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Flexible Exchange Rates and Prices:
The Recent Canadian Experience

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Since it has been almost a year since Canada returned to a flexible exchange rate, enough data is now available to provide preliminary answers to some common questions about the operations and effects of such an exchange rate system. In particular, wholesale price series for individual commodities are now available for the first six months of the Canadian float that make it possible to retest some of the results of earlier research on the effects of exchange rate changes on prices of internationally traded goods.^{1/}

A Pricing Response to Flexible Exchange Rates in Imperfect Markets

Previous work suggested that a flexible exchange rate will not necessarily force a continuous adjustment in relative prices of internationally traded goods because of the oligopolistic structure of typical industrial markets and the preferences among buyers and sellers in such markets for prices which do not change constantly. Internal price stability is possible for an open economy despite movements in a flexible exchange rate if firms quote fixed prices denominated in foreign exchange for export sales and simultaneously

^{1/} Robert M. Dunn, Jr., "Flexible Exchange Rates and Oligopoly Pricing: A Study of Canadian Markets," Journal of Political Economy, January/February 1970, pp. 140-51.

sell in the domestic market at fixed local currency prices. Exchange rate variations are then absorbed in changes in profits on export sales but profits on domestic sales are not affected. Whatever price changes do occur in each market are made in response to changes in local conditions rather than in response to the exchange rate. The lack of response to the exchange rate produces a form of variable price discrimination with the result that customers in a country with an appreciating currency pay relatively higher prices for internationally traded goods. A Canadian firm, for example, continues to sell at a fixed U.S. dollar price to U.S. customers when the Canadian dollar appreciates. The Canadian firm's Canadian dollar export receipts declined, but it does not reduce its Canadian dollar price to domestic customers, thereby charging U.S. customers less than Canadians. A depreciation of the Canadian dollar produces discrimination in the opposite direction as Canadian dollar export receipts rise with fixed U.S. dollar prices, but domestic customers pay unchanged Canadian dollar prices.

When both domestic and foreign customers' prices of traded goods are maintained despite exchange rate changes, customers have no reason to vary their purchases and the trade account effects of an exchange rate change may be quite modest in the short run. The trade account will react as though the elasticities of demand in export and import markets are each unity in the usual discussions, so that they sum two and the Marshall-Lerner condition for exchange

market stability is exceeded. The shift in the trade account resulting from an exchange rate change where the demand elasticities total two may be quite different, however, from that expected on the basis of various estimates of demand elasticities for internationally traded goods.^{2/} Although this pricing procedure could not be expected to operate in all traded goods markets in Canada, its presence in a significant proportion of the markets would noticeably affect the reaction, in the short run, of the trade account to exchange rate changes.

Although the constancy of prices means that customers have no reason to vary their purchases of internationally traded goods in response to an exchange rate change, profits on export sales are affected by a movement of the rate and this may encourage a long-term response in the volume of trade as exporters adjust sales and marketing efforts to increase sales in the relatively more profitable market. A depreciation of the Canadian dollar, for example, will increase the profits associated with Canadian export sales relative to sales within Canada and encourage Canadian firms to increase their marketing effort in the U.S. market. This

^{2/} See for example M. E. Kreinen, "Price Elasticities in International Trade" Review of Economics and Statistics, November 1967, pp. 510-16, Dale M. Hein, "Structural Stability and the Estimation of International Import Price Elasticities" Kyklos, #4, 1968, pp. 695-711, and H. S. Houthakker and Stephen P. Magee, "Income and Price Elasticities in World Trade", Review of Economics and Statistics, May 1969, pp. 111-25.

reaction is, however, inherently medium to long-term in nature.^{3/}

Because of arbitrage pressures and extreme effects on profits, the pricing mechanism described above cannot be expected to operate for large changes in an otherwise fixed rate or for particularly large changes in a flexible rate. As long as both producers and their customers dislike price instability, however, this price mechanism can operate for a floating rate which does not move sharply or over a wide range. In the case of an exchange rate which shows a continuing trend, prices are likely to remain fixed in the short-run and discontinuous adjustments may be made in relative prices from time to time to keep price disparities between markets within some limit. This limit depends on the possibilities for arbitrage between markets by customers, which in turn depends on transport costs and tariffs and on the ability of firms to see to it that their dealers or wholesalers sell only to customers within their normal marketing areas.^{4/}

^{3/} Firms choose to vary marketing efforts rather than prices for a number of reasons, the most important of which is considerable uncertainty about competitive reactions to price variations. The kinked oligopoly demand curve provides one set of competitive reactions which will discourage price changes. In addition, many firms are reported to feel considerable customer resistance to frequent price changes, so variations in marketing efforts become a preferred way of reacting to variations in the relative profitability of two markets.

^{4/} Transport costs and tariffs make it easier to discriminate against domestic customers than against foreign customers. In the no discrimination case, prices abroad exceed those at home by transport costs and tariffs. If the home price is then raised, arbitrage becomes possible only when the price increase exceeds transport costs and tariff in both directions. Protection is provided from arbitrage by foreign customers only if the firm begins by selling to them for somewhat less than the domestic price plus transport costs and tariffs.

Statistics for Canadian and U.S. prices for a number of traded commodities during the 1950's indicated quite clearly that this pricing mechanism was common during Canada's previous experience with flexible exchange rates and this paper is intended to determine whether this is still the case.^{5/}

The maintenance of traded goods prices in Canada and the United States which did not adjust to the 5.45 per cent appreciation of the Canadian dollar between May and December of last year would have two interesting implications. First, it would indicate that the market strength of sellers in North American industrial markets is sufficient to make these markets highly imperfect and to allow a considerable degree of price discrimination between groups of customers who are relatively close and among whom arbitrage might at least appear to be possible.

The second implication of this pricing procedure in the current Canadian case is that some Canadian firms may now be dumping in the U.S. market. The available data consists of price indexes rather than actual prices so it is impossible to determine the differences in absolute prices, but the maintenance of largely unchanged local currency prices in both markets by Canadian firms means that their export prices fell by approximately 5.45 per cent relative to domestic prices between May and December of 1970, and

^{5/} Time lags of up to one year were used in the previous study and did not show a lagged response of relative prices to the exchange rate.

this raises the possibility that they are now selling for less to U.S. customers than to Canadians in absolute terms.^{4/}

Data and Conclusions

The Dominion Bureau of Statistics now publishes industry selling price indexes for a much more extensive list of detailed products than was the case during the 1950's and consequently it is possible to find more price series for internationally traded goods to compare to U.S. wholesale price indexes than was the case previously.^{5/} The lists of commodities which follow are not intended to represent the majority of Canadian foreign trade, but are instead only lists

6/ A further implication of the confirmation of this pricing policy in Canada and the United States might be to question the anti-inflation and trade account effects of the recent European revaluations and appreciations. If Canadian domestic prices of internationally traded goods are largely unaffected by a 5.45 per cent appreciation, the direct price effects of the small European exchange rate changes may be quite limited. To the extent that local currency prices of some internationally traded goods are maintained in both exporting and importing countries despite the exchange rate changes, the adjustment of relative prices to the exchange rate which is expected in a competitive world will not occur. This would mean that the usefulness of forecasts of the trade account effects of the recent appreciations which are based on conventional estimates of demand elasticities is reduced.

It should be remembered in this regard that the operation of this pricing mechanism depends on the likelihood of arbitrage between national markets; the lack of tariffs and the low level of transport costs within Europe suggests that arbitrage would be easier within Europe than between Canada and the United States. This means that this pricing mechanism is less likely to operate for intra-E.C. trade than for trade between Europe and the rest of the world. The relative openness of markets within the European Community might make it quite difficult to maintain any significant amount of price discrimination within the region.

7/ Dominion Bureau of Statistics, Prices and Indexes, December 1970, pp. 2-38, and Bureau of Labor Statistics, Wholesale Prices and Price Indexes, various issues.

of typical goods for which both U.S. and Canadian price data is available and for which there was a significant amount of U.S.-Canadian trade during 1970.^{6/} Some of the products, such as wood pulp, newsprint, copper, and motor vehicles are extremely important items in Canadian trade, while others such as washing machines and California oranges are relatively minor. In all cases, however, trade did occur during 1970 so the relationship between Canadian and U.S. prices should have responded to the exchange rate if the usual assumptions of competitive trade models are accurate.

The Canadian government provides rather striking evidence of the price discrimination suggested above for two of the most important Canadian exports -- wood pulp and newsprint -- by providing separate price series for domestic and export sales.

8/ In the case of television sets there was little or no trade between Canada and the United States but both countries imported large numbers of sets from Japan, so the relationship between prices in Canada and the United States still should respond to the exchange rate if the assumptions of competition hold.

Table 1

Canadian Industry Selling Price Indexes
(in Canadian dollars)

	Per cent change May to December 1970
Wood pulp, sulphite paper grade	
domestic sales	+6.59
export sales	-2.20
Wood pulp, sulphate paper grade	
domestic sales	+5.69
export sales	-0.91
Newsprint, white rolls	
domestic sales	-0.18
export sales	-6.15

Between May and December export wood pulp prices fell slightly but domestic prices rose sharply. Canadian domestic prices increased by about 8.8 per cent relative to U.S. prices for one type of wood pulp and by 6.6 per cent for the other. The Canadian dollar appreciated by 5.45 per cent during this period so Canadian firms actually raised domestic prices relative to export prices by more than the exchange rate change. In the newsprint industry somewhat softer market conditions led to a 6.2 per cent decline in Canadian dollar export prices by year-end, but Canadian domestic prices fell by only 0.2 per cent, for a 6.0 per cent increase in domestic prices relative to export prices. Price discrimination is sometimes flagrant but it is hard to think of many cases in which firms provide data to the government for publication which openly documents such behavior.

For the remainder of the markets in this study the Canadian government publishes only one industry selling price or wholesale price index, so U.S. wholesale prices will be used for comparative purposes. If relative prices adjust to exchange rate changes to maintain roughly equal prices in the two markets, Canadian prices should fall relative to U.S. prices by the percentage of the appreciation of the Canadian dollar, which was 5.16 per cent between May and November of 1971. The table below is for the May-November period because December U.S. wholesale price indexes for individual commodities are not yet available. The Canadian series for California oranges is for retail rather than wholesale transactions. Wood pulp and newsprint are included in this table using a comparison between Canadian domestic and U.S. price indexes.

As may be seen in table 2 which follows, relative prices changed by approximately the required 5.45 per cent in only one of the fifteen markets. In four of the markets, Canadian prices actually rose relative to U.S. prices, and in five others, they declined by less than two per cent. The three extreme cases which showed Canadian declines of 14.7 per cent for copper, 23.62 per cent for coal, and 34.44 per cent for oranges relative to U.S. prices grew out of unusual circumstances which were particular to those markets. The Canadian coal mining industry is subsidized and in part regulated by the Canadian government which apparently ensured that the heavy upward pressure on U.S. prices did not affect Canadian output despite continuing large

Table 2

Changes in Canadian and U.S. Wholesale Prices,
May 1970 to November 1970

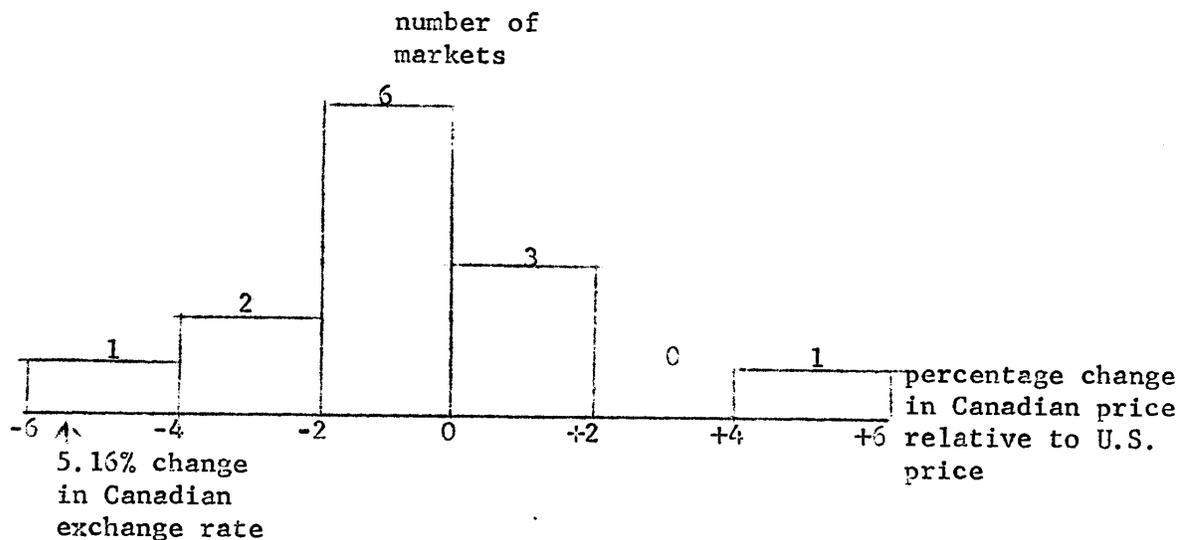
	<u>Per cent change in Canadian price</u>	<u>Per cent change in U.S. price</u>	<u>Per cent change in Canadian price rela- tive to U.S. price</u>
Wood pulp, sulphite	+ 6.84	+ 5.57	+ 1.27
Wood pulp, sulphate	+ 5.78	+ 5.07	+ 0.71
Newsprint	- 0.18	- 6.06	+ 5.88
Iron and steel mills	0.00	+ 1.51	- 1.51
Refined copper	-21.63	- 6.95	-14.68
Aluminum, rolling, casting and extruding	- 0.09	0.00	- 0.09
Agricultural implements	+ 0.98	+ 2.70	- 1.72
Motor vehicles mfr.	+ 3.19	+ 5.39	- 2.20
Washing machines, elec. automatic domestic	- 0.75	- 1.02	+ 0.27
Household refrigerators	- 0.92	+ 2.26	- 3.18
19" portable t.v. sets	+ 1.08	+ 1.52	- 0.44
A.C. motors, 1/3-1/2 hp	0.00	+ 5.03	- 5.03
Coal	0.00	+23.62	-23.62
Crude oil	- 0.87	0.00	- 0.87
Oranges, California*	+10.46	+44.90	-34.44

* Canadian retail and U.S. wholesale prices.

Sources: Prices and Price Indexes, Dominion Bureau of Statistics, various issues, and Wholesale Prices and Price Indexes, Bureau of Labor Statistics, U.S. Department of Labor, various issues.

imports from the United States. The Canadian retail price of California oranges was probably protected from U.S. wholesale price increases by the sharp and protracted price war in the Canadian supermarket industry which brought average food prices in Canada down by 3.24 per cent during 1970. Copper prices in the United States have been set for many years at levels which were not closely related to world prices and the U.S. industry was apparently successful in largely protecting itself from the declines in world prices. The U.S. wholesale price data includes a separate series for imported copper which shows a 33.01 per cent decline between May and November of 1970. This would indicate an 11.38 increase in the Canadian price to domestic customers relative to the price for export sales to U.S. customers.

If the three extreme cases are excluded, the distribution of relative price changes for the remaining 12 markets is as shown below.



For the limited number of markets studied in this paper it seems clear that relative prices did not adjust as is typically expected and instead that price discrimination was used to protect Canadian prices from most of the competitive price effects of the appreciation. This supports the conclusions of the previously cited study of the Canadian experience of the 1950's and suggests that this pricing behavior may be expected to occur often in cases of floating rates which move within a relatively narrow range.