STUDY 6

PRICES OF GENERIC-TO-BRAND NAME PRESCRIPTION DRUGS IN FIVE PROVINCIAL DRUG PLANS 1990-1997

Federal/Provincial/Territorial

Task Force on Pharmaceutical Prices

April, 1999

Approved by the Conference of F/P/T Deputy Ministers of Health
June 17 -18, 1999, Charlottetown, P.E.I.

EXECUTIVE SUMMARY

- This study of multiple source drug prices examines the relationship between prices of generic drugs and their corresponding brand name equivalents.

- An assessment of generic and brand name prices of these medicines has revealed an overall trend towards higher generic drug prices relative to their brand name equivalents while overall prices of brand name multiple source medicines have remained constant or declined.

- By 1997 generic prices were between 63% and 73% of their brand name equivalent's price. In earlier years generic prices were between 40% and 60% below the price of their brand name competitor.

- Further analysis is required to answer unresolved questions concerning what is an appropriate introductory price for first-entrant generic medicines (e.g. 70%, 60%, 55%, or some other percent of the brand name price), and to fully assess the role of competition among multiple source medicines on prices and utilization of these medicines (e.g. Does the number of suppliers of similar drug products in a therapeutic class decrease the average price for similar medicines over time? Does consumption of newer drug products (often at a higher price) increase or decrease?).

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1.0 INTRODUCTION

In March, 1997, the Federal Provincial Territorial (F/P/T) Task Force on Pharmaceutical Prices prepared an overview paper which provided a description of the pharmaceutical sector in Canada, a summary of existing information on drug prices and spending, as well as mechanisms used by private and public payers for regulating and/or influencing pharmaceutical prices. From this research, it was concluded that more detailed analyses of such prices and expenditures were needed. It was noted, that further research should be undertaken not only at an aggregate level, but also according to key criteria including, for example, whether a product is available from one or several competing sources; and whether or not a medicine is patented.

The Task Force has since examined price and expenditure trends, price levels, and cost drivers as they relate to prescription drugs reimbursed under six provincial drug plans.[1] The first of these analyses measured how prices and spending have changed between 1990 and 1997. Subsequent studies have assessed prices of non-breakthrough patented drugs; single source non-patented drugs; and multiple source non-patented (generic) drugs; an inter-provincial price comparison study was also undertaken. Finally, the Task Force has developed and applied a "cost-driver" analysis that has accurately measured the role of changes in existing drug prices, changes in utilization, and the impact of newly introduced medicines to changes in total drug spending.

The contribution of this Paper has been to examine prices of multiple source drugs with an emphasis on the relationship between prices of generic drugs and their corresponding brand name equivalents. The analysis covers five provincial drug plans over the period 1990 to 1997. These drug plans comprised about $2.1 billion dollars or 70% of total provincial drug plan spending in Canada in 1997.[2]

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[1] The Task Force has representatives from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Nova Scotia, Health Canada and the Patented Medicine Prices Review Board. It was established to examine one of six pharmaceutical issues identified at the April 1996 meeting of federal/provincial/territorial Ministers of Health. The other issues included utilization, marketing, wastage, consumer education and research and development. The work is overseen by the Pharmaceutical Issues Committee (PIC) of the Advisory Committee on Health Services (ACHS), which reports to the Conference of Deputy Ministers of Health.

[2] See Appendix 1 for an analysis comparing generic-to-brand name prices in Canada and the United States.

2.0 METHODOLOGY

Prices used in this study include wholesale and retail mark-ups (where applicable), and exclude dispensing fees. To measure generic and brand name price ratios, information on prices, quantities and total expenditures, were obtained from five provincial drug plans: British Columbia, Alberta, Saskatchewan, Manitoba and Ontario. Nova Scotia was omitted from this analysis due to the limited size of its data base.[3] Health Canada's Drug Product Database was used to ensure that only those drugs defined by the Food and Drug Act were included.

The analysis covers the period 1990 to 1997 and is organized in the following manner: Section 3 reports on the growth of generic market shares in each provincial drug plan; Section 4 presents the trend in generic-to-brand name price ratios for each provincial drug plan; Section 5 examines the impact on generic-to-brand name price ratios from the introduction of new generic drugs; and, Section 6 examines the effect on generic-to-brand name price ratios from the level of competition in a given market, i.e., the number of generic drugs available in a given market. A summary is provided in Section 7.

[3] Nova Scotia information is based on the top 500 selling drug products. As a result, only a few generic drugs and their brand name equivalents could be analyzed.

3.0 PROVINCIAL GENERIC AND BRAND NAME MARKET SHARES

Intercontinental Medical Statistics (IMS)[4] reports that in 1997 about forty percent of all prescriptions filled in Canada were generic drugs. This suggests that generic drugs comprise a significant portion of the Canadian market for pharmaceuticals. However, in terms of dollars spent, the Patented Medicine Prices Review Board (PMPRB)[5] reports that generic drugs make up about 12% of manufacturers sales of pharmaceuticals in Canada. Thus, while generic drugs make a significant portion of prescriptions filled they make up a much smaller portion of total expenditures.

As seen in Table 1, the generic share of provincial drug plan expenditures varied between 13.5% and 25.0% in 1997. It is evident that the generic share of expenditures was affected by changes in provincial reimbursement policies over this period. For instance, both Alberta in 1993, and British Columbia in 1994, implemented mandatory generic substitution policies that required patients to have prescriptions filled by generic drugs wherever possible. These policies increased the generic market share in those provinces by 50% and 70%, respectively, after one year.

Table 1 also demonstrates that since 1995, the generic drug share of provincial drug plan expenditures have levelled off in some provinces and fallen in others. This levelling off of market share is likely attributed to the combination of the passing of Bill C-91 in 1993, which extended greater patent protection to patentees, and the rapid growth in the sales of newer patented drugs introduced in the 1990's.[6]

Table 1

Generic Share of Provincial Drug Plan Expenditures					
	British Columbia (%)	**Alberta (%)**	**Saskatchewan (%)**	**Manitoba (%)**	**Ontario (%)**
1990	10.3.	N/A	15.5.	N/A	N/A
1991	11.6	N/A	19.0	N/A	34.1
1992	10.5	N/A	20.8	N/A	29.1
1993	10.0	10.2	19.5	N/A	24.7
1994	17.1	15.9	22.2	N/A	26.1
1995	22.4	18.3	27.4	27.6	25.9
1996	23.8	17.0	20.6	27.3	25.9
1997	22.3	13.5	24.5	25.0	23.1

4 See IMS Canada Drug Store and Hospital Purchases, 1997.

5 See PMPRB's Tenth Annual Report, 1997.

6 See F/P/T Price Task Force study, *Cost Driver Analysis of Provincial Drug Plans British Columbia 1990 to 1997 - Study 5,* for a discussion of the growth in expenditure of newer patented drugs.

Table 2 shows the number of cases where at least one generic drug competed with a brand name drug, and the number of cases where generic drugs faced no brand name competition. It is interesting to note that in 1997, depending on the province, in at least 45% of the cases generic drugs did not face any brand name competition.[7] This proportion was similar in previous years.

Table 2

Number of Generic Markets:
With and Without Brand Name Drugs, 1990-1997

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	% Ge n. and Brand name drugs	% Gen. only	% Gen. and Brand name drugs	% Gen. only	% Gen. and Brand name drugs	% Gen. only	% Gen. and Brand name drugs	% Gen. only	% Gen. and Brand name drugs	% Gen. only
1990	254	204	N/A	N/A	181	254	N/A	N/A	N/A	N/A
1991	272	213	N/A	N/A	191	269	N/A	N/A	201	235
1992	282	234	N/A	N/A	198	274	N/A	N/A	214	230
1993	321	246	249	227	213	302	N/A	N/A	207	234
1994	349	265	294	247	247	306	N/A	N/A	226	249
1995	374	279	323	260	281	334	266	201	250	254
1996	411	290	330	277	329	339	322	236	283	261
1997	395	326	346	277	328	354	308	249	307	296

[7] More analysis is required to understand which type of generic drugs may have some or no brand name competitors (e.g. size of market, older drugs, therapeutic disease group, etc.).

Table 3 shows the market share represented by generic drugs, in terms of expenditures, in each provincial drug plan when there was at least one generic alternative. In this situation, generic drugs captured a large share of provincial drug plan expenditures. As alluded to above, this large share of expenditures coincides with the mandatory generic substitution policy that has been implemented in most provincial drug plans. For example, when Alberta's mandatory substitution was implemented in 1993, the following year the generic share of the market increased from 21.4% in 1994 to 73.0% in 1995. Similarly, in British Columbia mandatory generic substitution was introduced in 1994 which coincides with an increase in the generic drugs market share from 54.6%% in 1994 to 93.2% in 1995.

Table 3

Median Generic Share of Expenditures					
	British Columbia (%)	**Alberta (%)**	**Saskatchewan (%)**	**Manitoba (%)**	**Ontario (%)**
1990	16.2	N/A	59.6	N/A	N/A
1991	18.5	N/A	79.5	N/A	83.5
1992	20.9	N/A	83.5	N/A	84.0
1993	20.7	N/A	85.5	N/A	82.1
1994	54.6	21.4	85.8	N/A	84.3
1995	93.2	73.0	85.2	92.5	85.4
1996	89.8	75.6	86.0	92.7	86.0
1997	89.5	78.3	86.7	91.9	91.0

4.0 PROVINCIAL GENERIC TO BRAND NAME PRICE RATIOS

It is generally acknowledged that generic drugs sell for less than their brand name equivalents.[8] To examine this issue in greater detail average generic prices were calculated by dividing total sales of all generic drugs by the total number of generic drugs. Average brand name prices were calculated in a similar fashion. A generic-to-brand name price ratio was then determined for each class of drug product by dividing the average generic price by the average price of the branded product.

Table 4 shows the median generic-to-brand name price ratios for each province.

Table 4

Median Generic-to-Brand Name Price Ratios By Year

	British Columbia (%)	Alberta (%)	Saskatchewan (%)	Manitoba (%)	Ontario (%)
1990	60.8	N/A	41.8	N/A	N/A
1991	61.9	N/A	40.0	N/A	74.4
1992	59.1	N/A	43.8	N/A	72.4
1993	59.0	56.0	53.0	N/A	72.4
1994	63.9	62.0	55.8	N/A	72.0
1995	71.3	63.4	60.0	76.4	75.0
1996	71.0	65.8	61.5	83.1	75.0
1997	70.2	68.9	63.1	74.6	74.8

As seen in Table 4, the trend in generic-to-brand name price ratios differed somewhat across the five provinces. For example, in 1991, half of all generic drugs in Saskatchewan sold for less than 40% of the brand name's price. While in British Columbia the median generic-to-brand name price ratio was 62%. The median generic-to-brand name price ratio was 74.4% in Ontario. In the early 1990's, generic drugs were priced relatively lower in most provinces, with the exception of Ontario, than in recent years.

By 1997, the median generic-to-brand name price ratios increased significantly in British Columbia, Alberta and Saskatchewan. Saskatchewan, however maintained the lowest average median generic-to-brand name price ratio at 63.1%. This compared to 70.2% in

[8] See Joel Lexchin MD, *Effect of generic drug competition on the price of prescription drugs in Ontario,* Canadian Medical Association Journal, 1993:148(1) pages 35-38.

British Columbia and 74.8% in Ontario. It is interesting to note that these trends coincided with the introduction of Quebec's lowest price policy in 1993.[9]

The median generic-to-brand name price ratio, while informative, does not provide information on the distribution of generic-to-brand name price ratios. Table 5 shows the percentage of all generic drugs that were priced at less than 50%, between 50% and 75%, 75% and over of the brand name drug for the years 1991, 1994 and 1997.

Table 5

Percent Distribution of Generic-to-Brand Name Price Ratios				
Province		**0 to 50%**	**50% to 75%**	**75% and over**
91	British Columbia	38	37	25
	Saskatchewan	63	21	11
	Ontario	26	25	49
94	British Columbia	31	36	33
	Alberta	35	33	32
	Saskatchewan	43	29	28
	Ontario	22	34	44
97	British Columbia	21	41	38
	Alberta	24	39	37
	Saskatchewan	32	37	31
	Manitoba	23	27	50
	Ontario	15	37	48

The results show that in 1991, Saskatchewan had 63% of all generic drug prices at less than half of the equivalent brand name price. While British Columbia had 38%, and Ontario only 26% of all generic drugs were so priced.

In 1994, only 31% of generic drugs in British Columbia and 22% in Ontario cost less than half of the original brand name product's price. In Saskatchewan, 43% of generic drug prices remained at less than half the price of brand name drugs. In Alberta, 35% of all generic drugs were priced at less than 50% of the brand name drug.

In 1997, generic drugs were priced at 50% or less of the brand name prices less frequently than in any previous year. In Ontario only 15% of generic drugs sold for less than half the

[9] The Quebec lowest drug price policy was intended to ensure that Quebec always had access to the lowest drug prices in Canada.

brand name price, in British Columbia 21%, in Alberta 24%, in Manitoba 23% and in Saskatchewan 32%.

Over the 1990-1997 period, the frequency at which generic drugs were priced at 50% or less of the brand name price, has fallen by nearly half in British Columbia, Alberta, Saskatchewan, and Ontario. As a result, more generic drugs were priced between 50% and 75%, and over 75%, of the brand name price.

Over the period 1990 to 1997, two observations have emerged regarding the pricing of generic and brand name drug products. As seen in Table 6, prices of generic drugs have been falling faster than prices of brand name drugs, while at the same time, the ratio of generic-to-brand name prices have remained the same or increased (see Table 4).

Table 6

Year-over-Year Price Changes for Generic and Brand Name Drugs, 1991 to 1997

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	% Gen.	% Brand	% Gen.	% Brand	% Gen.	% Brand	% Gen.	% Brand	% Gen.	% Brand
1991	0.3	5.5	N/A	N/A	–6.0	3.4	N/A	N/A	N/A	N/A
1992	-2.9	4.3	N/A	N/A	4.0	2.7	N/A	N/A	-5.6	2.0
1993	-9.5	1.9	N/A	N/A	18.1	1.4	N/A	N/A	-10.6	1.5
1994	-6.6	-.5	-3.2	-2.7	-2.5	1.0	N/A	N/A	-12.2	-2.6
1995	-1.3	-1.9	-2.5	1.5	0.9	0.9	N/A	N/A	-3.7	-0.6
1996	-1.3	-.6	-1.3	-1.1	-6.5	-0.2	-2.8	-1.6	-1.1	-1.0
1997	-1.7	-3.4	-1.6	0.1	-2.9	-0.4	-3.4	-1.2	-1.3	-0.6

One possible explanation is that generic drugs are being introduced at higher relative prices which in turn increases the median generic-to-brand name price ratio. Another explanation is that price trends for generic drugs which have no brand name competition are different than for generic drugs which have brand name competition.

These possible explanations are examined in Sections 5 and 6.

5.0 BY YEAR OF INTRODUCTION

To investigate whether or not introductory prices of new generic drugs may account for the increase in median generic-to-brand named prices, introductory generic-to-brand name prices were calculated by year of introduction.[10] This information is shown in Table 7 below.

Table 7

Median Generic-to-Brand Name Price Ratio by Province and by Year of Introduction 1991-1997

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario	
	% Med	#	% Med	#	% Med	#	% Med	#	% Med	#
1991	73.2	22	N/A	N/A	50.9	6	N/A	N/A	N/A	N/A
1992	73.2	20	N/A	N/A	73.6	5	N/A	N/A	77.3	7
1993	80.5	41	N/A	N/A	75.7	8	N/A	N/A	76.5	15
1994	75.5	39	76.4	44	75.3	36	N/A	N/A	70.9	25
1995	74.3	35	74.7	26	63.1	41	N/A	N/A	76.2	23
1996	75.1	43	75.0	45	68.8	53	82.9	50	74.9	41
1997	72.7	46	72.3	34	74.6	24	80.6	51	75.3	24

As shown in Table 7, prices for new generic drugs are relatively higher with respect to their brand name equivalents than prices of all generic drugs (see Table 4). This implies that newer generic drugs are priced higher relative to brand name equivalents than existing generic drugs. This trend is consistent across all provinces.

[10] In most cases the year of introduction is defined as the year in which the drug was first sold in that province.

6.0 THE LEVEL OF GENERIC COMPETITION

Table 8 shows that after the first generic drug is introduced, the market share for generic drugs is consistently 90% or more across the provinces. This may suggest that a high degree of competition exists once generic drug alternatives are available.[11]

Table 8

Median Generic Share, by Number of Generic Drugs 1997

	% One Generic	% Two Generics	% Three Generics	% Four Generics	% At least Five Generics
British Columbia	63.9	96.1	96.9	98.3	98.4
Alberta	62.3	89.9	92.1	96.0	95.5
Saskatchewan	69.9	95.4	95.3	97.3	97.7
Manitoba	72.5	96.9	97.3	98.3	97.9
Ontario	74.1	93.6	97.3	97.7	97.9

IMS (1997) and Joel Lexchin (1993) have found that the greater the number of generic drugs available in a given market the lower the generic-to-brand name drug price ratio.[12] This provides another measure to assess the degree of competition once generic drugs are available.

To examine this issue in greater detail provincial price information was used to report on the relationship between the number generic drugs available in a given market and the generic-to-brand name price ratio. It was found that in three provinces the generic-to-brand name price ratio declined initially, but began to rise when there were more than three generic alternatives available. However, in Alberta and Manitoba the generic-to-brand name price ratio appeared to decline after the first generic and remained somewhat constant thereafter. (See Table 9 for the generic-to-brand name price ratio by number of generic drugs and Table 10 for the number of generic drugs).

[11] More analysis is required to examine the degree of competitiveness.

[12] See IMS and Lexchin, IBID.

Table 9

Median Generic-to-Brand Name Price Ratio by Number of Generic Competitors

	British Columbia				Saskatchewan			
	% One Generic	% Two Generics	% Three Generics	% Four Generics	% One Generic	% Two Generics	% Three Generics	% Four Generics
1990	69	43	54	66	51	33	26	39
1991	67	43	55	67	47	37	30	37
1992	64	39	49	64	57	37	27	46
1993	71	39	50	58	60	47	49	57
1994	76	55	59	46	73	42	53	37
1995	82	58	71	47	70	40	61	35
1996	80	56	69	63	74	52	59	33
1997	78	60	69	58	77	54	60	39
	Alberta				**Manitoba**			
	% One Generic	% Two Generics	% Three Generics	% Four Generics	% One Generic	% Two Generics	% Three Generics	% Four Generics
1993	70	42	48	48	N/A	N/A	N/A	N/A
1994	76	50	51	47	N/A	N/A	N/A	N/A
1995	75	52	57	47	90	72	66	61
1996	75	64	63	56	93	79	81	67
1997	79	65	68	61	84	66	72	60
	Ontario				**Nova Scotia**			
	% One Generic	% Two Generics	% Three Generics	% Four Generics	% One Generic	% Two Generics	% Three Generics	% Four Generics
1991	81	68	66	71	N/A	N/A	N/A	N/A
1992	80	65	55	72	N/A	N/A	N/A	N/A
1993	80	71	60	66	N/A	N/A	N/A	N/A
1994	77	72	70	57	N/A	N/A	N/A	N/A
1995	79	75	71	67	N/A	N/A	N/A	N/A
1996	82	75	73	72	N/A	N/A	N/A	N/A

Median Generic-to-Brand Name Price Ratio by Number of Generic Competitors								
1997	78	75	71	68	N/A	N/A	N/A	N/A

Table 10

Number of Drug Product Classes by Number of Generic and by Year 1990-1997

	British Columbia				Saskatchewan			
	% One Generic	% Two Generics	% Three Generics	% Four Generics	% One Generic	% Two Generics	% Three Generics	% Four Generics
1990	120	86	42	9	99	68	14	4
1991	120	88	51	16	106	66	16	5
1992	127	93	44	21	110	67	16	5
1993	158	93	48	21	101	74	30	7
1994	170	94	53	24	113	68	38	26
1995	173	88	73	27	136	74	44	25
1996	181	97	73	35	140	79	61	25
1997	198	101	69	43	151	84	63	33
	Alberta				**Manitoba**			
	% One Generic	% Two Generics	% Three Generics	% Four Generics	% One Generic	% Two Generics	% Three Generics	% Four Generics
1993	124	77	38	19	N/A	N/A	N/A	N/A
1994	154	74	60	20	N/A	N/A	N/A	N/A
1995	161	77	66	22	122	96	41	18
1996	163	78	66	28	151	89	49	21
1997	164	82	60	39	173	107	48	32
	Ontario				**Nova Scotia**			
	% One Generic	% Two Generics	% Three Generics	% Four Generics	% One Generic	% Two Generics	% Three Generics	% Four Generics
1991	89	56	45	8	N/A	N/A	N/A	N/A
1992	91	58	42	21	N/A	N/A	N/A	N/A
1993	87	66	32	21	N/A	N/A	N/A	N/A
1994	110	62	40	19	N/A	N/A	N/A	N/A
1995	123	67	42	16	N/A	N/A	N/A	N/A

1996	132	77	48	21	N/A	N/A	N/A	N/A
1997	137	81	55	27	N/A	N/A	N/A	N/A

7.0 CONCLUSIONS

This study examined several aspects of generic-to-brand name pricing and expenditures over the period 1990 to 1997 in five provincial drug plans. It was found that generic prices have increased significantly relative to brand name prices. Thus, by 1997, generic prices were between 27% and 37% below brand name prices. In earlier years, generic prices were between 40% and 60% below brand name prices.

A number of factors may account for increasing generic-to-brand name prices over time including:

- new generic drugs are priced higher relative to brand name equivalents than are existing generic drugs;
- prices of brand name drugs have been flat or falling over time; and
- older brand name drugs are more likely to withdraw from the market allowing generic drugs to capture the entire market.

It was also found that over the period 1990 to1997, generic market share had levelled off in some provinces and fallen in others. This is likely attributed to the combination of the passing of Bill C-91 in 1993, which extended greater patent protection for brand name companies, and the rapid rate at which new patented drug sales increased over this period.

An analysis of the impact on prices of generic drugs to brand name drugs, when the number of generic drugs available increase in a given market, revealed that the ratio of prices did not necessarily decline as more generic alternatives are available in a given market. In fact, in three provinces the ratio of generic prices to brand name prices increased after three generic drugs entered the market. These results suggest that further analysis is required to fully understand the relationship between generic-to-brand name prices, and its implications for competitiveness.

APPENDIX 1

INTERNATIONAL COMPARISON BETWEEN THE GENERIC TO BRAND PRICE RATIO IN CANADA VERSUS THE UNITED STATES

The generic drugs used in this analysis were selected from the top 200 most commonly prescribed medicines (brand and generic), as reported by IMS Canada Drug Store and Hospital Purchases for the year 1995. The IMS list is based on the number of prescriptions dispensed in Canadian community pharmacies.

In order to compare generic-to-brand name price ratios between Canada and the U.S., only those drugs which had the same dosage form and strength in both countries were selected. It was found that only 30 drug products matched the above criteria. The sample in this analysis contains all of the 30 generic and brand name drug products that were common in both Canada and the U.S. It is important to note that, the common basket of comparable drug products contain mostly older drugs. The year of introduction ranges from 1961 to 1985. This can be attributed to the different patent legislation present in the two countries. Until 1987, due to compulsory licensing, generic companies in Canada were able to make generic copies of relatively new patented drugs which were still under patent protection in the U.S. See Tables 1 and 2 for detailed information on these drug products.

Price information for Canada was gathered from IMS Canada. Unit prices were calculated by dividing sales by total number of units sold. Information regarding U.S. generic and brand name prices were gathered from the Medispan database. Unit prices in the U.S., represent the average wholesale price (AWP) as reported in Medispan.

For each drug product, the generic-to-brand name price ratio in both countries was calculated by dividing the unit price of the generic drug product by the unit price of the brand name drug product. The ratios were then weighted by sales of the 30 drug products in the Canadian market. This was done to take into account the relative importance of each drug product in the Canadian market.

FINDINGS

Table 1 shows the generic-to-brand name price ratios in Canada and the U.S. In eleven out of thirty cases, the generic-to-brand name price ratios were higher in Canada than in the U.S. However, in ten out of these eleven cases, the U.S. prices, both generic and brand name, were higher than that of the Canadian prices. In one of the cases, the generic price in Canada was higher than the generic price in the U.S. Table 2 shows that, on average, the generic-to-brand name price ratio in Canada was 67%. In the U.S., the generic-to-brand name price ratio was 64%. The median generic-to-brand name price ratio was 53% in Canada and 58% in the U.S.

Table 1

Comparison of Generic-to-Brand Name Drug Prices in Canada and the U.S.				
Brand Name	**Generic Drug Canada**	**Generic Drug U.S.**	**% Price Ratio (U.S.) Generic/Brand**	**% Price Ratio (Canada) Generic/Brand**
Analgesics				
Tylenol w/ COD 2TAB NO.2	Novo-Gesic-C15	Acetaminophen w/ Codine	0.27	1.00
Tylenol w/ COD3 TAB NO.3	Novo-Gesic-C30	Acetaminophen w/ Codine	0.34	1.00
Anti-Arthritics				
Ansaid TAB 100MG	Apo-Flurbiprofen	Flurbiprofen	0.81	0.54
Feldene CAP 20MG	Apo-piroxicam	Piroxicam	0.84	0.51
Indocid CAP 25MG	Novo-Methacin	Indomethacin	0.27	0.20
Naprosyn TAB 250MG	Apo-Naproxen	Naproxen	0.84	0.33
Voltaren TAB 25MG	Novo-Difenac	Diclofenac Sodium	0.81	0.34
Anti-Infectives Systemics				
Amoxil CAP 250MG	Novamoxin	Amoxicillin	1.05	0.61
Keflex TAB 500MG	Novo-Lexin	Cephalexin	0.37	0.52
Minocin CAP 100MG	Apo-Minocycline	Minocycline	0.66	0.89
Vibramycin CAP 100MG	Apo-Doxy	Doxycycline	0.13	0.38
Anti-Spasmodic				
Ditropan TAB 5MG	Apo-Oxybutynin	Oxybutynin	0.72	0.79
Sulcrate TAB 1GM	Novo-sucralate	Sucralfate	0.80	0.80
Tagamet TAB 300MG	Novo-Cimetine	Cimetidine	0.81	0.24
Bronchial Therapy				
Theo-Dur TAB 300MG	Apo-Theo	Theophylline	0.54	0.54
Ventolin TAB 2MG	Novo-Salmol	Albuterol Sulfate	0.72	0.75

Comparison of Generic-to-Brand Name Drug Prices in Canada and the U.S.				
Brand Name	**Generic Drug Canada**	**Generic Drug U.S.**	**% Price Ratio (U.S.) Generic/Brand**	**% Price Ratio (Canada) Generic/Brand**
Cardiovasculars				
Adalat CAP 10MG	Apo-Nifed	Nefedipine	0.89	0.39
Capoten TAB 25MG	Apo-Capto	Capotril	0.83	0.59
Cardizem TAB 30MG	Apo-Dilitiaz	Diltiazem HCI	0.87	0.55
Isordil TAB 30MG	Apo-ISDN	Isosorbide Dinitrate	0.09	0.43
Isoptin TAB 120MG	Apo-Verap	Verapamil HCI	0.53	0.47
Lopressor TAB 100MG	Novo-Metoprol	Metoprolol Tartrate	0.76	0.53
Tenormin TAB 50MG	Apo-Atenol	Atenolol	0.45	1.08
Diuretics				
Aldactone TAB 25MG	Novo-Spiroton	Spironolactone	0.19	0.89
Hydrodiuril TAB 25MG	Apo-Hydro	Hydrochlorothiazide	0.23	0.75
Lasix TAB 20MG	Apo-Furosemide	Furosemide	0.35	0.14
Psychotherpetutic				
Ativan TAB 0.5MG	Novo-Lorazem	Lorazepam	0.21	0.50
Elavil TAB 25MG	Apo-Amitriptyline	Amitriptyline HCI	0.23	0.07
Serax TAB 15MG	Novoxapam	Oxazepam	0.47	0.25
Xanax TAB 0.25MG	Alprazolam	Alprazollam	0.63	0.42

Table 2

Table 2: Average Generic-to-Brand Name Price Ratios in Canada and the U.S.			
Canada		**U.S.**	
% Mean (Sales Weighted)	% Median	% Mean (Sales Weighted)	% Median
67	53	64	58

APPENDIX 2

REGRESSION ANALYSIS OF PROVINCIAL GENERIC TO BRAND NAME PRICE RATIOS

Regression analysis can be used to complement the above analysis on the relationship between prices of generic drugs and their brand name equivalents. To investigate whether the ratio of prices declines or increases when the number of generic alternatives increases, a bivariate regression analysis is used.[13] Regression analysis can also be used to determine if other factors are affecting the relationship between prices of generic drugs and their brand name equivalents, e.g. age of drug, therapeutic novelty, etc.

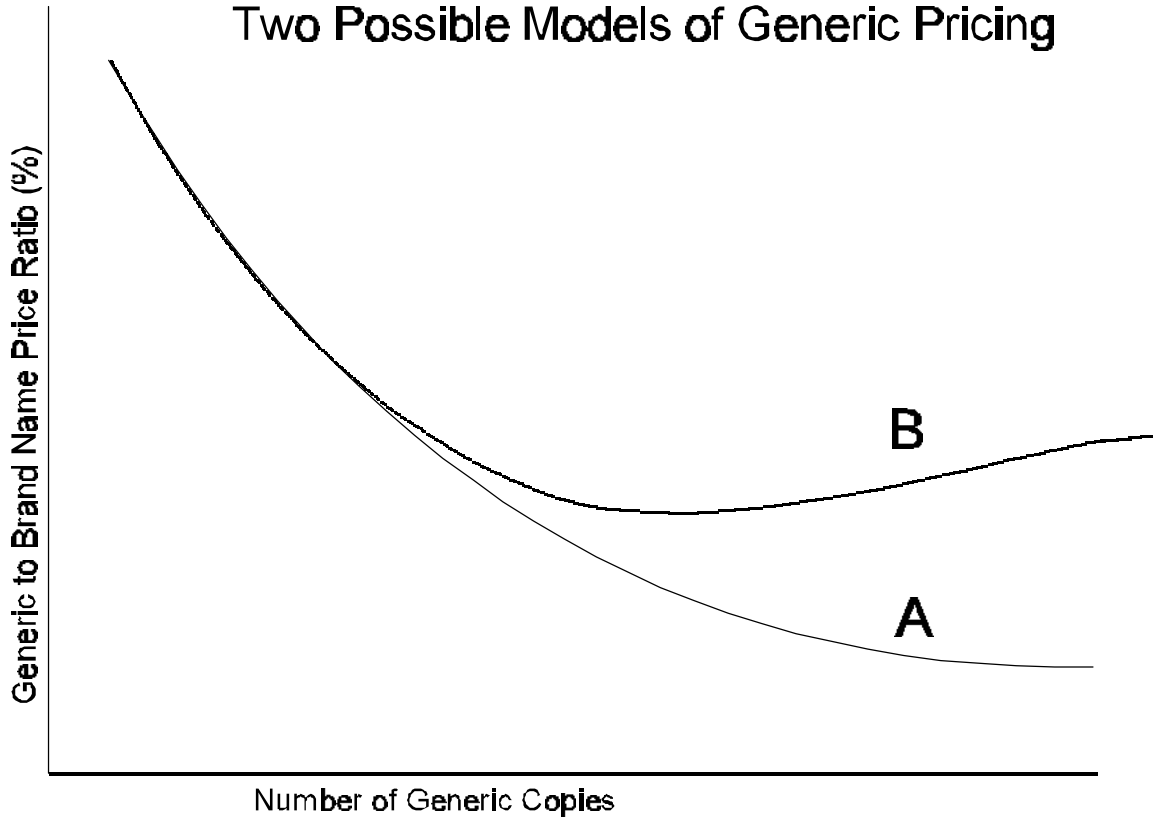
DESCRIPTION OF THE REGRESSION MODEL

Two models are illustrated in Figure 1. If the price ratio declines with the introduction of the second and third generic but rises with the fourth and subsequent entrants then the relationship between the price ratio and number of generic competitors is by definition not linear and may be represented by model B. Alternatively, if the price ratio declines with each new entrant but at a declining rate, this may be represented by model A.[14] Both models are non-linear, (i.e. the number of generic alternatives experience a non-linear relationship to the generic-to-brand name prices).

[13] The price strategy of a brand name manufacturer with a mature product facing four generic competitors and possibly some new innovative products also competing for the same patients, may to drop its price thereby raising the price ratio.

[14] If the ratio were to decline at a constant rate, eventually the generic price would be modeled as being negative.

Figure 1



The formulae for Models A and B are given below:

$$\text{(Model A) } \ln\left(\frac{G}{B}_i\right) = b_1 AGE\_Br_i + b_2 NGEN_i + e_i$$

$$\text{(Model B) } \ln\left(\frac{G}{B}_i\right) = b_1 AGE\_Br_i + b_2 NGEN_i + b_3 NGEN_i^2 + e_i$$

The two models are identical with the exception that Model B contains an extra term, the square of the number of generics currently on the market. By construction, Model A forces the price ratio to decline indefinitely as number of generics increases, so long as B_2 is negative. Model B allows for the prediction of a rising price ratio so long as B_3 is positive.

If B_3 is negative or is positive but not significantly different from zero at the five percent level[15] Model B will be rejected. If the inclusion of the square of the number of generics does not explain a significant number of the total variability in the data then Model B will also be rejected. These two test are normally referred to as 'T-Tests' and 'F-tests' respectively by statisticians.[16]

Another requirement is that the coefficients that the model estimates be an appropriate sign. Either Model A or Model B should be rejected if B_2 was positive, implying that the price ratio should *increase* indefinitely.

RESULTS

The results of the regression analysis are summarized in Table 1.

Table 1

Results from Provincial Generic-to-Brand Name Price Ratios

Province	Model A		Model B					Reject Model B?
	B_1	B_2	B_1	B_2	B_3	T-Test	F-Test	
B.C.	-0.014**	-0.169**	-0.009**	-0.36**	0.050**	PASS	PASS	NO
Alberta	-0.160**	-0.141**	-0.011**	-0.314**	0.041**	PASS	PASS	NO
Saskatchewan	-0.021**	-0.170**	-0.014**	-0.387	0.049**	PASS	PASS	NO
Manitoba	-0.014**	-0.091**	-0.012**	-0.151**	0.014**	PASS	PASS[17]	NO
Ontario	-0.011**	-0.095**	-0.009	-0.162**	0.016**	PASS	PASS	NO

** Statistically significant at the 1% level.

The regression results found that in all provinces Model B fit the data better than Model A.

[15] Statistical significance takes advantage of variability in the sample data to make inferences regarding variability in the population from which the sample was drawn. It is then possible to gauge the reliability of a point estimate such as a slope coefficient.

A point estimate that is statistically significant at the five percent level, is one that if twenty different data sets were obtained, no more than one of the twenty point estimates would be less than or equal to zero.

[16] These two criteria for rejecting Model B test the hypothesis slightly differently. They are unlikely to provide conflicting results.

[17] The value of the F-statistic for Manitoba is significant at the 5.1% level.