the authors selected the most commonly used dosage form, dosage strength, and package size for the United States, and were able to match 121 by brand name, manufacturer, dosage strength, dosage form, and whether available only by prescription in both the United States and Canada.
>
> *Data source:* U.S. prices were obtained from the Wholesale Acquisition Cost in the Medi-Span Master Drug Data Base-Select. Canadian prices were obtained from the Best Available Price listed in the Ontario Drug Benefit (ODB) Formulary when available, or directly from the manufacturers of the drugs or from a major Canadian wholesaler for the 20 studied drugs that were not on the ODB formulary. The authors compared the prices for specific package sizes, as well as the aggregate cost of purchasing a common prescription of all 121 products in both countries.
>
> *Currency conversion:* Canadian prices to U.S. dollars using the May 1, 1991, exchange rate.
>
> *Results:* For the drugs studied, drug manufacturers charged wholesalers significantly more in the United States than the same manufacturers did in Canada. The entire market basket of drugs would cost 32 percent more in the United States than in Canada. When the price differentials were computed drug-by-drug, the median price differential per package between the United States and Canada was 43 percent.

Danzon and Kim (1998) undertook an international price comparison study to demonstrate the sensitivity of such studies to methodological decisions.

> *Drug selection and matching:* including brand name, generic, and over-the-counter products, in nine countries (United States, Canada, Germany, France, Italy, Japan, United Kingdom, Switzerland, and Sweden). Products were matched first based on the international product name (IPN, in which products must have the same chemical composition, and the same brand name or same manufacturer), and then by active ingredient (molecule) and anatomical therapeutic class (MOL/ATC), and found that significantly more products could be included when matches were based on MOL/ATC. Rather than pick one dosage and pack size, the authors converted all products to grams of active ingredient and the number of standard units.
>
> *Data source:* The authors used IMS data for sales of cardiovascular products for a one-year period between 1991 and 1992.
>
> *Price index and weights:* Price differences were determined using three different price indices (Laspeyres, Paasche, and Fisher).

Results: Using their preferred method of matching drugs by MOL/ATC and weighting using a Laspeyres price index, the authors found that prices in the United States were 16.6 percent higher than prices in Canada, but if the same price index was used with drugs that matched according to IPN, Canadian prices were 6.2 percent higher than U.S. prices.

Danzon and Chao (2000) used bilateral drug price and quantity indices for seven countries to demonstrate differences compare manufacturer prices of drugs in the U.S. to manufacturer prices in other nations.

Drug selection and matching: The authors matched drugs based on active ingredient and anatomic therapeutic category. The weighted average price for the molecule incorporates all forms and packs of that molecule.

Data source: The authors used IMS data from 1992.

Price index: The authors used the Laspeyres index, which may be most relevant to the U.S. perspective because it uses U.S. weights, and may be interpreted as a lower-bound of what the U.S. could save by adopting other countries' pricing.

Results: The authors found that, while drug prices are higher in the U.S. than in most other countries, their methods show smaller differences than previous studies. Calculations using the Laspeyres index show that Canada and Germany have prices 2.1 percent and 24.7 percent higher than the U.S., respectively, while prices for drugs are lower in Japan (11.6%), Italy (12.9%), the U.K. (16.6), and France (67%).

Graham and Robson (2000) compared both wholesale and retail prices for drugs in the United States and Canada.

Drug selection and matching: The researchers started with the 60 drugs with the highest volume of prescriptions written in the United States from January through October 1998, using those that were identical in their chemical name, dosage and strengths, and form, and compared brand-name drugs only to other brand-name drugs and generic drugs only to other generic drugs. Fifteen drugs had to be excluded from each part of the study because they were not identical in every way, or because price information was not available in each data source, although not the same 15 drugs in each case.

Data source: For wholesale prices, Graham and Robson used the prices from the *Red Book* for the United States and the Ontario Drug Benefit Program formulary for Canada.

Weights: The authors weighted by number of prescriptions.

Results: The authors found that, while drugs are typically 42% cheaper in Canada, there is a wide range of differences between the prices of drugs in the two countries. Two generic drugs had higher wholesale prices.

Danzon and Furukawa (2003) compared average price levels for pharmaceuticals in nine countries, including the United States and Canada in 1992 and 1999. Using the manufacturer price levels in order to eliminate differences attributable to wholesaler and retailer margins and taxes, and adjusting

for manufacturer discounts to managed care plans and Medicaid, the authors compared price indexes for a sample of products from each country.

> *Drug selection and matching:* The authors began with the 350 leading molecules in the U.S. (by sales volume), and from these selected 249 that were available in at least four of the study countries in 1992. For each molecule, they included all products with that active ingredient, including both brand-name, generic, and over-the-counter drugs. At least 90 percent of the drugs were available in all the study countries, except Japan, which only had 76 percent.
>
> *Data source:* The authors used data from the IMS Health Midas data set.
>
> *Price index:* The authors calculated four price indices for each country: all products for each molecule; all products for each molecule, adjusted for discounts; drugs that match only on indication, form, and strength; and drugs that match only on indication, form, and strength, adjusted for discounts.
>
> *Results:* Except for Japan, which had higher prices, all of the study countries had lower prices than the United States. Canada's prices were 33 percent lower than U.S. prices net of discounts, and 40 percent lower ignoring discounts.

Anderson and colleagues (2004) used methods similar to those used by Danzon and Furukawa (2003), but opted for greater standardization, rather than greater representativeness, in order to simulate the prices that would paid by the United States' Medicare program if usage were fixed but prices matched those in other countries.

> *Drug selection and matching:* Prices for all available dosage strengths in each country were considered for a market basket of the thirty drugs, both brand and generic, with the highest total spending in the United States that were available in the other three countries.
>
> *Data source:* The authors used IMS health data to obtain the prices of drugs in Canada, France, the United Kingdom, and the United States.
>
> *Price index:* The authors calculated a Laspeyres price index, with the quantity sold in the United States as the base, using average wholesale prices (AWP).
>
> *Results:* Analysis revealed the average prices for the market basket of drugs were 52 percent lower in Canada, 59 percent lower in France, and 47 percent lower in the United Kingdom, than in the United States. When the authors assumed that Medicare could purchase drugs at a 20 percent discount on AWP, the difference was reduced somewhat, with prices 40 percent lower in Canada, 48 percent lower in France, and 34 percent lower in the United Kingdom than in the United States.

To show that it matters who is the purchaser of drugs, Hollis (2004) compared government prices for drugs in the United States and Canada.

> *Drug selection and matching:* Hollis used a sample of 16 drugs without generic competition in either country from the list of the top 50 drugs in Canada, as measured by expenditure.

Generic drugs were excluded due to the fact that competitive market pressures, including government price controls and negotiating tactics drive the pricing of generic drugs.

Data source: The comparison used the Ontario Drug Benefit Plan price and the Federal Supply Schedule price (used by the Veterans Administration and the Department of Defense in the United States) for the most popular strength of each medication.

Currency conversion: U.S. prices were converted to Canadian dollars using the approximate exchange rate at the time that Speaker of the U.S. House of Representatives Dennis Hastert complained about Canadian price controls on prescription drugs.

Results: The analysis showed that the prices paid by the U.S. government for drugs are only 2.5 percent higher than the price paid by the Ontario plan.

The HHS Task Force on Drug Importation (2004) estimated differences between the U.S. and nine other countries: Australia, Canada, France, Germany, Greece, Japan, Poland, Switzerland, and the United Kingdom.

Drug selection and matching: The authors began with a list of 60 best-selling brand name drugs and 50 best-selling generic drugs, and narrowed it down to 54 brand drugs and 29 generics after excluding drugs not available in all 10 countries.

Data source: The comparison used invoice data from the 2003 IMS MIDAS database for 10 countries.

Weighting: The authors weighted by number of U.S. prescriptions, and also adjusted for wholesale rebates by comparing IMS data with CMS data on Average Manufacturer Price.

Results: Foreign prices for top-selling brand name products were approximately 60 percent of the U.S. price. Generic prices were lower in the United States than every country except Poland. Canadian prices were just over half U.S. prices for brand name drugs, and nearly twice as much as U.S. prices for generics.

Studies of Retail Prices

In 1998, the minority staff of the House Committee on Government Reform issued a report comparing retail prescription drug prices in the 1st Congressional District of Maine with drug prices in Canada and Mexico.

Drug selection and matching: The study examines the pricing of twelve drugs: ten brand name prescription drugs with the highest dollar sales to the elderly in the United States and two drugs that in a previous study were found to experience substantial discrimination in price according to whether the drug was purchased by an individual or by a larger organization. The study used the prices paid by consumers without prescription drug coverage in both countries. The study used the drug dosage, form, and package size used by the GAO its 1992

report. For drugs that were not included in the GAO report, the study used the most common dosage, form, and package size listed in the *Drug Topics Red Book*.

Data Source: Prices in the United States were obtained from a survey conducted by the minority staff and the staff of Representative Allen of nine drug stores in Allen's congressional district—six independent pharmacies and three chain stores. Prices for drugs in Canada and Mexico were obtained from a survey of four pharmacies in Canada (in three different provinces) and three in Mexico (in Ciudad Juarez).

Currency conversion: Canadian and Mexican prices were converted to U.S. dollars using exchange rates effective on October 5, 1998.

Results: For all the drugs in the study, U.S. prices were significantly higher than Canadian and Mexican prices. On average, senior citizens in the United States paid 72 percent more than the average prices in Canada and 102 percent more than the prices in Mexico.

Graham and Robson (2000) compared both wholesale and retail prices for drugs in the United States and Canada.

Drug selection and matching: The researchers started with the 60 drugs with the highest volume of prescriptions written in the United States from January through October 1998, using those that were identical in their chemical name, dosage and strengths, and form, and compared brand-name drugs only to other brand-name drugs and generic drugs only to other generic drugs. Fifteen drugs had to be excluded from each part of the study because they were not identical in every way, or because price information was not available in each data source, although not the same 15 drugs in each case.

Data source: For the retail part of their study, the authors compared the prices at Costco, the only pharmacy with locations in both countries.

Weights: The authors weighted by number of prescriptions.

Results: The authors found that, while drugs are typically 28% cheaper in Canada at the retail level, there is a wide range of differences between the prices of drugs in the two countries. Seven generic drugs had higher retail prices.

Graham and Tabler (2001) studied the retail prices of three patented prescription drugs (Celebrex, Lipitor, and Paxil) in three areas in the United States and in three Canadian areas along the border between the two countries.

Data source: The authors randomly selected 50 pharmacies in each of the six areas, and called each of the pharmacies to obtain the price of a 30-day supply of each of the drugs, as well as information about any dispensing fees and the availability and price of delivery of prescriptions.

Currency conversion: The authors calculated an exchange rate based on a 12-day period.

Results: For all three drugs, the prices at Canadian pharmacies were significantly lower than the prices at pharmacies in the United States, but there was also substantial variation in prices across areas within the same country and even within an individual region.

The HHS Task Force on Drug Importation (2004) compared internet prices in the United States and Canada, adjusted for shipping costs for U.S. consumers (typically $10-$15 from Canada and zero to $2 from the U.S.).

Drug selection and matching: The study started with a list of 30 top-selling brand drugs and seven top-selling chronic use generics. The list was narrowed to 22 brand drugs and 5 generic drugs after excluding drugs that were not available via the internet, were not available in Canada, or were OTC in one or both countries.

Products were matched by strength and package size when possible, or packages were adjusted by the number of tablets when computing unit costs. This led to a list of 118 matching brand products and 14 generic products.

Data source: Prices were collected from PharmacyChecker.com, a website that collects prices from 30 Canadian and six U.S. internet pharmacies. For each drug, the authors collected the lowest U.S. price and the lowest Canadian price.

Results: Brand drugs are about 37 percent less at Canadian internet pharmacies, while generics are about 32% less at U.S. internet pharmacies, net of shipping costs.

Quon and colleagues (2005) compared the prices of prescription drugs from three U.S. pharmacies and 12 Canadian Internet pharmacies that sell drugs to both Canadian and American customers.

Drug selection and matching: Only brand-name drugs were used; the authors purposely excluded generic drugs because other studies have shown that Canadian prices for generic drugs are similar to or higher than U.S. prices. Forty-four of the 50 most popular (by sales volume) drugs were brand-name drugs and available in both countries and were used for the study. Unit prices were based on a lot size of 100 units when available or on the next size smaller in the 25 percent of cases where that lot size was not available. Dosages for each medication were based on recommended daily dose ranges, daily frequencies of administrations, and dose availabilities.

Data source: The authors collected their data from the pharmacies' websites, which all listed their prices in U.S. dollars.

Results: Calculating the cost per year for a single patient by multiplying the mean unit prices by the number of units per year, the authors found that Americans can save about 24 percent on brand-name medications if purchased from Canadian internet pharmacies rather than major U.S. drug chain pharmacies. Only three drugs, all for erectile dysfunction, were more expensive in Canada.

In a 2005 report the minority staff of the U.S. House of Representatives Committee on Government Reform studied whether the new Medicare Part D drug benefit is effective in lowering drug prices for seniors.

Drug selection and matching: The authors examined the prices of ten drugs with the highest sales to Medicare beneficiaries in 2004, comparing the prices negotiated by the ten leading Medicare drug plans to the prices that consumers in Canada pay for the same drugs.

Data source: The authors used the Medicare website to obtain the prices the ten leading Medicare drug plans negotiated with manufacturers and pharmacies, prices available for the drugs at drugstore.com at the time of the study, prices available for the drugs at Costco drugstores, and prices paid by consumers in Canada. (The source of Canadian prices was not defined).

Results: The analysis revealed that the prices offered by the drug plans were substantially higher than the prices paid by consumers in Canada: on average, the prices offered by the Medicare drug plans were 61 percent higher than the Canadian prices, with one plan's prices coming in at 73 percent higher than the Canadian prices, and prices for individual drugs approaching or even exceeding 100 percent more than the Canadian prices.

Discussion

While most studies have found that Canadian drug prices are lower than prices in the United States, estimates of the magnitude of the difference vary widely, as results are very sensitive to methodological choices. It is not possible to define one perfect methodology for these comparisons, as many decisions with regard to methodology involve tradeoffs. However, it is clear that certain methodological choices will strengthen the results of an analysis. For example, while simple comparisons that select a few popular drugs that are available in the same form in both countries provide interesting results and may reveal whether an individual in the United States could save money by purchasing a particular drug in Canada, more complex analyses of larger market baskets of drugs available in each country may offer a better understanding of systematic differences in the markets. In such a larger study, careful methodological decisions can help ensure an "apples-to-apples" comparison and increase confidence in the results.

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