Pharmaceutical Prices and Reference-based Pricing

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I. Introduction

The pricing of ethical (prescription) drugs has been a source of concern in Canada over the past forty years and has given rise to a number of governmental commissions. Patent protection of the pharmaceutical industry is provided in response to the highly research intensive nature of the industry. However, in rewarding innovators, the patent system creates market power, leading to high prices of brand-name prescription drugs.

Generic drugs have been made available in Canada under compulsory licensing arrangements or when patent protection is ended, and are priced significantly lower than the brand-name equivalents. Demand for lower-priced generic drugs has been particularly evident in the publicly insured market [Lexchin: 1993,148] where demand is more price elastic. An increasing shift in drug expenditures in Canada from the private sector to the public sector since 1970 [Gorecki: 1992, 2-5], along with the establishment of provincial formularies which list interchangeable bioequivalent drugs and their prices [Health Industries Branch: 1997, 48], has contributed to the growth of the generic drug industry.

The relationship between generic and brand-name ethical drugs, in terms of market share and pricing, has been the focus of a number of research papers [Caves *et al.*: 1991, Frank and Salkever: 1992 and 1995, Grabowski and Vernon: 1992, Hurwitz and Caves: 1988]. The market for pharmaceuticals is considered to be segregated, consisting of two segments with very different price elasticities of demand, and the two groups of drugs target the different segments with very different pricing strategies. The generic drugs compete in price for a share of the price-sensitive publicly insured market, while the brand-name drugs compete through marketing for a share of the more price inelastic market segment.

The impact on pharmaceutical prices with insurance coverage resulting from a change in the method of reimbursement has been evaluated for several different methods: the best-available price or lowest-cost alternative system introduced in Ontario in 1986 [Gorecki: 1992, 61-66], the actual acquisition cost system introduced in Nova Scotia in 1986 [Anis: 1992], and a most-favored-customer rule adopted in the U.S. in 1991 [Scott Morton: 1997].

A best-available price or lowest-cost alternative reimbursement system is now widely used in Canada. Except in the case of British Columbia, provincial formularies list the prices of interchangeable bioequivalent drugs which will be reimbursed by the provincial drug plans. With a lowest-cost alternative system, pharmacy reimbursement is restricted to the lowest-priced product available. The provinces differ somewhat in terms of price selection and product selection rules [Anis: 1992, 422], however pharmacists are expected to dispense the least costly drug and, in most provinces, cannot make a no-substitution decision [Angus & Karpetz: 1998, 88].

With an actual acquisition cost system, the pharmacist is reimbursed the actual acquisition cost of the drug, rather than the formulary price. The choice of interchangeable brand is left to the discretion of the pharmacist, although substitution must be to a lower priced drug [Gorecki: 1992, 70]. To encourage pharmacists to select less costly drugs, incentive payments may be provided to product select [Gorecki: 1992, 72].

In the United States, a most-favored-customer rule for Medicaid reimbursement has been adopted, whereby Medicaid pays manufacturers the lowest price which is offered to any buyer of the drug, or a percentage of the average manufacturer price (87.5% for brand-name products and 90% or generics), whichever is lower. This method of reimbursement is intended to secure lower prices for Medicaid which does not purchase drugs in bulk. Access to all state

Medicaid formularies and reimbursement from the federal program provides incentive for firms to enrol in the program.

Insurance coverage with reference-based pricing (RBP) was introduced in British Columbia in 1995 for three classes of drugs, and was expanded to include two additional classes in 1997 [B.C. Government: 1998]. Except in cases of medical necessity, reimbursement by the drug benefit program is specified by a reference product which is determined to be medically effective and the most cost effective product in a RBP therapeutic category [Dickson & Redwood: 1998, 435].

RBP differs from formularies in that drugs are grouped by therapeutic category and are not interchangeable substitutes. This method of grouping may change the nature of competition in the pharmaceutical industry in that single-source drugs (brand-name drugs without generic substitutes) are grouped with multiple-source drugs (brand-name drugs and their generic equivalents), and different multiple-source drugs are grouped together.

Prior to the implementation of RBP in British Columbia, reimbursement was limited to the actual acquisition cost of the average of lower cost alternatives, provided such alternatives existed within a therapeutic class of a drug [B.C. Government: 1998]. The objective of this research project is twofold: (i) to determine whether the introduction of reference-based pricing in British Columbia has encouraged competition in the pharmaceutical industry and, when compared with the actual acquisition cost/lower cost alternative reimbursement method, has resulted in lower prices of brand-name or generic ethical drugs, and (ii) to determine whether price changes of brand-name and generic drugs included in the RBP program have differed according to the competition they have faced from drugs with the same active ingredient and dosage.

The article is organised as follows: Section II provides some background on the pharmaceutical industry; Section III examines various provincial drug reimbursement programs; Section IV offers a review of the literature; Section V outlines the research methodology employed and provides a discussion of the data; Section VI reports on the results of the empirical analysis; and Section VII concludes with a summary.

II. The Pharmaceutical Industry

The pharmaceutical industry is a complex industry and an important component of Canada's health care system. On the supply side, manufacturers of pharmaceuticals may be categorised as either innovators or imitators [Scott Morton: 1997, 275-76]. The multinational brand-name companies invest in the discovery, development and marketing of new drugs. Patent protection of these drugs gives the firms market power, reflected in the high prices of brand-name pharmaceuticals. The generic companies make lower-priced copies of the brand products that are off-patent or subject to compulsory licensing.

On the demand side, the industry is unique in many ways. Demand for prescription drugs differs from most types of consumer demand in that consumers usually rely on the knowledge of a physician in determining the appropriate drug to be prescribed. The physician may not be particularly concerned about or even aware of the relative prices of the prescription drugs, and his or her awareness of the drug choices available may be influenced by the marketing promotions of the pharmaceutical companies.

There are two groups of buyers: those who are relatively price insensitive and those who are more price sensitive. Individual patients who pay directly, or those who are covered by private insurance plans that do not specify price restrictions, may be relatively insensitive to

the prices of prescription drugs. However, hospitals or public drug plans may be considerably more price sensitive, preferring the least cost alternative.

2.1 Brand-Name Sector

The pharmaceutical industry is global in scope, dominated by the multinational manufacturers of brand-name drugs. Economies of scale exist in both fine chemical manufacturing and in research and development [Morgan: 1998, 682]. Economies of scope are also particularly significant in pharmaceutical research, where a diverse research portfolio allows for spillovers of knowledge [Henderson & Cockburn: 1996].

The major pharmaceutical firms are headquartered in the U.S., the U.K., Sweden, Germany, France, Japan and Switzerland [Health Industries Branch: 1997, 10]. In the past five years, there have been a number of mergers and acquisitions among drug companies, in an effort to benefit from increased scale and efficiency [Health Industries Branch: 1997, 11].

Canada is a small player in the world pharmaceutical industry. The foreign-owned subsidiaries of multinational brand-name drug companies in Canada focus on product formulation, packing and filling, and marketing and distribution, rather than on new product innovation [Health Industries Branch: 1997, 34]. In terms of research and development conducted by the multinational subsidiaries in Canada, the emphasis is on clinical research [Lexchin: 1993, 156].

The discovery and development of new drugs is time-consuming, risky and expensive. At present, the development of a new drug takes about 11 years; the probability of success is approximately one in every 10,000 synthesized substances; and the average cost of developing a new drug in 1994 was estimated at approximately $291 million U.S. [Kaitin:1996, 111].

Patent protection is provided for the pharmaceutical industry to provide incentive to carry out research. However, high levels of prices are a concern. Not withstanding the risk and cost of investment in research and development, the pharmaceutical industry is very profitable. Pharmaceutical firms have been ranked first or second in terms of return on shareholders' equity between 1960 and 1991, averaging 18.4 percent compared to an average of 11.9 percent for the top 500 industrials; and, in 1995, they received the highest ranking by *Fortune* for return on revenues, assets and equity [Morgan: 1998, 693].

Pharmaceutical revenues are highly dependent on a very small number of products. On average, about 20% of each firm's earnings are attributable to sales of a single drug [Ballance: 1996, 99]. Firms have an incentive to retain patent protection through modified dosage forms, " "newer", long-acting or extended-release versions of the original product" [Morgan:1998, 704]. These "line extensions" accounted for 43% of newly patented drugs market in Canada between 1991 and 1995 [Angus & Karpetz: 1998, 82].

Along with high levels of prices and profits, the research agenda of the pharmaceutical industry is a concern [Morgan:1998, 701-702]. Research is concentrated in areas that are more likely to guarantee returns, focusing on nearly identical compounds with similar therapeutic effects, the so-called "me-too" drugs [Morgan: 1998, 701]. Between 1991 and 1995, 49% of the newly patented drugs in Canada offered "only moderate or no improvement over existing drugs" as opposed to 8% which were considered breakthroughs [Angus & Karpetz: 1998, 83]. Another risk-averse strategy is to develop products that will continue to have a stable and predictable market, i.e. symptomatic relief and maintenance drugs that are able to generate long-term sales [Morgan: 1998, 702; Angus & Karpetz: 1998, 83].

Marketing expenditures are very high in the pharmaceutical industry, accounting for 24% of company expenditures in 1989 [Ballance: 1996, 97]. Marketing strategies emphasize product differentiation since many of the new products have similar chemical compounds [Morgan: 1998, 704]. The substitution of new drugs for older drugs contributes to the increasing level of pharmaceutical expenditures. Recent studies indicate that 75 of the 200 top-selling drugs from 1991 to 1994 in Canada had been on the market for four years or less and these newer products are more than twice as costly as the older drugs, based on cost per insurance claim [Morgan: 1998, 687].

2.2 Generic Sector

Generic drugs have the identical chemical compounds as their brand-name equivalents and compete with brand-name drugs on the basis of price. In Canada, there are two dominant Canadian-owned firms in the generic market sector, Apotex and Novopharm, although approximately 15 to 20 firms participate solely in the generic drug market; up to 20 additional firms market generic drugs along with other lines [Health Industries Branch: 1997, 16,37].

Generic products enter the market when brand-name drugs come off-patent or by way of compulsory licensing. Compulsory licensing in Canada prior to 1993, and the emphasis of provincial drug programs on substitution toward lower-priced drugs, contributed to the growth of the generic sector. In 1996, 39.8 % of the number of prescription filled were accounted for by generic drugs, representing 17.4 % of the total value [Health Industries Branch: 1997, 12].

Many manufacturers have launched pseudo-generic copies of their own drugs to realize sales from the generic market while maintaining higher prices for the brand-name version of the drug, and to gain early access to the generic market [Angus & Karpetz:1998, 89, Morgan:

1998, 705]. Several small pseudo-generic firms have recently merged to form a large generic company, Alti-Med, which is owned by three multinational brand-name manufacturers [Angus & Karpetz: 1998, 89].

2.3 Overview of Patent Regulation and Compulsory Licensing in Canada

Canada's emphasis on compulsory licensing in the pharmaceutical industry to promote competition from generic drugs has been unique among developed countries [Morgan: 1998, 713]. Compulsory licensing for drug patents began in Canada in 1923 with amendments to the Patent Act. Firms were permitted to manufacture and sell a patented drug under license before the expiry of its 17-year patent as long as the drug was manufactured in Canada [Morgan: 1998, 713]. Returns to scale made Canada an unprofitable market for manufacturing and the early compulsory licensing program was largely ineffective with only 22 applications granted for compulsory licenses between 1923 and 1969 [Eastman: 1985, 2].

Concern over the high cost of patented drugs in the 1960s led to further amendments of the Patent Act in 1969. Firms were allowed to import patented drugs for sale under compulsory license subject to a 4 percent royalty fee [Morgan: 1998, 714]. These amendments resulted in a significant increase in compulsory licensing. Between 1969 and 1982, more than 290 compulsory licenses were granted [Morgan: 1998, 714].

Lobbying against compulsory licensing by the multinational pharmaceutical companies throughout the 1970s and 1980s and the signing of the free-trade deal with the U.S. led to further amendments of the Patent Act in Bill C-22 in 1987 [Lexchin: 1993, 150]. Companies introducing new drugs were given a minimum of seven years of protection from compulsory licensing if the manufacturing of fine chemicals was done within Canada and ten years of

protection otherwise, and the patent term was set at 20 years commencing from the date of filing [Morgan: 1998, 715]. Bill C-22 also changed patent protection of pharmaceuticals from a process patent to a product patent system. Process-only or product-by-process patenting is a weaker form of patent protection since new means of producing a product will not infringe upon the patent [Eastman 1985, p.xxiii]. To ensure that prices would not be excessive, the Patented Medicine Prices Review Board (PMPRB) was created [Lexchin: 1993, 153]. The Board was authorized to monitor and report on the introductory price of new patented drugs.

Following the passage of Bill C-22, developments in the area of patent protection took place during the GATT multilateral trade talks and the North American Free Trade Agreement (NAFTA) negotiations [Smith: 1993, 8]. To keep intellectual property protection in Canada consistent with international trading obligations, further amendments to the Patent Act in Bill C-91 were passed in 1993 [Health Industries Branch: 1997, 41]. Compulsory licensing was eliminated entirely, although compulsory licences in existence before December 20, 1991 were permitted to continue.

III. Provincial Drug Programs

Pharmaceuticals make up a large part of healthcare expenditures in Canada, accounting for 12% of the total expenditures in 1996 [Morgan:1998, 683]. About 70 % of total drug expenditures are accounted for by prescription drugs [Morgan: 1998, 684]. The public-sector expenditures on prescription drugs as a proportion of total expenditures on prescription drugs rose from 26.5% in 1975 to 51.6% in 1985 [Gorecki: 1992, 684]. Since 1985, about 30% of total pharmaceutical expenditures have been publicly funded [Morgan: 1998, 684].

Public expenditures on ethical drugs vary considerably across the provinces. In 1987, public sector expenditures as a proportion of total expenditures on prescription drugs ranged from a high of 86.7% in Saskatchewan to a low of 34.2% in Nova Scotia. [Table 1 - Gorecki: 1992, 5].

Table 1. Public-sector expenditure as a proportion of total expenditure on prescription drugs, Canada and the provinces, selected years, 1975-87

	1975	1980	1985	1987
		(Per Cent)		
British Columbia	35.2	37.6	65.8	66.7
Alberta	27.8	31.7	41.4	45.7
Saskatchewan	32.7	76.2	99.3	86.7
Manitoba	28.7	37.1	55.5	54.5
Ontario	16.5	36.1	43.1	42.5
Quebec	35.5	73.8	63.5	62.8
New Brunswick	35.6	40.7	50.7	44.8
Nova Scotia	38.0	36.9	40.4	34.2
P.E.I.	33.3	24.5	31.6	56.8
Newfoundland	31.1	22.6	48.8	66.5
Canada	26.5	43.4	51.6	50.5

[Gorecki:1992, 5]

The provincial drug plans vary in terms of major beneficiary groups, pricing strategies, co-payment mechanisms and deductibles, as indicated in Table 2. All of the drug plans provide some form of coverage for senior citizens and those on social assistance [Angus & Karpetz: 1998, 86].

With rising pharmaceutical expenditures and limited resources, provincial governments have attempted to control costs through the use of co-payment mechanisms. Co-payment may be applied to either the drug cost or the dispensing fee and, in many provinces, there is also a deductible to be paid by the beneficiary (Table 2). Studies have indicated a decrease in utilisation rates of both essential and discretionary drugs as a result of co-payment schemes,

Table 2. Summary of Canadian provincial/territorial drug benefit programmes

province	*major beneficiary groups*	*pricing strategies*	*co-payment mechanisms*	*deductibles*
British Columbia	Seniors	RBP		
	Social assistance recipients	LCA		
	All other residents		30% to max/year	$600/year
Alberta	Seniors & widow(er)s	LCA	30% to max/Rx -no premium	
	Social assistance recipients	MAC		
	All other residents		30% to max/Rx + premium	
Saskatchewan	Families with income <$50,000	LCA	Varies with income	
	Saskatchewan assistance plan		$2.00/Rx	
	All other residents		35% co-payment	
Manitoba	All residents, including seniors	LCA		Variable
	Social Assistance recipients			Varies with income
Ontario	Seniors	LCA		$100/year
	Social assistance recipients		$2.00/Rx	
	Homecare/long term care res.		$2.00/Rx	
	Residents below certain income		$2.00/Rx	Varies with income
Quebec	Seniors	LCA	25% of Rx to maximum amount	Var. prem. + $100/year
	Social assistance recipients		25% of Rx to max. (children exempt)	$100/year
	Other residents		Same as seniors (children exempt)	Same as seniors
New Brunswick	Seniors (income-based)	LCA	$9.05/Rx	
	Human Resource Dev. clients	MAC	$4.00/adults, $2.00/children	
	Home-hospital patients		Same as seniors	
Nova Scotia	Seniors	LCA	20% Rx to max amt	$215/year
	Social assistance recipients	MAC	$3.00/Rx	
	Family benefits programme		20% to max amt	
Prince Edward Island	Seniors	LCA	First $7.00/Rx	
	Social assistance recipients		$2.00/Rx if not filled at gov't pharmacy	
Newfoundland	Seniors	LCA		
	Social assistance recipients			
Yukon	Seniors	LCA		
	Social assistance recipients			
NWT	Extended health benefits programme	None		
	Metis Health Benefit programme			

LCA = lowest-cost alternative among interchangeable products; MAC = maximum allowable cost for non-interchangeable products of the same chemical entity; RBP = reference-based pricing; Rx = prescription

[Angus & Karpetz: 1998, 85]

with the largest reductions in the use of essential medications [Angus & Karpetz: 1998, 86]. This reduction in drug usage may have potentially harmful effects on health status. The co-payment schemes are also limited in their ability to contain costs in that consumers entrust the physicians to make the decisions regarding drug prescriptions, as to whether medication is required and which drug is appropriate. Although consumers may choose the lowest dispensing fee, this is a small proportion of the prescription cost [Angus & Karpetz: 1998, 86].

The pricing strategies of the various provincial drug benefit programs also differ and have been evolving since the mid-1970s in an effort to control pharmaceutical expenditures. All of the provinces, excluding British Columbia, use provincial formularies which specify drugs that will be reimbursed by the drug plan and list interchangeable bioequivalent drugs and their prices. The objective of the formularies is "to encourage more clinically effective and cost-effective prescribing" [Angus & Karpetz: 1998, 87]. Formularies have been criticized for being overly restrictive, however many drug plans specify requirements for certain drugs rather than deny access [Angus & Karpetz: 1998, 87].

Various drug reimbursement programs have been implemented across the country. At present, most provinces use a lowest-cost alternative system, sometimes referred to as a best-available price model. When there are several equivalent interchangeable drugs, the lowest-cost method restricts reimbursement to the lowest priced product, thereby encouraging generic substitution. These plans do not permit physicians to indicate "no substitution" without written or verbal request, and in most provinces the pharmacists cannot make a "no substitution" decision [Angus & Karpetz: 1998, 88]. Variations of this system are in operation in Europe and some U.S. managed care plans.

A major concern with regard to formularies has been the use of "spread-pricing". With "spread-pricing", a manufacturer lists a higher price on the formulary and offers rebates or "kickbacks" to the pharmacist, lowering the actual acquisition cost for the pharmacist [Anis:1992]. The introduction of the best-available price system in Ontario in 1986 appeared to substantially reduce the "spread", however it appears to have re-emerged since then [Gorecki" 1992, 67].

In some cases, reimbursement is based on the actual acquisition cost. In this case, pharmacists are reimbursed according to the price listed on their purchase invoice. This method of reimbursement was used in Nova Scotia between 1986 and 1990, and has been used in British Columbia since at least 1977 [Gorecki: 1992, 72-75]. Incentives may be provided to pharmacists to select lower-cost products. In Nova Scotia, beginning in 1987 a flat payment of $0.40 was made for each product selection and this incentive payment increased to $0.50 in 1988. In British Columbia, pharmacists have been given 20% of the difference between 110% of the highest-priced brand price and the actual acquisition cost billed [Gorecki: 1992, 72]. Beginning in 1995, British Columbia began using a low cost alternative program, with reimbursement limited to the actual acquisition cost of the average of lower cost alternative.

3.1 Reference-Based Pricing

British Columbia has been the first of the provinces to introduce reference-based pricing (RBP) where multi-source and single-source drugs are grouped together if they are determined to be therapeutic substitutes [Dickson & Redwood: 1998, 473]. The provincial drug benefit program, Pharmacare, reimburses only the cost of the reference drug, deemed to

be the most cost-effective among the therapeutic group, except in cases of medical necessity when a more expensive drug is required. This type of pricing system has also been implemented in Germany, The Netherlands, New Zealand and Australia [Dickson & Redwood: 1998, 473].

RBP began in British Columbia in 1995 for three classes of drugs: nitrate therapies for stable angina, H2 antagonists, and non-steroidal anti-inflammatory drugs. Beginning in 1997, two additional classes were included: ace inhibitors and calcium channel blockers [B.C. Government: 1998].

A number of concerns relating to the grouping of drugs that do not have the same chemically active ingredients have been voiced. Since these drugs are not bioequivalent, they may not be therapeutically interchangeable since patients may "absorb, metabolize and eliminate different medications in the same class" very differently [Canadian Cardiovascular Society: 1997, 35]. The health status of the patients may be adversely affected by prescribing the reference product. In cases where patients require a more expensive medication, physicians must obtain special prescribing authority, a time consuming task [Boulet & Tessier: 1996,48]. Both of these situations may lead to an increase in healthcare costs. Concerns also arise regarding the possibility of two-tiered health care where access to more expensive medication is based upon the ability to pay [Boulet & Tessier: 1997, 47].

However, these issues need not be a concern if all of the products are medically effective and if the physician is able to prescribe a more expensive product for medical reasons. While special requests may be time-consuming, physicians will be aware of the cost of the prescription drugs and may develop more cost-effective prescription practices, perhaps avoiding more expensive "me-too" drugs or line extensions of off-patent brand-name drugs.

IV. Review of the Literature

Recent research regarding pharmaceutical pricing has looked at pricing strategies and market shares of brand-name and generic drugs in response to generic entry. A segregated market model has been developed to explain how generics, entering the market at significantly lower prices than brand-name drugs, may lead to price increases for the brand-name products. This model has been supported by various empirical studies.

Research with regard to the effects of insurance coverage and pharmaceutical pricing has demonstrated that reimbursement methods may effect changes in drug prices. Again, a segregated market model has been supported as changes in reimbursement methods have been shown to affect the lower-priced generic sector.

4.1 Pattern of Entry of Generics and Pricing Strategies

Compulsory licensing in Canada throughout the 70s and 80s contributed to the growth of the generic drug industry in Canada. In the U.S., generic entry increased substantially following the enactment of the Drug Price Competition and Patent Term Restoration Act in 1984. This law facilitated the entry of generic drug products after patent expiration since generic producers were required only to demonstrate bioequivalence rather than duplicate many of the original innovator's tests. As the generic drug sector has become an increasingly important part of the pharmaceutical industry, a number of analyses have dealt with the pattern of entry of generics and the pricing strategies of both the generic and brand-name companies.

The empirical data on generic entry and pharmaceutical pricing demonstrate a general pattern [Grabowski and Vernon: 1992, 335] where generic products enter the market at a

significantly lower price than the pioneering product and decline significantly over time. Prices of the brand-name products remain higher than the generic products and actually increase after generic entry. The lower-priced generic products gain significant market share and the average market price decreases over time.

A segregated market model has been used to explain how entry by generics can lead to price increases for brand-name drugs Frank and Salkever: 1992]. The demand side of the market for prescription drugs is seen to consist of two segments: one which is sensitive to differences between brand name and generic prices (hospitals, HMOs and Medicaid patients), and one which is more insensitive (individuals purchasing prescription drugs).

The brand-name producer is viewed as a Stackelberg price leader. The firm incorporates the price responses of the generic producers into its own pricing decision. The generic market is characterized by a Nash-Cournot non-cooperative game, where generic producers are fringe firms that take the brand-name price as given. The entry of generics will result in price sensitive buyers shifting away from brand-name products. A less elastic demand for brand-name products will then allow a profit-maximizing firm to raise its price.

The price responses to generic entry in the market for brand-name and generic drugs have been empirically estimated and the results support the segmented market model [Frank and Salkever: 1995]. Competition among generic drug producers results in substantial price reductions for generic drugs, however increased competition from generics does not result in price reductions by brand-name producers. Rather, small price rises in brand-name products result from expanded competition. In this case, generic drugs are assumed to compete with brand-name drugs and generic products with identical chemical compounds. Competition within a therapeutic class is not considered.

A more complex econometric model has also been used to estimate the relationship between generic competition and brand-name prices [Caves, Whinston and Hurwitz: 1991]. When unobservable time-varying factors are taken into account, the innovator's price may be found to decline with the number of generic entrants. However, generic competition has a stronger effect on generic prices than on brand-name prices, and generic prices are much lower than the brand-name prices.

The effect of generic entry on market prices and as well as market shares has also been examined [Grabowski and Vernon: 1992]. The effect of generic entry on pioneer pricing is shown to be relatively insignificant, however pricing may be influenced by the relative sizes of the different market segments. Generic entry is found to be statistically related to the profitability of entry, and the lowest-price generic supplier is found to capture the largest market share. However, other factors, including quality differences and first mover advantage, appear to influence market shares of generic firms.

The brand-name market share is found to rise significantly with the level of promotion and the number of years under patent [Hurwitz and Caves: 1988]. While the price differential between the brand-name product and the generic drug will significantly increase the generic share of the market, the innovator's value-maximizing strategy is not to meet the generic prices immediately. The generic market share is found to grow over time with the accumulation of generic suppliers.

4.2 Insurance Coverage and Pharmaceutical Prices

While the segregated market model has been used to explain the pattern of entry of generics and the pricing strategies of drug companies, it does not incorporate the effects of

different reimbursement methods on drug prices. A number of analyses have dealt with the relationship between insurance coverage and pharmaceutical pricing.

The effects of a best-available price (BAP) reimbursement method on pharmaceutical prices have been examined in the case of Ontario [Gorecki: 1992]. The Ontario Drug Benefit (ODP) program was introduced in 1974 and drug benefits and reimbursement prices were listed in a drug formulary. A major problem with the program was that of inflated formulary drug prices as a result of "price-spreading" [Gorecki: 1992, 27]. In an attempt to remove the "spread", the difference between the reimbursement price and the price the pharmacist actually pays to the drug firm, the ODP Act of 1986 established the cost of drugs according to the concept of the best available price. The plan reimburses pharmacists up to the best available price, plus ten per cent for a dispensing fee.

The BAP reimbursement method was expected to reduce the prices of interchangeable drugs. The demand for single-source drugs is seen to be generated through marketing directed at the physicians, rather than cutting prices to the pharmacist [Gorecki: 1992, 62].

Prices of single-source and interchangeable drugs before BAP (1986) and after BAP (1987 in the short-run and 1989 in the long-run) were examined. The BAP method resulted in significantly lower prices for interchangeable drugs and higher prices for single-source drugs in the short-run. However, in the longer-run, prices increased for both groups, perhaps indicating a return of the "spread" [Gorecki: 1992, 67].

The price effects of an actual acquisition cost (AAC) reimbursement model have been examined in the case of Nova Scotia [Anis: 1992]. From 1976 to 1986, the province of Nova Scotia used formulary pricing. Beginning in 1983, product selection was permissive, meaning that pharmacists would be reimbursed according to the price of any generic drug listed in the

formulary as long as substitution was made to a lower-priced brand. In July 1986, Nova Scotia switched from formulary to actual acquisition cost (AAC) pricing. Under this system, pharmacists were reimbursed according to the price listed on the purchase invoice.

A model was developed to explain "spread-pricing" with formulary pricing. The patentee firms produce and sell differentiated brand-name products and act as monopolists. The generics do not gain the brand-name market share by using price discounts in the short run. The generic firms play a two-stage game. In the first stage, the firms submit a price for their product. A winner with the lowest available price emerges and gains the uncontested segment of the market that does not receive kickbacks. In the second stage, the firms use kickbacks to gain a greater share of the contested segment of the market.

According to this model, price bids will be lower with a larger number of firms and the more pessimistic the firms with regard to the price set by the patentee firm. The optimal level of the kickback will be an increasing function of the first-stage price, i.e. with a larger number of firms, the first-stage price will be lower and the kickbacks will be lower.

The AAC system was expected to eliminate kickbacks. Without the potential for "spread-pricing", one would expect prices of generic drugs to fall as they compete for a share of the price-sensitive market. The decline in prices should be lower when there are a relatively large number of generic competitors. Patentee firms are not expected to change prices as a result of the change in reimbursement method.

The author estimated the percentage change in prices following the switch to the AAC regime and AAC pricing was found to reduce prices, as predicted by the model, although more generic firms did not necessarily lead to lower bids.

Although prices of interchangeable drugs apparently declined with the change in reimbursement method in Nova Scotia, the generic market share did not increase. An incentive payment was used to encourage the use of generic substitutes, however it was not effective in promoting product selection. As a result, the actual acquisition cost system was abolished in 1990 and replaced with a maximum allowable cost method of reimbursement.

A most-favored-customer (MFC) rule was adopted in 1991 in the U.S. for Medicaid reimbursement and the effects of this reimbursement method on drug prices have recently been examined [Morton: 1997]. Although this reimbursement method is not used in Canada, it is interesting to note that changes in the method of reimbursement may have implications for the pricing of pharmaceuticals.

With a MFC rule, manufacturers enrol their drugs in the program to guarantee access to state formularies, and Medicaid is able to secure lower prices than it would otherwise since it does not purchase drugs in bulk. Medicaid pays manufacturers of brand-name products 87.5% of the average manufacturer price (AMP) or their "best price", if lower. The price of a generic product for Medicaid is 90% of the AMP. program provides incentive for firms to enrol in the program.

Theoretical models suggest that firms would "commit to "soft" price competition" [Morton: 1997, 270] as a result of a MFC rule, since competing on the basis of price for the low-price end of the market becomes more costly. Following the implementation of a MFC rule, the prices of patented brand-name drugs did not significantly increase, however the prices of branded products with generic competition rose. The strategic response of the generic firms was more evident in concentrated markets where generic prices increased.

V. Empirical Analysis

5.1 Objective

The literature regarding generic entry, market share and pricing strategies has focused on the relationship between a brand-name drug and its interchangeable generic drug. It has been found that generics compete with each other for the price-sensitive share of the market, while brand-name products continue to be more highly priced and target the more price-inelastic market sector. With regard to insurance coverage and drug pricing, different reimbursement schemes have been shown to result in different levels of pharmaceutical prices. To date, the research has not dealt with a reference-based pricing model that groups together different brand-name drugs, with or without generic equivalents, that are used for treating the same therapeutic condition.

Reference-based pricing was introduced in British Columbia on October 1, 1995 for two categories of drugs: the H2 antagonists used to treat gastrointestinal complaints and non-ulcer dyspepsia (category 36), and the nitrates used to treat stable angina (category 57). On November 27, 1995, RBP was extended to include the non-steroidal anti-inflammatory drugs or NSAIDs (category 41), and on January 1, 1997, two categories of drugs used to treat hypertension, the ACE inhibitors (category 24) and the dihydropyridines (category 9901), were included in the program.

The objective of this analysis is twofold. First, it will examine whether the introduction of reference-based pricing (RBP) in British Columbia has led to increased competition and has contributed to reductions in the prices of either generic or brand-name pharmaceuticals when compared with an actual acquisition cost of the average of lower cost alternatives (LCA/AAC) reimbursement model. The second goal is to determine whether changes in the prices of

brand-name and generic drugs included in the RBP program have differed according to the competition faced from drugs with the same active ingredient.

The manufacturers of brand-name drugs with generic substitutes may choose not to compete in the publicly-insured market, or may compete with their own pseudo-generics. However, RBP may result in price competition among the brand-name manufacturers for a share of the market requiring the more medically effective drug. Brand-name drugs are known to compete through marketing directed to the physician and RBP may result in price competition among the brand-name manufacturers, particularly as the physicians become more price conscious. With greater competition among a larger number of generic products of different active ingredients, prices may also decrease for generic drugs.

5.2 Methodology

To achieve the research objectives, two comparisons of the percentage changes in drug prices which followed the implementation of reference-based pricing were required. First, a comparison was made between the percentage price changes of the drugs included in the RBP program (RBP drugs) and those not included (non-RBP drugs), in order to determine whether reference-based pricing may have increased competition and contributed to lower drug prices when compared with a LCA/AAC reimbursement method. The brand-name and generic drugs included in the RBP program were grouped according to the competition they faced from drugs with the same active ingredient and dosage. The percentage price changes were then compared for the different groups to determine whether price changes among the RBP drugs have differed according to their direct competition.

In order to make these comparisons of percentage price changes, it was necessary to find both pre-RBP and post-RBP prices. The pre-RBP price used in the calculation of price changes was the earliest pre-RBP 1995 price available. It should be noted that manufacturers of drugs in the first three categories to be included in the RBP program may have already changed their prices by this date, in anticipation of the introduction of RBP. However, the 1995 prices were the only pre-RBP prices available. If prices had already been adjusted downwards, the price changes calculated may be less than the actual price changes which resulted from the RBP program.

The January 1997 price was chosen as a short-run post-RBP price. Short-run comparisons of percentage price changes were made for the drugs in the first three RBP categories (36,57,41) to be included in the program and those drugs not included. Drugs in RBP categories 24 and 9901 were not included in the non-RBP group since changes in the prices of these drugs may have already taken place in anticipation of reference-based pricing.

The longer-run post-RBP price was the most recent price available, as of March 1999. Longer-run comparisons were again between the first three RBP categories and the non-RBP group, in order to demonstrate the differences in price changes between the short-run and the longer-run. Longer-run comparisons were also made between the larger group of RBP drugs (Categories 36,57,41,24,9901) and the non-RBP group.

5.2.1 Comparison of Price Changes of RBP and Non-RBP drugs

Two methods were used to compare the percentage price changes of the RBP drugs and the non-RBP drugs following the implementation of reference-based pricing. A comparison was made between the mean and median percentage change in the prices of drugs

included in the RBP program and those not included; and another comparison was made between the proportions of the two groups which increased or decreased in price. Both short-run and longer-run comparisons were made between the two groups of drugs, as well as between the two groups of brand-name drugs and the two generic groups.

The percentage price change data included a number of outliers. The mean percentage price changes were calculated for the RBP and the non-RBP drugs with the outliers included. However since outliers affect the value of the mean, the mean percentage price changes were also calculated with the more extreme outliers deleted. A two sample *t*-statistic test (with unequal variances) was used to determine the significance of the difference in the means of the two groups.

The problem of outliers was avoided with a comparison of the proportions of drugs in the RBP and the non-RBP groups for which prices increased, decreased or remained constant, following the introduction of reference-based pricing. A Chi-square test of independence was used to determine whether the proportions were different between the groups of drugs. Again, brand-name and generic drugs were compared between each group of drugs, and both short-run and longer-run comparisons were made.

5.2.2 Comparison of Price Changes of RBP Brand-Name and Generic Drugs

To determine whether price changes of brand-name and generic drugs included in the RBP program differed according to the competition they faced, drugs were assigned code numbers according to whether they were brand-name or generic, and according to the competition within their sub-categories. For categories 36, 57, 41 and 24, the sub-categories include only drugs with the same active ingredient and the same dosage. For category 9901,

the sub-category includes drugs with various dosages of the same active ingredient. The drugs in category 9901 were coded according to the competition they faced from drugs with the same active ingredient and the same dosage. The drugs were coded as follows:

1: Brand-name drug facing no competition

2: Brand-name drug facing only brand-name competition

3: Brand-name drug facing both brand-name and generic competition

4: Brand-name drug facing only generic competition

5: Generic drug facing two or fewer generic competitors

6: Generic drug facing three or more competitors

In the cases of the drugs included in categories 36, 57 and 41, the codes differed for a number of drugs, depending on whether the analysis was short-run or longer-run, due to a change in the number of drugs with the same active ingredient on the market. Both the short-run and longer-run codes are included in the drug listings in the appendix.

Again, two methods were used to compare the percentage price changes for the various RBP drug groups. Regression analysis was used to estimate the mean percentage price changes for the different groups, and a comparison was made between the proportions of negative, positive and zero percentage price changes for each group.

A regression equation adapted from Anis (1992) was used to estimate the price changes following a change in reimbursement method from an actual acquisition cost of the average of lower cost alternatives model to a reference-based pricing model. The empirical estimation involved a straightforward comparison of average percentage price changes between different groups of drugs. The following regression equation was estimated using ordinary least squares (OLS):

$$\Delta P = \alpha_o + \alpha_1 D2 + \alpha_2 D3 + \alpha_3 D4 + \alpha_4 D5 + \alpha_5 D6$$

where $D2 = 1$ if the ith observation is a Code 2 drug; zero otherwise.

$D3 = 1$ if the ith observation is a Code 3 drug; zero otherwise.

$D4 = 1$ if the ith observation is a Code 4 drug; zero otherwise.

$D5 = 1$ if the ith observation is a Code 5 drug; zero otherwise.

$D6 = 1$ if the ith observation is a Code 6 drug; zero otherwise.

The omitted category is the Code 1 drug; represented by the constant, α_o, and ΔP is the percentage change in price. The regression equation was estimated for both short-run and long-run percentage price changes.

The residuals were checked graphically for normality and equal variance. The percentage price change data included a number of outliers as well as a large number of zero values and the residuals did not fit a normal distribution. Also, the variances of the residuals differed between groups.

To correct for heteroscedasticity, the regression equation was estimated using generalised least squares (GLS). The model was transformed by dividing through by the within-group standard deviation corresponding to each observation. In this way, the extreme observations were given relatively smaller weight than those observations close to the mean. The residuals were again graphically checked for normality and equal variance.

As an alternative approach, a comparison was made between the proportions of drugs in the different coded groups which increased, decreased, or remained constant in price following the implementation of reference-based pricing. A Chi-square test of independence was used to determine whether the proportions were statistically different between the groups, and both short-run and longer-run comparisons were again made.

5.3 The Data

The data required in the analysis were the prices of drugs in British Columbia prior to, and following, the introduction of reference-based pricing in the province. Reference-based pricing was introduced in British Columbia on October 1, 1995 for two categories of drugs, RBP categories 36 and 57, and on November 27, 1995, the program was extended to include a third group, RBP category 41. On January 1, 1997, two additional categories, RBP categories 24 and 9901, were added to the program.

The pre-RBP price was chosen to be the earliest 1995 price available. The January 1997 prices were chosen as the short-run post-RBP prices for the three categories of drugs included in the program in 1995. The longer-run post-RBP price used in the analysis was the most recent price available, as of March 1999.

All of the data were obtained from Pharmacare, the B.C. drug benefit program. The data were obtained from the web site for the B.C. Ministry of Health and Ministry Responsible for Seniors at www.hlth.gov.bc.ca/pharme. British Columbia is the one province in Canada that does not use a provincial formulary [Lindsey and West: 1999, 9], and the prices of drugs are not listed on a regular basis. However, Pharmacare does compile a manufacturer's price list for all drugs sold in the province and these prices which are recognized by Pharmacare, have been used for this analysis.

The Pharmacy Network Project (PNP) File includes the CDIC drug number, the brand name of the drug, the manufacturer of the drug, the active ingredient in the drug, and the RBP category and subcategory. The manufacturer prices were obtained from the Manufacturer's Price File. (The current manufacturer prices are listed in both the PNP and Manufacturer's

Price Files.) Whether the drug is considered by Pharmacare to be generic or not was obtained from the Drugmaster File.

A total of 10,201 drugs were listed in the PNP File. Only those with a pre-RBP 1995 price listed in the Manufacturer's Price File were considered for the analysis. Many of the drugs listed have come on to the market since 1995, and others may not have had a 1995 price listed. A total of 4003 drugs had a pre-RBP 1995 price listed and were selected for the analysis. Of these, 9 had price changes greater than 200 % and were deleted from the analysis as extreme outliers, and 241 drugs were included in the RBP program. A total of 3753 drugs were included in the non-RBP sample group, 2413 brand-name drugs and 1340 generics.

Of the 438 RBP drugs listed in the PNP file, 241 had pre-RBP 1995 prices listed in the Manufacturer's Price File. Five of these drugs were excluded from the analysis: two had 1995 prices recorded following the implementation of reference-based pricing, two were identical to other drugs included in the sample, and one had a questionable price recorded, resulting in an obvious outlier. Of the 236 RBP drugs included in the analysis, 142 were brand-name drugs and 94 were generics.

The first three categories of drugs to be included in the RBP program (Categories 36,57,41) accounted for 150 of the RBP drugs in the sample; 75 brand-name drugs and 75 generic drugs. These drugs were used for the short-run analysis. The two categories of drugs included in the RBP program in 1997 (Categories 24,9901) accounted for 86 of the RBP sample drugs, 67 brand-name drugs and 19 generics.

A listing of the sample of RBP drugs used in the analysis may be found in the appendix. The drugs are listed by category; included are the CDIC numbers, brand name, chemical name, manufacturer, RBP category and sub-category, and Code number. The price changes are also

listed by RBP category and by code for the CDIC drug numbers, and are included in the appendix.

VI. Results

To determine whether reference-based pricing has resulted in lower drug prices in British Columbia, when compared with an actual acquisition cost of the average of lower cost alternatives reimbursement model, the percentage price changes which followed the introduction of RBP were compared for RBP and non-RBP drugs, including both brand-name and generic drugs. A comparison was also made between the percentage price changes of brand-name and generic RBP drugs, grouped according to the competition faced from drugs with the same active ingredient and dosage, to determine whether price changes have differed among the RBP groups according to their direct competition. The results of the empirical analysis are presented for these two comparisons

Both short-run and longer-run comparisons were made between the non-RBP drugs and the RBP drugs in the first three categories to be included in the program, and the differences between the short-run and longer-run comparisons were examined. Only longer-run comparisons were made between the non-RBP group and the larger RBP group with all five drug categories included.

6.1 Comparison of Price Changes of RBP and Non-RBP drugs

The RBP and non-RBP groups were compared with regard to the differences in the median and mean percentage price changes following the introduction of RBP, and the differences in the proportions of drugs for which prices increased, decreased or remained

constant. Comparisons were also made between the RBP and non-RBP brand-name and generic drugs.

6.1.1 Comparison of Median and Mean Percentage Price Changes

There were a number of outliers in the percentage price changes for both the RBP and the non-RBP drugs. The medians and means were compared for the two groups with the outliers included, and these results are presented in Table 3 for the short-run comparison, and in Table 4 for the longer-run comparison. Since outliers affect the mean values, the medians and means were also compared with the more extreme outliers deleted from the data set. Nine percentage price changes greater than 150 % for non-RBP drugs, and six greater than 40 % for RBP drugs, were omitted. The results of the comparisons made without the outliers are presented in italics in Tables 3 and 4.

In the short-run, the difference in the average percentage price change between RBP drugs and non-RBP drugs was significant, with prices of RBP drugs falling an average of 2.02 %, as opposed to an average decline of 0.71 % in the prices of non-RBP drugs. The most significant difference between the two groups was in the generic category, with RBP drug prices decreasing on average by 2.42 %, compared to an average decline of 0.63 % for the non-RBP group. The average percentage price decrease of RBP brand-name drugs was also greater than that of the non-RBP drug group, however the difference was not statistically significant.

With the outliers deleted, the difference between the mean percentage price change of RBP and non-RBP drugs was relatively small and statistically insignificant. However, RBP

drugs fell in price relatively more than did non-RBP drugs, and the difference in percentage price changes was greater for the generic drug group.

While the average percentage price changes differed between the groups, a large number of drugs did not experience price changes, and the median price change was zero for both generic and brand-name drugs in both the RBP and the non-RBP groups.

Table 3. Short-run comparison of median and mean percentage price changes
(comparison with the outliers deleted is in italics)

Drug Group	Median % Price Change		Mean % Price Change		Standard deviation		t-statistic		p-value	
All drugs										
Non-RBP drugs	0	*0*	-0.71	*-0.90*	13.20	*11.91*	2.45	*1.60*	.015	*.111*
RBP Cats. 36,57,41	0	*0*	-2.02	*-1.45*	6.03	*3.50*				
Brand-name drugs										
Non-RBP drugs	0	*0*	-0.75	*-0.75*	11.45	*11.45*	1.18	*0.64*	.240	*.526*
RBP Cats. 36,57,41	0	*0*	-1.63	*-1.05*	6.13	*3.50*				
Generic drugs										
Non-RBP drugs	0	*0*	-0.63	*-1.17*	15.86	*12.69*	2.20	*1.30*	.029	*.197*
RBP Cats. 36,57,4	0	*0*	-2.42	*-1.86*	5.95	*3.47*				

In the longer-run comparison, the difference in the average percentage price change between RBP drugs (Categories 36,57,41) and non-RBP drugs was more significant. Prices of RBP drugs declined by an average of 3.06 %, compared to an average decline in price of 0.88 % for the non-RBP drugs. The increase in this differential was due to the generic sector. In the non-RBP group, the average percentage price change for generic drugs was positive between 1997 and 1999, while prices of RBP generic drugs on average continued to decline. The median percentage change in RBP generic prices fell to -1.99 % in the longer run.

In the longer-run comparison between non-RBP drugs and the larger group of RBP drugs (Categories 36,57,41,24,9901), the most significant difference between the two groups was again in the generic category. RBP generic drugs declined in price by an average of 4.84 %, as opposed to a slight price decrease of 0.24 % for non-RBP generics, and the median percentage price change for the generic drug category was -1.99 % for the RBP group compared to zero for the non-RBP group. RBP brand-name prices fell by an average of 2.31 % compared to an average price decline of 1.24 % for non-RBP brand-name drugs, however this difference was not statistically significant. The median percentage price changes were zero for brand-name drugs in both the RBP and the non-RBP groups.

With the outliers deleted, the differences between the two groups were somewhat smaller. Prices of drugs in RBP Categories 36, 57 and 42 fell on average by 2.5 % compared to a 1.32 % average decline in non-RBP drug prices. There was very little difference between brand-name groups, however RBP generic prices continued on average to decline, while non-RBP generic drug prices remained relatively constant between 1997 and 1999. As a result, RBP generic drug prices declined by an average of 3.90 % in the longer-run, as opposed to an average 1.18 % decline for the non-RBP group. The median percentage price change of RBP generic drugs also fell to -1.96 %.

Similarly, in the longer-run comparison between non-RBP drugs and all RBP categories, with the outliers deleted the differences in percentage price changes were smaller. Differences in percentage price changes were not significant in the brand-name sector where both RBP and non-RBP drug prices fell on average by 1.39 % and the median percentage price change was zero for both groups. However, differences were significant in the generic sector where RBP prices declined on average by 4.35 % compared to a decline of 1.18% for non-

RBP prices. The median percentage price change for generic drugs was -1.99 % for the RBP group and zero for the non-RBP drugs.

Table 4. Longer-run comparison of median and mean percentage price changes
(comparison with the outliers deleted is in italics)

Drug Group	Median % Price Change	Mean % Price Change	Standard deviation	t-statistic	p-value
All drugs					
Non-RBP drugs	0 *0*	-0.88 *-1.32*	17.65 *15.41*	3.21 *2.2*	.002 *.029*
RBP Cats. 36,57,41	0 *0*	-3.06 *-2.50*	7.52 *5.82*		
Non-RBP drugs	0 *0*	-0.88 *-1.32*	17.65 *15.41*	3.51 *2.59*	.001 *.01*
All RBP Categories	0 *0*	-3.32 *-2.56*	9.72 *6.18*		
Brand-name drugs					
Non-RBP drugs	0 *0*	-1.24 *-1.39*	16.23 *15.41*	*0.52 -0.44*	.605 *.658*
RBP Cats. 36,57,41	0 *0*	-1.69 *-1.11*	6.93 *4.78*		
Non-RBP drugs	0 *0*	-1.24 *-1.39*	16.23 *15.41*	1.37 *-0.01*	.171 *.991*
All RBP Categories	0 *0*	-2.31 *-1.39*	8.46 *5.65*		
Generic drugs					
Non-RBP drugs	0 *0*	-0.24 *-1.18*	16.23 *15.42*	4.15 *3.17*	.000 *.002*
RBP Cats. 36,57,41	-1.99 *-1.96*	-4.43 *-3.90*	7.87 *6.42*		
Non-RBP drugs	0 *0*	-0.24 *-1.18*	16.23 *15.42*	3.71 *3.93*	.000 *.000*
All RBP Categories	-1.99 *-1.99*	-4.84 *-4.35*	11.24 *6.54*		

- **Summary**

From a comparison of median and mean percentage price changes of RBP and non-RBP drugs following the implementation of reference-based pricing, it would appear that reference-based pricing has had a significant impact on the generic drug sector. Grouping generic drugs of different active ingredients within the same pricing category has apparently resulted in greater competition and lower prices.

The mean percentage price declines were greater for RBP generic drugs than for non-RBP generics following a year of reference-based pricing, and the difference in the mean percentage price changes between RBP and non-RBP generic drugs has increased over a three-year period. The median percentage price changes have also been significantly different for the two groups, with a median of -1.99 % for RBP drugs and zero for the non-RBP group.

The same cannot be said for the brand-name drug group. Prices of RBP brand-name drugs on average have not fallen significantly relative to non-RBP brand-name prices throughout this same period, and the median percentage price changes for both groups have been zero. From this comparative analysis of average percentage price changes, it would seem that competition between brand-name drugs has not increased with the introduction of reference-based pricing. This would support the segregated market model in which brand-name drugs do not compete with generic drugs for a share of the more price-sensitive market.

An analysis based on a comparison of mean percentage price changes is limited in that outliers may affect the value of the mean. An attempt has been made to eliminate the extreme outliers, however such a comparison may not adequately convey the differences between the RBP and the non-RBP drug groups. Also, since prices have not changed for a large number of drugs in both of the groups, a comparison of the median percentage price changes may not necessarily demonstrate the differences between the two groups.

6.1.2 Comparison of Proportions of RBP and Non-RBP Drugs for which Prices Increased, Remained Constant, or Decreased

A comparison of the proportions of the two drug groups which experienced no change in price, or either price increases or decreases, was used as an alternative method in comparing

percentage price changes of the RBP and non-RBP drugs. This comparison avoided the problems involved in the mean and median comparisons that were associated with outliers and a large number of zero price changes. The complete data set was used for this analysis.

The actual numbers of drugs in the RBP and non-RBP groups that decreased, remained constant, or increased in price, were compared with the numbers of drugs in each group that would be expected to decrease, remain constant, or increase in price, based on equal proportions for each group. That is, the expected number of RBP drugs to increase in price = (total number of drugs which increased in price / total number of drugs) * total number of RBP drugs. Similarly, the expected number of non-RBP drugs to increase in price = (total number of drugs which increased in price / total number of drugs) * total number of non-RBP drugs. A Chi-square test of independence was used to determine whether the proportions of RBP and non-RBP drugs for which prices increased, decreased, or remained constant following the implementation of reference-based pricing, were significantly different, i.e. whether the expected numbers were significantly different than the actual numbers. The results are presented in Table 5 for the short-run comparisons and in Table 6 for the longer-run comparisons.

In the short-run, 33.3% of RBP drugs decreased in price following the implementation of reference-based pricing, as opposed to 15.6 % of non-RBP drugs, while prices increased for only 3.3 % of RBP drugs compared to 9.6 % of non-RBP drugs. The Chi-square tests confirm that the proportions of RBP and non-RBP drugs for which prices increased, decreased, or remained constant following the implementation of reference-based pricing, were significantly different. Had these proportions been equal, 16.3 % of RBP drugs would have decreased in price, and 9.5 % of RBP drug prices would have increased.

The proportions were significantly different for both brand-name and generic drugs. Brand-name prices fell for 24.0 % of RBP drugs compared to 13.4 % of non-RBP drugs, and increased for 5.3 % of the RBP group compared to 11.2 % of the non-RBP group. The differences were more pronounced for the generic drugs: 42.7 % of the RBP group decreased in price as opposed to 23.3 % of the non-RBP group, and prices increased for 1.3 % of RBP drugs compared to 7.2 % of non-RBP drugs.

Table 5. Short-run comparison of the relative numbers of RBP and non-RBP drugs that decreased, remained constant, or increased in price

Number of drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	587 (15.6%)	612.5	2798 (74.6%)	2781.8	368 (9.8%)	358.7	*3753*
RBP drugs, Categories 36,57,41	50 (33.3%)	24.5	95 (63.3%)	111.8	5 (3.3%)	14.3	*150*
Total	*637* (16.3%)	*637*	*2893* (74.1%)	*2893*	*373* (9.6%)	*373*	*3903*

p-value = .000, Chi-Sq = 36.436

Number of brand-name drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	275 (11.4%)	284.2	1867 (77.4%)	1862.1	271 (11.2%)	266.7	*2413*
RBP drugs, Categories 36,57,41	18 (24%)	8.8	53 (70.7%)	57.9	4 (5.3%)	8.3	*75*
Total	*293* (11.8%)	*293*	*1920* (77.2%)	*1920*	*275* (11.1%)	*275*	*2488*

p-value = .002, Chi-Sq = 12.524

Number of generic drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	312 (23.3%)	325.8	931 (69.5%)	921.4	97 (7.2%)	92.8	*1340*
RBP drugs, Categories 36,57,41	32 (42.7%)	18.2	42 (56%)	51.6	1 (1.3%)	5.2	*75*
Total	*344* (24.3%)	*344*	*973* (68.8%)	*973*	*98* (6.9%)	*98*	*1415*

p-value = .000, Chi-Sq = 16.429

In the longer-run comparison between non-RBP and RBP (Categories 36,57,41) drugs, the two groups were again significantly different in terms of the proportions of drugs which increased, decreased, or remained constant in price. Further price changes took place between 1997 and 1999 in both groups, and by 1999, 41.3 % of RBP drugs had decreased in price compared to 24.7 % of non-RBP drugs, while only 6.0 % of the RBP group had increased in price as opposed to 17.0 % for the non-RBP group. There was also a significant difference between the non-RBP drugs and the larger RBP group. Of the larger RBP group, 36.7 % experienced price reductions, and 6.8 % increased in price.

The proportions of brand-name drugs which increased, decreased, or remained constant in price did not differ significantly between the RBP (Categories 36,57,41) and the non-RBP groups in the longer-run analysis. Little change occurred in the RBP group in terms of the number of price increases or decreases between 1997 and 1999, however the number of positive price changes increased from 11.2 % to 18.6 % for the non-RBP group, and negative price changes increased from 11.4 % to 19.9 %. With the larger RBP group, the Chi-square test was able to detect significant differences, due to the larger number of data. While there was little difference in the relative numbers of drugs which declined in price, only 9.2 % of the RBP brand-name drugs increased in price between 1995 and 1999, compared with 18.6 % of the non-RBP group, and relatively more of the RBP prices did not change throughout this period.

The differences between the RBP and the non-RBP groups were much more significant in the longer-run for the generic sector. By 1999, 60 % of RBP (Categories 36,57,41) generic drugs had fallen in price since the implementation of reference-based pricing, while only 2.7 % had experienced price increases. For the non-RBP group, prices fell for 33.4 % of generic

drugs, and increased for 14.2 %. Overall, for the five RBP categories, prices fell for 59.6 % of generic drugs and increased for 3.2 %.

Table 6. Longer-run comparison of the relative numbers of RBP and non-RBP drugs that decreased, remained constant, or increased in price

Number of drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	928 (24.7%)	952.0	2186 (58.2%)	2178.0	639 (17.0%)	623.1	*3753*
RBP drugs, Categories 36,57,41	62 (41.3%)	38.1	79 (52.7%)	87.1	9 (6.0%)	24.9	*150*
Total	*990* (25.4%)	*990*	*2265* (58.0%)	*2265*	*648* (16.6%)	*648*	*3903*

p-value = .000, Chi-Sq = 27.018

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	928 (24.7%)	955.0	2186 (58.2%)	2181.8	639 (17.0%)	616.3	*3753*
RBP drugs, All Categories	87 (36.9%)	60.1	133 (56.4%)	137.2	16 (6.8%)	38.8	*236*
Total	*1015* (25.4%)	*1015*	*2319* (58.1%)	*2319*	*655* (16.4%)	*655*	*3989*

p-value = .000, Chi-Sq = 27.19

Number of brand-name drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	480 (19.9%)	482.0	1484 (61.5%)	1488.7	449 (18.6%)	442.3	*2413*
RBP drugs, Categories 36,57,41	17 (22.7%)	15.0	51 (68.0%)	46.3	7 (9.3%)	13.8	*75*
Total	*497* (20.0%)	*497*	*1535* (61.7%)	*1535*	*456* (18.3%)	*456*	*2488*

p-value = .123, Chi-Sq = 4.192

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	480 (19.9%)	482.6	1484 (61.5%)	1494.1	449 (18.6%)	436.3	*2413*
RBP drugs, All Categories	31 (21.8%)	28.4	98 (69.0%)	87.9	13 (9.2%)	25.7	*142*
Total	*511 (20.0%)*	*511*	*1582 (61.9%)*	*1582*	*462* (18.1%)	*462*	*2555*

p-value - .017, Chi-Sq - 8.102

Number of generic drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	448 (33.4%)	466.9	702 (52.4%)	691.3	190 (14.2%)	181.8	*1340*
RBP drugs, Categories 36,57,41	45 (60.0%)	26.1	28 (37.3%)	38.7	2 (3.2%)	10.2	*75*
Total	*493* (34.8%)	*493*	*730* (51.6%)	*730*	*192* *(13.6%)*	*192*	*1415*

p-value = .000, Chi-Sq = 24.446

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Non-RBPdrugs	448 (33.4%)	471.0	702 (52.4%)	688.7	190 (14.2%)	180.4	*1340*
RBP drugs, All Categories	56 (59.6%)	33.0	35 (37.2%)	48.3	3 (3.2%)	12.7	*94*
Total	*504* (35.1%)	*504*	*737* (51.4%)	*737*	*193* (13.5%)	*193*	*1434*

p-value = .000, Chi-Sq =28.883

- **Summary**

Based on a comparison of the proportions of RBP and non-RBP drugs for which prices increased, decreased, or remained constant following the implementation of reference-based pricing, it would appear that reference-based pricing has resulted in lower prices. Significantly more price decreases and fewer price increases have occurred within the RBP drug group.

As in the comparison of mean and median percentage price changes, this analysis demonstrates a particularly significant impact of reference-based pricing on the generic sector. Sixty per cent of the generic drugs included in the RBP program have decreased in price since 1995, and price competition among generic drugs has continued throughout the four years since reference-based pricing began.

The analysis differs from the mean and median comparisons however, in detecting a significant difference between the two groups of brand-name drugs in terms of the relative

number of drugs that have increased in price or have not changed in price. Reference-based pricing appears to have contributed to fewer price increases among brand-name drugs. Most of the price decreases among RBP (Categories 36,57,41) brand-name drugs occurred during the first year. If brand-name prices had been adjusted prior to the implementation of reference-based pricing, a more significant difference in the relative number of price decreases also may have been detected with earlier pre-RBP price data.

It would appear that reference-based pricing has increased competition within the generic sector by grouping together generic drugs with different active ingredients. It would also appear that grouping brand-name drugs by therapeutic category may have resulted in some degree of competition within the brand-name sector.

6.2 Comparison of Price Changes of RBP Brand-Name and Generic Drugs

The drugs included in the RBP program were grouped according to the competition they faced from drugs with the same active ingredient and dosage. Comparisons were then made between the various groups with respect to the percentage price changes which followed the implementation of reference-based pricing. Two approaches were used in comparing the percentage changes in prices: regression analysis and a comparison of the proportions of the groups for which prices decreased, increased, or remained constant.

6.2.1 Regression Analysis

An analysis of variance (ANOVA) was carried out using a linear regression equation with dummy variables. The regression equation was estimated using both short-run and longer-run percentage price changes. The equations were first estimated using ordinary least

squares and the residuals were checked for normality and heteroscedasticity. Residual plots clearly indicated that the variances of the residuals differed between groups, and also that the residuals were not normally distributed. To correct for unequal variances, the regression equations were reestimated using generalised least squares (GLS) with a hetero-parameter for each group.

The following form of the equation was used for the GLS estimation:

$$\Delta P = \alpha_o D1 + \alpha_1 D2 + \alpha_2 D3 + \alpha_3 D4 + \alpha_4 D5 + \alpha_5 D6$$

where $D1 = 1$ if the ith observation is a Code 1 drug; zero otherwise.

$D2 = 1$ if the ith observation is a Code 2 drug; zero otherwise.

$D3 = 1$ if the ith observation is a Code 3 drug; zero otherwise.

$D4 = 1$ if the ith observation is a Code 4 drug; zero otherwise.

$D5 = 1$ if the ith observation is a Code 5 drug; zero otherwise.

$D6 = 1$ if the ith observation is a Code 6 drug; zero otherwise.

and ΔP is the percentage change in price.

Following the GLS estimation, the residuals were again checked for equal variance and normality (see appendix, pp. xviii-xx) While the residual plots indicated homoscedasticity, the residuals were not normally distributed. To improve the normality, the observations corresponding to the more extreme residual outliers were omitted (4-9 observations) from the data set and the equations were reestimated using generalised least squares. Although the values of the coefficients were affected by deleting the outliers, the t tests indicated the same basic results. The non-normality of the residuals is a concern, however the consistency of the t tests provides some reassurance that the statistically significant coefficients are indeed non-zero. The GLS estimates based on the entire data set are presented for the short-run analysis

(Categories 36,57,41), and for both of the longer-run analyses (Categories 36,57,41 and Categories 36,57,41,24,9901).

Table 7. GLS estimation of short-run RBP percentage price changes (Categories 36,57,41)

Dependent variable = Percentage change in price
Mean dependent variable = -2.0233
Number of observations = 150

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
D1	-0.0005	0.0005	-0.981	0.328	-.00148	0.0005
D2	-0.7453	0.4992	-1.493	0.138	-1.7321	0.2415
D3	-4.002	1.9429	-2.060	0.041	-7.8425	-0.1621
D4	-0.4432	0.3729	-1.188	0.237	-1.1802	0.2939
D5	-3.8892	1.5872	-2.450	0.015	-7.0264	-0.7519
D6	-1.3804	0.2799	-4.930	0.000	-1.9338	-0.8270

F(6, 144) = 6.53
Prob > F = 0.0000
R-squared = 0.2138
Adj R-squared = 0.1810
Root MSE = .9973

The short-run regression analysis shows that brand-name drugs facing competition from both brand-name and generic drugs with the same active ingredient and dosage (Code 3), declined in price by an average of 4.0 % following the implementation of reference-based pricing, and that this decline was statistically significant. Prices did not decrease for brand-name drugs without competition (Code 1), and the slight percentage price decreases of brand-name drugs facing only brand-name competition (Code 2) or only generic competition (Code 4) were not significant.

The average percentage price decreases were significant for both generic groups. Prices of generic drugs facing competition from one or two competitors (Code 5) decreased by

an average of 3.9 %, and generic drugs with three or more competitors (Code 6) fell in price by 1.4 % on average.

The R-squared value for the regression equation is low at 0.19, as a result of the high within-group variability. However, what is of interest is the comparison between groups and not the prediction of individual observations. In an ANOVA model, the R-squared value is not relevant. The F statistic, on the other hand, indicates highly significant variation between groups, despite high within-group variability.

Table 8. GLS estimation of longer-run RBP percentage price changes (Categories 36,57,41)

Dependent variable = Percentage change in price
Mean dependent variable = -3.0610
Number of observations = 150

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
D1	-0.0006	0.0006	-0.990	0.324	-0.0017	0.0005
D2	-2.7459	2.0497	-1.340	0.182	-6.7971	1.3054
D3	-2.9614	1.8312	-1.617	0.108	-6.5809	0.6581
D4	-0.3249	0.3257	-0.998	0.320	-0.9688	0.3189
D5	-5.1026	1.9545	-2.611	0.010	-8.9659	-1.2394
D6	-4.0316	0.8787	-4.588	0.000	-5.7685	-2.2947

F(6, 144) = 5.71
Prob > F = 0.0000
R-squared = 0.1922
Adj R-squared = 0.1585
Root MSE = .99878

In the longer-run, the percentage price decreases of brand-name drugs facing competition from other brand-name drugs were greater as prices fell on average by 2.7 %, however these decreases were not statistically significant. The average percentage price decline for brand-name drugs with both brand-name and generic competition was somewhat less in the longer-run at - 3.0 %, however this decline was also insignificant. Prices of brand-

name drugs without competition did not fall in the longer-run scenario. Brand-name drugs with only generic competition on average declined slightly, however the percentage price decrease was statistically insignificant.

Both groups of generic drugs declined significantly in price, and the average percentage price changes were larger in the longer-run. Prices of generics with three or more competitors declined by an average of 4.03 %, while generic drugs with one or two competitors on average declined by 5.1 % between 1995 and 1999.

Table 9. GLS estimation of longer-run RBP percentage price changes (All RBP Categories)

Dependent variable = Percentage change in price
Mean dependent variable = -3.3202
Number of observations = 236

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
D1	0.0794	0.0797	0.996	0.320	-0.0777	0.2366
D2	-1.6018	0.9219	-1.738	0.084	-3.4182	0.2146
D3	-6.2530	2.0788	-3.008	0.003	-10.3490	-2.1570
D4	-0.1852	0.1864	-0.994	0.321	-0.5524	0.1820
D5	-4.5616	1.6245	-2.808	0.005	-7.7625	-1.3607
D6	-5.0137	1.5951	-3.143	0.002	-8.1568	-1.8706

F(6, 230) = 5.30
Prob > F = 0.0000
R-squared = 0.1215
Adj R-squared = 0.0986
Root MSE = 1.00

For the overall RBP group, the longer-run regression analysis shows a significant average decrease in price of 6.3 % for brand-name drugs facing competition from other brand-name drugs as well as generics, while brand-name drugs with no competition or only generic competition did not decline in price. The average percentage price decrease for brand-name

drugs with other brand-name competition was -1.6 %, however this change was not statistically significant.

Both groups of generic drugs show significant average percentage changes in price. Prices of drugs with three or more competitors declined on average by 5.0 %, and prices of generics with one or two competitors fell by an average of 4.6 %.

- **Summary**

Based on the regression analysis, it would appear that declines in the prices of RBP brand-name and generic drugs following the introduction of reference-based pricing have differed according to the competition faced by drugs with the same active ingredient and dosage.

For brand-name drugs, price decreases have not occurred for those drugs that do not have any direct competition or compete only with generic equivalents. Brand-name drugs facing other brand-name competition on average appear to have declined somewhat in price, however these price decreases have not proven to be statistically significant. The one group of brand-name drugs that has shown a significant decrease of 6.3 % in the average percentage price change is the brand-name group facing competition from both generics and other brand-name drugs, and these price decreases appear to be more significant in the short-run. This evidence suggests that brand-name competition may increase with reference-based pricing and result in lower prices of brand-name drugs when the brand-name products are interchangeable and have equivalent generic competition.

Both groups of generic drugs on average have been declining in price since the implementation of reference-based pricing. Generics facing greater competition have shown average percentage price decreases of 5 %, compared to 4.6 % for those with two or fewer

competitors. Again, the empirical evidence suggests that grouping generic drugs by therapeutic category increases competition and results in lower prices.

6.2.2 Comparison of Proportions of RBP Brand-Name and Generic Drugs for which Prices Increased, Remained Constant, or Decreased

A comparison of the proportions of the RDP drug groups which decreased, increased or remained constant in price, was used as an alternative method in comparing price changes. The long-run percentage price change data for all five RDP categories were used for the analysis since a larger data set was required in order to use the Chi-square test of independence. Because the expected number of drugs with positive percentage price changes were less than five for the comparison of the brand-name groups and the generic groups, the Chi-square test was used only to determine whether the proportions which decreased or remained constant in price were significantly different. The results are presented in Table 10.

Table 10. Longer-run comparison of the relative numbers of RBP drug groups that decreased, remained constant, or increased in price

Number of drugs

	ΔP<0		ΔP=0		ΔP>0		
Drug Group	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
RBP brand-name drugs	31 (21.8%)	52.4	98 (69.0%)	80	13 (9.2%)	9.6	*142*
RBP generic drugs	56 (59.6%)	34.7	35 (37.2%)	53	3 (3.2%)	6.4	*94*
Total	*87 (36.9%)*	*87*	*133 (5.6%)*	*133*	*16 (6.8%)*	*16*	*236*

p-value = .000, Chi-Sq = 34.959

Number of brand-name drugs

	ΔP<0		ΔP=0		ΔP>0		
Drugs Group	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Code 1	3 (7.9%)	8.9	34 (89.5%)	28.1	1		*38*
Code 2	9 (28.0%)	6.7	19 (59.4%)	21.3	4		*32*
Code 3	18 (40.9%)	9.1	20 (45.5%)	28.9	6		*44*
Code 4	1 (3.6%)	6.3	25 (89.3%)	19.8	2		*28*
Total	*31 (21.8%)*	*31*	*98 (69.0%)*	*98*	*13*		*142*

All expected values for ΔP>0 were <5; comparison of ΔP<0 and ΔP=0, only
p-value = .000, Chi-Sq = 23.287

Number of generic drugs

	ΔP<0		ΔP=0		ΔP>0		
Type of Drug	Actual	Expected	Actual	Expected	Actual	Expected	*Total*
Code 5	14 (38.9%)	21.5	21 (58.3%)	13.5	1		*36*
Code 6	42 (72.4%)	34.5	14 (24.1%)	21.5	2		*58*
Total	*56 (59.6%)*	*56*	*35 (37.2%)*	*35*	*3*		*94*

All expected values for ΔP>0 were <5; comparison of ΔP<0 and ΔP=0, only
p-value = .001, Chi-Sq =11.148

A comparison of the proportions of brand-name and generic RBP drugs for which prices have increased, decreased, or remained constant since reference-based pricing began indicates that price changes have differed among drugs included in the reference-based pricing program depending on whether the drug is a brand-name or generic drug, and depending on the competition the drug faces within the RBP sub-categories from drugs with the same active ingredient and dosage. Price decreases have made up a significantly larger proportion of the price changes for generic drugs compared to brand-name drugs, however within the two groups there have been significant differences.

Among brand-name drugs, very few drugs with no competition or only generic competition have decreased in price. However, prices have fallen for 40.9 % of brand-name drugs with brand-name and generic competition, and 28 % of drugs with only brand-name competition . Since reference-based pricing has been implemented, prices have decreased for 72 % of the generic drugs with more than two competitors, and 39 % of those with fewer competitors.

It would appear that reference-based pricing has increased competition among interchangeable brand-name drugs and among generic drugs, and has contributed to lower drug prices. However, prices have not declined for brand-name drugs that do not face competition or face only generic competition.

VII. Conclusion

Prescription drug prices in Canada remain a concern, particularly in an era of rising health care expenditures and fiscal constraints. Patent protection of the pharmaceutical industry contributes to high prices of brand-name drugs, patented variations of the original drug or line extensions, and similar "me-too" drugs. Demand for these single-source drugs is generated through intensive marketing directed at physicians. Generic drugs provide a low-cost alternative to the brand-names. However, with the elimination of compulsory licensing in Canada, these drugs cannot be introduced until the patent has expired.

Provincial drug plans in Canada have attempted to reduce costs by encouraging the use of lower cost prescription drugs through provincial formularies which list interchangeable bioequivalent drugs and their prices, and lowest-cost alternative or best-available-price reimbursement methods. The reference-based pricing model implemented in British Columbia

goes one step further in grouping different drugs by therapeutic category. The therapeutic categories for which RBP has been implemented involve maintenance therapy and long-term treatment, areas in which research and development is concentrated and where new drugs are often introduced at high cost.

Based on empirical evidence, it would appear that the implementation of reference-based pricing in British Columbia has increased competition within the pharmaceutical industry and has contributed to lower drug prices. Changes in drug prices also appear to be closely related to the competition faced from drugs with the same active ingredient and dosage.

Grouping drugs by therapeutic category has not resulted in lower prices of brand-name drugs for which there are no interchangeable brand-name products with the same active ingredient and dosage, whether or not there are generic equivalents. While this evidence supports a segregated market model, price competition apparently has increased among brand-name drugs with the same active ingredient and dosage, particularly if faced with generic competition as well. Brand-name manufacturers appear to have adjusted prices soon after the implementation of RBP, but the price reductions have not continued over the longer-run.

The greatest impact of reference-based-pricing in terms of price effects has been in the generic sector. There has been a significant increase in the number of price reductions of generic drugs since the implementation of RBP in British Columbia, and in the average percentage price decline. Again, price reductions have been related to the direct competition from equivalent drugs, with more frequent and relatively larger price decreases among generic drugs with three or more competitors. Unlike the brand-name sector, generic drugs have continued to fall in price over the three-year period since RBP began in the province.

Public expenditure on prescription drugs is relatively high in British Columbia, and price sensitivity may have encouraged price reductions within the province. On the other had, British Columbia is a very small player in the world market and it is interesting to note that drug prices have been sensitive to a change in the method of reimbursement.

In conclusion, reference-based pricing should contribute to cost savings in British Columbia through switching to less costly prescription drugs. Further savings may be realised through lower drug prices, particularly lower prices of interchangeable generic and brand-name drugs.

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Appendix

RBP Drugs, Categories and Codes, Categories 36,57,41

CDIC	Brand Name	Chemical Name	Manu.	Cat.	Sub.	C.	LR
710121	PEPCID TAB 20MG	FAMOTIDINE 20MG TA	MSD	36	1	4	4
1953842	APO-FAMOTIDINE TAB 20MG USP	FAMOTIDINE 20MG TA	APX	36	1	6	6
2022133	NOVO-FAMOTIDINE TAB 20MG	FAMOTIDINE 20MG TA	NOP	36	1	6	6
2024195	NU-FAMOTIDINE TAB 20MG	FAMOTIDINE 20MG TA	NXP	36	1	6	6
710113	PEPCID TAB 40MG	FAMOTIDINE 40MG TA	MSD	36	2	4	4
1953834	APO-FAMOTIDINE TAB 40MG USP	FAMOTIDINE 40MG TA	APX	36	2	6	6
2022141	NOVO-FAMOTIDINE TAB 40MG	FAMOTIDINE 40MG TA	NOP	36	2	6	6
2024209	NU-FAMOTIDINE TAB 40MG	FAMOTIDINE 40MG TA	NXP	36	2	6	6
778338	AXID CAP 150MG	NIZATIDINE 150MG CA	LIL	36	3	1	4
778346	AXID CAP 300MG	NIZATIDINE 300MG CA	LIL	36	4	1	4
553379	ZANTAC TAB 150MG	RANITIDINE HCL 150MG TA	UNK	36	5	4	4
733059	APO-RANITIDINE TAB 150MG	RANITIDINE HCL 150MG TA	APX	36	5	6	6
828564	NOVO-RANIDINE TAB 150MG	RANITIDINE HCL 150MG TA	NOP	36	5	6	6
828823	ALTI-RANITIDINE HCL TAB 150MG	RANITIDINE HCL 150MG TA	KNR	36	5	6	6
865737	NU-RANIT TAB 150MG	RANITIDINE HCL 150MG TA	NXP	36	5	6	6
641790	ZANTAC TAB 300MG	RANITIDINE HCL 300MG TA	UNK	36	7	4	4
733067	APO-RANITIDINE TAB 300MG	RANITIDINE HCL 300MG TA	APX	36	7	6	6
828556	NOVO-RANIDINE TAB 300MG	RANITIDINE HCL 300MG TA	NOP	36	7	6	6
828688	ALTI-RANITIDINE HCL TAB 300MG	RANITIDINE HCL 300MG TA	KNR	36	7	6	6
865745	NU-RANIT TAB 300MG	RANITIDINE HCL 300MG TA	NXP	36	7	6	6
514004	VOLTAREN TAB 25MG	DICLOFENAC SODIUM 25MG TE	NVR	41	1	4	4
808539	NOVO-DIFENAC ECT 25MG	DICLOFENAC SODIUM 25MG TE	NOP	41	1	5	6
839175	APO-DICLO TAB 25MG	DICLOFENAC SODIUM 25MG TE	APX	41	1	5	6
886017	NU-DICLO ENTERIC COATED TAB 25MG	DICLOFENAC SODIUM 25MG TE	NXP	41	1	5	6
782459	VOLTAREN SR 75 TAB	DICLOFENAC SODIUM 75MG TS	NVR	41	2	4	4
2158582	NOVO-DIFENAC SR - SRT 75MG	DICLOFENAC SODIUM 75MG TS	NOP	41	2	5	5
2162814	APO-DICLO SR - 75MG	DICLOFENAC SODIUM 75MG TS	APX	41	2	5	5
514012	VOLTAREN TAB 50MG	DICLOFENAC SODIUM 50MG TE	NVR	41	3	4	4
808517	NOVO-DIFENAC ECT 50MG	DICLOFENAC SODIUM 50MG TE	NOP	41	3	6	6
839183	APO-DICLO TAB 50MG	DICLOFENAC SODIUM 50MG TE	APX	41	3	6	6
870978	DICLOFENAC ECT 50MG	DICLOFENAC SODIUM 50MG TE	PDL	41	3	6	6
886025	NU-DICLO ENTERIC COATED TAB 50MG	DICLOFENAC SODIUM 50MG TE	NXP	41	3	6	6
590827	VOLTAREN SR TAB 100MG	DICLOFENAC SODIUM 100MG TI	NVR	41	4	4	4
2048698	NOVO-DIFENAC SR TABLETS 100MG	DICLOFENAC SODIUM 100MG TI	NOP	41	4	5	5
2091194	APO-DICLO SR 100MG	DICLOFENAC SODIUM 100MG TI	APX	41	4	5	5
587699	DOLOBID TAB 250MG	DIFLUNISAL 250MG TA	FRS	41	5	4	4
2039486	APO-DIFLUNISAL TAB 250MG	DIFLUNISAL 250MG TA	APX	41	5	5	5
2048493	NOVO-DIFLUNISAL TAB 250MG	DIFLUNISAL 250MG TA	NOP	41	5	5	5
2058405	NU-DIFLUNISAL TAB 250MG	DIFLUNISAL 250MG TA	NXP	41	5	5	5
576131	DOLOBID TAB 500MG	DIFLUNISAL 500MG TA	FRS	41	6	4	4
2039494	APO-DIFLUNISAL TAB 500MG	DIFLUNISAL 500MG TA	APX	41	6	5	5
2048507	NOVO-DIFLUNISAL TAB 500MG	DIFLUNISAL 500MG TA	NOP	41	6	5	5
2058413	NU-DIFLUNISAL TAB 500MG	DIFLUNISAL 500MG TA	NXP	41	6	5	5

328642	NALFON CAP 300MG	FENOPROFEN CALCIUM 300MG CA	LIL	41	7	1	1
345504	NALFON TAB 600MG	FENOPROFEN CALCIUM 600MG TA	LIL	41	8	1	1
593346	FROBEN TAB 50MG	FLURBIPROFEN 50MG TA	ORG	41	9	3	3
647942	ANSAID TAB 50MG USP	FLURBIPROFEN 50MG TA	UNK	41	9	3	3
675202	ALTI-FLURBIPROFEN TAB 50MG	FLURBIPROFEN 50MG TA	KNR	41	9	6	6
1912046	APO-FLURBIPROFEN FC TABLETS 50MG	FLURBIPROFEN 50MG TA	APX	41	9	6	6
2020661	NU-FLURBIPROFEN TAB 50MG	FLURBIPROFEN 50MG TA	NXP	41	9	6	6
2100509	NOVO-FLURPROFEN FC TABLET 50MG	FLURBIPROFEN 50MG TA	NOP	41	9	6	6
593354	FROBEN TAB 100MG	FLURBIPROFEN 100MG TA	ORG	41	10	3	3
600792	ANSAID TAB 100MG USP	FLURBIPROFEN 100MG TA	UNK	41	10	3	3
675199	ALTI-FLURBIPROFEN TABLETS 100MG	FLURBIPROFEN 100MG TA	KNR	41	10	6	6
1912038	APO-FLURBIPROFEN FC TABLETS 100MG	FLURBIPROFEN 100MG TA	APX	41	10	6	6
2020688	NU-FLURBIPROFEN TAB 100MG	FLURBIPROFEN 100MG TA	NXP	41	10	6	6
2100517	NOVO-FLURPROFEN FC TABLET 100MG	FLURBIPROFEN 100MG TA	NOP	41	10	6	6
863882	FROBEN-SR CAP 200MG	FLURBIPROFEN 200MG CS	ORG	41	11	2	2
16039	INDOCID CAP 25MG	INDOMETHACIN 25MG CA	MSD	41	12	3	3
337420	NOVO-METHACIN CAP 25MG	INDOMETHACIN 25MG CA	NOP	41	12	6	6
611158	APO INDOMETHACIN CAP 25MG	INDOMETHACIN 25MG CA	APX	41	12	6	6
865850	NU-INDO CAP 25MG	INDOMETHACIN 25MG CA	NXP	41	12	6	6
16047	INDOCID CAP 50MG	INDOMETHACIN 50MG CA	MSD	41	13	3	3
337439	NOVO-METHACIN CAP 50MG	INDOMETHACIN 50MG CA	NOP	41	13	6	6
611166	APO INDOMETHACIN CAP 50MG	INDOMETHACIN 50MG CA	APX	41	13	6	6
865869	NU-INDO CAP 50MG	INDOMETHACIN 50MG CA	NXP	41	13	6	6
463248	INDOCID SR 75MG	INDOMETHACIN 75MG CS	MSD	41	14	1	1
761664	RHODIS CAP 50MG	KETOPROFEN 50MG CA	RXP	41	15	3	3
790427	APO-KETO CAP 50MG	KETOPROFEN 50MG CA	APX	41	15	5	5
1926403	ORUDIS CAP 50MG	KETOPROFEN 50MG CA	RPR	41	15	3	3
2044633	NU-KETOPROFEN CAP 50MG	KETOPROFEN 50MG CA	NXP	41	15	5	5
761672	RHODIS ENTERIC COATED TAB 50MG	KETOPROFEN 50MG TE	RXP	41	16	3	3
790435	APO-KETO-E ECT 50MG	KETOPROFEN 50MG TE	APX	41	16	5	5
1926381	ORUDIS E-50 ECT 50MG	KETOPROFEN 50MG TE	RPR	41	16	3	3
1981528	NOVO-KETO-EC TAB 50MG	KETOPROFEN 50MG TE	NOP	41	16	5	5
2044781	NU-KETOPROFEN-E ECT 50MG	KETOPROFEN 50MG TE	NXP	41	16	5	5
2150816	PMS-KETOPROFEN E-50 - ECT 50MG	KETOPROFEN 50MG TE	PMS	41	16	3	3
761680	RHODIS ENTERIC COATED TAB 100MG	KETOPROFEN 100MG TE	RXP	41	17	3	3
842664	APO-KETO-E ECT 100MG	KETOPROFEN 100MG TE	APX	41	17	5	5
1926365	ORUDIS E-100 ECT 100MG	KETOPROFEN 100MG TE	RPR	41	17	3	3
1981536	NOVO-KETO-EC TAB 100MG	KETOPROFEN 100MG TE	NOP	41	17	5	5
2044641	NU-KETOPROFEN-E ECT 100MG	KETOPROFEN 100MG TE	NXP	41	17	5	5
2150824	PMS-KETOPROFEN E-100 - ECT	KETOPROFEN 100MG TE	PMS	41	17	3	3
1926373	ORUDIS SR-200 SRT 200MG	KETOPROFEN 200MG TI	RPR	41	18	3	3
2031175	RHODIS SR 200MG	KETOPROFEN 200MG TI	RXP	41	18	3	3
2172577	APO-KETO SR TABLETS 200MG	KETOPROFEN 200MG TI	APX	41	18	5	5
1913050	ORUVAIL CONTROL. RELEASE CAP 150	KETOPROFEN 150MG CC	RPR	41	19	2	2
2183099	RHOVAIL 150 - SRC 150MG	KETOPROFEN 150MG CC	RXP	41	19	2	2
1913069	ORUVAIL CONTROL. RELEASE CAP 200	KETOPROFEN 200MG CC	RPR	41	20	2	2
2183102	RHOVAIL 200- SRC 200MG	KETOPROFEN 200MG CC	RXP	41	20	2	2
864048	TORADOL TAB 10MG	KETOROLAC TROMETH. 10MG TA	SYN	41	22	2	3

2162660	TORADOL 10MG TABLETS	KETOROLAC TROMETH. 10MG TA	HLR	41	22	2	3
1917056	ARTHROTEC 50 TAB	DICLOFENAC SOD./MISOPROSTOL 50-0	SEA	41	23	1	1
2083531	RELAFEN TABLETS 500MG	NABUMETONE 500MG TA	SMJ	41	24	1	1
1937340	NAPROSYN E TAB 250MG	NAPROXEN 250MG TE	SYN	41	25	2	2
2162792	NAPROSYN E 250MG TABLETS - ECT	NAPROXEN 250MG TE	HLR	41	25	2	2
1937359	NAPROSYN E TAB 375MG	NAPROXEN 375MG TE	SYN	41	26	2	2
2162415	NAPROSYN E 375MG TABLETS - ECT	NAPROXEN 375MG TE	HLR	41	26	2	2
1937332	NAPROSYN E TAB 500MG	NAPROXEN 500MG TE	SYN	41	27	2	2
2162423	NAPROSYN E 500MG TABLETS - ECT	NAPROXEN 500MG TE	HLR	41	27	2	2
788767	NAPROSYN-SR TAB 750MG	NAPROXEN 750MG TI	SYN	41	28	3	3
2162466	NAPROSYN SR 750MG TABLETS	NAPROXEN 750MG TI	HLR	41	28	3	3
525596	FELDENE CAP 10MG	PIROXICAM 10MG CA	PFI	41	29	3	3
642886	APO PIROXICAM CAP 10MG	PIROXICAM 10MG CA	APX	41	29	6	6
695718	NOVO-PIROCAM CAP 10MG	PIROXICAM 10MG CA	NOP	41	29	6	6
865761	NU-PIROX CAP 10MG	PIROXICAM 10MG CA	NXP	41	29	6	6
2139952	ALTI-PIROXICAM-CAP 10MG	PIROXICAM 10MG CA	KNR	41	29	3	3
2144212	RHO-PIROXICAM - 10MG CAP	PIROXICAM 10MG CA	ROP	41	29	3	3
2171813	GEN-PIROXICAM-CAP 10MG	PIROXICAM 10MG CA	GPM	41	29	6	6
525618	FELDENE CAP 20MG	PIROXICAM 20MG CA	PFI	41	30	3	3
642894	APO PIROXICAM CAP 20MG	PIROXICAM 20MG CA	APX	41	30	6	6
695696	NOVO-PIROCAM CAP 20MG	PIROXICAM 20MG CA	NOP	41	30	6	6
865788	NU-PIROX CAP 20MG	PIROXICAM 20MG CA	NXP	41	30	6	6
2139960	ALTI-PIROXICAM-CAP 20MG	PIROXICAM 20MG CA	KNR	41	30	3	3
2144220	RHO-PIROXICAM - CAP 20MG	PIROXICAM 20MG CA	ROP	41	30	3	3
2171821	GEN-PIROXICAM - CAP 20MG	PIROXICAM 20MG CA	GPM	41	30	6	6
2027909	DISALCID TAB 500MG	SALSALATE 500MG TA	MDA	41	31	1	1
2027917	DISALCID TAB 750MG	SALSALATE 750MG TA	MDA	41	33	1	1
456888	CLINORIL TAB 150MG	SULINDAC 150MG TA	FRS	41	34	4	4
745588	NOVO-SUNDAC TAB 150MG	SULINDAC 150MG TA	NOP	41	34	5	5
778354	APO-SULIN TAB 150MG	SULINDAC 150MG TA	APX	41	34	5	5
2042576	NU-SULINDAC TAB 150MG	SULINDAC 150MG TA	NXP	41	34	5	5
432369	CLINORIL TAB 200MG	SULINDAC 200MG TA	FRS	41	35	4	4
745596	NOVO-SUNDAC TAB 200MG	SULINDAC 200MG TA	NOP	41	35	6	6
778362	APO-SULIN TAB 200MG	SULINDAC 200MG TA	APX	41	35	6	6
808636	SULINDAC-200 TAB 200MG	SULINDAC 200MG TA	PDL	41	35	6	6
2042584	NU-SULINDAC TAB 200MG	SULINDAC 200MG TA	NXP	41	35	6	6
884367	MOBIFLEX TAB 20MG	TENOXICAM 20MG TA	HLR	41	36	2	3
1924613	ALBERT TIAFEN TAB 200MG	TIAPROFENIC ACID 200MG TA	MMR	41	37	5	5
1989782	SURGAM TAB 200MG	TIAPROFENIC ACID 200MG TA	HRU	41	37	3	3
2136112	APO-TIAPROFENIC TABLETS-200MG	TIAPROFENIC ACID 200MG TA	APX	41	37	5	5
1924621	ALBERT TIAFEN TAB 300MG	TIAPROFENIC ACID 300MG TA	MMR	41	38	5	5
1989774	SURGAM TAB 300MG	TIAPROFENIC ACID 300MG TA	HRU	41	38	3	3
2136120	APO-TIAPROFENIC TABLETS -300MG	TIAPROFENIC ACID 300MG TA	APX	41	38	5	5
1989790	SURGAM SR CAP 300MG	TIAPROFENIC ACID 300MG CP	HRU	41	39	2	2
364126	TOLECTIN 200 TAB 200MG	TOLMETIN SODIUM 200MG TA	MCN	41	40	1	1
484938	TOLECTIN 400 CAP 400MG	TOLMETIN SODIUM 400MG CA	MCN	41	41	4	4
2076233	NOVO-TOLMETIN CAPSULES 400MG	TOLMETIN SODIUM 400MG CA	NOP	41	41	5	5
632740	TOLECTIN TAB 600MG	TOLMETIN SODIUM 600MG TA	MCN	41	42	1	1

740721	CEDOCARD-SR SRT 20MG	ISOSORBIDE DINITRATE 20MG TS	PMS	57	1	5	5
786683	CORADUR TAB 20MG	ISOSORBIDE DINITRATE 20MG TS	UNK	57	1	4	4
749362	NITROGARD-SR TAB 1MG	NITROGLYCERIN 1MG TY	AST	57	4	1	1
1927809	NITRONG SR SRT 2.6MG	NITROGLYCERIN 2.6MG TS	RPR	57	5	2	2
749389	NITROGARD-SR TAB 3MG	NITROGLYCERIN 3MG TY	AST	57	6	1	1
749370	NITROGARD-SR TAB 5MG	NITROGLYCERIN 5MG TY	AST	57	7	1	1
749397	NITROGARD-SR TAB 2MG	NITROGLYCERIN 2MG TY	AST	57	8	1	1
476595	PERITRATE TAB 10MG	PENTAERYTHRITOL TETRANIT. 10 MG T	PDA	57	9	1	1
476609	PERITRATE TAB 20MG	PENTAERYTHRITOL TETRANIT. 20 MG T	PDA	57	10	1	1
476579	PERITRATE FORTE TAB 80MG	PENTAERYTHRITOL TETRANIT. 80 MG T	PDA	57	11	1	1
476587	PERITRATE SA 80MG TAB	PENTAERYTHRITOL TETRANIT. 80 MG T	PDA	57	12	1	1

RBP Drugs, Categories and Codes, Categories 24, 9901

CDIC	Brand Name	Chemical Name	Manu.	Cat.	Sub.	C
885835	LOTENSIN TAB 5MG	BENAZEPRIL TAB 5MG	NVR	24	1	1
885843	LOTENSIN TAB 10MG	BENAZEPRIL TAB 10MG	NVR	24	2	1
885851	LOTENSIN TAB 20MG	BENAZEPRIL TAB 20MG	NVR	24	3	1
1911465	INHIBACE TAB 1MG	CILAZAPRIL TAB 1.0MG	HLR	24	4	1
1911473	INHIBACE TAB 2.5MG	CILAZAPRIL TAB 2.5MG	HLR	24	5	1
1911481	INHIBACE TAB 5MG	CILAZAPRIL TAB 5.0MG	HLR	24	6	1
657298	VASERETIC TAB 10/25	ENALAPRIL MALEATE PLUS 10/25	FRS	24	7	1
851795	VASOTEC TAB 2.5MG	ENALAPRIL MALEATE TAB 2.5MG	FRS	24	8	4
2020025	APO-ENALAPRIL TAB 2.5MG	ENALAPRIL MALEATE TAB 2.5MG	APX	24	8	5
708879	VASOTEC TAB 5MG	ENALAPRIL MALEATE TAB 5MG	FRS	24	9	4
2019884	APO-ENALAPRIL TAB 5MG	ENALAPRIL MALEATE TAB 5MG	APX	24	9	5
670901	VASOTEC TAB 10MG	ENALAPRIL MALEATE TAB 10MG	FRS	24	10	4
2019892	APO-ENALAPRIL TAB 10MG	ENALAPRIL MALEATE TAB 10MG	APX	24	10	5
670928	VASOTEC TAB 20MG	ENALAPRIL MALEATE TAB 20MG	FRS	24	11	4
2019906	APO-ENALAPRIL TAB 20MG	ENALAPRIL MALEATE TAB 20MG	APX	24	11	5
1907107	MONOPRIL TAB 10MG	FOSINOPRIL TAB 10MG	BQC	24	12	1
1907115	MONOPRIL TAB 20MG	FOSINOPRIL TAB 20MG	BQC	24	13	1
839388	PRINIVIL TAB 5MG	LISINOPRIL TAB 5MG	MSD	24	14	3
2049333	ZESTRIL TAB 5MG	LISINOPRIL TAB 5MG	ZEN	24	14	3
839396	PRINIVIL TAB 10MG	LISINOPRIL TAB 10MG	MSD	24	15	2
2049376	ZESTRIL TAB 10MG	LISINOPRIL TAB 10MG	ZEN	24	15	2
839418	PRINIVIL TAB 20MG	LISINOPRIL TAB 20MG	MSD	24	16	2
2049384	ZESTRIL TAB 20MG	LISINOPRIL TAB 20MG	ZEN	24	16	2
2103729	ZESTORETIC - TAB	LISINOPRIL/HYDROCHLORO TAB 10/12.5	ZEN	24	17	2
2108194	PRINZIDE TAB 10-12.5	LISINOPRIL/HYDROCHLORO TAB 10/12.5	MSD	24	17	2
884413	PRINZIDE TAB 20-12.5	LISINOPRIL/HYDROCHLORO TAB 20/12.5	MSD	24	18	2
2045737	ZESTORETIC TAB 20/12.5MG	LISINOPRIL/HYDROCHLORO TAB 20/12.5	ZEN	24	18	2
884421	PRINZIDE TAB 20-25	LISINOPRIL/HYDROCHLORO TAB 20/25	MSD	24	19	2
2045729	ZESTORETIC TAB 20/25MG	LISINOPRIL/HYDROCHLORO TAB 20/25	ZEN	24	19	2
878928	NORVASC TAB 5MG	AMLODIPINE TAB 5MG	PFI	24	20	1

878936	NORVASC TAB 10MG	AMLODIPINE TAB 10MG	PFI	24	21	1
791695	CARDENE CAP 20MG	NICARDIPINE CAP 20MG	SYN	24	22	2
2162741	CARDENE 20MG CAPSULES	NICARDIPINE CAP 20MG	HLR	24	22	2
791709	CARDENE CAP 30MG	NICARDIPINE CAP 30MG	SYN	24	23	2
1911805	CARDENE CAP 30MG	NICARDIPINE CAP 30MG	AYE	24	23	2
2162733	CARDENE 30MG CAPSULES	NICARDIPINE CAP 30MG	HLR	24	23	2
2154390	NIFEDIPINE PA 10 - SRT 10MG	NIFEDIPINE PA TAB 10MG	YMG	24	24	3
2154404	NIFEDIPINE PA 20 - SRT 20MG	NIFEDIPINEPA TAB 20MG	YMG	24	25	3
2181525	APO-NIFED PA - SRT 20MG	NIFEDIPINEPA TAB 20MG	APX	24	25	5
2155907	ADALAT XL - SRT 30MG	NIFEDIPINE TAB 30MG	YNO	24	26	1
2155990	ADALAT XL - SRT 60MG	NIFEDIPINE TAB 60MG	YNO	24	27	2
1911821	ZOFRAN INJ 2MG/ML	ONDANSETRON INJ 2MG/ML	UNK	9901	3	1
1925970	ZOFRAN TAB 4MG	ONDANSETRON TAB 4MG	UNK	9901	3	1
1925989	ZOFRAN TAB 8MG	ONDANSETRON TAB 8MG	UNK	9901	3	1
610062	IMODIUM ORAL SOL 0.2MG/ML	LOPERAMIDE HCL LIQ .2MG	JAN	9901	10	3
860743	IMODIUM CAPLETS 2MG	LOPERAMIDE HCL CAPLET 2MG	JAN	9901	10	3
2016095	PMS-LOPERAMIDE HYDROCHLORIDE SOLUTI	LOPERAMIDE HCL LIQ .2MG	PMS	9901	10	5
2132591	NOVO-LOPERAMIDE TABLETS-2MG	LOPERAMIDE HCL TAB 2MG	NOP	9901	10	6
2162784	KENRAL-LOPERAMIDE - 2MG CAPLET	LOPERAMIDE HCL CAPLET 2MG	KNR	9901	10	3
564966	LOZIDE TAB 2.5MG	INDAPAMIDE TAB 2.5MG	SEV	9901	11	3
2049341	INDAPAMIDE HEMIHYDRATE TAB 2.5MG	INDAPAMIDE TAB 2.5MG	PPB	9901	11	3
2153483	GEN-INDAPAMIDE- TAB 2.5MG	INDAPAMIDE TAB 2.5MG	GPM	9901	11	5
614327	METHOTREXATE DBL INJ 2.5MG/ML	METHOTREXATE INJ 2.5MG	FAU	9901	12	2
2182939	METHOTREXATE 2.5MG/ML VIAL	METHOTREXATE INJ 2.5MG	FAU	9901	12	2
614335	METHOTREXATE DBL INJ 10MG/ML	METHOTREXATE INJ 10MG	FAU	9901	13	1
2182947	METHOTREXATE INJECTION - 10MG/ML	METHOTREXATE INJ 10MG	FAU	9901	13	1
1911457	METHOTREXATE SODIUM INJ 25MG/ML USP	METHOTREXATE INJ 25MG	FAU	9901	14	4
2099705	METHOTREXATE NA INJ.IM IV IAR INT I	METHOTREXATE INJ 25MG	NOP	9901	14	5
2182955	METHOTREXATE INJECTION - 25MG/ML	METHOTREXATE INJ 25MG	FAU	9901	14	4
765996	DIAMICRON TAB 80MG	GLICLAZIDE TAB 80MG	SEV	9901	19	3
891800	DIFLUCAN TAB 50MG	FLUCONAZOLE TAB 50MG	PFI	9901	21	4
891819	DIFLUCAN TAB 100MG	FLUCONAZOLE TAB 100MG	PFI	9901	21	4
731439	ATROVENT SOLUTION 0.25MG/ML	IPRATROPIUM SOL .25MG/ML (WP)	BOE	9901	24	4
1950681	ATROVENT UDV SOL INH 250MCG/ML	IPRATROPIUM SOL .25MG/ML (WOP)	BOE	9901	24	4
2026759	ATROVENT UDV LIQ ORL INH 125MCG/ML	IPRATROPIUM SOL UNIT DOSE 125MCG/M	BOE	9901	24	4
2097141	ALTI-IPRATROPIUM INHALATION SOLUTIO	IPRATROPIUM SOL .25MG/ML (WP)	KNR	9901	24	6
2126222	APO-IPRAVENT SOLUTION - INH 250MCG/	IPRATROPIUM SOL .25MG/ML (WP)	APX	9901	24	6
860808	ALTI-SALBUTAMOL SULPHATE RESPIRATOR	SALBUTAMOL SOL 5MG/ML	KNR	9901	25	6
897345	VENTOLIN NEBULES P.F. SOL 2.5MG/2.5	SALBUTAMOL NEBULE PF SOL 1MG/ML	UNK	9901	25	3
1926934	GEN-SALBUTAMOL STERINEBS	SALBUTAMOL NEBULE PF SOL 1MG/ML	GPM	9901	25	6
1945203	VENTOLIN NEBULES PF SOL 5MG/2.5ML	SALBUTAMOL NEBULE PF SOL 2MG/ML	UNK	9901	25	3
1947222	VENTOLIN RESPIRATOR SOLUTION 5MG/ML	SALBUTAMOL SOL 5MG/ML	UNK	9901	25	3
1986864	ALTI-SALBUTAMOL SULPHATE RESPIRATO	SALBUTAMOL NEBULE PF SOL 1MG/ML	KNR	9901	25	6
2022125	VENTOLIN NEBULES P.F. LIQ INH 1.25M	SALBUTAMOL NEBULE PF SOL 0.5MG/ML	UNK	9901	25	3
2046741	APO-SALVENT LIQ INH-ORL 5MG/ML	SALBUTAMOL SOL 5MG/ML	APX	9901	25	6
2048760	ASMAVENT RESPIRATOR SOLUTION INH 5	SALBUTAMOL SOL 5MG/ML	TCH	9901	25	6
2069571	PMS-SALBUTAMOL RESPIRATOR SOLUTION	SALBUTAMOL SOL 5MG/ML	PMS	9901	25	6
2154412	RHO-SALBUTAMOL RESPIRATOR SOLUTION	SALBUTAMOL SOL 5MG/ML	RXP	9901	25	3

2017652	ISUPREL LIQ 0.5%	ISOPROTERENOL LIQ 0.5%	SAW	9901	26	2
541389	BEROTEC 1MG/ML	FENOTEROL SOL 1MG/ML	BOE	9901	27	1
2056704	BEROTEC UDV INHALATION SOLUTON 0.62	FENOTEROL SOL .625 MG/ML	BOE	9901	27	1
1978918	PULMICORT NEBUAMP SUS 0.25MG/ML	BUDESONIDE NEBUAMP 0.25MG/ML	AST	9901	28	1
1978926	PULMICORT NEBUAMP SUS 0.5MG/ML	BUDESONIDE NEBUAMP 0.5MG/ML	AST	9901	28	1
534609	INTAL NEBULISER 1%	SOD CROMOGLYCATE LIQ 1%	FIS	9901	29	4
2046113	PMS-SODIUM CROMOGLYCATE NEBULIZER S	SOD CROMOGLYCATE LIQ 1%	PMS	9901	29	6
2049082	NOVO-CROMOLYN NEBULIZER SOLUTION 1%	SOD CROMOGLYCATE LIQ 1%	NOP	9901	29	6

Price Changes by Codes, RBP Categories 36,57,41

CDIC No.	RBP Category	Sub-Category	1995 price	1997 price	current price	SR % p change	SR Code	LR % p change	LR Code
463248	41	14	10663	10662	10662	-0.009	1	-0.009	1
328642	41	7	2861	2861	2861	0	1	0	1
345504	41	8	5187	5187	5187	0	1	0	1
364126	41	40	3956	3956	3956	0	1	0	1
476579	57	11	2955	2955	2955	0	1	0	1
476587	57	12	3800	3800	3800	0	1	0	1
476595	57	9	1235	1235	1235	0	1	0	1
476609	57	10	1665	1665	1665	0	1	0	1
632740	41	42	8038	8038	8038	0	1	0	1
749362	57	4	1735	1735	1735	0	1	0	1
749370	57	7	3135	3135	3135	0	1	0	1
749389	57	6	2435	2435	2435	0	1	0	1
749397	57	8	2090	2090	2090	0	1	0	1
1917056	41	23	5540	5540	5540	0	1	0	1
2027909	41	31	2167	2167	2167	0	1	0	1
2027917	41	33	3250	3250	3250	0	1	0	1
2083531	41	24	6700	6700	6700	0	1	0	1
1927809	57	5	4162	4162	3038	0	2	-27.01	2
1937332	41	27	9218	8950	8950	-2.907	2	-2.907	2
1937340	41	25	3893	3780	3780	-2.903	2	-2.903	2
1937359	41	26	5061	4915	4915	-2.885	2	-2.885	2
2162792	41	25	3893	3780	3882	-2.903	2	-0.283	2
2162423	41	27	9218	8950	9192	-2.907	2	-0.282	2
863882	41	11	11730	11730	11730	0	2	0	2
1913050	41	19	11308	11308	11308	0	2	0	2
1913069	41	20	14621	14621	14621	0	2	0	2
2183099	41	19	4986	4986	4986	0	2	0	2
2183102	41	20	6156	6156	6156	0	2	0	2
1989790	41	39	6333	6333	6334	0	2	0.0158	2
2162415	41	26	5061	4915	5089	-2.885	2	0.5533	2
2031175	41	18	11146	6156	6156	-44.77	3	-44.77	3
593346	41	9	3812	3061	3061	-19.7	3	-19.7	3

593354	41	10	4992	4009	4009	-19.69	3	-19.69	3
2139952	41	29	4321	4147	4147	-4.027	3	-4.027	3
2139960	41	30	7458	7158	7158	-4.023	3	-4.023	3
2144220	41	30	7457	7158	7158	-4.01	3	-4.01	3
2144212	41	29	4320	4147	4147	-4.005	3	-4.005	3
788767	41	28	12645	12150	12150	-3.915	3	-3.915	3
2162466	41	28	12645	12150	12400	-3.915	3	-1.938	3
884367	41	36	12160	12160	12160	0	2	0	3
16039	41	12	3255	3255	3255	0	3	0	3
16047	41	13	5287	5287	5287	0	3	0	3
525596	41	29	9172	9172	9172	0	3	0	3
525618	41	30	15379	15379	15379	0	3	0	3
761664	41	15	1662	1662	1662	0	3	0	3
761672	41	16	1662	1662	1662	0	3	0	3
761680	41	17	3078	3078	3078	0	3	0	3
1926365	41	17	7182	7182	7182	0	3	0	3
1926373	41	18	14621	14621	14621	0	3	0	3
1926381	41	16	3551	3551	3551	0	3	0	3
1926403	41	15	3551	3551	3551	0	3	0	3
1989774	41	38	6515	6515	6515	0	3	0	3
1989782	41	37	5455	5455	5455	0	3	0	3
2150816	41	16	1662	1662	1662	0	3	0	3
2150824	41	17	3078	3078	3078	0	3	0	3
864048	41	22	5830	5910	5910	1.3722	2	1.3722	3
647942	41	9	4643	4736	4927	2.003	3	6.1167	3
600792	41	10	6275	6400	6659	1.992	3	6.1195	3
2162660	41	22	5889	6130	6277	4.0924	2	6.5886	3
514004	41	1	3297	3125	3125	-5.217	4	-5.217	4
778338	36	3	8392	8392	8392	0	1	0	4
778346	36	4	15206	15206	15206	0	1	0	4
710113	36	2	17013	16845	17013	-0.987	4	0	4
432369	41	35	7203	7203	7203	0	4	0	4
456888	41	34	5685	5685	5685	0	4	0	4
484938	41	41	5665	5665	5665	0	4	0	4
514012	41	3	6594	6594	6594	0	4	0	4
553379	36	5	10953	10953	10953	0	4	0	4
576131	41	6	7055	7055	7055	0	4	0	4
590827	41	4	13209	13209	13209	0	4	0	4
641790	36	7	20620	20620	20620	0	4	0	4
710121	36	1	9357	9357	9357	0	4	0	4
782459	41	2	9267	9267	9267	0	4	0	4
786683	57	1	3277	3277	3277	0	4	0	4
587699	41	5	5648	5648	5649	0	4	0.0177	4
2172577	41	18	10965	6156	6156	-43.86	5	-43.86	5
2158582	41	2	7246	6036	5907	-16.7	5	-18.48	5
2136120	41	38	4886	4398	4104	-9.988	5	-16	5
1924621	41	38	4885	4395	4104	-10.03	5	-15.99	5
1924613	41	37	4090	3680	3437	-10.02	5	-15.97	5

2136112	41	37	4090	3682	3437	-9.976	5	-15.97	5
842664	41	17	3560	3078	3078	-13.54	5	-13.54	5
2076233	41	41	4530	4249	4249	-6.203	5	-6.203	5
2048698	41	4	8068	8048	7874	-0.248	5	-2.405	5
2091194	41	4	8054	8054	7874	0	5	-2.235	5
2162814	41	2	6040	6040	5907	0	5	-2.202	5
2048507	41	6	5182	5182	5180	0	5	-0.039	5
745588	41	34	3824	3824	3824	0	5	0	5
778354	41	34	3824	3824	3824	0	5	0	5
790427	41	15	1662	1662	1662	0	5	0	5
790435	41	16	1662	1662	1662	0	5	0	5
1981528	41	16	1662	1662	1662	0	5	0	5
1981536	41	17	3078	3078	3078	0	5	0	5
2039486	41	5	4235	4235	4235	0	5	0	5
2039494	41	6	5181	5181	5181	0	5	0	5
2042576	41	34	3824	3824	3824	0	5	0	5
2044633	41	15	1662	1662	1662	0	5	0	5
2044641	41	17	3078	3078	3078	0	5	0	5
2044781	41	16	1662	1662	1662	0	5	0	5
2048493	41	5	4235	4235	4235	0	5	0	5
2058405	41	5	4235	4235	4235	0	5	0	5
2058413	41	6	5181	5181	5181	0	5	0	5
740721	57	1	3277	3277	3605	0	5	10.009	5
337439	41	13	1865	1865	1511	0	6	-18.98	6
611166	41	13	1865	1865	1511	0	6	-18.98	6
865869	41	13	1865	1865	1511	0	6	-18.98	6
337420	41	12	1075	1075	871	0	6	-18.98	6
611158	41	12	1075	1075	871	0	6	-18.98	6
865850	41	12	1075	1075	871	0	6	-18.98	6
828564	36	5	4250	4042	4042	-4.894	6	-4.894	6
828823	36	5	4250	4042	4042	-4.894	6	-4.894	6
865737	36	5	4250	4042	4042	-4.894	6	-4.894	6
733059	36	5	4250	4120	4042	-3.059	6	-4.894	6
2171821	41	30	7498	7159	7159	-4.521	6	-4.521	6
642886	41	29	4321	4147	4147	-4.027	6	-4.027	6
695718	41	29	4321	4147	4147	-4.027	6	-4.027	6
865761	41	29	4321	4147	4147	-4.027	6	-4.027	6
2171813	41	29	4321	4147	4147	-4.027	6	-4.027	6
642894	41	30	7458	7158	7158	-4.023	6	-4.023	6
695696	41	30	7458	7158	7158	-4.023	6	-4.023	6
865788	41	30	7458	7158	7158	-4.023	6	-4.023	6
808547	41	3	4027	4024	3937	-0.074	6	-2.235	6
886025	41	3	4027	4024	3937	-0.074	6	-2.235	6
839183	41	3	4027	4027	3937	0	6	-2.235	6
808539	41	1	2012	2012	1969	0	5	-2.137	6
839175	41	1	2012	2012	1969	0	5	-2.137	6
886017	41	1	2012	2012	1969	0	5	-2.137	6
828688	36	7	7947	7787	7787	-2.013	6	-2.013	6

2155907	24	26	19950722	0.93	0.93	0	0	1
2182947	9901	13	19951125	6.6	6.8	0.2	3.03	1
614327	9901	12	19950701	4	4	0	0	2
791695	24	22	19950601	0.48	0.48	0	0	2
791709	24	23	19950601	0.68	0.68	0	0	2
839396	24	15	19950601	0.809	0.8092	0.0002	0.025	2
839418	24	16	19950601	0.9723	0.9724	1E-04	0.01	2
884413	24	18	19950601	0.9724	0.9724	0	0	2
884421	24	19	19950601	0.9724	0.9724	0	0	2
1911805	24	23	19950612	0.7	0.7	0	0	2
2017652	9901	26	19950601	0.847	0.847	0	0	2
2045729	24	19	19950601	0.9723	0.9723	0	0	2
2045737	24	18	19950601	0.9723	0.9723	0	0	2
2049376	24	15	19950601	0.8093	0.8093	0	0	2
2049384	24	16	19950601	0.9723	0.9723	0	0	2
2103729	24	17	19950601	0.8093	0.8093	0	0	2
2108194	24	17	19950601	0.8093	0.8092	-1E-04	-0.012	2
2155990	24	27	19950722	1.459	1.459	0	0	2
2162733	24	23	19950930	0.7	0.68	-0.02	-2.857	2
2162741	24	22	19950930	0.55	0.48	-0.07	-12.73	2
2182939	9901	12	19951125	4	4	0	0	2
564966	9901	11	19950601	0.4727	0.4727	0	0	3
610062	9901	10	19950601	0.1053	0.1052	-0.0001	-0.095	3
765996	9901	19	19950601	0.355	0.3725	0.0175	4.93	3
839388	24	14	19950601	0.6733	0.6735	0.0002	0.03	3
860743	9901	10	19950601	0.7417	0.3806	-0.3611	-48.69	3
897345	9901	25	19950601	0.3862	0.3862	0	0	3
1945203	9901	25	19950601	0.7338	0.7338	0	0	3
1947222	9901	25	19950601	0.937	0.937	0	0	3
2022125	9901	25	19950601	0.199	0.1829	-0.0161	-8.09	3
2049333	24	14	19950601	0.6737	0.6736	-1E-04	-0.015	3
2049341	9901	11	19951021	0.3782	0.2977	-0.0805	-21.29	3
2154390	24	24	19951021	0.3498	0.2245	-0.1253	-35.82	3
2154404	24	25	19951021	0.5472	0.39	-0.1572	-28.73	3
2154412	9901	25	19950701	0.694	0.632	-0.062	-8.934	3
2162784	9901	10	19950909	0.43	0.247	-0.183	-42.56	3
534609	9901	29	19950601	0.3846	0.3846	0	0	4
670901	24	10	19950601	0.96	0.96	0	0	4
670928	24	11	19950601	1.1583	1.1583	0	0	4
708879	24	9	19950601	0.7987	0.7988	1E-04	0.013	4
731439	9901	24	19950601	0.8785	0.8785	0	0	4
851795	24	8	19950601	0.6753	0.6753	0	0	4
891800	9901	21	19950601	4.856	4.856	0	0	4
891819	9901	21	19950601	8.6146	8.6146	0	0	4
1911457	9901	14	19950701	8	8	0	0	4
1950681	9901	24	19950601	1.318	1.318	0	0	4
2026759	9901	24	19950601	0.659	0.659	0	0	4
2182955	9901	14	19951125	8	8	0	0	4

828556	36	7	7945	7787	7787	-1.989	6	-1.989	6
865745	36	7	7945	7787	7787	-1.989	6	-1.989	6
733067	36	7	7943	7787	7787	-1.964	6	-1.964	6
675199	41	10	3544	3508	3508	-1.016	6	-1.016	6
675202	41	9	2590	2564	2564	-1.004	6	-1.004	6
870978	41	3	4034	4027	4024	-0.174	6	-0.248	6
2022141	36	2	11371	11370	11370	-0.009	6	-0.009	6
2024209	36	2	11371	11370	11370	-0.009	6	-0.009	6
745596	41	35	4840	4840	4840	0	6	0	6
778362	41	35	4840	4840	4840	0	6	0	6
808636	41	35	4840	4840	4840	0	6	0	6
1912038	41	10	3508	3508	3508	0	6	0	6
1912046	41	9	2564	2564	2564	0	6	0	6
1953834	36	2	11370	11370	11370	0	6	0	6
1953842	36	1	6317	6317	6317	0	6	0	6
2020661	41	9	2564	2564	2564	0	6	0	6
2020688	41	10	3508	3508	3508	0	6	0	6
2024195	36	1	6315	6315	6315	0	6	0	6
2042584	41	35	4840	4840	4840	0	6	0	6
2100509	41	9	2564	2564	2564	0	6	0	6
2100517	41	10	3508	3508	3508	0	6	0	6
2022133	36	1	6316	6317	6317	0.0158	6	0.0158	6

Price Changes by Codes, Categories 24, 9901

CDIC	RBP Category	Sub-Category	1995 date	1995 price	Current Price	p change	% p change	Code
541389	9901	27	19950601	0.703	0.703	0	0	1
614335	9901	13	19950701	6.6	6.6	0	0	1
657298	24	7	19950601	0.96	0.96	0	0	1
878928	24	20	19950601	1.28	1.28	0	0	1
878936	24	21	19950601	1.9	1.9	0	0	1
885835	24	1	19950805	0.575	0.575	0	0	1
885843	24	2	19950805	0.68	0.68	0	0	1
885851	24	3	19950805	0.78	0.78	0	0	1
1907107	24	12	19950601	0.79	0.79	0	0	1
1907115	24	13	19950601	0.95	0.95	0	0	1
1911465	24	4	19950601	0.59	0.59	0	0	1
1911473	24	5	19950601	0.68	0.68	0	0	1
1911481	24	6	19950601	0.79	0.79	0	0	1
1911821	9901	3	19950601	9.035	9.035	0	0	1
1925970	9901	3	19950601	11.9767	11.9766	-1E-04	-8E-04	1
1925989	9901	3	19950601	18.2803	18.28	-0.0003	-0.002	1
1978918	9901	28	19950601	0.4	0.4	0	0	1
1978926	9901	28	19950601	0.8	0.8	0	0	1
2056704	9901	27	19950601	0.703	0.703	0	0	1

2016095	9901	10	19950601	0.0839	0.0839	0	0	5
2019884	24	9	19950601	0.655	0.655	0	0	5
2019892	24	10	19950601	0.7882	0.7872	-0.001	-0.127	5
2019906	24	11	19950601	0.9498	0.9498	0	0	5
2020025	24	8	19950601	0.5538	0.5538	0	0	5
2099705	9901	14	19950701	5.625	5.625	0	0	5
2153483	9901	11	19950601	0.378	0.2978	-0.0802	-21.22	5
2181525	24	25	19951021	0.39	0.39	0	0	5
860808	9901	25	19950601	0.773	0.632	-0.141	-18.24	6
1926934	9901	25	19950601	0.676	0.2434	-0.4326	-63.99	6
1986864	9901	25	19950601	0.2704	0.2434	-0.027	-9.985	6
2046113	9901	29	19950601	0.2884	0.2596	-0.0288	-9.986	6
2046741	9901	25	19950601	0.695	0.632	-0.063	-9.065	6
2048760	9901	25	19950601	0.695	0.632	-0.063	-9.065	6
2049082	9901	29	19950601	0.2884	0.2594	-0.029	-10.06	6
2069571	9901	25	19950601	0.695	0.632	-0.063	-9.065	6
2097141	9901	24	19950601	0.6575	0.6575	0	0	6
2126222	9901	24	19950601	0.4428	0.6575	0.2147	48.49	6
2132591	9901	10	19950612	0.5	0.4483	-0.0517	-10.34	6

Price Changes by RBP Categories, Categories 36,57,41

CDIC No.	RBP Category	Sub-Category	1995 date	1995 price	1997 date	1997 price	% p change	Code	I.R	current price	% I.R p ch.
710121	36	1	19950601	9357	19970101	9357	0	4	4	9357	0
1953842	36	1	19950601	6317	19970101	6317	0	6	6	6317	0
2022133	36	1	19950601	6316	19970101	6317	0.0158	6	6	6317	0.0158
2024195	36	1	19950601	6315	19970101	6315	0	6	6	6315	0
710113	36	2	19950601	17013	19970101	16845	-0.987	4	4	17013	0
1953834	36	2	19950601	11370	19970101	11370	0	6	6	11370	0
2022141	36	2	19950601	11371	19970101	11370	-0.009	6	6	11370	-0.009
2024209	36	2	19950601	11371	19970125	11370	-0.009	6	6	11370	-0.009
778338	36	3	19950601	8392	19970101	8392	0	1	4	8392	0
778346	36	4	19950601	15206	19970101	15206	0	1	4	15206	0
553379	36	5	19950601	10953	19970101	10953	0	4	4	10953	0
733059	36	5	19950601	4250	19970101	4120	-3.059	6	6	4042	-4.894
828564	36	5	19950601	4250	19970101	4042	-4.894	6	6	4042	-4.894
828823	36	5	19950601	4250	19970118	4042	-4.894	6	6	4042	-4.894
865737	36	5	19950601	4250	19970101	4042	-4.894	6	6	4042	-4.894
641790	36	7	19950601	20620	19970101	20620	0	4	4	20620	0
733067	36	7	19950601	7943	19970101	7787	-1.964	6	6	7787	-1.964
828556	36	7	19950601	7945	19970101	7787	-1.989	6	6	7787	-1.989
828688	36	7	19950601	7947	19970118	7787	-2.013	6	6	7787	-2.013
865745	36	7	19950601	7945	19970101	7787	-1.989	6	6	7787	-1.989
514004	41	1	19950701	3297	19970101	3125	-5.217	4	4	3125	-5.217
808539	41	1	19950601	2012	19970101	2012	0	5	6	1969	-2.137

839175	41	1	19950601	2012	19970101	2012	0	5	6	1969	-2.137
886017	41	1	19950601	2012	19970101	2012	0	5	6	1969	-2.137
782459	41	2	19950701	9267	19970101	9267	0	4	4	9267	0
2158582	41	2	19950612	7246	19970101	6036	-16.7	5	5	5907	-18.48
2162814	41	2	19950701	6040	19970101	6040	0	5	5	5907	-2.202
514012	41	3	19950701	6594	19970101	6594	0	4	4	6594	0
808547	41	3	19950601	4027	19970101	4024	-0.074	6	6	3937	-2.235
839183	41	3	19950601	4027	19970101	4027	0	6	6	3937	-2.235
870978	41	3	19950601	4034	19970101	4027	-0.174	6	6	4024	-0.248
886025	41	3	19950601	4027	19970101	4024	-0.074	6	6	3937	-2.235
590827	41	4	19950701	13209	19970101	13209	0	4	4	13209	0
2048698	41	4	19950601	8068	19970101	8048	-0.248	5	5	7874	-2.405
2091194	41	4	19950601	8054	19970101	8054	0	5	5	7874	-2.235
587699	41	5	19950601	5648	19970101	5648	0	4	4	5649	0.0177
2039486	41	5	19950601	4235	19970101	4235	0	5	5	4235	0
2048493	41	5	19950601	4235	19970101	4235	0	5	5	4235	0
2058405	41	5	19950601	4235	19970101	4235	0	5	5	4235	0
576131	41	6	19950601	7055	19970101	7055	0	4	4	7055	0
2039494	41	6	19950601	5181	19970101	5181	0	5	5	5181	0
2048507	41	6	19950601	5182	19970101	5182	0	5	5	5180	-0.039
2058413	41	6	19950601	5181	19970101	5181	0	5	5	5181	0
328642	41	7	19950601	2861	19970101	2861	0	1	1	2861	0
345504	41	8	19950601	5187	19970101	5187	0	1	1	5187	0
593346	41	9	19950601	3812	19970101	3061	-19.7	3	3	3061	-19.7
647942	41	9	19950601	4643	19970101	4736	2.003	3	3	4927	6.1167
675202	41	9	19950601	2590	19970118	2564	-1.004	6	6	2564	-1.004
1912046	41	9	19950601	2564	19970101	2564	0	6	6	2564	0
2020661	41	9	19950601	2564	19970101	2564	0	6	6	2564	0
2100509	41	9	19950601	2564	19970101	2564	0	6	6	2564	0
593354	41	10	19950601	4992	19970101	4009	-19.69	3	3	4009	-19.69
600792	41	10	19950601	6275	19970101	6400	1.992	3	3	6659	6.1195
675199	41	10	19950601	3544	19970118	3508	-1.016	6	6	3508	-1.016
1912038	41	10	19950601	3508	19970101	3508	0	6	6	3508	0
2020688	41	10	19950601	3508	19970101	3508	0	6	6	3508	0
2100517	41	10	19950601	3508	19970101	3508	0	6	6	3508	0
863882	41	11	19950601	11730	19970101	11730	0	2	2	11730	0
16039	41	12	19950601	3255	19970101	3255	0	3	3	3255	0
337420	41	12	19950601	1075	19970101	1075	0	6	6	871	-18.98
611158	41	12	19950601	1075	19970101	1075	0	6	6	871	-18.98
865850	41	12	19950601	1075	19970101	1075	0	6	6	871	-18.98
16047	41	13	19950601	5287	19970101	5287	0	3	3	5287	0
337439	41	13	19950601	1865	19970101	1865	0	6	6	1511	-18.98
611166	41	13	19950601	1865	19970101	1865	0	6	6	1511	-18.98
865869	41	13	19950601	1865	19970101	1865	0	6	6	1511	-18.98
463248	41	14	19950601	10663	19970101	10662	-0.009	1	1	10662	-0.009
761664	41	15	19950805	1662	19970101	1662	0	3	3	1662	0
790427	41	15	19950601	1662	19970101	1662	0	5	5	1662	0
1926403	41	15	19950601	3551	19970101	3551	0	3	3	3551	0

2044633	41	15	19950902	1662	19970101	1662	0	5	5	1662	0
761672	41	16	19950805	1662	19970101	1662	0	3	3	1662	0
790435	41	16	19950601	1662	19970101	1662	0	5	5	1662	0
1926381	41	16	19950601	3551	19970101	3551	0	3	3	3551	0
1981528	41	16	19950601	1662	19970101	1662	0	5	5	1662	0
2044781	41	16	19950902	1662	19970101	1662	0	5	5	1662	0
2150816	41	16	19951021	1662	19970101	1662	0	3	3	1662	0
761680	41	17	19950805	3078	19970101	3078	0	3	3	3078	0
842664	41	17	19950601	3560	19970101	3078	-13.54	5	5	3078	-13.54
1926365	41	17	19950601	7182	19970101	7182	0	3	3	7182	0
1981536	41	17	19950601	3078	19970101	3078	0	5	5	3078	0
2044641	41	17	19950902	3078	19970101	3078	0	5	5	3078	0
2150824	41	17	19951021	3078	19970101	3078	0	3	3	3078	0
1926373	41	18	19950601	14621	19970101	14621	0	3	3	14621	0
2031175	41	18	19951021	11146	19970101	6156	-44.77	3	3	6156	-44.77
2172577	41	18	19950805	10965	19970101	6156	-43.86	5	5	6156	-43.86
1913050	41	19	19950601	11308	19970101	11308	0	2	2	11308	0
2183099	41	19	19951104	4986	19970101	4986	0	2	2	4986	0
1913069	41	20	19950601	14621	19970101	14621	0	2	2	14621	0
2183102	41	20	19951104	6156	19970101	6156	0	2	2	6156	0
864048	41	22	19950601	5830	19970101	5910	1.3722	2	3	5910	1.3722
2162660	41	22	19951118	5889	19970111	6130	4.0924	2	3	6277	6.5886
1917056	41	23	19950601	5540	19970101	5540	0	1	1	5540	0
2083531	41	24	19950601	6700	19970101	6700	0	1	1	6700	0
1937340	41	25	19950601	3893	19970101	3780	-2.903	2	2	3780	-2.903
2162792	41	25	19951118	3893	19970101	3780	-2.903	2	2	3882	-0.283
1937359	41	26	19950612	5061	19970101	4915	-2.885	2	2	4915	-2.885
2162415	41	26	19951118	5061	19970101	4915	-2.885	2	2	5089	0.5533
1937332	41	27	19950601	9218	19970101	8950	-2.907	2	2	8950	-2.907
2162423	41	27	19951118	9218	19970101	8950	-2.907	2	2	9192	-0.282
788767	41	28	19950601	12645	19970101	12150	-3.915	3	3	12150	-3.915
2162466	41	28	19951118	12645	19970101	12150	-3.915	3	3	12400	-1.938
525596	41	29	19950601	9172	19970101	9172	0	3	3	9172	0
642886	41	29	19950601	4321	19970101	4147	-4.027	6	6	4147	-4.027
695718	41	29	19950601	4321	19970101	4147	-4.027	6	6	4147	-4.027
865761	41	29	19950601	4321	19970101	4147	-4.027	6	6	4147	-4.027
2139952	41	29	19950909	4321	19970118	4147	-4.027	3	3	4147	-4.027
2144212	41	29	19950930	4320	19970101	4147	-4.005	3	3	4147	-4.005
2171813	41	29	19951021	4321	19970101	4147	-4.027	6	6	4147	-4.027
525618	41	30	19950601	15379	19970101	15379	0	3	3	15379	0
642894	41	30	19950601	7458	19970111	7158	-4.023	6	6	7158	-4.023
695696	41	30	19950601	7458	19970111	7158	-4.023	6	6	7158	-4.023
865788	41	30	19950601	7458	19970125	7158	-4.023	6	6	7158	-4.023
2139960	41	30	19950909	7458	19970118	7158	-4.023	3	3	7158	-4.023
2144220	41	30	19950930	7457	19970118	7158	-4.01	3	3	7158	-4.01
2171821	41	30	19951021	7498	19970101	7159	-4.521	6	6	7159	-4.521
2027909	41	31	19950601	2167	19970101	2167	0	1	1	2167	0
2027917	41	33	19950601	3250	19970101	3250	0	1	1	3250	0

456888	41	34	19950601	5685	19970101	5685	0	4	4	5685	0
745588	41	34	19950601	3824	19970101	3824	0	5	5	3824	0
778354	41	34	19950601	3824	19970101	3824	0	5	5	3824	0
2042576	41	34	19950601	3824	19970101	3824	0	5	5	3824	0
432369	41	35	19950601	7203	19970101	7203	0	4	4	7203	0
745596	41	35	19950601	4840	19970101	4840	0	6	6	4840	0
778362	41	35	19950601	4840	19970101	4840	0	6	6	4840	0
808636	41	35	19950601	4840	19970101	4840	0	6	6	4840	0
2042584	41	35	19950601	4840	19970101	4840	0	6	6	4840	0
884367	41	36	19950601	12160	19970101	12160	0	2	3	12160	0
1924613	41	37	19950601	4090	19970101	3680	-10.02	5	5	3437	-15.97
1989782	41	37	19950601	5455	19970101	5455	0	3	3	5455	0
2136112	41	37	19950601	4090	19970101	3682	-9.976	5	5	3437	-15.97
1924621	41	38	19950601	4885	19970101	4395	-10.03	5	5	4104	-15.99
1989774	41	38	19950601	6515	19970101	6515	0	3	3	6515	0
2136120	41	38	19950601	4886	19970101	4398	-9.988	5	5	4104	-16
1989790	41	39	19950601	6333	19970101	6333	0	2	2	6334	0.0158
364126	41	40	19950601	3956	19970101	3956	0	1	1	3956	0
484938	41	41	19950601	5665	19970101	5665	0	4	4	5665	0
2076233	41	41	19950601	4530	19970101	4249	-6.203	5	5	4249	-6.203
632740	41	42	19950601	8038	19970101	8038	0	1	1	8038	0
740721	57	1	19950601	3277	19970101	3277	0	5	5	3605	10.009
786683	57	1	19950601	3277	19970101	3277	0	4	4	3277	0
749362	57	4	19950601	1735	19970101	1735	0	1	1	1735	0
1927809	57	5	19950601	4162	19970101	4162	0	2	2	3038	-27.01
749389	57	6	19950601	2435	19970101	2435	0	1	1	2435	0
749370	57	7	19950601	3135	19970101	3135	0	1	1	3135	0
749397	57	8	19950601	2090	19970101	2090	0	1	1	2090	0
476595	57	9	19950601	1235	19970101	1235	0	1	1	1235	0
476609	57	10	19950601	1665	19970101	1665	0	1	1	1665	0
476579	57	11	19950601	2955	19970101	2955	0	1	1	2955	0
476587	57	12	19950601	3800	19970101	3800	0	1	1	3800	0

Price Changes by Categories, Categories 24, 9901

CDIC	RBP Category	Sub-Category	1995 date	1995 price	current price	p change	% p change	Code
885835	24	1	19950805	0.575	0.575	0	0	1
885843	24	2	19950805	0.68	0.68	0	0	1
885851	24	3	19950805	0.78	0.78	0	0	1
1911465	24	4	19950601	0.59	0.59	0	0	1
1911473	24	5	19950601	0.68	0.68	0	0	1
1911481	24	6	19950601	0.79	0.79	0	0	1
657298	24	7	19950601	0.96	0.96	0	0	1
851795	24	8	19950601	0.6753	0.6753	0	0	4
2020025	24	8	19950601	0.5538	0.5538	0	0	5

708879	24	9	19950601	0.7987	0.7988	1E-04	0.01252	4
2019884	24	9	19950601	0.655	0.655	0	0	5
670901	24	10	19950601	0.96	0.96	0	0	4
2019892	24	10	19950601	0.7882	0.7872	-0.001	-0.1269	5
670928	24	11	19950601	1.1583	1.1583	0	0	4
2019906	24	11	19950601	0.9498	0.9498	0	0	5
1907107	24	12	19950601	0.79	0.79	0	0	1
1907115	24	13	19950601	0.95	0.95	0	0	1
839388	24	14	19950601	0.6733	0.6735	0.0002	0.0297	3
2049333	24	14	19950601	0.6737	0.6736	-1E-04	-0.0148	3
839396	24	15	19950601	0.809	0.8092	0.0002	0.02472	2
2049376	24	15	19950601	0.8093	0.8093	0	0	2
839418	24	16	19950601	0.9723	0.9724	1E-04	0.01028	2
2049384	24	16	19950601	0.9723	0.9723	0	0	2
2103729	24	17	19950601	0.8093	0.8093	0	0	2
2108194	24	17	19950601	0.8093	0.8092	-1E-04	-0.0124	2
884413	24	18	19950601	0.9724	0.9724	0	0	2
2045737	24	18	19950601	0.9723	0.9723	0	0	2
884421	24	19	19950601	0.9724	0.9724	0	0	2
2045729	24	19	19950601	0.9723	0.9723	0	0	2
878928	24	20	19950601	1.28	1.28	0	0	1
878936	24	21	19950601	1.9	1.9	0	0	1
791695	24	22	19950601	0.48	0.48	0	0	2
2162741	24	22	19950930	0.55	0.48	-0.07	-12.727	2
791709	24	23	19950601	0.68	0.68	0	0	2
1911805	24	23	19950612	0.7	0.7	0	0	2
2162733	24	23	19950930	0.7	0.68	-0.02	-2.8571	2
2154390	24	24	19951021	0.3498	0.2245	-0.1253	-35.82	3
2154404	24	25	19951021	0.5472	0.39	-0.1572	-28.728	3
2181525	24	25	19951021	0.39	0.39	0	0	5
2155907	24	26	19950722	0.93	0.93	0	0	1
2155990	24	27	19950722	1.459	1.459	0	0	2
1911821	9901	3	19950601	9.035	9.035	0	0	1
1925970	9901	3	19950601	11.9767	11.9766	-1E-04	-0.0008	1
1925989	9901	3	19950601	18.2803	18.28	-0.0003	-0.0016	1
610062	9901	10	19950601	0.1053	0.1052	-0.0001	-0.095	3
860743	9901	10	19950601	0.7417	0.3806	-0.3611	-48.685	3
2016095	9901	10	19950601	0.0839	0.0839	0	0	5
2132591	9901	10	19950612	0.5	0.4483	-0.0517	-10.34	6
2162784	9901	10	19950909	0.43	0.247	-0.183	-42.558	3
564966	9901	11	19950601	0.4727	0.4727	0	0	3
2049341	9901	11	19951021	0.3782	0.2977	-0.0805	-21.285	3
2153483	9901	11	19950601	0.378	0.2978	-0.0802	-21.217	5
614327	9901	12	19950701	4	4	0	0	2
2182939	9901	12	19951125	4	4	0	0	2
614335	9901	13	19950701	6.6	6.6	0	0	1
2182947	9901	13	19951125	6.6	6.8	0.2	3.0303	1
1911457	9901	14	19950701	8	8	0	0	4

2099705	9901	14	19950701	5.625	5.625	0	0	5
2182955	9901	14	19951125	8	8	0	0	4
765996	9901	19	19950601	0.355	0.3725	0.0175	4.92958	3
891800	9901	21	19950601	4.856	4.856	0	0	4
891819	9901	21	19950601	8.6146	8.6146	0	0	4
731439	9901	24	19950601	0.8785	0.8785	0	0	4
1950681	9901	24	19950601	1.318	1.318	0	0	4
2026759	9901	24	19950601	0.659	0.659	0	0	4
2097141	9901	24	19950601	0.6575	0.6575	0	0	6
2126222	9901	24	19950601	0.4428	0.6575	0.2147	48.4869	6
860808	9901	25	19950601	0.773	0.632	-0.141	-18.241	6
897345	9901	25	19950601	0.3862	0.3862	0	0	3
1926934	9901	25	19950601	0.676	0.2434	-0.4326	-63.994	6
1945203	9901	25	19950601	0.7338	0.7338	0	0	3
1947222	9901	25	19950601	0.937	0.937	0	0	3
1986864	9901	25	19950601	0.2704	0.2434	-0.027	-9.9852	6
2022125	9901	25	19950601	0.199	0.1829	-0.0161	-8.0905	3
2046741	9901	25	19950601	0.695	0.632	-0.063	-9.0647	6
2048760	9901	25	19950601	0.695	0.632	-0.063	-9.0647	6
2069571	9901	25	19950601	0.695	0.632	-0.063	-9.0647	6
2154412	9901	25	19950701	0.694	0.632	-0.062	-8.9337	3
2017652	9901	26	19950601	0.847	0.847	0	0	2
541389	9901	27	19950601	0.703	0.703	0	0	1
2056704	9901	27	19950601	0.703	0.703	0	0	1
1978918	9901	28	19950601	0.4	0.4	0	0	1
1978926	9901	28	19950601	0.8	0.8	0	0	1
534609	9901	29	19950601	0.3846	0.3846	0	0	4
2046113	9901	29	19950601	0.2884	0.2596	-0.0288	-9.9861	6
2049082	9901	29	19950601	0.2884	0.2594	-0.029	-10.055	6

GLS estimation of short-run RBP percentage price changes (Categories 36,57,41)

Figure 1. Comparison of residuals to a normal distribution

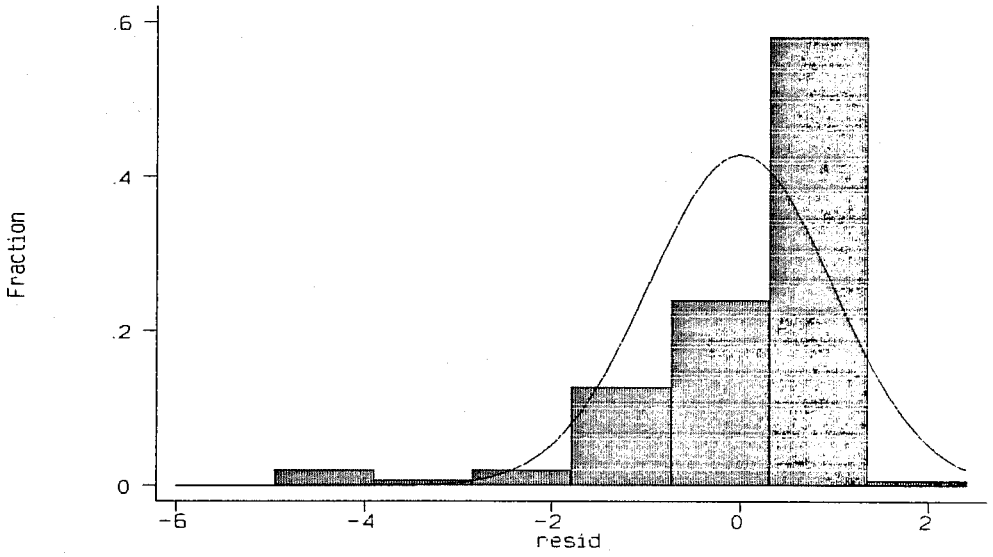
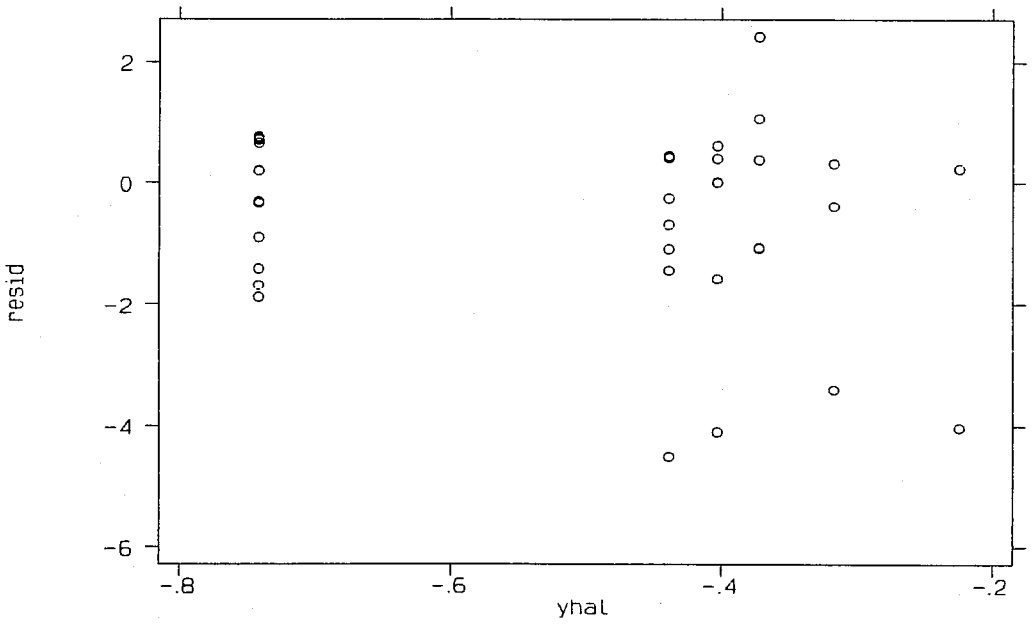


Figure 2. Residual plot



yhat = predicted value

GLS estimation of longer-run RBP percentage price changes (Categories 36,57,41)

Figure 3. Comparison of residuals to a normal distribution

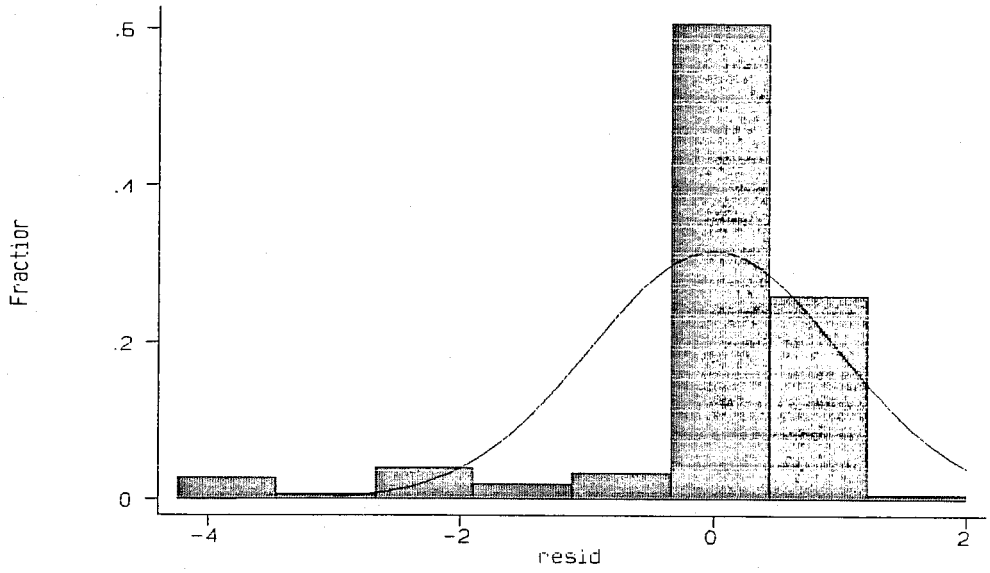
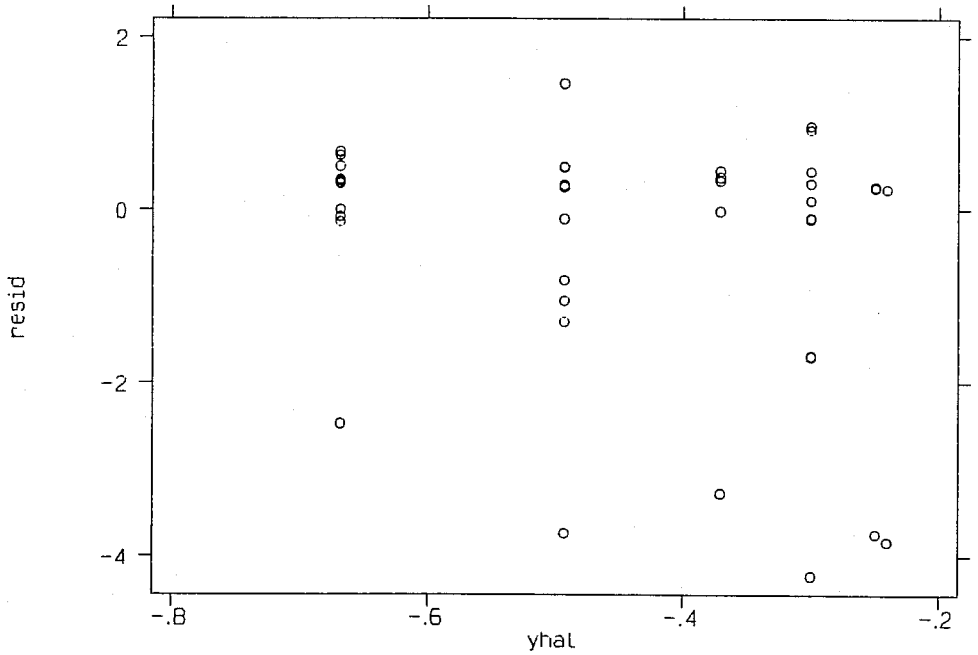


Figure 4. Residual plot



yhat = predicted value

GLS estimation of longer-run RBP percentage price changes (Categories 36,57,41,24,9901)

Figure 5. Comparison of residuals to a normal distribution

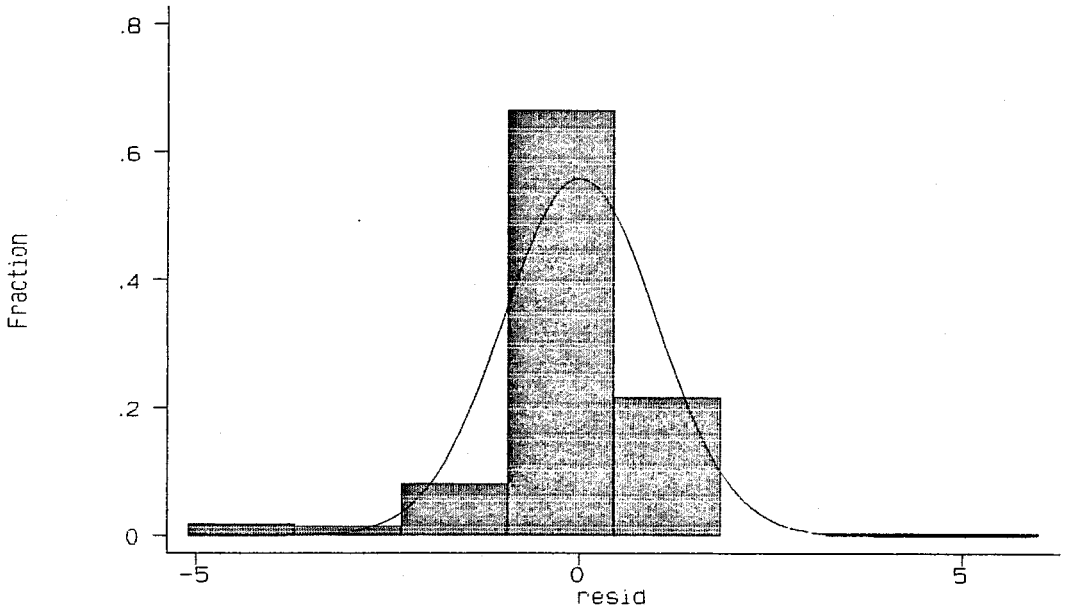
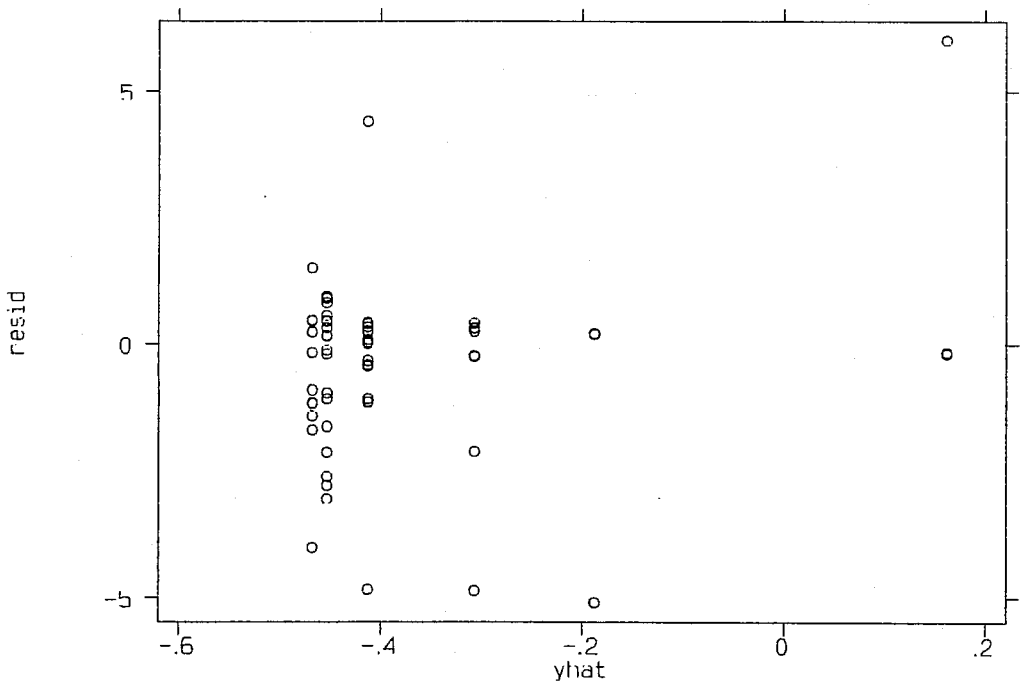


Figure 6. Residual plot



yhat = predicted value