THE RELATIVE EFFECTS OF UNCERTAINTY ON IMPORT VOLUME UNDER FLEXIBLE AND PEGGED EXCHANGE RATES: THE CANADIAN EXPERIENCE 1951 - 1964

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PETER JOHN GINMAN

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Peter J. Ginman

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Mordechai Kreinin
Major professor

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ABSTRACT

THE RELATIVE EFFECTS OF UNCERTAINTY ON IMPORT VOLUME UNDER FLEXIBLE AND PEGGED EXCHANGE RATES: THE CANADIAN EXPERIENCE 1951-1964

By

Peter John Ginman

There has been a growing concern with the adequacy of the postwar international monetary system. The adoption of a flexible exchange rate system to replace the present pegged gold exchange standard has been suggested as one remedy to the problem. One of the arguments most frequently voiced against a flexible exchange rate system is that its very flexibility creates uncertainties which may lead to a contraction of trade volume. This thesis investigates the argument by testing the hypothesis that orderly flexible exchange rates will not appreciably dampen trade volume below those levels attainable under pegged rates.

This hypothesis is tested on the Canadian flexible exchange rate experience of 1951 to 1964. The first phase of the study concentrates on the theoretical specification of a deterministic import demand model. This demand function relates import volume to expected exchange rates, incremental forward/spot exchange rate differentials and income as explanatory variables. The expectation hypothesis for exchange rates takes the form of a distributed lag

function, where the parameter γ is interpreted as the coefficient of expectations--a proxy for flexible exchange rate engendered uncertainty.

Theoretically, γ can vary between positive unity and zero. At these limits, respectively, exchange rate expectations either have little effect, as they would under pegged exchange rates, or, as the flexible exchange rate critics argue, have a substantial effect on importing behavior.

If uncertainty plays an important role in determining import volume, γ would have a value approaching zero. If Canada changed to a pegged rate on a priori grounds, one would expect the import function to shift upwards as importers adjusted their respective utility functions to the new trading circumstances where exchange rate expectations are always realized.

The second phase of the analysis applies an iterative maximum likelihood estimating technique to a stochastic version of the import model derived in the preceding phase. The "best fit" value of γ was found to be 0.6, indicating that a moderate level of uncertainty existed under the Canadian experience with flexible rates. As expected, the income variables and seasonal adjustment dummies explained most of the variation in import volume, while the expected exchange rate and incremental forward/spot exchange rate differential variables contributed little. The maximum

likelihood parameters were then used to derive estimated import levels. To test whether the import function had shifted during the past May, 1962 return to pegged rates, these estimated imports were extrapolated for the eleven quarter period ending 1964 (IV). This produced further evidence upholding the hypothesis, namely, that imports exceeded expected values in only four out of the last seven quarters, allowing for an adjustment period, and that all but one of these fell within the confines of a stringent confidence band. These findings are further strengthened by tests indicating that the structural parameters of the model did not shift significantly when Canadian exchange rate policy changed. Thus, contrary to the assertions of the critics of flexible exchange rates, for the Canadian experience import volume was not appreciably affected by uncertainty arising from exchange rate variability.

While the Canadian experience can provide many insights into the pegged versus flexible exchange rate controversy, caution must be exercised in an attempted generalizations of these findings. It must be kept in mind that the Canadian experience was unique for several reasons, the two most important being that Canada alone operated on flexible exchange rates in a world of pegged rates and she had close economic ties with the United States. Any conclusions drawn ignoring these facts could only be considered as purely conjectural.

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Peter John Ginman

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CHAPTER I

INTRODUCTION AND OBJECTIVES OF STUDY

There has been a growing concern with the adequacy of the postwar international monetary system ever since the Western European currencies attained convertibility in 1958. Both critics and defenders of the present gold-exchange standard realize that adjustments to or complete revision of the system is in order if world trade is to continue its expansion. The increasing trends in international cooperation on all fronts are but an overt manifestation and realization that modern technology has shrunken the world and increased the degree of specialization and interdependence among nations.

Most criticisms and suggested revisions of the present system revolve around the historical ties between gold and national currencies. More specifically, the debate centers on whether to maintain or amend the present pegged exchange rate system or to adopt a flexible exchange rate. This latter course of action would call for permanently moving away from pegged rates and allowing the value of a country's currency to be determined solely by freely working international market forces.

One of the arguments most frequently voiced against a flexible exchange rate system is that its very flexibility creates uncertainties beyond those normally associated with market transactions. These uncertainties, it is argued, will dampen both export and import trade volumes as buyers turn to domestic and/or alternative suppliers who operate on pegged exchange rate systems. But, as Milton Friedman argues,

> Instability of exchange rates is a symptom of instability in the underlying economic structure. Elimination of this symptom by administrative freezing of exchange rates cures none of the underlying difficulties and only makes adjustment to them more painful.[1]

The Canadian experiment with flexible exchange rates, as we shall see, provides supporting evidence for Friedman's arguments.

This thesis tests the hypothesis that orderly flexible exchange rates will not appreciably dampen trade volume below those levels attainable under pegged rates. The Canadian flexible exchange rate experience of 1951 to 1962 is used as the proving ground; consequently, any generalization regarding the hypothesis should be restricted to this case.

Perhaps the best approach to test the uncertainty hypothesis would be to examine the export side of the

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[1]Milton Friedman, "The Case for Flexible Exchange Rates," Essays in Positive Economics (Chicago: University of Chicago Press, 1953), p. 197.

trade balance. This could be justified on grounds that merchandise exports are normally the most important earners of the foreign exchange that is necessary to finance import transactions. For a number of reasons, however, this argument does not have much strength for the Canadian case. Since international trade is relatively important to Canada and is heavily concentrated in the American and British markets, exchange rate uncertainty probably affects the Canadian trader to a larger extent than the foreign purchaser of Canadian goods.

This view is further substantiated because foreign, especially the American, purchasers of Canadian goods have many alternative domestic and foreign sources of supply in contrast to the limited domestic alternatives for Canadian traders. While this allows the foreign traders to avoid exchange uncertainties, the Canadian importers who resort to using foreign alternative suppliers must confront the flexible exchange rate. Since the uncertainties arising from a flexible exchange rate system would seemingly affect the Canadian importers more, this study concentrates on the import side of the trade equation.

The objectives of this thesis are threefold. First, to construct a deterministic model that explains the plausible relationships that exist between import volume and the principle determinants of import demand. These independent variables are, in turn, specified to reflect

the inherent uncertainties under flexible exchange rates. Second, a stochastic model is used to estimate the probable extent of uncertainty during the Canadian experience with flexible rates. And third, the effect of this estimated uncertainty level on hypothetical trade volume under flexible rates is contrasted with the actual Canadian post May, 1962 experience under pegged rates.

After a discussion of the literature surrounding the flexible versus pegged exchange rate controversy, presented in Chapter II, and the background information regarding the Canadian experience under both flexible and pegged exchange rates of Chapter III, these objectives are examined in great detail in Chapters IV and V. A concise summary of the technique used and the conclusions derived from the study can be found at the end of Chapter V.

CHAPTER II

THE FLEXIBLE EXCHANGE RATE CONTROVERSY: THE ARGUMENTS AND THE LITERATURE

The Flexible Exchange Rate Mechanism

Under a flexible exchange rate system the total demand for, and of, a nation's currency is continuously equilibrated by the exchange market mechanism which expresses that rate at which units of the nation's currency will exchange for a unit of foreign currency. Assuming that the relevant supply and demand elasticities are sufficiently high, and that there is an absence of destabilizing speculation in the exchange market, there will always be some rate that will restore equilibrium in the current and capital accounts of the nation's balance of payments.

Under ideal conditions, a deficit in the current account would give rise to an increased supply of domestic currency. The market would react to this excess supply and allocate it by depreciating the country's currency. The increased foreign demand for the depreciating country's exports should allow the export sector to expand, this expansion being financed out of rising profits resulting from the increased domestic prices of these goods. Since

the depreciation increases the price of foreign goods expressed in domestic currency, the rise in export volume should be complemented by a concomitant decline in the country's imports. These adjustments should eventually lead to the restoration of equilibrium in the balance of payments.

The length of time necessary to restore equilibrium is, of course, dependent on the existence of excess capacity at home, the magnitude of the initial changes in relative prices, and domestic resource mobiltiy and adaptability. Because of these considerations there are many possible patterns that the equilibrium adjustment time path could take. For example, if the international adjustments to price changes are slow, the initial depreciation of the exchange rates might have to be quite large to accommodate a short-run return to balance of payments equilibrium. An overly large initial depreciation could, however, turn a deficit into a surplus that would appreciate the exchange rate and ultimately reverse the above forces by dampening the net effect of the original depreciation.

If short-term speculative capital inflows are stabilizing, however, the depreciation probably would never have to reach these proportions. Speculative inflows would come into play whenever speculators felt that the rate was only temporarily depreciated and would eventually rise in

response to the movement towards a balance of payments surplus. These inflows are helpful to the deficit country since they temporarily finance the deficit and simultaneously dampen the amplitude of exchange rate variations. In addition to this advantage of maintaining balance of payments equilibrium, many other arguments are put forth in behalf of this exchange rate system.

Arguments for the Flexible Exchange Rate System

This system insures continuous balance of payments equilibrium. The unfettered international market forces can quickly adjust the demand and supply of a nation's currency without being hampered by political considerations, domestic resource reallocations, and internal price and income adjustments. The exchange rate adjustments can quickly and easily realign internal market forces, bringing about balance of payments equilibrium without the complications associated with the fixed gold exchange standard. The relative sensitivity of flexible rates to changing market forces guarantees continuous adjustments and avoids the economic costs of prolonged disequilibrium as well as the shock effects of sudden reactions to these problems in the form of monetary crises and austerity programs. The economic costs of these prolonged resource misallocations are high and would not occur under gradually adjusting flexible rates.

The growing number of flexible exchange rate advocates led by Friedman, Meade and Sohmen,[1] continuously stress the argument that free rates allow domestic authorities more independence to pursue domestic stabilization objectives than do fixed rates. The autonomous pursuit of domestic full employment by national governments has been apparent ever since the gold standard "rules of the game" were violated during the inter-war period.[2] Under the existing fixed exchange rate system, when governments fail to respond to external payments disequilibrium with appropriate domestic policies, their only recourse, after draining reserves, must be to impose direct controls or to change the exchange rate's value. With the world's present commitment to currency convertibility and pressures for removal of all direct and indirect barriers to free trade, the flexible exchange rate seems to be the only plausible way to accomplish these ends.

The proponents of the flexible rates argue that *while* domestic policy independence is gained under their system, it is not completely independent, and that the inevitable ties that exist between a nation's domestic and

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[1]Friedman, op. cit., pp. 157-203; J. E. Meade, "The Case for Variable Exchange Rates," Three Banks Review, XXVII (September, 1955); Egon Sohmen, Flexible Exchange Rates--Theory and Controversy (Chicago: University of Chicago Press, 1961).

[2]The classic discussion of the inter-war period is found in Ragnar Nurkse, International Currency Experience (Geneva: League of Nations, 1944).

external economic affairs cannot be completely ignored. Haphazard or extreme domestic policies will bring international repercussions regardless of the exchange rate system. They also believe that while the rate is free to change, every effort should be made to minimize the range of fluctuations.[3] According to them, flexible rates are not inherently unstable; instability arises from the basic economic forces in the economy and that if these are unstable, no system, including a pegged rate system, will be able to work effectively. If conditions are not extremely out of line, normal domestic policies aimed at promoting growth with full employment and reasonable price stability, can always be pursued without over concern with their effect on the external balance.

The limits of exchange rate variability will not be extreme, according to supporters of the flexible rate; consequently, entry into foreign trade will not be stymied. Furthermore, traders reduce uncertainty by hedging in the forward markets. Broad forward markets should develop spontaneously once experience with the flexible rate system indicates relative stability. An ancillary benefit of these markets is that they reinforce the factors that prompt stabilizing speculative inflows.[4]

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[3] As in the Canadian experience. See Chapter III, p. 28.

[4] The literature regarding this will be explored further below.

Under the present pegged rate system, countries must constantly be aware of the external effects of domestic policies. If a country has to give higher priority to external conditions and hasn't sufficient policy tools to simultaneously manage the domestic economy, it may find a policy conflict that will lead to external relations dictating internal policies.[5] Or, as the case would be in most countries, domestic policy considerations would take priority over external conditions, forcing the authorities to implement direct controls and/or after sufficient foreign exchange reserve drainage, to resort to large changes in the exchange rate's peg vis-a-vis the dollar.

Milton Friedman believes that flexible exchange rates not only allow for a better harmonization of internal and external policies, but that the internal monetary policies can be more in line with domestic policy objectives.[6] Sohmen also argues that flexible rates provide their biggest service by reinforcing the effects of domestic monetary policies.[7] For instance, if a country has an inflationary gap it normally reacts by raising interest rates.

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[5]This was the case in the United Kingdom prior to their November, 1967 devaluation. Monetary policy became virtually useless at the domestic level because short-term interest rate policy was wholly based on balance of payments considerations. Adherence to this policy cost the monetary authorities control over growth in the domestic money supply.

[6]Friedman, op. cit., p. 200.

[7]Sohmen, op. cit., pp. 83-90.

This reduces domestic spending, causes capital inflows which increase the demand for the nation's currency, thereby increasing the spot rate, causing increased imports and dampened exports. The deterioration of the trade balance takes pressure off domestic prices and/or tends to lower income. The net effect is that, via the flexible rate mechanism, external repercussions reinforce domestic policy. If a deflationary gap existed instead, the above forces reverse themselves enhancing growth in income and employment through an improved trade balance and again increase the effectiveness of monetary policy.[8]

A final advantage of freely fluctuating rates is that they do away with the need for gold and foreign exchange reserves, except in the cases where governments use stabilization funds to influence the trend in rate fluctuations. There is no need to support rates if they are allowed to find their equilibrium levels. This is one of the reasons that has contributed to an international liquidity shortage. Under the flexible rate system, these

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[8]See: Robert A. Mundell's "Flexible Exchange Rate and Employment Policy," Canadian Journal of Economics and Political Science, XXVII (November, 1961), pp. 509-517, and "Monetary Dynamics of International Adjustment Under Fixed and Flexible Exchange Rates," Quarterly Journal of Economics, LXXIV (May, 1961), pp. 227-257; J. M. Fleming, "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates," IMF Staff Papers, IX (November, 1962), pp. 369-380.

large public balances could be eliminated and private speculators would satisfy private demands for liquidity.[9]

Agruments Against the Flexible Exchange Rate System

While there are many arguments against flexible exchange rates, they can be condensed down to three principle criticisms: (1) low supply and demand elasticities will prohibit and stifle the necessary equilibrating exchange rate adjustments; (2) international trade and investment volume will be reduced as the result of the uncertainties emanating from unstable flexible rates; and (3) as a subset of (2) there are strong arguments which indicate that unstable exchange rates will result from destabilizing speculation. A few other reservations regarding this system will also be discussed at the end of this section.

The low elasticities argument is based on the static precept of the Marshall-Lerner condition. This classic theoretical proposition

> . . . states, in effect, that depreciation will improve the balance of payments of a country and appreciation worsen it, if the sum of the elasticities of demand for a country's exports and of its demand for imports is greater than one.[10]

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[9]Egon Sohmen, International Monetary Problems and the Foreign Exchanges (Princeton University International Finance Section, Special Papers in International Economics, No. 4; April, 1963).

[10]Charles P. Kindleberger, International Economics (4th ed.; Homewood, Illinois: Richard D. Irwin, Inc., 1968), p. 259.

For this to work, it is also necessary that supply elasticities are infinite and that trade is initially balanced. The early post World War II "elasticity pessimists" were convinced that elasticities were too low, and consequently that a depreciation would only worsen the deficit.[11] The implication underlying the view that devaluation of weak currencies would simply mean their further weakening is that the foreign exchange market is inherently unstable. These views have been countered by the theoretical

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[11]This view can be found in the following literature on the subject: T. Balogh and P. P. Streeten, "The Inappropriateness of Simple 'Elasticity' Concepts in the Analysis of International Trade," Bulletin of the Oxford University Institute of Statistics, XIII (April, 1951), pp. 65-77 esp. p. 66 and the diagram on p. 76; A. J. Brown, "Trade Balance and Exchange Stability," Oxford Economic Papers, VI (April, 1942), p. 105; P. T. Ellsworth, "Exchange Rates and Exchange Stability," Review of Economics and Statistics, XXXII (February, 1950), pp. 1-12; G. Haberler, "The Market of Foreign Exchange and Stability of the Balance of Payments," Kyklos, III (Fash. 3, 1949), p. 194; R. F. Harrod, "Convertibility Problems," Economia Internazionale, XII (February, 1955), p. 27; S. Laursen and L. A. Metzler, "Flexible Exchange Rates and the Theory of Employment," Review of Economics and Statistics, XXXII (November, 1950), p. 282, p. 295; J. E. Meade, The Balance of Payments and Mathematical Supplement (London: Oxford University Press, 1951), p. 323; P. A. Samuelson, "Disparity in Postwar Exchange Rates," in Foreign Economic Policy for the United States, ed. by S. E. Harris (Cambridge: Harvard University Press, 1948), p. 401; G. Stuvel, The Exchange Stability Problem (New York: Augustus M. Kelley, 1951); H. A. von Stackleberg, translation of "Die Theorie des Wechselkurses bein vollständiger Koncurrenz," Jahrbücher für National Okonomie and Statistik, CLXI (1949), pp. 1-65, appears in International Economic Papers, No. 1 (London and New York: Macmillan, 1951), pp. 147, 138-139.

arguments of Sohmen[12] and Morgan[13] who have shown, respectively, that there always exist stable equilibria for foreign exchange supply and demand schedules on both sides of any possible unstable point, and that only in the improbable case of instability in an underlying commodity market can there be an unstable foreign exchange market.

The low elasticity critics also defend their view by using the behavioristic argument that businessmen, accustumed to reacting only to large sustained changes in the exchange rate, would not react very strongly to the short-term small changes that accompany a flexible exchange rate system. Furthermore, the relatively inelastic demands of many countries for imports of essential raw materials and foodstuffs also tend to support their low elasticity argument.

The recent successful adjustments of several pegged rates coupled with the increase in international competition, have changed these attitudes and discussion of low elasticities have gradually diminished.

The second argument against flexible exchange rates will be treated in a little more detail, since it is primarily towards this criticism that this thesis is

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[12]Sohmen, Flexible Exchange Rates, Theory and Controversy, pp. 3-11.

[13]E. V. Morgan, "The Theory of Flexible Exchange Rates," American Economic Review (June, 1955), pp. 291-292.

directed. The central thrust of this argument is that flexible exchange rate systems give rise to uncertainty that will dampen international trade and capital flows. At the core of this criticism lies the notion that uncertainty is due to the instability inherent in the system, and that even if it is not already present, its anticipation is sufficient to bring about a lowering of international transactions of all kinds. Since the remainder of this thesis will be devoted to an examination of the effects of uncertainty on import volume, it seems appropriate to start the discussion with the arguments concerning the commodity trade restrictions that alledgedly result from flexible rates.

Critics claim that trade volume will be diminished because of reluctance on the part of traders to contract in the face of exchange rate variability. They argue that there will be increased uncertainty regarding profit margins because there may be changes in the exchange price that traders originally agreed upon. Traders can cut down on these risk factors by transacting in the forward exchange market, but since this further adds to costs, to say nothing of the shortage of forward exchange when the market is thin, they will limit transactions only to those commodities for which there are relatively secure profit levels. Thus, not only is trade volume cut back, but also the type of transaction.

Long-term investment flows will also slow down under flexible rates, argue the critics, because either or both the lenders and borrowers may refuse to obligate themselves to long-term contracts in the face of such risk. The creditor may demand that the repayments be made in his domestic currency as a hedge against exchange rate variability and since this would shift the rish burden almost entirely on the borrower, he may not make the investment. Therefore, to avoid these long-run risks, the critics argue, we should maintain our present pegged rate system of exchange rates.

The advocates of change to a flexible system believe that the maintenance of the present system of pegged rates does not really offer any more security or reduced risk than do the free rates. Long-term risk will be virtually the same under both systems, since there has been a history of, and a good prospect of future periodic adjustments of rates under the present system.[14] Scammel argues that expected price levels in the trading countries, not the expected changes in exchange rates, are the ultimate criteria for determining the safety of long-term investments.[15] Furthermore, Meade feels that fear of exchange controls

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[14]R. E. Caves, "Flexible Exchange Rates," American Economic Review, LIII (May, 1963), p. 122; W. M. Scammell, International Monetary Policy (London: Macmillan, 1961), pp. 95-96; Sohmen, International Monetary Problems and the Foreign Exchange, pp. 64-65.

[15]Scammel, op. cit., p. 96.

under pegged rates are more of a real threat to long-term investment than are variable exchange rates.[16] Caves[17] points out that the "solvency risks"[18] brought about by price and income changes under pegged rates may deter less risky long-term investments as much as the "conversion risks" under flexible rates.

At the root of all the criticism lies the question of the stability of flexible rates. Defenders of the system feel that instability is due to fundamental problems and disturbances in the real forces of the economy and that instability of the exchange rate would occur, regardless of the system the country happens to be using. Under pegged rates, disturbances to foreign trade and investment may be less than with a flexible rate system in the absence of re- or devaluation, but the relative tranquility can be maintained over the long run only by introducing exchange and other controls. Haberler, for one, believes that small exchange rate variations are preferable and less disturbing to international trade and investment flows than are direct controls which may partially or totally exclude

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[16]Meade, "The Case for Variable Exchange Rates," p. 17.

[17]Caves, op. cit., p. 122.

[18]"Solvency risks" are unexpected increases or decreases in quasi-rents that will affect the profitability of a particular investment and its rank on the list of profitable uses of funds.

certain markets.[19] To the extent that participation in any market involves risktaking, then, of course, flexible exchange rates will give rise to uncertainty. But since under this system the rate is free to fluctuate in every respect, the question becomes, will this bring forth speculation that may ultimately become destabilizing in nature?

Using the inter-war period as evidence,[20] some critics argue that speculative flows will be destabilizing and consequently will enhance the amplitude and frequency of exchange rate variations. The reasoning behind these views is as follows: once real factors in the economy precipitate a depreciation of the rate, speculators, on the belief that the rate will continue to depreciate, move out of the currency, and by their own actions realize their anticipations. As soon as speculators realize that the rate has depreciated beyond the levels called for by the real forces in the economy, they will in anticipation of its appreciation begin purchasing it, ultimately driving it to an overvalued state, and so on.

Friedman[21] concludes that Nurske's data is not evidence of destabilizing speculation. He argues that the

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[19]G. Haberler, Currency Convertibility (No. 541 in the series National Economic Problems; Washington, D.C.: American Enterprise Association, 1954), p. 26.

[20]Nurkse, op. cit., pp. 117-122.

[21]Friedman, op. cit., p. 176.

speculative flows were responses to overvalued rates during that period and that consequently such movements were stabilizing, moving the exchange rates closer to their equilibrium levels. Speculative movements of these types are desirable and are stabilizing in their effect on rate movements. The very fact that the speculative moves can go in both directions is in and of itself an argument for flexible as opposed to pegged rates.

There is a high probability that there will always be unanimity of opinion regarding the direction of change that the rate will ultimately take. This unity of expectations can lead to changes in the peg that are exaggerated. Under flexible rates, on the other hand, there will be doubt as to what the true rate should be and opposing viewpoints will lead to stability. These arguments assume that speculators are well informed and that the country's financial authorities will initiate appropriate stabilization policies when needed. Absence of either or both of these assumptions could lead to a breakdown of the system. Meade[22] and other proponents of flexible exchange rates feel that the governments should intervene in the exchange

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[22]J. E. Meade, "The Future of International Payments," in Factors Affecting the United States Balance of Payments, compilation of studies prepared for the Subcommittee on International Exchange and Payments, Joint Economic Committee, U. S. Congress, 87th Congress, 2d Session 1962, p. 250.

markets with an exchange equalization fund[23] to overcome any change of inappropriate speculative movements.

Friedman believes that the assumption regarding well informed speculators is inherent in the profit motive.[24] He argues that since speculation is continuous, profits must exist, and since destabilizing speculation would lead to speculative losses--speculation on the whole must be of the stabilizing variety. There has been some criticism of this argument. Baumol's[25] model shows that profitable speculation can be destabilizing by assuming that people buy (sell) after prices have already started to rise (fall), thereby increasing the speed of transactions as well as the frequency of fluctuations. Telser[26] upholds Friedman's view by criticizing the assumptions of Baumol's model. Telser suggests that speculators react just before prices change their trend and consequently tend to reverse the flows and stabilize exchange rates.

There have been studies to support both the critics and advocates of flexible rates. On the positive side,

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[23]See Chapter III for a discussion of Canada's experience with this proposal, p. 28.

[24]Friedman, op. cit., p. 175.

[25]W. J. Baumol, "Speculation, Profitability, and Stability," Review of Economics and Statistics (August, 1957), p. 7.

[26]L. G. Telser, "A Theory of Speculation Relating Profitability and Stability," Review of Economics and Statistics (August, 1959), pp. 295-301.

Tsiang[27] examined the interwar period and found that the 1919-1926 data for three European countries did not exhibit any destabilizing speculation. In his study of the 1950-1954 data covering the Peruvian flexible exchange rate experience, he found similar evidence.[28] Both Rhomberg[29] and Poole[30] found that speculation tended to stabilize the Canadian rate.

While not proving that speculation had a destabilizing effect on flexible rates, Aliber[31] and Eastman[32] studying the European inter-war experience and the Canadian post World War II experience, respectively, could find no evidence that it stabilized the rates either. To avoid the pitfalls that are common in empirical studies of this

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[27]S. C. Tsiang, "Fluctuating Exchange Rates in Countries with Relatively Stable Economics. Some European Experiences After World War I," IMF Staff Papers, VII (October, 1959), pp. 244-273.

[28]S. C. Tsiang, "An Experiment with a Flexible Exchange Rate System: The Case of Peru, 1950-1954," IMF Staff Papers, V (February, 1957).

[29]R. Rhomberg, "Canada's Foreign Exchange Market: A Quarterly Model," IMF Staff Papers, VII (April, 1960).

[30]W. Poole, "The Stability of the Canadian Flexible Exchange Rate," The Canadian Journal of Economics, XXXIII, No. 2 (May, 1967), pp. 205-217.

[31]R. Z. Aliber, "Speculation in the Foreign Exchanges: The European Experience, 1919-1926," Yale Economic Essays, II (Sprin, 1962).

[32]H. C. Eastman, "Aspects of Speculation in the Canadian Market for Foreign Exchanges," Canadian Journal of Economics and Political Science, XXIV (August, 1958).

type, such as what measure of stability to use, the historical interpretation of data, etc., Kindleberger suggests using a more readily understandable index, such as the type of monetary and fiscal policies in operation during the time period studied.[33] If correct contra-cyclical policies are employed for the situation at hand, then speculative flows should be of the stabilizing kind. These relationships seemed to have held during the Canadian experience with flexible exchange rates.

Another criticism that has received some attention is the fear that inflationary effects of depreciation could lead to further depreciation and therefore a generally unstable exchange rate.[34] This argument has some credence in countries where imports are important in the country's cost-of-living index. Under these conditions, exchange rate depreciation would increase the price of these imports and thereby put pressure on the cost-of-living index, which in turn could force domestic prices and wages up and lead to a payments deficit which could cause a further rate depreciation. If speculators anticipated this inflation-depreciation cycle, they could further weaken the currency by moving funds to stronger currencies. The argument does

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[33] C. E. Kindleberger, "Flexible Exchange Rates," Monetary Management, prepared for the Commission of Money and Credit (1963), pp. 410-412.

[34] Scammell, op. cit., pp. 97-98.

not carry much weight, according to Lutz[35] since in most major trading countries domestic goods and services make up the majority of items in the cost-of-living index. Furthermore, there are generally lags between all of the phases of this cycle, so that the depreciation has time to offset the payments situation anyway.

The final argument against flexible exchange rates is simple. They have never worked. The critics say that the many attempts during the inter-war period failed and the eleven-year Canadian experience also ended in failure. The rebuttal for the inter-war period experience is that conditions during the period did not allow any system to work, including pegged rate schemes. A second argument only points out that flexible rates are not the only thing a nation need adopt to maintain equilibrium. As the next chapter will explain at length, the failure of the Canadian experiment with flexible rates was not the fault of the system itself, but of the government's misunderstanding of its operation and persistence in pursuing policies that led to the system's demise. This brings us to a discussion of the Canadian experience from 1950 to 1962 and

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[35] F. Lutz, "The Case for Flexible Exchange Rates," Banca Nazionale del Lavoro Quarterly Review, VII (December, 1954), p. 182.

the relevance of the preceding discussion to the Canadian case.[36]

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[36]The best recent summarial work of literature covering the exchange rate debates can be found in M. O. Clement, R. K. Pfister, and K. J. Rothwell, Theoretical Issues in International Economics (Boston: Houghton Miflin Co., 1967), Chapter VI.

Growing interest in this debate has led to several more popularized publications, one of the best of which is M. Friedman and R. V. Roosa, The Balance of Payments: Free Versus Fixed Exchange Rates, Fourth in the series of National Debate Seminars, American Enterprise Institute, Washington, D.C. (1967).

CHAPTER III

THE CANADIAN EXPERIENCE WITH FLEXIBLE EXCHANGE RATES

Introduction

Since the principle hypothesis of this study is tested by drawing on the recent Canadian experiment with flexible rates, it is important to have some familiarity with the external and internal economic forces that were in effect during the September, 1950 to May, 1962 period. This chapter undertakes this task and accordingly examines in turn: the pre-September, 1950 events that led to the adoption of flexible rates; the relatively successful experience of September, 1950 to 1956; the eventful 1956 to May, 1962 period that precipitated the demise of the flexible exchange rate experiment; and finally, the post-pegging period immediately following May, 1962.[1]

Pre-September, 1950 Period

Canada shared the exchange experiences of most Western countries since World War I. She remained on the

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[1]This chapter draws heavily on: H. H. Binhammer, "Canada's Foreign Exchange Problems: A Review," Kyklos, XVII (No. 4, 1964), pp. 636-652; and L. B. Yeager, International Monetary Relations (New York: Harper & Row Publishers, 1966), pp. 423-440; and other sources as noted.

gold standard until 1929, adopted a flexible rate until the start of World War II and operated on a rate pegged to the U. S. dollar at a ten per cent discount from 1939 to 1946. During the four-year period from 1946 to 1949 the Canadian pegged rate officially changed twice before it was ultimately set free in September, 1950.

In 1946, speculative capital inflows, in anticipation of revaluation and fear that the U. S. inflationary trends brought on by the elimination of U. S. wartime price controls would be transmitted to Canada, prompted the authorities to revalue the Canadian dollar to parity with its American counterpart. In the summer of 1949, however, Canada had to devalue by ten per cent. This return to the old discount vis a vis the U. S. dollar was prompted by many factors, such as: unchecked domestic inflation; pent-up demand for American goods; failure to maintain traditional surpluses with the United Kingdom as an offset to current account deficits; speculative capital outflows anticipating the ultimate devaluation; and a barrage of competitive European devaluations.

Speculators responded almost immediately to the new rate, and the summer of 1950 witnessed an unprecedented inflow of foreign capital. Foreign exchange reserves rose by over $500 million, an increase of almost fifty per cent in the official holdings of gold and U. S. dollars.[2]

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[2]See Appendix A, Table A1.

While part of this capital constituted long-term investments in the booming raw materials industries, the majority were short-term speculative funds.[3]

By the end of September, 1950, Canada's rate stabilization program had caused her official holdings of gold and U. S. dollars to grow almost to the $1.8 billion mark. Fearing that the impending public release of these statistics would spark further speculative inflows, the authorities concluded that a freely fluctuating, rather than a revalued pegged rate, would be the better policy choice for Canada. Canada's post World War II difficulty in finding the correct rate, coupled with her favorable experience with a flexible rate during the inter-war period of monetary instability, gave strength to this decision.[4] Accordingly, after first assuring the International Monetary Fund that the step was but a temporary experiment designed to allow the free market to decide the appropriate rate to be pegged in the future, Canada went on a freely fluctuating exchange rate on September 30, 1950.[5]

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[3]Samuel I. Katz, "The Canadian Dollar: A Fluctuating Currency," Review of Economics and Statistics, XXXV (August, 1953), pp. 236-237.

[4]T. N. Brewis et al., Canadian Economic Policy (Toronto: The Macmillan Company of Canada, Ltd, 1961), p. 261.

[5]See Peter M. Cornell, "Exchange Flexibility in Canada: Some Underlying Factors," Public Policy, A Year Book of the Graduate School of Public Acministration, Harvard University, 1958; and R. Wonnacott, The Canadian Dollar 1948-1958 (Toronto: University of Toronto Press, 1958).

The 1950 to 1956 Period

Throughout the 1950-1956 period, the flexible exchange rate mechanism behaved in an almost textbook fashion reflecting the true equilibrium between total demand and supply of Canadian dollars. Numerous studies have shown that the relationship between the rate fluctuations and changes in domestic economic conditions were in line with *a priori* theoretical expectations.[6] The only non-market force in effect was the Bank of Canada's Exchange Fund Account (EFA). This stabilization tool was used only to check destabilizing short-term trends and allowed any tenacious long-term movement to follow its course.[7] Yeager found a strong positive correlation between the rate's fluctuations and purchasing power parity as measured by

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[6]See Leland B. Yeager, "Some Facts About the Canadian Exchange Rate," *Current Economic Comment*, XX (November, 1958), pp. 39-54; Samuel I. Katz, "Le dollar canadien et le course de change fluctuant," *Bulletin d'Information et de Documentation de la Banque Nationale de Belguique*, 30th year, I, (May, 1955), pp. 7-8; R. Wonnacott, *op. cit.*, p. 123; E. P. Neufield, *Bank of Canada Operations and Policy* (Toronto: University of Toronto Press, 1958), p. 208; Rudolf R. Rhomberg, "Canada's Foreign Exchange Market: A Quarterly Model," *IMF Staff Papers*, VII (April, 1960), p. 447; James C. Ingram, "The Canadian Exchange Rate, 1950-57," *Southern Economic Journal*, XXVI (January, 1960), p. 207; R. E. Artus, "Canada Pegs Its Dollar," *The Banker*, CXII (June, 1962), p. 363.

[7]John Pippenger, "The Canadian Experience with Flexible Exchange Rates," *American Economic Review*, LVII (May, 1967), pp. 545-555.

relative price changes, as well as interest rate differentials between the U. S. and Canada.[8]

Short-term speculative capital movements appear to have been of the stabilizing variety. As soon as it became apparent that the flexible rate was not going to vary significantly, short-term capital movements settled into a pattern with inflows matching rate declines and outflows following rate increases. This behavior is also implied by Rhomberg's econometric model of Canada which showed that a one per cent depreciation of the Canadian dollar attracted about the same amount of capital inflow as did a one per cent difference in Canadian over U. S. interest rates.[9] One of the most significant attributes of the change to flexible rates was the end of pre-1950 "hot" money movements that had plagued Canada.

One of the best arguments supporting flexible exchange rates is that they allow considerable freedom in the choice of domestic economic policies and minimize their repercussions on the economy's foreign sector. Flexible rates do not completely circumvent the interdependency of domestic and foreign policy, but the free-playing international market forces cause the exchange rate to adjust

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[8]Yeager, op. cit., pp. 39, 54.

[9]Rudolf R. Rhomberg, "A Model of the Canadian Economy Under Fixed and Fluctuating Exchange Rates," Journal of Political Economy, LXXII (February, 1964), p. 12.

the external accounts in a complementary fashion.[10] Domestic and foreign economic policies are, however, inextricably linked and since the flexible rate adjusts to changes in real economic forces, any prolonged misuse of domestic policy could cause a perverse reaction of these forces and upset this complementarity.

With Canadian exports and imports of goods and services averaging about twenty and twenty-three per cent of GNP, respectively,[11] the relationship between domestic and foreign economic policies is very important. During the 1950-56 period, the relative freedom to pursue independent[12] domestic policies offered by the free exchange rate allowed Canada to effectively halt the inflationary tendencies caused by heavy capital investment in resource development. The tight monetary policy had the proper deflationary domestic effects and simultaneously encouraged capital inflows, which in turn pushed the exchange rate to a premium, causing a dampening of exports and an expansion of imports. Thus, simultaneously this

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[10]For a good discussion of the close interdependence between monetary policy and the freely fluctuating exchange rate, see Robert A. Mundell, "Problems of Monetary and Exchange Rate Management in Canada," The National Banking Review, II (September, 1964), pp. 77-86.

[11]See Appendix B, Tables B2 and B3.

[12]Gerald K. Helleiner points out that independent Canadian monetary policy was due to the existence of a flexible exchange rate in "Connections Between United States and Canadian Capital Markets, 1952-1960," Yale Economic Essays, II, No. 2 (Fall, 1962), pp. 398-400.

policy attracted capital which expanded the economy's capacity and encouraged imports, thereby relieving the excessive pressures of the overtaxed economy.[13]

The relatively smooth operation of the Canadian experiment with flexible exchange rates during the 1950-56 period began to progressively falter in the second half of the decade as misinterpretations of the system led to the pursuit of inconsistent policies.

The 1956-May, 1962 Period

The year 1956 marked the beginning of a new era in the Canadian flexible exchange rate period. During that year, most of the principle economic indicators[14] began to register evidence that the Canadian economy was slowing down. Economic growth as measured by annual growth in real GNP, averaged 6.7 per cent for the 1950-56 period, began to decline seriously after peaking in 1956 at 8.6 per cent, and averaged only 2.8 per cent for the 1956-62 period. This decline can mostly be attributed to the decline in Korean War generated demand, the general downturn in the United States' economy, the change in world supply and demand conditions for primary product, and

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[13]Rudolph G. Penner in his article, "Inflow of Long-term Capital and the Canadian Business Cycle 1950-1960," Canadian Journal of Economics and Political Science, XXVIII, No. 4 (November, 1962), pp. 526-542, refutes the commonly held thesis that long-term capital inflows had a deflationary effect on the economy.

[14]All the indicators referred to in this section can be found in Appendix A, Tables A1 through A6.

competition in the production of manufactured goods from the Japanese and Europeans.

Unemployment, the cohort of declining economic growth, began to rise to conspicuous levels in the 1956-62 period. After averaging only 3.2 per cent for the 1950-56 period, it steadily rose, peaking at 11.3 per cent of the work force in February, 1961. During the 1956-62 period it averaged almost twice the rate of the early period, or 6.3 per cent.[15] These high rates were partially due to a surplus of unskilled labor that had been generated by the earlier fast growth of primary industries, Hungarian refugees, and a shortage of vocational training schools.

Both wholesale and retail prices were fairly stable throughout the 1956-62 period. One may have expected some deflation to have taken place given the economic trends, but Canadian wage and price structures, similar to those of the United States, tend to be subject to downward rigidities. The slight increases in these price indices are mainly attributable to unbalanced sectoral demands pressing on inelastic sources of supply that ironically existed in the midst of overall excess capacity. Wholesale and retail price indices (1953 = 100) averaged 101 to 99, respectively, for the 1950-56 period and rose to 105 and 110 in the 1956-62 era. The highest recordings on both

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[15]Only 1956-62 information are provided in Tables A3 and A4 of Appendix A. Check table sources for further documentation of earlier period averages.

indices occurred in 1961, the year preceding the exchange crisis.

The balance of payments also reflected these trends. From 1950 to 1956, the current and capital accounts were in a healthy condition. The flexible exchange rate complemented the domestic expansionary policies and allowed sufficient capital inflow to cover current account deficits. These earlier deficits averaged only C$312 million in contrast to C$1,222 million over the 1956-62 period. The deficit on merchandise account steadily declined over the 1956-62 period. Imports increased in the first few years, reflecting their complementarity with direct foreign investments as well as the premium on the Canadian dollar, while in the later years of the period they declined, relatively, as income levels fell and the nature of the capital inflows changed. Exports, on the other hand, remained fairly stable throughout the period.

The balance on other current transactions did not fare so well. Tourism receipts were consistently well below payments for travel abroad by Canadians. Interest and divident payments were high throughout the period, reflecting the growth in Canadian indebtedness abroad. These payments represented over half of the non-merchandise deficit in five out of the seven years of the period. There were continual deficits in all the other current

account items as well, with the majority of these remaining outpayments representing immigrant remittances to families abroad. From 1956 to 1962 the overall current account deficits averaged over a billion dollars per year.

Short and long-term capital movements covered the current account deficits in four out of the seven years, from 1956 to 1962. In 1957, 1959 and 1960 the authorities were forced to draw down official reserves to maintain overall balance in the external accounts. As we shall see, the insistence on a tight monetary policy in the face of declining economic growth, aside from worsening that trend, had important ramifications in the capital markets. The policy produced a disparity between domestic and American interest rates which caused capital inflows. Of the two most important categories of long-term inflows, namely direct investment and foreign investment in Canadian securities, only the latter was stimulated by these events.

The interest rate differential had a pronounced effect on American participation in Canadian security issues at the government, provincial, community and corporate levels (see Table 6). This single component of the capital account indicates more than any other balance of payments entry the close interdependence between domestic and foreign economic policies. These inflows were most responsible for the premium on the Canadian dollar as the

floating exchange rate correctly equilibrated the excess demand for Canadian dollars with their supply.

These current and capital account disequilibria accompanied the general slowdown in Canadian economic activities. Mr. Coyne, then governor of the Bank of Canada, felt that the simultaneous presence of rising unemployment and inflation was the result of excessive imports and large foreign, mostly American,[16] capital inflows. His solution to these problems consisted of a combination of tight monetary policy and controls on imports and foreign borrowing by Canadians. He reasoned that tight money would reduce capital expansion and thereby reduce inflation while at the same time dampening import demand. He hoped that by promoting increased protection for the secondary industries and introducing legislation forcing the "Canadianization" of American businesses in Canada that American capital inflows could be stopped. But given the inefficient oligopolistic structure of Canadian secondary industry and the small domestic market, protection would only have aggravated

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[16]For example, foreign investment amounted to almost $24 billion in 1959, with 75 per cent, or $18 billion originating in the U. S. By 1959, the foreign ownership of major industry had grown to 51 per cent of manufacturing, 63 per cent of petroleum and natural gas, and 59 per cent of mining, according to H. I. MacDonald, "Problems for Canada in the World Economy," in Economics: Canada, ed. by M. H. Watkins and D. F. Forster (Toronto: McGraw-Hill Company of Canada Limited, 1963), p. 174.

domestic problems, closed the door on much needed international competition, and passed the costs on to the already burdened Canadian community. Fortunately, these measures were never carried too far before the 1962 crisis.[17]

That Coyne did not understand the relationship of domestic to foreign economic policies, especially under a flexible rate system is quite evident given his persistent application of a tight money policy. By keeping the money supply restricted through high interest rates he forced Canadians to borrow abroad and thereby perpetuated the capital inflows he desperately wanted to terminate. The free rate, doing its job well, kept the Canadian dollar at a premium and thereby maintained the balance of payments deficits.

Tight monetary policy continued to aggravate the situation until Coyne was forced out of office in 1961. Fortunately, the full impact of these policies were probably never felt by the distressed economy. Harry Johnson, in his study of monetary policy as a short-run stabilization instrument undertaken for the Canadian Royal Commission on Banking and Finance, points out that the lags

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[17]See Harry G. Johnson, The Canadian Quandary: Economic Problems and Policies (Toronto: McGraw-Hill Company of Canada Limited, 1963), pp. 11-21; and Jacob Viner, "American Capital and the Canadian Economy," in M. H. Watkins and D. F. Forster, Economics: Canada, op. cit., pp. 188-194.

between policy need and actual implementation, and implementation and effect ("inside" and "outside" lags) are very long. He concludes, ". . . that the effect of monetary policy on the Canadian economy is imprecise, slow, and variable; there is a relationship present, but it is extremely hazy."[18] If these lags were shorter, in all probability the crisis of 1962 would have occurred much sooner.

Until Coyne's ouster in 1961, both he and Finance Minister Fleming failed to admit any relationship between monetary policy, capital inflows, and the overvalued currency. After continual criticism by academic economists, backed by a steadily worsening situation, Fleming finally reversed his position. To stimulate business activity, discourage capital inflow and lower unemployment, he lowered interest rates and rejected overt nationalistic economic policies.

Unfortunately, the return to easy money was accompanied by official intervention in the exchange market. Rather than allow the free rate to depreciate itself in response to the lowered interest rates, the E. F. A. was employed to artificially depress the exchange rate. While some connection was finally seen between the monetary policy, unemployment and capital flows, the crucial link between these and the free rate was misconstrued. The

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[18]Johnson, op. cit., p. 187.

reduction in capital inflow would have reduced the premium on the Canadian dollar, lowered the exchange rate, caused an increase in exports, dampened imports, and thereby reduced the current account deficits that had been so rampant since 1956.

Canadian reserves fluctuated widely during the eleven month period from June, 1961 to May, 1962 (see Table A1). The E. F. A. found itself first manipulating the rate downward, gaining reserves, and then trying to maintain an overvalued rate, causing a steady loss of reserves, until the Spring crisis ended with the official adoption of a fixed, devalued rate on May 2, 1962 at a pegged price of 92.5 U. S. cents.[19] The relative freedom in the formulation of domestic policy afforded by a free rate became obvious during this period as

> . . . Canada had seen the ironic adoption of contractionary monetary and fiscal policies to cope with an ermegency stemming from official action to depreciate the Canadian dollar, in turn undertaken in hopes of expanding employment and production.[20]

The presistent problems of current account deficits, intense capital flows, speculative and otherwise, the change to a manipulated exchange rate, and finally, the pegging of the rate, prompted many people to blame the

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[19]During the 12-month intervention, the rate depreciated by 9.5 per cent, bringing the total decline in the value of the Canadian dollar to 12.4 per cent.

[20]Yeager, International Monetary Relations, loc. cit., p. 439.

freely fluctuating rate for Canada's economic problems in the 1956-62 period. These allegations could not have been more incorrent. The free rate did its job well--it equated the total demands and supplies of Canadian dollars on the exchange market. It was the misinterpretation of the advantages of flexible rates and the persistent following of incorrect policies that gave rise to the trouble.

Throughout the entire flexible exchange rate period Canadian importers had the opportunity to use the forward exchange market as a hedge against uncertainty.[21] An October, 1962 survey of importing corporation undertaken as part of a Royal Commission study sheds some interesting light on this activity.[22] Table 3.1 provides a summary of the survey's findings. In general, the forward markets were not too extensively used by either classification of firm, but there is a noticeable difference in the foreign exchange operations of small and large firms. As the table indicates, a high proportion of the small firms dealt exclusively in the spot market, and while the percentage of large firms that chose to cover their positions is greater, over half of the survey respondents in this classification still dealt exclusively on the spot market. In sum, the

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[21]The theoretical implications of this mechanism and its incorporation into the model are discussed at length in the next chapter, pp. 53-56.

[22]J. H. Young and J. F. Helliwell, "The Effects of Monetary Policy on Corporations," Royal Commission on Banking and Finance (1964), Chapter XI, pp. 419-426.

survey's evidence indicates that all categories of Canadian corporate importers made regular spot purchases during the stable period of the flexible exchange rate experience, and increased their activities during the 1960-62 period of relative instability, and virtually ceased forward operations after May, 1962.

TABLE 3.1.--Foreign exchange practices of Canadian corporations, 1950-1962.

Assets of Firm	Percentage distribution of survey replies			
	Always use the spot market	Occasional or frequent forward transactions	Always use the forward market	Total
Under $10 million	76%	6%	18%	100%
$10 million and over	51%	10%	39%	100%

Source: J. H. Young and J. F. Helliwell, "The effects of Monetary Policy on Corporations," Royal Commission on Banking and Finance (1964), p. 420.

Post-May, 1962 Period

After a brief stabilization period immediately following the official actions of May 2, 1962, things took a turn for the worse. The indecisive election in June, 1962, coupled with the contradictory remarks by the Conservative minority, renewed the loss of confidence and capital outflows began to mount. Reserves fell catastrophically between May 30, 1962 and June 22, 1962 as the E. F. A.

introduced an operation designed to support the newly pegged rate. These actions plus a commitment to deliver forward exchange of $239 million brought the reserve level down to $861 million. On June 24, 1962 the Prime Minister announced the exchange emergency and proclaimed that the May 2 rate would be maintained at all costs.

To back up his statement, the government mobilized $1,050 million in cash and standby credits from international sources and instituted special measures including an increase in the bank rate to 6 per cent; temporary surcharges from 5 to 15 per cent on non-essential imports; and a decrease in the duty exemptions allowed Canadian tourists. By September, 1962 confidence had been restored, monetary policy eased and capital inflows resumed on a regular basis. As the foreign exchange reserves accumulated, the government reduced its commitments to the foreign nations and international organizations that had come to its rescue.

Conclusion

Oversight and a misunderstanding of the important relationships between domestic and foreign economic policies caused Canada to experience an exchange crisis and the loss of a unique and successful experiment with a freely fluctuating exchange rate. Policy makers incorrectly diagnosed the causes of declining economic growth and followed restrictive monetary and fiscal policies.

The failure to recognize the dependency between monetary policy, capital inflows, balance of payments deficits, and an artifically overvalued currency, thrust blame on a perfectly working floating exchange rate which led to active interventions in the foreign exchange markets as well as a series of nationalistic policies to thwart capital inflows from the United States.

These actions forced a return to a fixed rate in May, 1962. Canada's lessons were learned too late. Its actions had forced it to once again become a member of the fixed gold exchange standard community wherein its domestic policies could no longer be sought independently of exchange rates and reserve level considerations. The next chapter formulates a deterministic import demand model that incorporates the possible motivational factors explaining import level during this Canadian experience with flexible exchange rates.

CHAPTER IV

THE MODEL

Introduction

This chapter seeks to explain the plausible relationships that exist between uncertainty, caused by expectations about future exchange rate levels, and current import levels. Using a Marshallian partial equilibrium framework, theoretical import demand and supply functions are derived from domestic excess demand and supply functions to show the differential impacts of pegged and flexible exchange rate systems, after which both approaches are incorporated into a model for the purpose of investigating the hypothesis. The focus of these discussions is on identifying the specifying the determinants of the import demand function. The next chapter will express this function in an empirically testable form as well as present the parameter estimates for use in deriving conclusions regarding the hypothesis.

Generalized Import Demand and Supply Functions

For expository purposes, the following discussion assumes that all functions are linear in two variables with all other explanatory variables held constant. This

approach simplifies the algebra and allows for parallel graphical presentations. Buyers and sellers of imported commodities are assumed to be rational economic agents with an awareness of alternatives and knowledge of all the relevant market datam sufficient to maximize their respective utility functions. Any non-market forces, such as tariffs, quotas, exchange stabilization and/or exchange control schemes, etc., that add to or affect the costs of purchasing goods are assumed to be given and will not be dealth with in any explicit way.

Before the effects of uncertainty arising from the flexible exchange rate mechanism can be discussed, the relevant import functions have to be derived. The following discussion is in terms of the ith commodity so that aggregation problems can be avoided at this stage.[1] The domestic demand for the ith commodity can be expressed as:

$$4.1 \qquad Q_{d_1} = f_1 (p_{c_i}, p_s, Y), \qquad i=1,\ldots,n$$

where Q_{d_1} is the quantity of the ith commodity demanded per unit of time;

P_{c_i} is the domestic price of the ith commodity;

P_s is the price of domestic substitutes, and

Y is a measure of income appropriate to the ith commodity.

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[1] These and other estimation problems are discussed in the following chapter.

For any given state of technology (i.e., production function) the domestic supply function of the ith commodity is expressed as:

$$4.2 \qquad Q_{s_i} = f_2(p_{c_i}, w_i),$$

where Q_i and p_{c_i} are defined above and w_i is the price of inputs.

A linear representation of equations 4.1 and 4.2 is shown in Figure 4.1a. At prices below the market clearing price p_{c_i}, say $p_{c_{i_2}}$, the domestic demand for the ith commodity exceeds its domestic supply by a quantity A-B. This is the quantity of imports that will be demanded at $p_{m_{i_1}}$ equal to C-D in Figure 4.1b. The import demand function portrayed in Figure 4.1b is then the difference between equations 4.1 and 4.2, or

$$4.3 \qquad Q_{d_i} - Q_{s_i} = M_{d_i}$$

where the import demand function is generalized as follows:

$$4.4 \qquad M_{d_i} = f_3 (r, p_{c_i}, p_{f_i}, Y),$$

where p_i and Y are defined as before, and

- r is the exchange rate expressed in terms of the number of units of foreign currency per unit of domestic currency, and
- p_{f_i} is a foreign price index appropriate for the ith commodity.

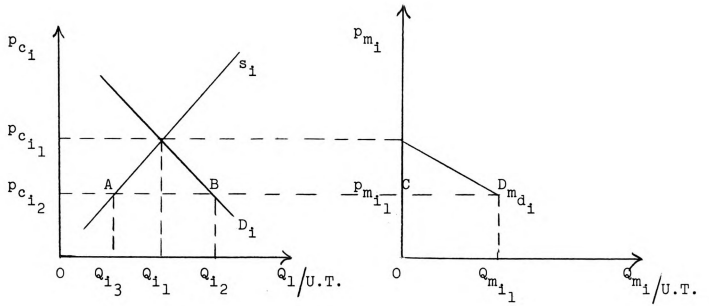

Figure 4.1. (a) Domestic Market ith Commodity. (b) Import Demand Function ith Commodity.

A parallel process could be followed to derive excess supply functions in each country producing the ith commodity. The sum of these excess supply functions would represent the import supply function. From the Canadian point of view, however, this function would appear highly or even infinitely elastic, since changes in her import demand for the ith commodity would not effect its world price.[2] This import supply function is expressed as follows:

$$4.5 \qquad P_{s_i} = f_4 (p_{c_i}, p_{f_i}, r, F_i),$$

where p_{s_i} and F_i are the import supply price (c.i.f.) to Canada and freignt and any other duty on imports of the ith commodity, respectively, and the other variables are as defined above.

By combining certain independent variables into an index of relative prices, r/, as follows:

$$4.6 \qquad r/ = p_f/rp_c,$$

the import market equilibrium can be portrayed graphically as in Figure 4.2 below. With the independent variable defined as above in 4.6, it is easy to see the importance that the type of exchange rate system would have on the import market. Under a pegged exchange rate system, the

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[2]This assumption is discussed and adopted in the following chapter, p. 64.

level of imports would be largely determined by relative prices, but under flexible or freely fluctuating rates the relation would be compounded by changes in the rate as well as relative prices. The increased likelihood of change in the independent variable would tend to increase the degree of uncertainty involved in import transactions. Since this could lead to a dampening of import activities, it is important to understand the role of uncertainty and of measures to counter its effects. That is the task of the next section.

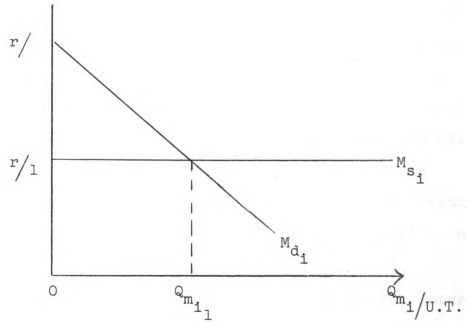

Figure 4.2. Canadian Import Market.

The Role of Uncertainty in Import Markets

Uncertainties exist in all markets that lack perfect knowledge. When commodity markets become international in scope, the level of uncertainty increases further due to the introduction of the vagarious foreign exchange market.

At this stage in the formulation of the model, it is important to examine the ramifications that uncertainty has on the demand for imports under flexible exchange rates. This discussion is confined to the effects of uncertainty on current real transactions with only passing reference given speculation, stabilizing or otherwise, in the short-term capital and foreign exchange markets. Although importers are not overtly involved in speculation, in the normal sense of that term, their very actions have the same effects on the foreign exchange markets as those of professional speculators. Their decisions to hold off or purchase foreign exchange depend on their expectations regarding the future level of the exchange rate, as well as the short-term interest rates at home and in the countries with which they transact business. This behavior will enhance existing uncertainties and consequently the transactions of professional speculators as well.

Because the degree of uncertainty about the future exchange rates grows more than in proportion to their time horizons, both importers and professional speculators have difficulty in predicting the future levels of exchange

rates. Assuming that the importer must pay for an import in foreign exchange at some given data in the future, he has to estimate a probability distribution of possible outcomes to guide his actions, such as:

4.7 $P(r^*) = f(r^*)\, dr^*,$

that yields an expected value of the exchange rate on the given future date, where P is the probability and r^* and dr^* are the expected exchange rate and incremental changes in it, respectively.

After netting out the costs involved in the transactions, he gets an estimate of the profits yielded. If he is spending an amount X on the purchase of the foreign exchange and the unit cost of the transaction is equal to x, his profits would amount to:

4.8 $\pi = X(r^* - r - x),$

where r is the present observed rate. Assuming that the importer has the following utility function, that relates all possible gains and losses to a utility index,

4.9 $U = U(\pi) = U(\pi(r)),$

where $U(0) = 0$ and $U'' < 0$, indicating diminishing marginal utility for each additional dollar earned, or not earned.

Given the preceding relationships, the expected value of the importers satisfaction can be expressed as:

$$4.10 \quad E(U) = \int_0^{\infty} U(\pi) \cdot P(\pi).$$

It is possible that this expected utility could turn out negative even though the expected value of profit is positive. There is a greater likelihood of this occurring the greater the degree of uncertainty about the future rate, (i.e., uncertainty could outweigh the expected value of profits and he may rationally not import). There is a greater chance of this occurring the faster the marginal utility of gain diminishes, and the greater the dispersion of the expected exchange rate.[3] Thus, the rational importer, while not overtly speculating, can alter the total demand and supply of currency and in the face of seemingly profitable ventures may not import due to uncertainty caused by flexible rates.

An alternative explanation of importing behavior in the face of uncertainty can be made in terms of the Hicksian elasticity of expectations concept.[4] Hicks defines "the

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[3]This discussion is an adaptation, in part, of J. Vanek, International Trade: Theory and Economic Policy (Homewood, Ill.: Richard D. Irwin, Inc., 1962), Chapter 10, pp. 158-185.

[4]J. R. Hicks, Value and Capital (2d ed.; London: Oxford, 1946), pp. 203-206.

elasticity of a particular person's expectations of the price of a commodity x as the ratio of the proportional rise in expected future prices of x to the proportional rise in its current price."[5] The elasticity of price expectations can vary between the limits of zero and one. An elasticity of zero indicates that current price changes have no effect on expected future prices, while an elasticity of one implies that previously expected constant long-run equilibrium prices will remain constant at current price levels. By allowing this spread in the range of elasticities, Hicks recognizes that past prices, deemed "normal" may not be the sole explanation of price expectations. Since in the real world conditions are seldom, if ever, "normal," our concept of the elasticity of expectations will express a change in current price as a deviation from what was the past expected normal price instead of a deviation from what prices were up to now. If r^*_t and $r/_t$ are the expected normal price and the actual price of the ith commodity in time period t, respectively, the Hicksian definition of the elasticity of expectations, γ, implies

$$4.11 \qquad \gamma = \frac{\log r^*_t - \log r^*_{t-1}}{\log r/_t - \log r^*_{t-1}}, \quad 0 \leqslant \gamma < 1.$$

The present discussion can easily be adopted to this topic by using exchange rates in the place of prices. If 4.11

[5] Ibid., p. 205.

is expressed in terms of actual exchange rates instead of logarithms, γ can be more appropriately called the coefficient of expectations instead of the elasticity of expectations, as follows:

$$4.12 \quad r^*_t - r^*_{t-1} = \gamma (r/_t - r^*_{t-1}).^6$$

The forward exchange market mechanism tends to reduce uncertainty by making the coefficient of expectations approach unity. Theoretically at least, the operation of the forward exchange market eliminates all uncertainty.[7] Suppose an importer has on his balance sheet a number of claims in foreign exchange (A) as well as a number of foreign exchange liabilities (B), and that both of these are to come due three months in the future. The importer would be in a position to sell foreign exchange forward if he was in a long position, i.e., if A was larger than B on the due date, so that he would have a salable surplus of foreign exchange equal to (A-B). The importer would be in a short position and would want to buy forward if B exceeded A. He would in this case need to buy (B-A) of foreign exchange to settle his debts.

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[6]Marc Nerlove, Distributed Lags and Demand Analysis for Agricultural and Other Commodities, USDA Agricultural Handbook No. 141, June, 1958, pp. 22-23.

[7]The following discussion is largely based on Vanek, op. cit., pp. 58-60.

If there are not restrictions on foreign investment in the short-term capital markets of the trading countries, i.e., perfect arbitrage, the spot and forward rates will tend to become related in a definite way depending on the domestic short-term rates of interest of the trading partners. This relationship is expressed in equation 4.13, where r_s and r_f are the spot and forward exchange rates expressed as units of foreign currency per unit of domestic currency, respectively, and the short term, usually ninety days, domestic and foreign rates of interest are represented by i_c and i_f.

$$4.13 \quad r_f = r_s \frac{1 + i_f}{1 + i_c}$$

When both short term rates of interest are equal the spot and forward rates of exchange will also be equal. If, however, the domestic interest rate should be greater than the foreign rate, the forward exchange rate will be greater than the spot exchange rate and vice versa. To show how equation 4.13 would work, assume a situation for which interest rates in both countries are equal and that temporarily the forward exchange rate exceeds the spot rate. In this situation, importers in the foreign country with a long position would not sell forward exchange but would rather hedge by borrowing in the foreign money market an amount equal to their anticipated future surplus, purchase

spot domestic currency and invest it in the domestic money market. This action would lower the supply of forward foreign exchange, increase the spot supply causing the forward exchange rate to fall, the spot rate to rise until equilibrium is restored with the spot and forward rates equalized.

While it is theoretically possible to eliminate uncertainty, realistically market imperfections and institutional restrictions cut down on the efficiency of the mechanism described above. Examples of these are: less than perfect knowledge by both traders and dealers, imperfectly competitive behavior by bankers and forward exchange dealers, transaction expenses, personal liquidity preferences, as well as institutional requirements and restrictions, such as controls on short-term capital movements.

These imperfections would upset equation 4.13 above, as discrepancies, r_d, between the quoted forward rate, r_f, and the spot rate adjusted for short-term interest rate differentials, r_a, arose: i.e.,

$$4.14 \quad r_d = r_f - r_a$$

where,

$$4.15 \quad r_a = \frac{1 + i_f}{1 + i_c} ,$$

and all exchange rates are expressed in foreign currency per unit of domestic currency. While the absolute magnitude of r_d is an indicator of market imperfections, changes in its size should be a partial indication of the effect of hedging activities on import volume,

$$4.16 \quad M_i = f(r'_d),$$

where

$$4.17 \quad r'_d = (r_{d_t} - r_{d_{t-1}}).^{8}$$

The greater this differential, the more likely importers would be anticipating exchange appreciation and the more likely current import levels would fall, and vice versa.

When the less than perfect degree of certainty on the part of those importers who get involved in forward exchange transactions are combined with the uncertainty of importers, who for expediency or other reasons avoid the forward markets, there is a distinct possibility that the uncertainty resulting from fluctuating rates will have some bearing on the level of import transactions.

This section has been devoted to looking into the role of uncertainty in import markets. In summary, we noted that uncertainty while existing in all markets, is

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[8] L. Officer, An Econometric Model of Canada Under the Fluctuating Exchange Rate. Harvard Economic Series (Cambridge: Harvard University Press, 1968), pp. 20-24.

magnified at the international level, especially under a flexible exchange rate system. We saw that the importer has to maximize a utility function that takes into account not only his profit/loss position, but also his expectations regarding future exchange rates and that the uncertainty factor may cause him not to undertake what are otherwise seemingly profitable ventures. An alternative explanation of his uncertainty was explained by the elasticity of expectations discussion.

Theoretically, the importers' uncertainties can be completely eliminated by forward exchange operations. On a more practical plane, however, the forward markets are not perfect and can only reduce risk and not eliminate it. While the effect of forward exchange operations should reduce uncertainty to some degree under flexible exchange rates, there still may be sufficient doubt left in the importer's mind to affect his trading decisions.

Now that we have discussed the derivation of the import demand function and the tenents of uncertainty that affect importers, it is time to return to both these concepts and further develop them into the final form of the model. In particular, equation 4.4, the generalized import function, has to be amended to reflect the uncertainty discussion. The final import demand function is

$$4.18 \quad M_i = f(r^*, r'_d, Y) \qquad i=1,\ldots,n$$

where all independent variables except r* are as defined above. r* is the currently held expected value of the future flexible exchange rate. It is assumed that previous period of experience affects the importer's currently held expectations about the future value of the exchange rate.

The expectations hypothesis of this model takes the form discussed and presented above as equation 4.12, which is again:

$$4.12 \quad r^*_t - r^*_{t-1} = \gamma\,(r/_t - r^*_{t-1}) \qquad 0 \leqslant \gamma < 1,$$

where $r/_t$, the index of relative prices, is as defined in 4.6 above, $r/_t = \frac{P_f}{rp_c}$. On the assumption that the more recent period of the exchange rate experience has more bearing on the present expected exchange rate, we will allow the lags to decline in a geometric progression in successive periods indefinitely. This can be explained by making the following assumptions and transpositions of equation 4.12. If for the moment we assume all explanatory variables but r^*_t are constant, i.e.,

$$4.19 \quad M_i = f\,(r^*_t)$$

or put into linear form,

$$4.20 \quad M_i = \alpha + r^*_t,$$

and transposing equation 4.12 into

4.21 $r^*_t = \gamma r/_t + r^*_{t-1}(1 - \gamma)$, $0<\gamma<1$.

Equation 4.21 postulates that the current exchange rate expectations are a weighted average of the rate expectations held last period and last period's actual exchange rate. If we lag 4.21 and express r^*_{t-1} in terms of r^*_{t-2} and r_{t-1} and repeat the process indefinitely, we get:

4.22 $$r^*_t = \gamma^2 r^*_{t-2} + \gamma(1 - \gamma)r_{t-1} + (1 - \gamma)r_t$$

$$= \gamma^3 r^*_{t-3} + \gamma^2(1 - \gamma)r_{t-2} + \gamma(1 - \gamma)r_{t-1} + (1 - \gamma)r_t$$

$$= \ldots$$

$$= (1 - \gamma)\sum_{i=0}^{\infty} \gamma^i r_{t-1} .^9$$

In summary, the model explaining variation in import volume under flexible exchange rates contains the following two behavioral and one definitional equations:

4.18 $M_i = f(r^*, r'_d, Y)$ $\quad i=1,\ldots,n$

4.21 $r^*_t = r/_t + r^*_{t-1}(1 - \gamma)$, $0\leq\gamma<1$.

4.6 $r/_t = \frac{P_f}{rP_c}$.

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[9] C. F. Christ, Econometric Models and Methods (New York: John Wiley and Sons, Inc., 1966), pp. 204-208.

If a fixed rate is assumed to replace the flexible rate ceteris paribus, γ would approach unity and the model would in effect be reduced to one equation since current rate expectations would always be equal to current rates. If, as opponents of the flexible rate system argue, uncertainty is inversely related to imports, one would then expect on an a priori basis that imports would rise.[10] The importers expected utility would be positively related to expected profits since the exchange rate uncertainty would be virtually eliminated.[11]

Theoretically, the demand for imports should shift upwards due to the hypothetical change in the exchange rate system from a flexible exchange rate to a pegged rate. Using the same defined relations as in Figure 4.2 above, a two-dimensional linear approximation of these effects is shown in Figure 4.3. At relative exchange rates $r/_1$ imports of $0 - Q_{m_{i_1}}$ are demanded under a system of flexible rates. If, ceteris paribus, $r/_1$ becomes $\bar{r}/$, a pegged rate, the reduction of uncertainty would, through changes in the importers utility function, increase imports to $0 - Q_{m_{i_2}}$ as the demand function shifts to (M'_{d_i}).

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[10]The assumption of pegged rates does not completely eliminate uncertainty. This is especially true for long-term ventures or contracts. See Chapter II, pp. 15-18, for a discussion of this.

[11]See pages 49-51, above.

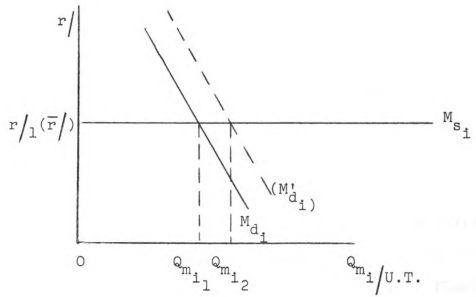

Figure 4.3. Import Market.

The next chapter tests the hypothesis that, at least for the Canadian case, with the same trading conditions, there has been little, if any, difference between the observed and hypothetical import trade levels under the flexible and pegged rate system.

CHAPTER V

ESTIMATION PROCEDURE, FINDINGS AND CONCLUSIONS

Introduction

The preceding chapter concentrated on developing and explaining the functional relationships underlying the Canadian demand for imports during the period of flexible exchange rates. This deterministic approach undoubtedly omits other variables that partially explain variation in aggregate import levels. These omissions result from ignorance of their identity as well as the theoretical process explaining their role. Despite these limitations, the equations discussed at the end of Chapter IV can be estimated if the omitted variables can be represented by a randomly distributed disturbance term. If, additionally, this distribution is assumed to be normal, of zero mean, homoskedastic and that the individual disturbances of each observation are serially uncorrelated, the estimators resulting from the least squares regressions technique will be unbiased and efficient.[1] This study assumes that these

[1]The assumption of a normal and independent distribution of the unexplained residuals is especially important for the iterative maximum likelihood approach applied to equations containing distributed lags as in the first

conditions are met. Since the principal intent of this analysis is to estimate what effects uncertainty has on the import demand function, the simultaneous approach wherein the parameters of every equation would be estimated, is rejected in favor of the single equation approach. This implies that all factors affecting the demand for imports are pre-determined; that is, they are not determined by imports.

Since the assumption of unbiased parameter estimates made above holds only when the disturbance term is statistically independent of the regressors, it is necessary to examine these conditions a little closer. Orcutt has indicated that this requirement may not hold for import demand functions because of interdependence between the demand and supply equations and the probable existence of errors of measurement.[2] While it is reasonable to assume under a flexible exchange rate system that the independent variables representing real income and variation in forward spot exchange rate differences are pre-determined, and consequently statistically independent of the disturbance term, this may not be true of the international price variable. Since import and price data satisfy both demand

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testing procedure discussed and employed below on page 66ff. For the importance of these assumptions, see any recent econometrics text such as J. Johnston, Econometric Methods (New York: McGraw-Hill, 1963).

[2]G. Orcutt, "Measurement of Price Elasticities in International Trade," Review of Economics and Statistics (May, 1950), pp. 117-130.

and supply relations, it may not be possible for import volume to absorb all the price induced variations in the disturbance term.

It is quite clear that international price data are influenced by events that effect demand and supply relations at both the world and individual country levels. In the Canadian case these effects are minimized since she imports only a small fraction of the total world's supply of exports. It follows then that the export supply functions faced by Canada are highly elastic, and that they could be assumed infinitely elastic without committing serious error. This assumption is made here, thereby eliminating the effects of supply and demand interdependence and facilitating the single equation approach that has been adopted. Kemp has shown that a sufficient condition for the independence of price and the disturbance term is that shifts of the import function should be independent of shifts in the import supply function.[3] This is a reasonable assumption for Canada since her import demand function is an excess demand function and shifts in it would largely be the reflection of changes in domestic supply and demand relations, especially given the high elasticity of import supply functions. Furthermore, since Canada alone operated under a flexible exchange rate system

[3]M. Kemp, The Demand for Canadian Imports 1926-1955 (Toronto: University of Toronto Press, 1962), pp. 12-15.

in a world of pegged rates the role that changing expectations play under such a unique system further supports the assumption of independence.

"Errors of observation" may introduce additional bias into the least square estimators, especially with regard to the price variable as well as the coefficients of other estimators, even if they are measured without error. Orcutt indicates that unless the error is highly and negatively correlated with price, the bias will be "towards zero."[4] Since the implicit price deflator used in this study is an aggregative measure, it would be extremely difficult to measure the margin of error or the direction the bias might take. Consequently, we will conclude that errors exist and that some bias in the estimates is inevitable and that, therefore, some caution must be exercised in evaluating the estimated coefficients. On the other hand, the relatively large number of observations (forty-five or fifty-six, depending on the testing procedure) increases the degrees of freedom, thereby reducing the standard errors of the coefficients.

Two different testing procedures are followed in examining the central hypothesis of this thesis. The first testing procedure reduces the model to one estimatable equation and following an iterative maximum lieklihood approach, the "best fit" equation is chosen and conclusions

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[4]Orcutt, op. cit., pp. 124-125.

regarding the magnitude of the coefficient of expectations and consequently the role of uncertainty and its effect on the volume of imports are drawn.

The second testing procedure involves an extrapolation of the "best fit" equation found in the first approach into the post-flexible rate period to yield the estimated import levels that would have occurred under the assumption that the exchange rate policy of flexible rates had continued. These estimates are then compared with the actual import levels that occurred under the pegged rate system. If the actual imports fall within the confidence intervals established for the flexible rate period, evidence tending to uphold the hypothesis will have been found. This approach implicitly assumes that the structural parameters of the model did not change with the change in exchange rate policy. To test whether this ceteris paribus assumption is valid, shift dummies are incorporated into the equation and their significance tested.

These approaches are examined in detail below and the empirical results of each are discussed. The final section of this chapter will present conclusions regarding the central hypothesis.

First Testing Procedure

The model formulated in the previous chapter contains the following equations:

$$4.18 \quad M_t = f(r^*_t, r'_{d_t}, Y_t), \qquad i=1,\ldots n$$

$$4.21 \quad r^*_t = \gamma r/_t + r^*_{t-1}(1-\gamma) \qquad 0 \leqslant \gamma < 1$$

$$4.6 \quad r/_t = P_{f_t} \Big/ r_{s_t} p_{c_t}$$

Expanding the discussion from the ith commodity to the aggregate import level and expressing equation 4.22 in linear form, yields:

$$5.1 \quad M_t = \alpha + \beta_1 r^*_t + \beta_2 r'_{d_t} + \beta_3 Y_t + \beta_4 Q_1 + \beta_5 Q_2 + \beta_6 Q_3 + \varepsilon_t$$

where all the above notations have the following definitions:

M_t = imports of goods and services, unadjusted for seasonal variation, deflated by the implicit price deflator, imports of goods and services, millions of Canadian dollars.

r^*_t = expected exchange rate expressed as equation 4.21 in which $r/_t$ is defined as in equation 4.6, where:

P_{f_t} = foreign price index; proxy - implicit price deflator, imports of goods and services, 1957 = 100

r_{s_t} = U. S.$/Can.$

p_{c_t} = domestic price index; proxy = implicit price deflator, GNP, 1957 = 100.

r'_{d_t} = change in forward/adjusted spot exchange rate differential.[5]

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[5]Calculated from equations 4.14, 4.15 and 4.17 in previous chapter where r_f = forward rate US$/Can.$; r_s = spot rate US$/Can.$; i_f = quarterly average of daily

Y_t = Gross National Product, unadjusted for seasonal variation, deflated by implicit price deflator GNP, millions of Canadian dollars.

Q_1, Q_2 and Q_3 are predetermined seasonal adjustment variables defined as

$$Q_i = \begin{cases} 1 \text{ if quarter } i \\ 0 \text{ otherwise} \end{cases} \qquad i=1, 2, 3$$

σ_t = a well behaved disturbance term.

The period of analysis formally begins on January 1, 1951. This excludes the first three months of the flexible exchange rate experience, thereby allowing for a transition period for the economy to adjust from a pegged rate to a floating rate. Although some vestiges of exchange control carried over into 1951, their effects were insignificant and will be ignored. The period of analysis for the first and third testing procedures will terminate on March 31, 1962. This is one month short of the official return to a pegged rate. While this date coveniently lends itself to the quarterly observation period used, there is also a rationale behind this choice, since the government had already changed its "hands off" policy and started using its official reserves of gold and foreign exchange before the second quarter of 1962.

This period permits the use of forty-five quarterly observations covering the period from the first quarter of

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quotations on US 90-day Treasury Bill rate; i_c = quarterly average of mid-month quotations of Canadian 90-day Treasury Bill rate.

1951 to the first quarter of 1962, inclusive. An annual model would be clearly inferior as it would allow for only eleven observations and would cover up substantial intra-annual movements of the explanatory variables. For the same reasons, the model based on quarterly observations would be inferior to one composed of monthly observations. A lack of monthly data on GNP and imports, however, prohibits this type of detailed analysis. The second testing approach used below expands the number of observations from forty-five to fifty-six, adding eleven observations ranging from the second quarter of 1962 to the last quarter of 1964.

Since both equations 4.18 and 4.21 contain the unobservable expected exchange rate, r^*, it is desirable to reduce the model to one equation containing only observable variables. To facilitate the following discussion, we will assume the import function has only one independent variable, r^*_t, so that the model simplifies to the following two equations:

$$5.2 \qquad M_t = \alpha + \beta r^*_t + \varepsilon_t$$

$$4.21 \qquad r^*_t = \gamma r/_t + r^*_{t-1} (1 - \gamma).$$

To eliminate r^*_t from equation 5.2 equation 4.21 is substituted in its place, yielding:

$$5.3 \qquad M_t = \alpha + \beta\gamma r/_t + (1 - \gamma)\beta r^*_{t-1}$$

The next step is to lag 5.2 by one quarter and solve for βr^*_{t-1}, as follows:

$$5.4 \qquad \beta r^*_{t-1} = -\alpha + M_{t-1} - \varepsilon_{t-1}$$

Then substitute 5.4 into 5.3, yielding the final reduced form in estimatable form:[6]

$$5.5 \qquad M_t = \alpha\gamma + \beta_1\gamma r/_t + (1 - \gamma)M_{t-1} + \varepsilon_t - (1 - \gamma)\varepsilon_{t-1}$$

When this method is applied to equations 5.1 and 4.21, this equation is yielded:

$$5.6 \qquad M_t = \alpha\gamma + \beta[\gamma r/_t] + \beta_2[r'd_t - (1 - \gamma)\, r'd_{t-1}] + \beta_3[Y_t - (1 - \gamma)Y_{t-1}] + \beta_4[Q_{1_t} - (1 - \gamma)Q_{1_{t-1}}] + \beta_5[Q_{2_t} - (1 - \gamma)Q_{2_{t-1}}] + \beta_6[Q_{3_t} - (1 - \gamma)Q_{3_{t-1}}] + (1 - \gamma)M_{t-1} + \eta_t$$

where $\eta_t = \varepsilon_t - (1 - \gamma)\varepsilon_{t-1}$

This formulation of the import demand function is desirable so that the value of γ, the coefficient of expectations can be estimated. If, as argued in the last

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[6] An adaptation of Christ, op. cit., pp. 206-207.

chapter, γ is a reasonable proxy for uncertainty, it can assume any value between zero and one. The closer it approaches one the less expectations will tend to play a role in determining the current levels of imports as importers become more motivated by current exchange rates and make fewer adjustments in anticipation of future rates. The value of γ can be derived in various ways depending on the choice of estimation method.

There are three alternative methods by which this import demand function could be estimated--unrestricted least squares, restricted least squares, or by an iterative maximum likelihood method.[7] Using an unrestricted least squares approach, an ordinary least squares regression of equation 5.6 could be run and estimates of γ could be found by solving any of the estimated coefficients. The major difficulty with this technique is that it is highly unlikely that γ would retain the same estimated value when any other coefficient is used. Since it is likely that γ could take on as many different values as there are coefficients, an alternative approach is preferable. Conclusions regarding the value of the coefficient could also be made by using a restricted least

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[7]See M. Nerlove's criticism of Stone and Rowe and an outline of these approaches in M. Nerlove, "The Market Demand for Durable Goods: A Comment," Econometrica, Vol. 28, 1 (January, 1960), pp. 132, 142; and R. Stone and D. A. Rowe, "The Market Demand for Durable Goods," Econometrica, Vol. 25 (July, 1957), pp. 423-443.

squares approach and arbitrarily assigning plausible values to γ, but as Nerlove points out, this is ". . . unduly restrictive."[8] The approach used here is a modified restricted least squares technique since the value of γ ultimately chosen for use in the next testing is found by following an iterative maximum likelihood approach. The maximum likelihood estimate of γ will be that value of γ that minimizes the variance of the residuals or equivalently maximizes the coefficient of multiple correlation, R^2.

Notice that if the structural equation 5.1 conforms to the assumptions made on page 1 regarding a randomly distributed disturbance term, the transformed equation 5.6 contains a "new" disturbance term that violates the assumptions and is autocorrelated, i.e., $\eta_t = \varepsilon_t - (1 - \gamma)\varepsilon_{t-1}$. Since this will cause the ordinary least squares estimates of the coefficient of 5.6 to be inconsistent, an alternative method of estimation will have to be employed.[9]

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[8]Nerlove, "The Market Demand for Durable Goods: A Comment," p. 132.

[9]The following presentation is based on Chapter XII, pp. 14-21 of a forthcoming econometric text by Jan Kmenta, Michigan State University. The primary sources for this technique are: L. R. Klein, "The Estimation of Distributed Lags," Econometrica, 26 (October, 1958), pp. 553-565, and were operationally developed in P. J. Dhrymes, "Efficient Estimation of Distributed Lags with Autocorrelated Error Terms," Discussion Paper No. 23, Department of Economics, University of Pennsylvania, and in A. Zellner and M. S. Geisel, "Analysis of Distributed Lag Models with Applications to Consumption Function Estimation," manuscript, University of Chicago (January, 1968).

Estimators for use with the iterative maximum likelihood approach are developed as follows below. For expository purposes equation 5.6 will be written in simplified form as equation 5.5 above, which is again,

$$5.5 \quad M_t = \alpha\gamma + \beta_1\gamma r/_t + (1 - \gamma)M_{t-1} + \varepsilon_t - (1 - \gamma)\varepsilon_{t-1}.$$

Rewriting this as

$$M_t - \varepsilon_t = \alpha\gamma + \beta_1\gamma r/_t + (1 - \gamma)(M_{t-1} - \varepsilon_{t-1}).$$

And if,

$$\alpha_0 = \alpha\gamma$$

$$\beta_0 = \beta_1\gamma \ ,$$

then alternatively,

$$E(M_t) = \alpha_0 + \beta_0 \, r/_t + (1 - \gamma) \, E(M_{t-1}).$$

But since,

$$E(M_{t-1}) = \alpha_0 + \beta_0 \, r/_{t-1} + (1 - \gamma) \, E(M_{t-2}),$$

$$E(M_{t-2}) = \alpha_0 + \beta_0 \, r/_{t-2} + (1 - \gamma) \, E(M_{t-3}),$$

$$\vdots$$

$$E(M_1) = \alpha_0 + \beta_0 \, r/_1 + (1 - \gamma) \, E(M_0),$$

we can also write

$$5.7 \quad E(M_t) = \alpha_0 (1 + (1 - \gamma) + (1 - \gamma)^2 + \ldots + (1 - \gamma)^{t-1} + \beta_0 (r/_t + (1 - \gamma)r/_{t-1} + (1 - \gamma)^2 r/_{t-2} + \ldots + (1 - \gamma)^{t-1} r/_1) + (1 - \gamma)^t E(M_0).$$

Using the formula for the sum of a geometric progression, and the fact that $\alpha_0 = \alpha\gamma$, we can reformulate 5.7 as:

$$5.7a \quad M_t = \alpha + B_0 W_t^{(1 - \gamma)} + (\theta_0 - \alpha) (1 - \gamma)^t + \eta_t$$

where $$W_t^{(1 - \gamma)} = \gamma r/_t + (1 - \gamma)\gamma r/_{t-1} + (1 - \gamma)^2 \gamma r/_{t-2} + \ldots + (1 - \gamma)^{t-1} \gamma r/_1$$

and $$\theta_0 = E(M_0).$$

The logarithmic likelihood function for M_1, M_2, ... M_n is

$$5.8 \quad L = \frac{n}{2} \log (2 \pi \sigma^2) - \frac{1}{2\sigma^2} \sum_{t=1}^{n} [M_t - \alpha - \beta_0 W_t^{(1-\gamma)} - (\theta_0 - \alpha) (1 - \gamma)^t]^2$$

Maximizing L with respect to α, B_0, $(1 - \gamma)$ and θ_0 is equivalent to minimizing

$$S^{(1-\gamma)} = \sum_{t=1}^{n} [M_t - \alpha - B_0 W_t^{(1-\gamma)} - (\theta_0 - \alpha)(1-\gamma)^t]^2$$

with respect to the same parameters. Since we know that $0 \leqslant \gamma < 1$, we can easily calculate the minimizing values of α, B_0 and θ and the corresponding value of $S^{(1-\gamma)}$. After successive iterations for various values of γ ranging from 0.1 to 1.0 have been run, that value of γ that minimizes $S^{(1-\gamma)}$ will yield the maximum likelihood estimates of the parameters. When this technique is applied to equation 5.6 the following estimatable transformed equation is yielded:

$$5.6a \quad M_t = \alpha + \beta_1[W_t^{(1-\gamma)}] + \beta_2[r'd_t - (1-\gamma)^t r'd_0] + \beta_3[Y_t - (1-\gamma)^t Y_0] + \beta_4[Q_{1_t} - (1-\gamma)^t Q_{1_0}] + \beta_5[Q_{2_t} - (1-\gamma)^t Q_{2_0}] + \beta_6[Q_{3_t} - (1-\gamma)^t Q_{3_0}] + [\theta-\alpha][1-\gamma^t] + \varepsilon_t,$$

where subscript 0 refers to 1950 (IV) values of the variables and $W_t^{(1-\gamma)}$ was found as follows:

t	$W_t^{(1-\gamma)}$
1	$W_1 = \gamma r/_1$

$$2 \qquad W_2 = \gamma r/_2 + (1-\gamma)W_1$$

$$3 \qquad W_3 = \gamma r/_3 + (1-\gamma)W_2$$

$$\vdots$$

$$45 \qquad W_{45} = \gamma r/_{45} + (1-\gamma)W_{44}$$

The maximum likelihood parameters of equation 5.6a were found for a value of γ equal to 0.6.[10] Graphically, these findings can be seen in Figure 5.1 where the residual variance curve shows both the local and global minimums occurring at values of γ equal to 0.2 and 0.6 respectively. These findings held for both additive and multiplicative formulations of the equation.[11] The parameter estimates of this function in its additive form are:

$$5.9 \quad M = \underset{}{-2086.6238} - \underset{(296.4154}{494.4801r/} + \underset{(2198.8053)}{2680.7834r'd}$$

$$+ \underset{(0.0203)}{0.2253Y} - \underset{(44.1492)}{21.0459Q1} + \underset{(42.2253)}{110.6218Q_2}$$

$$- \underset{(45.5356)}{198.6400Q_3} + \underset{(2293.6585)}{3714.1212\,(1-\gamma)^t} \quad R^2 = 0.86301 \quad SEE \ (98.5373)$$

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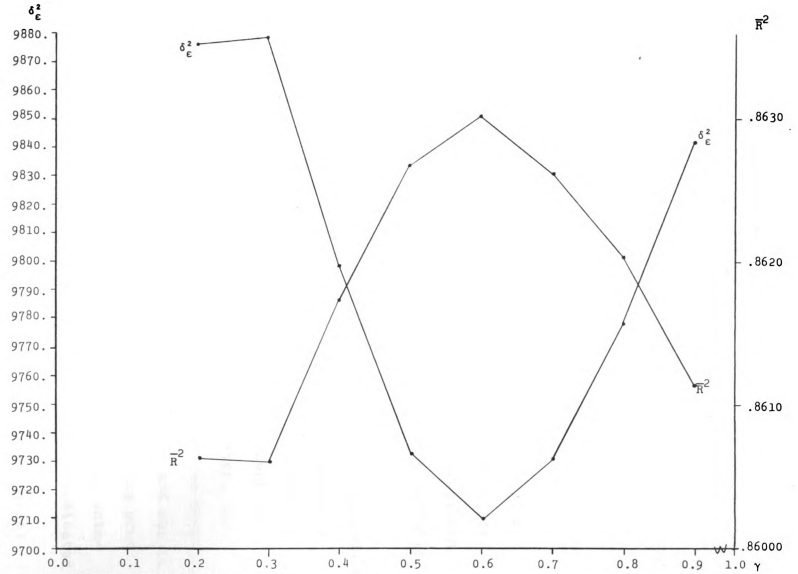
[10] See Appendix B, Table B1 for estimated parameters of other values of γ.

[11] Slightly higher values of R^2 were found for the logarithmic formulation for all values of γ. These results are rejected, however, because they are misleading in that the transformation of the regressands into their natural logarithms probably accounts for most of the differences in R^2 values and also because the "t" values consistently indicate lower levels of significance for all variables, for all values of γ.



Source: Appendix B, Table B1.

Figure 5.1 Residual Variance and Coefficients of Determination for γ Values 0.1 to 1.0.

The partial correlation coefficients and relevant elasticities are as follows:

r/	-0.2645 ;	-0.2756
r'd	0.1965	
y	0.8772 ;	0.9458
Q_1	-0.0781	
Q_2	0.3956	
Q_3	-0.5828	
$(1-\gamma)^t$..	0.2573	

Unfortunately, we cannot use the Durban-Watson test for autocorrelation since it is not applicable to regression models wherein the lagged value of the dependent variable is also one of the regressors.[12]

The empirical findings of the first testing procedure tend to support the basic hypothesis of this thesis. A coefficient of expectations of 0.6 implies that uncertainty about future exchange rates affects present importing activities. It should be emphasized, however, that this value of γ is only a partial indicator of the relative importance of uncertainty to Canadian importers and has to be evaluated in conjunction with the second testing procedure below. Further indications of the relative unimportance of the index of relative prices, r/, is indicated

[12] J. Durban and G. S. Watson, "Testing for Serial Correlation in Least-Squares Regression," Pts. I and II, Biometrica, 1950 and 1951.

by only a 90 per cent significance level and a partial correlation coefficient of -0.2645. While the a priori expectation of an inverse relationship between r/ and M was realized, no such designation can be made about r'd. Only if expectations regarding exchange rate variability affects the utility functions of all importers in the same direction and to the same degree is it possible to make similar predictions regarding the sign of the incremental forward/spot exchange rate differential variable, r'd. The findings that r'd is statistically insignificant supports the arguments presented in Chapter III which showed that for the Canadian experience hedging activities via the forward exchange mechanism played a relatively minor role.[13] This is further indicated by the relatively low partial correlation coefficient of 0.1965.

Y, the real GNP variable, predictably explains most of the variation in import volume. Its high significance level and partial correlation coefficient of 0.8772 support this view. The statistical significance levels of the seasonal variables and their partial $\bar{R}^2$'s, given the geographical location of Canada, also corroborate all a priori expectations.

The elasticities of the r/ and Y variables are relatively meaningless since the elasticity of r/ is really the total elasticity of an index of relative

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[13]See Chapter III, pp. 38-40.

prices adjusted for changes in the exchange rates and the income elasticity is understandably large since it includes the important investment components and their attendant impact of import volumes.

This first testing procedure has given us some insights into the relative impact of uncertainty on Canadian import volume. The incorporation of our estimate of γ, the coefficient of expectations into the model will allow for a closer examination of the role of uncertainty resulting from flexible exchange rates.

Second Testing Procedure

The second testing procedure involves using the maximum likelihood coefficient of expectations, 0.6, to solve equation 4.21 for various values of r^*.[14] Once this series is generated for the fifty-six quarter period 1951 (I) to 1964 (IV), it is used with other basic data[15] over the same period in the structural import demand function, equation 5.1. Estimated import levels, $\hat{M}$, are then derived by using the maximum likelihood parameters of equation 5.9 in equation 5.1a.

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[14] Since Canada adopted flexible exchange rates on September 30, 1950, the end of the third quarter, it is reasonable to assume that until the fourth quarter of 1950 expectations were always realized, i.e., $\gamma = 1.0$. Based on this assumption, r^*_{t-1} of equation 4.2 is equal to 1.2791 generating an r^* for 1950 (IV) of 1.2460 and thereby allowing the r^* series to be constructed.

[15] See Appendix B, Tables B2 to B17.

$$5.1a \quad \hat{M}_t = -2086.6238 - 494.4801\, r^*_t + 2680.7834\, r'd_t + 0.2253\, Y_t - 21.0459\, Q_{1_t} + 110.6218\, Q_{2_t} - 198.6400\, Q_{3_t} + \varepsilon_t,$$

where

$$\varepsilon_t = M_t - \hat{M}_t$$

Figure 5.2 plots both the actual and estimated imports over the fifty-six quarter period, and clearly shows the disparity between actual and estimated imports in the post-May, 1962 period. The extrapolated import values are, by assumption, those values that would have occurred had Canada remained on a flexible exchange rate system, ceteris paribus, through 1964 (IV). If, as argued in Chapter IV[16] uncertainty is a significant determinant of importing activity, one would expect, after an initial adjustment period, that import volume would increase over those levels associated with the assumed maintenance of the flexible exchange rate system.

Notice that there is not any pronounced shift of the import demand function after May, 1962. Out of the total eleven quarter period after the return to a pegged rate, only five quarters registered increases in import volume. If the standard error of the estimate is used to establish confidence limits, the 95 per cent level would

[16] Chapter IV, pp. 60-61.

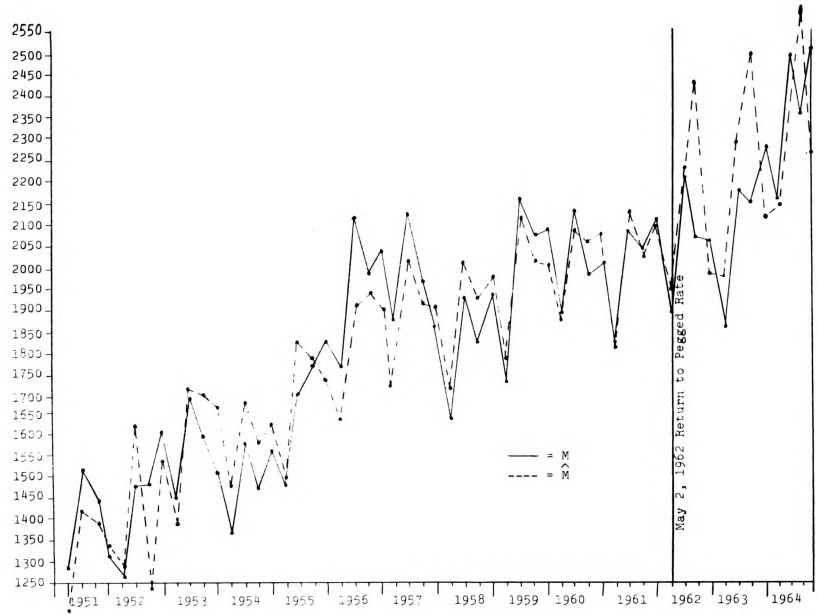

Figure 5.2 Actual and Estimated Imports 1950 (I) to 1964 (IV), Inclusive. (Millions of Canadian Dollars)

TABLE 5.1.--Actual and Estimated Canadian Imports 1962 (II) to 1964 (IV) inclusive.

	Millions of Canadian Dollars		
	Actual Imports	Estimated Imports	Residual Error
1962			
II	2217	2236	- 19
III	2077	2438	-361
IV	2074	1986	88
1963			
I	1864	1982	-118
II	2183	2292	-109
III	2155	2514	-359
IV	2283	2114	169
1964			
I	2153	2139	14
II	2492	2466	26
III	2353	2619	-266
IV	2507	2262	245

Source: Appendix B, Table B17.

be approximately $\hat{M} \pm 2\sigma_{\varepsilon}$ or $\hat{M} \pm$ Can.$198 million.[17] This confidence band covers all but one of the cases where actual imports exceed the hypothesized flexible exchange rate import levels. If a four quarter adjustment period is allowed to enable importers to completely adjust to the new pegged rate system[18] over half of the remaining seven

[17]This is a far more stringent test of the shift than the standard error of the forecast, which would have a widening confidence band for each successive extrapolation period. See L. R. Klein, A Textbook of Econometrics (Evanston, Ill: Row, Peterson & Co., 1953), Chapter IV, VI.

[18]This interim transition period is not only to allow adjustments of the importer's utility function, but

quarters show the shift but again in only 1964 (IV) does the import level exceed the stringent confidence band used here as a guideline. The tightness of the observed shifts of import levels around the estimated import levels indicates that they are nothing exceptional and for the most part deviate by no more than what one would expect on a purely random basis. Thus, this testing procedure seems to indicate that, at least for the Canadian case, uncertainty brought on by flexible exchange rates had little effect on import trade volume.

An alternative test must be made before any final conclusions regarding the hypothesis can be drawn. This analysis is based on interpreting a shift in the import demand function that results primarily from changes in Canadian exchange rate policy. To check on the validity of this ceteris paribus assumption, shift dummies are introduced for each independent variable and tested for statistical significance. A multiple regression was run on the following model for the full fifty-six quarter period:

$$M_t = \alpha + \beta_1 \alpha D_1 + \beta_2 r^*_t + \beta_3 Z_1 + \beta_4 r'd_t + \beta_5 Z_2 + \beta_6 Y_t + \beta_7 Z_3 + \beta_8 Q_1 + \beta_9 Q_2 + \beta_{10} Q_3$$

---

also to allow him to draw down inventory hoards of essential imports no longer necessary under pegged rates.

where

$$D_1 = \begin{cases} 0 & 1951(\text{I}) \text{ to } 1962(\text{I}), \text{ inclusive} \\ 1 & 1962(\text{II}) \text{ to } 1964(\text{IV}), \text{ inclusive,} \end{cases}$$

and,

$$Z_1 = D_1 r^*_t$$

$$Z_2 = D_1 r'd_t$$

$$Z_3 = D_1 Y_t \quad [19]$$

The results of this analysis are as follows:

$$5.1b \quad M_t = -893.82 + (0)\alpha D_1 - \underset{(264.80)}{474.00} r^*_t + \underset{(2890.87)}{4278.49} Z_1$$

$$+ \underset{(2515.40)}{1584.76} r'd_t - \underset{(3159.21)}{4264.94} Z_2 + \underset{(0.02)}{0.20} Y_t$$

$$- \underset{(0.05)}{0.04} Z_3 + \underset{(46.00)}{1.84} Q_1 + \underset{(47.24)}{146.92} Q_2 -$$

$$- \underset{(47.50)}{96.91} Q_3 \quad . \quad R^2 = 0.8524$$
$$\text{SEE} = 117.60$$
$$\text{DW} = 1.38$$

The shift dummy coefficients β_1, β_3, β_5 and β_7 are all statistically insignificant indicating that the ceteris paribus assumption of the preceding analysis was valid despite the over twelve year period that the study covers. Since the structure of the model used here did not appear

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[19] Johnston, op. cit., pp. 221-228.

to shift, more weight has to be put on the conclusions discussed above. It is to these conclusions and some necessary qualifications that are required that we now turn.

Summary and Conclusions

This study has investigated the effects that uncertainty, engendered by a system of flexible exchange rates, has on the volume of aggregate Canadian imports. The general conclusion is that Canadian import volume was not appreciably affected by the fluctuating rates. The inquiry took place in two phases. The first phase used an iterative maximum likelihood process to find the "best fit" value of γ, the coefficient of expectations. Given the model formulated in this thesis, this value of γ is 0.6, a level acceptable on *a priori* grounds. Since this value is less than but approaching unity, where exchange rate expectations are always realized, as under pegged rates, it indicates that a moderate level of uncertainty did exist for the Canadian experience under flexible rates.

The second phase of the analysis involved using the estimated parameters of the "best fit" equation, found in the first step in the structural import demand function. The coefficients were used to derive estimated import levels under the uncertainty conditions imposed by the 0.6 coefficient of expectations. Extrapolations of these

levels into the post-May, 1962 period provided further evidence upholding the hypothesis, namely, that while imports increased in four out of the last seven quarters, allowing for an adjustment period, all but one of these fell within the confines of a stringent confidence band. These findings are further strengthened by alternative tests indicating that the structural parameters of the model did not shift significantly. Thus, contrary to the assertions of the critics of flexible exchange rates, for the Canadian experience import volume was not appreciably affected by uncertainty arising from exchange rate variability.

While the Canadian experience can provide many insights into the pegged versus flexible exchange rate controversy, caution must be exercised in any attempted generalizations of these findings. It must be kept in mind that the Canadian experience was unique for several reasons, the two most important being that Canada alone operated on flexible exchange rates in a world of pegged rates and she had economic ties with the United States. Any conclusions drawn ignoring these facts could only be considered as purely conjectural.

The only plausible generalization that could be drawn from the Canadian experience is that it worked and provided an orderly mechanism for conducting all forms of international transactions, as long as it was allowed to

operate in accord with the dictates of free market forces, as in the 1951-1956 period. This knowledge alone is encouraging!

APPENDICES

APPENDIX A

CANADIAN BACKGROUND STATISTICS

TABLE A1.--Canadian official holdings of gold and foreign exchange, 1950-62 inclusive.
(millions of US dollars)

Year		Quarter			
		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1950	A Gold	501	506	533	569
	B Foreign Exchange	671	699	1,006	1,227
1951	A	604	635	673	786
	B	1,108	1,041	941	949
1952	A	856	877	878	879
	B	936	939	972	976
1953	A	896	924	951	977
	B	960	869	823	833
1954	A	1,007	1,028	1.046	1,066
	B	837	812	860	865
1955	A	1,083	1,102	1,125	1,138
	B	808	803	820	766
1956	A	1,124	1,102	1,106	1,109
	B	762	792	799	828
1957	A	1,103	1,106	1,104	1,103
	B	831	831	842	788
1958	A	1,092	1,083	1,080	1,077
	B	781	823	844	860
1959	A	1,077	1,073	1,051	962
	B	824	857	884	915
1960	A	951	925	901	998
	B	916	868	930	959
1961	A	885	899	920	940
	B	1,036	1,066	1,032	1,150
1962	A	959	848	682	702
	B	842	792	1,623	1,892

Source: IMF, International Financial Statistics, Vol. IV, No. 6 (June, 1951), pp. 14-15, for 1950; UN Monthly Bulletin of Statistics, various issues for 1951-1962.

TABLE A2.--Growth in real gross national product, 1950-1962. (millions of constant (1949) Canadian dollars)

	Gross National Product	Annual Percentage Change	
1950	17,471	10.7	Total Percentage Increases
1951	18,547	10.6	1950-62 62.2
1952	20,027	7.8	1950-56 36.3
1953	20,794	3.8	1956-62 18.1
1954	20,186	-3.0	
1955	21,920	8.6	Arithmetic Mean of Annual
1956	23,811	8.6	Percentage Increases
1957	24,117	1.3	1950-62 4.9
1958	24,397	1.2	1950-56 6.7
1959	25,242	3.5	1956-62 2.8
1960	25,805	2.2	
1961	26,468	2.6	
1962	28,111	6.2	

Source: Dominion Bureau of Statistics, Canada Year Book 1963-64 (Ottawa, Queen's Printer and Controller of Stationary, 1964), p. 1016.

TABLE A3.--Canadian unemployment, quarterly, 1956-1962.

Year	Quarter				Annual Average
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
1956	5.9	3.4	2.0	2.7	3.4
1957	6.1	4.0	3.2	5.3	4.6
1958	10.1	7.1	4.8	6.3	7.1
1959	9.3	5.7	3.7	5.2	6.0
1960	9.4	6.7	5.1	6.8	7.0
1961	11.1	7.4	4.9	5.6	7.2
1962	8.8	5.7	4.2	5.3	5.9

Source: Compiled from monthly data from various issues of United Nations Monthly Bulletin of Statistics (New York: Office of the United Nations).

TABLE A4.--Canadian wholesale and retail price indices, quarterly, 1956-1962.

(1953 = 100)

Year	Quarter				Annual Average
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
1956					
A	101	102	103	103	102
B	101	101	103	104	102
1957					
A	103	103	103	102	103
B	104	105	106	107	106
1958					
A	103	103	103	104	103
B	107	108	108	109	108
1959					
A	105	105	105	104	104
B	109	109	109	111	110
1960					
A	104	105	104	104	104
B	110	110	111	112	111
1961					
A	105	105	106	107	106
B	112	112	112	112	112
1962					
A	107	108	109	110	108
B	111	112	113	114	112

Source and Notes: Compiled from monthly data from various issues of United Nations Monthly Bulletin of Statistics (New York: Statistical Office of the United Nations). A - wholesale price index; B - retail price index.

TABLE A5.--Canadian balance of payments, 1956-1962 (millions of Canadian dollars).

	1956	1957	1958	1959	1960	1961	1962
CURRENT ACCOUNT							
Merchandise Trade							
Exports	4,837	4,894	4,887	5,150	5,392	5,889	6,380
Imports	5,565	5,488	5,066	5,572	5,540	5,716	6,203
Balance on Merchandise Trade	- 728	- 594	- 179	- 422	- 148	173	177
Other Current Transactions							
Receipts							
Travel expenditures	337	363	349	391	420	482	562
Interest and dividends	142	154	168	182	173	209	202
Freight and shipping	457	445	401	420	442	486	509
All other current receipts[1]	691	659	632	649	683	668	730
Total	1,627	1,621	1,550	1,642	1,718	1,845	2,003
Payments							
Travel expenditures	408	525	542	598	627	642	605
Interest and dividends	523	589	612	671	653	770	794
Freight and shipping	502	515	460	525	533	568	595
All other current payments[2]	742	853	838	930	1,000	1,020	1,060
Total	2,255	2,482	2,502	2,724	2,813	3,000	3,054
Balance on Other Current Transactions	- 628	- 861	- 952	-1,082	-1,095	-1,155	-1,051
Current Account Balance	-1,356	-1,455	-1,131	-1.504	-1,243	- 982	- 874
CAPITAL ACCOUNT							
Long Term Capital Movements							
Direct Investment							
In Canada by non-residents	583	514	420	550	650	520	495
Abroad by Canadians	- 104	- 68	- 48	- 80	- 50	- 75	- 109
Net direct investment	479	446	372	470	600	445	386
Investment in Foreign Securities	2	6	3	- 33	- 19	- 34	- 65
Loans and Capital Subscription by Government of Canada							
Advances, etc.	- 3	---	- 34	- 1	- 11	- 8	- 22
Repayments	69	50	64	34	32	37	129

Long Term Capital Transactions, n.i.e.	152	42	100	28	62	132	- 116
Total Long Term Capital Movements	1,424	1,301	1,112	1,148	900	910	668
Short Term Capital Movements							
Change in Canadian Dollar Holdings of Foreigners	- 26	- 34	105	16	123	- 26	- 13
Other Capital Movements	16	83	23	329	181	388	374
Total Short Term Capital Movements	- 10	49	128	345	304	362	361
Official Holdings of Gold and Foreign Exchange							
Change in Holdings	- 33	105	- 109	70	39	- 229	- 537
Change in Net International Monetary Fund Position	- 15	--	--	- 59	--	- 61	378
Other Special International Financial Assistance		--	--	--	--	--	4
Net Change in Official Holdings	- 48	105	- 109	11	39	- 290	- 155
Net Capital Movement	1,366	1,455	1,131	1,504	1,143	982	874

Source and footnotes: Dominion Bureau of Statistics, The Canadian Balance of International Payments, Cat. No.s 67-201 and 67-001, footnotes 1 and 2 from page 15.

[1]All Other Current Receipts include: gold production available for export, inheritances and immigrants' funds; government transactions which include payments by foreign governments for maintaining diplomatic and military establishments in Canada; personal and institutional remittances of a non-commercial nature; miscellaneous income including transfers of income and profits not listed elsewhere: business services and other transactions which are broadly classified as business, professional and personal services.

[2]All Other Current Payments include: inheritances and emigrants' funds; government transactions including official representation and military expenditures abroad and membership assessments in international organizations; miscellaneous payments including income and profits not listed in the Interest and Dividends Account; business services and other transactions including various payments by subsidiaries in Canada to head offices abroad.

TABLE A6.--Sales of new Canadian security issues to non-residents, 1956-1962
(millions of Canadian dollars)

	1956	1957	1958	1959	1960	1961	1962
Bonds and Debentures							
Government of Canada	9	16	76	56	30	37	155
Provincial governments	224	136	168	334	103	66	148
Municipal governments	112	123	148	158	133	47	74
Corporations	252	462	242	112	155	343	331
Total	597	737	634	660	421	493	708
Common and Preferred Stocks	70	61	43	47	26	45	20
Total	667	798	677	707	447	538	728

Source: Dominion Bureau of Statistics, Sales and Purchases of Securities Between Canada and Other Countries, Monthly, Cat. No. 67-002.

APPENDIX B

RAW DATA

TABLE B1.--Iterative maximum likelihood regression results.

γ	M_t =	$-B_1 r/t$	$+B_2 r' d_t$	$+B_3 Y_t$	$-B_4 Q_1$	$+B_5 Q_2$	$-B_6 Q_3$	$+B_7 (1-\gamma)^t$	$\bar{R}^2$	ε^2
0.1		Determinant approaches zero; regression will not run								
0.2	-1200.7847	-766.6300 (638.86)	+2217.6658 (2286.26)	+0.2058 (0.03)	-30.4544 (46.85)	-108.4487 (42.87)	-182.9987 (49.99)	+2642.7235 (2565.75)	.86065	9877.1795
0.3	-1671.2961	-629.7255 (469.95)	+2470.1998 (2245.64)	+0.2161 (0.03)	-24.9467 (45.36)	+108.8199 (42.84)	-191.9175 (47.62)	+3147.3542. (2402.56)	.86063	9878.5510
0.4	-1878.0834	-574.3442 (380.36)	+2589.0262 (2212.85)	+0.2204 (0.02)	-23.1949 (44.62)	-109.0977 (42.45)	-195.3289 (46.51)	-3394.8487 (2341.28)	.86175	9798.8815
0.5	-1987.9070	-534.8260 (328.12)	+2638.9678 (2199.14)	+0.2231 (0.02)	-22.1540 (44.30)	+109.7182 (42.36)	-197.2398 (45.87)	+3554.4617 (2308.09)	.86267	9733.6180
0.6	-2086.6238	-494.4801 (296.42)	+2680.7834 (2198.80)	+0.2253 (0.02)	-21.0450 (44.15)	+110.6218 (42.22)	-198.6400 (45.54)	+3714.1212 (2293.66)	.86301	9709.5995
0.7	-2176.7972	-452.5578 (275.95)	+2714.6284 (2207.02)	+0.2272 (0.02)	-19.6899 (43.76)	+111.8034 (42.19)	-199.7651 (45.40)	+3887.1206 (2300.07)	.86271	9731.1714
0.8	-2260.3092	-412.1330 (259.20)	+2745.4176 (2214.05)	+0.2288 (0.02)	-18.1593 (44.29)	+113.0885 (42.36)	-200.7759 (45.42)	+4117.5372 (2339.51)	.86203	9779.1332
0.9	-2328.7870	-375.2857 (250.19)	+2766.7567 (2213.41)	+0.2302 (0.02)	-16.5848 (43.63)	+114.2272 (42.47)	-201.7272 (45.54)	+4598.5143 (2554.74)	.86114	9842.2074
1.0		Determinant approaches zero; regression will not run.								

TABLE B2.--Imports of goods and services are adjusted for seasonal variations.
(Millions of current Canadian dollars)

	Quarters			
	I	II	III	IV
1950			1,137	1,332
1951	1,259	1,563	1,484	1,307
1952	1,202	1,368	1,353	1,477
1953	1,335	1,597	1,496	1,415
1954	1,264	1,478	1,379	1,453
1955	1,397	1,605	1,665	1,776
1956	1,709	2,071	1,942	1,993
1957	1,841	2,131	1,968	1,873
1958	1,666	1,945	1,852	1,960
1959	1,761	2.177	2,091	2,102
1960	1,902	2,167	2,031	2,060
1961	1,900	2,157	2,165	2,265
1962	2,047	2,425	2,278	2,283
1963	2,071	2,436	2,442	2,593
1964	2,463	2,866	2,689	2,850

Source: Dominion Bureau of Statistics (DBS) National Accounts: Income and Expenditures by Quarters Table 2, line 11, various issues.

TABLE B3.--Gross national product. Current dollars, unadjusted for seasonal variations.

Year	Quarters			
	I	II	III	IV
1950			5,350	4,721
1951	4,452	5,100	6,328	5,290
1952	5,129	5,739	5,171	5,956
1953	5,461	6,036	7,389	6,134
1954	5,526	6,082	6,939	6,324
1955	5,806	6,604	7,813	6,909
1956	6,564	7,327	8,826	7,826
1957	7,175	7,856	8,894	7,984
1958	7,185	8,104	9,170	8,435
1959	7,688	8,538	9,661	8,897
1960	8,152	8,713	9,963	9,100
1961	8,144	9,010	10,118	9,572
1962	8,986	9,863	11,313	10,399
1963	9,575	10,415	12,079	11,171
1964	10,444	11,511	12,903	12,145

Source: DBS, National Accounts: Income and Expenditures, by quarters, Table 1, lines 9 and 13.

TABLE B4.--Canadian domestic price index. Implict price deflator GNP.
(1957 = 100)

Year	Quarters			
	I	II	III	IV
1950			78.6	80.3
1951	82.2	84.9	88.0	90.2
1952	90.6	90.8	90.1	90.5
1953	90.8	90.3	91.2	91.2
1954	92.2	92.9	93.5	93.9
1955	93.0	9.30	93.3	94.7
1956	95.4	96.6	97.4	98.8
1957	99.3	99.8	100.4	100.5
1958	100.9	102.0	101.8	102.8
1959	103.6	104.1	104.8	105.6
1960	105.4	105.9	106.0	106.5
1961	106.7	106.6	106.6	106.9
1962	107.6	108.1	108.7	109.2
1963	109.6	110.1	110.4	111.1
1964	111.6	112.3	113.3	113.8

Source: DBS, National Accounts: Income and Expenditures, by quarters, Table 19, line 12.

TABLE B5.--Foreign price index. Implicit price deflator, Imports of goods and services.
(1957 = 100)

Year	Quarters			
	I	II	III	IV
1950			91.2	92.9
1951	97.9	102.7	102.4	100.1
1952	95.6	92.8	91.6	92.2
1953	92.4	93.1	93.9	93.7
1954	92.9	93.8	94.0	93.3
1955	93.3	93.5	94.1	96.4
1956	97.2	97.3	97.6	97.5
1957	98.9	99.8	100.4	101.0
1958	102.1	101.1	101.3	101.5
1959	101.1	101.1	100.9	100.6
1960	101.0	101.8	102.3	102.5
1961	103.6	103.3	105.9	107.2
1962	108.2	109.4	109.7	110.1
1963	111.1	111.6	113.3	113.6
1964	114.4	115.0	114.3	113.7

Source: DBS, National Accounts: Income and Expenditures, by quarters Table 19, line 11.

TABLE B6.--Canadian short term interest rate three month treasury bill rate--quarterly, mid-month quotations.

Year	I	II	III	IV
1950			0.56	0.62
1951	0.70	0.75	0.81	0.91
1052	0.91	1.02	1.11	1.25
1953	1.44	1.58	1.82	1.90
1954	1.74	1.58	1.30	1.14
1955	1.03	1.33	1.65	2.45
1956	2.58	2.71	2.90	3.51
1957	3.72	3.77	3.88	3.67
1958	2.79	1.61	1.54	3.07
1959	3.73	4.90	5.58	4.98
1960	4.45	3.04	2.53	3.23
1961	3.15	3.06	2.50	2.59
1962	3.10	3.64	5.22	4.05
1963	3.71	3.38	3.56	3.64
1964	3.82	3.66	3.73	3.76

Source: International Monetary Fund (IMF) International Financial Statistics, various issues.

TABLE B7.--Foreign short term interest rate, U.S. three month treasury bill rate quarterly, average daily quotations.

Year	Quarters			
	I	II	III	IV
1950			1.23	1.35
1951	1.40	1.53	1.62	1.65
1952	1.64	1.67	1.83	1.92
1953	2.04	2.20	2.02	1.48
1954	1.08	0.81	0.87	1.03
1955	1.26	1.51	1.86	2.35
1956	2.38	2.60	2.60	3.06
1957	3.17	3.16	3.38	3.34
1958	1.84	1.02	1.71	2.79
1959	2.80	3.02	3.55	4.30
1960	3.94	3.09	2.39	2.36
1961	2.38	2.32	2.32	2.48
1962	2.74	2.72	2.86	2.80
1963	2.91	2.94	3.28	3.50
1964	3.54	3.48	3.50	3.68

Source: IMF, International Financial Statistics, various issues.

TABLE B8.--Spot exchange rate, U.S. dollars per Canadian dollar.
(Average Noon rate)

Year	Quarters			
	I	II	III	IV
1950			.9070	.9533
1951	.9529	.9396	.9459	.9614
1952	.9994	1.0190	1.0120	1.0228
1953	1.0308	1.0177	1.0294	1.0320
1954	1.0246	1.0177	1.0294	1.0320
1955	1.0246	1.0148	1.0144	1.0019
1956	1.0012	1.0089	1.0200	1.0350
1957	1.0434	1.0459	1.0499	1.0328
1958	1.0193	1.0348	1.0341	1.0332
1959	1.0304	1.0398	1.0477	1.0529
1960	1.0506	1.0257	1.0274	1.0212
1961	1.0102	1.0058	.9689	.9651
1962	.9545	.9317	.9279	.9292
1963	.9281	.9282	.9252	.9275
1964	.9258	.9252	.9269	.9306

Source: Bank of Canada. Statistical Summary, Supplement various issues. Above is inverse of reported rates.

TABLE B9.--Forward exchange rate, U.S. dollar per Canadian dollar.
(Average Noon Rate)

Year	Quarters			
	I	II	III	IV
1950			.9577	.9577
1951	.9565	.9429	.9494	.9638
1952	.9984	1.0171	1.0354	1.0276
1953	1.0200	1.0076	1.0081	1.0190
1954	1.0262	1.0128	1.0271	1.0298
1955	1.0243	1.0150	1.0148	1.0017
1956	1.0008	1.0075	1.0171	1.0302
1957	1.0386	1.0427	1.0460	1.0288
1958	1.0167	1.0334	1.0337	1.0334
1959	1.0287	1.0357	1.0422	1.0496
1960	1.0493	1.0260	1.0275	1.0205
1961	1.0097	1.0049	.9687	.9656
1962	.9542	.9306	.9234	.9269
1963	.9264	.9278	.9250	.9275
1964	.9257	.9255	.9269	.9302

Source: Bank of Canada. Statistical Summary, Supplement, various issues; above is inverse of reported rates.

TABLE B10.--Adjusted spot exchange rate, U.S. dollars per Canadian dollar.

Year	Quarters			
	I	II	III	IV
1950				.9603
1951	.9596	.9468	.9535	.9684
1952	1.0066	1.0255	1.0192	1.0296
1953	1.0369	1.0239	1.0315	1.0278
1954	1.0179	1.0100	1.0251	1.0309
1955	1.0270	1.0166	1.0165	1.0009
1956	.9992	1.0078	1.0170	1.0306
1957	1.0378	1.0397	1.0449	1.0295
1958	1.0099	1.0288	1.0359	1.0304
1959	1.0211	1.0212	1.0276	1.0461
1960	1.0455	1.0261	1.0260	1.0126
1961	1.0071	1.0063	1.0016	1.0017
1962	1.0032	1.0078	1.0180	1.0097
1963	1.0059	1.0039	1.0025	1.0013
1964	1.0026	1.0021	1.0022	1.0003

Source: Tables B6, B7, B8; derived from

$$r_a = r_s \frac{1 + if}{1 + ic}$$

TABLE B11.--Forward/spot exchange rate differential.

Year	Quarters			
	I	II	III	IV
1950				.9973
1951	.9967	.9959	.9957	.9952
1952	.9919	.9918	1.0159	.9980
1953	.9837	.9841	.9773	.9914
1954	1.0082	1.0028	1.0020	.9989
1955	.9974	.9984	.9983	1.0008
1956	1.0016	.9997	1.0001	.9996
1957	1.0007	1.0029	1.0011	.9993
1958	1.0067	1.0045	.9979	1.0029
1959	1.0074	1.0142	1.0142	1.0033
1960	1.0036	.9999	1.0016	1.0078
1961	1.0071	1.0063	1.0016	1.0017
1962	1.0032	1.0078	1.0180	1.0097
1963	1.0059	1.0039	1.0025	1.0013
1964	1.0026	1.0021	1.0022	1.0003

Source: Tables B9 and B10 derived from $rd = rf / ra$

TABLE B12.--Incremental forward/spot exchange rate differential.

Year	Quarters			
	I	II	III	IV
1950				.9994
1951	.9994	.9992	.9998	.9995
1952	.9967	.9999	1.0243	.9824
1953	.9857	1.0004	.9931	1.0144
1954	1.0169	.9946	.9992	.9969
1955	.9985	1.0010	.9999	1.0025
1956	1.0008	.9981	1.0004	.9995
1957	1.0011	1.0022	.9982	.9982
1958	1.0074	.9978	.9934	1.0050
1959	1.0045	1.0068	1.0000	.9892
1960	1.0003	.9963	1.0016	1.0063
1961	.9993	.9992	.9953	1.0001
1962	1.0015	1.0046	1.0101	.9918
1963	.9962	.9980	.9986	.9988
1964	1.0013	.9995	1.0001	.9981

Source: Table B11 derived from $r'd = \frac{rd_t}{rd_{t-1}}$.

TABLE B13.--Import volume, imports of goods and services, unadjusted for seasonal variation.
(Millions of constant Canadian dollars)

Year	Quarters			
	I	II	III	IV
1950	1,025	1,292	1,247	1,434
1951	1,286	1,522	,1449	1,306
1952	1,257	1,474	1,477	1,602
1953	1,445	1,715	1,593	1,510
1954	1,361	1,577	1,467	1,557
1955	1,497	1,717	1,769	1,842
1956	1,758	2,128	1,990	2,044
1957	1,861	2,135	1,960	1,854
1958	1,632	1,924	1,828	1,931
1959	1,742	2,153	2,072	2,090
1960	1,883	2,129	1,985	2.010
1961	1,834	2,088	2,044	2,113
1962	1,892	2,217	2,077	2,074
1963	1,864	2,183	2,155	2,283
1964	2,153	2,492	2,353	2,507

Source: Tables B2 and B5; derived from $M_v = \frac{M}{p_f}$.

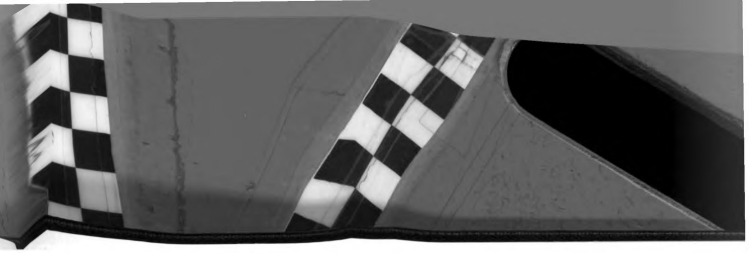

TABLE B14.--Gross national product, Constant dollars, unadjusted for seasonal variation. (Millions of Canadian Dollars)

Year	Quarters			
	I	II	III	IV
1950	4,953	5,444	6,807	5,879
1951	5,416	6,007	7,190	5,864
1952	5,661	6,320	5,739	6,581
1953	6,014	6,684	8,102	6,726
1954	5,993	6,547	7,421	6,735
1955	6,243	7,101	8,374	7,296
1956	6,881	7,585	9,062	7,921
1957	7,226	7,872	8,859	7,944
1958	7,121	7,945	9,008	8,205
1959	7,421	8,202	9,219	8,425
1960	7,734	8,228	9,399	8,545
1961	7,633	8,452	9,492	8,954
1962	8,351	9,124	10,408	9,523
1963	8,682	9,460	10,941	10,055
1064	9,358	10,250	11,388	10,672

Source: Tables B3 and B4; derived from $Y = \frac{GNP}{P_c}$.

TABLE B15.--Index of relative prices adjusted for exchange rates.

Year	Quarters			
	I	II	III	IV
1950				
1951	1.2499	1.2874	1.2302	1.1543
1952	1.0558	1.0030	1.0046	.9961
1953	.9872	1.0131	1.0002	.9956
1954	.9834	.9921	.9766	.9628
1955	.9791	.9907	.9943	1.0160
1956	1.0176	.9984	.9824	.0535
1957	.9545	.9561	.9525	.9731
1958	.9927	.9578	.9623	.9556
1959	.9471	.9340	.9190	.9048
1960	.9121	.9372	.9394	.9425
1961	.9611	.9635	1.0253	1.0391
1962	1.0535	1.0864	1.0872	1.0847
1963	1.0924	1.0920	1.0979	1.1018
1964	1.1074	1.1068	1.0886	1.0736

Source: Tables B4, B5 and B8; derived from r/ = $\frac{pf}{rPc}$.

TABLE B16.--Expected exchange index.

Year	Quarters			
	I	II	III	IV
1950				1.2460
1951	1.2483	1.2718	1.2468	1.1913
1952	1.1100	1.0458	1.0211	1.0061
1953	.9938	1.0057	1.0024	.9983
1954	.9894	.9910	.9824	.9706
1955	.9757	.9847	.9904	1.0058
1956	1.0129	1.0042	.9911	.9685
1957	.9601	.9577	.9546	.0657
1958	.9819	.9675	.9644	.9591
1959	.9519	.9412	.9278	.9140
1960	.9129	.9276	.9346	.9393
1961	.9524	.9490	.9988	1.0230
1962	1.0413	1.0848	1.0688	1.0784
1963	1.0868	1.0899	1.0942	1.0987
1964	1.1039	1.1057	1.0954	1.0823

Souece: Generated by solving equation 4.21 for $\gamma = 0.6$. See Chapter V, footnote 14.

TABLE B17.--Actual and estimated Canadian imports 1951(I) to 1964(IV) inclusive.
(Millions of Canadian Dollars)

	Quarter											
	I			II			III			IV		
	M	$\hat{M}$	ε	M	$\hat{M}$	ε	M	$\hat{M}$	ε	M	$\hat{M}$	ε
1951	1286	1175	111	1522	1427	95	1449	1398	51	1306	1325	- 19
1952	1257	1291	- 34	1474	1611	-137	1477	1249	228	1602	1532	70
1953	1445	1398	47	1715	1714	1	1593	1707	-114	1510	1654	-144
1954	1361	1479	-118	1576	1675	- 99	1467	1580	-113	1557	1623	- 66
1955	1497	1493	4	1717	1820	-103	1769	1792	- 23	1842	1747	95
1956	1758	1625	133	2128	1912	216	1990	1948	42	2044	1899	145
1957	1861	1729	132	2135	2011	124	1960	1915	45	1854	1902	- 48
1958	1632	1712	- 80	1924	2010	- 86	1828	1930	-102	1931	1982	- 51
1959	1742	1786	- 44	2153	2106	47	2072	2014	58	2090	2011	79
1960	1883	1865	18	2129	2090	39	1985	2055	- 70	2010	2072	- 62
1961	1834	1820	14	2088	2133	- 45	2044	2028	16	2113	2106	7
1962	1892	1944	- 52	2217	2236	- 19	2077	2438	-361	2074	1986	88
1963	1864	1982	-118	2183	2292	-109	2155	2514	-359	2283	2114	169
1964	2153	2139	14	2492	2466	26	2353	2619	-266	2507	2262	245

Source: Table B13 and estimates derived from equation 5.1a.

BIBLIOGRAPHY

BIBLIOGRAPHY

Articles and Periodicals

Aliber, R. Z. "Speculation in the Foreign Exchanges: The European Experience, 1919-1926." Yale Economic Essays, II (Spring, 1962), 171-245.

Artus, R. E. "Canada Pegs Its Dollar." The Banker, CXII, (June, 1962), 362-369.

Balogh, T., and Streeten, P. P. "The Inappropriateness of Simple 'Elasticity' Concepts in the Analysis of International Trade." Bulletin of the Oxford University Institute of Statistics, XIII (April, 1951), 65-77.

Baumol, W. J. "Speculation, Profitability, and Stability." Review of Economics and Statistics (XXXIX (August, 1957), 263-271.

Binhammer, H. H. "Canada's Foreign Exchange Problems: A Review." Kyklos, XVII (No. 4, 1964), 636-652.

Brown, A. J. "Trade Balance and Exchange Stability." Oxford Economic Papers, VI (April, 1942), 101-108.

Caves, R. E. "Flexible Exchange Rates." American Economic Review, LIII (May, 1963), 120-129.

Durban, J, and Watson, G. S. "Testing for Serial Correlation in Least-Squares Regression." Pts. I and II. Biometrica (1950-51), 409-428.

Eastman, H. C. "Aspects of Speculation in the Canadian Market for Foreign Exchanges." Canadian Journal of Economics and Political Science, XXIV (August, 1958), 355-372.

Ellsworth, P. T. "Exchange Rates and Exchange Stability." Review of Economics and Statistics, XXXII (February, 1950), 1-12.

Fleming, J. M. "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates." IMF Staff Papers, IX (November, 1962), 369-380.

Haberler, G. "The Market of Foreign Exchange and Stability of the Balance of Payments." Kyklos, III (Fash. 3, 1949), 193-218.

Harrod, R. F. "Convertibility Problems." Economia Internazionale, XIII (February, 1955), 20-34.

Helleiner, Gerald K. "Connections Between United States' and Canadian Capital Markets, 1952-1960." Yale Economic Essays, II (Fall, 1962), 398-400.

Ingram, James C. "The Canadian Exchange Rate, 1950-57." Southern Economic Journal, XXVI (January, 1960), 207-218.

Katz, Samuel I. "Le dollar canadien et le course de change fluctuant." Bulletin d'Information et de Documentation de la Banque Nationale de Belguique. 30th year, I (May, 1955), 7-8.

_____. "The Canadian Dollar: A Fluctuating Currency." Review of Economics and Statistics, XXXV (August, 1953), 236-237.

Klein, L. R. "The Estimation of Distributed Lags." Econometrica, XXVI (October, 1958), 553-565.

Laursen, S., and Metzler, L. A. "Flexible Exchange Rates and the Theory of Employment." Review of Economics and Statistics, XXXII (November, 1950), 281-299.

Lutz, F. "The Case for Flexible Exchange Rates." Banca Nazionale del Lavoro Quarterly Review, VII (December, 1954), 175-185.

Meade, J. G. "The Case for Variable Exchange Rates." Three Banks Review, XXVII (September, 1955), 3-27.

Morgan, E. V. "The Theory of Flexible Exchange Rates." American Economic Review, XLV (June, 1955), 279-295.

Mundell, Robert A. "Flexible Exchange Rate and Employment Policy." Canadian Journal of Economics and Political Science, XXVII (November, 1961), 509-517.

_____. "Monetary Dynamics of International Adjustment Under Fixed and Flexible Exchange Rates." Quarterly Journal of Economics, LXXIV (May, 1961), 227-257.

_____. "Problems of Monetary and Exchange Rate Management in Canada." The National Banking Review, XI (September, 1964), 77-86.

Nerlove, M. "The Market Demand for Durable Goods: A Comment." Econometrica, XXVIII (January, 1960), 132-142.

Orcutt, G. "Measurement of Price Elasticities in International Trade." Review of Economics and Statistics, XXXII (May, 1950), 117-132.

Penner, Rudolph G. "Inflow of Long-term Capital and the Canadian Business Cycle, 1950-1960." Canadian Journal of Economics and Political Science, XXVIII (November, 1962), 527-542.

Pippenger, John. "The Canadian Experience with Flexible Exchange Rates." American Economic Review, LVII (May, 1967), 545-555.

Poole, W. "The Stability of the Canadian Flexible Exchange Rate." The Canadian Journal of Economics, XXXIII, No. 2 (May, 1967), 205-217.

Rhomberg, R. R. "A Model of the Canadian Economy Under Fixed and Fluctuating Exchange Rates." Journal of Political Economy, LXXII (February, 1964), 1-29.

_____. "Canada's Foreign Exchange Market: A Quarterly Model." IMF Staff Papers, VII (April, 1960), 439-456.

Stone, R., and Rowe, D. A. "The Market Demand for Durable Goods." Econometrica, XXV (July, 1957), 423-443.

Telser, L. G. "A Theory of Speculation Relating Profitability and Stability." Review of Economics and Statistics, XLI (August, 1959), 295-301.

Tsiang, S. C. "An Experiment with a Flexible Exchange Rate System: The Case of Peru, 1950-54." IMF Staff Papers, V (February, 1957), 449-476.

_____. "Fluctuating Exchange Rates in Countries with Relatively Stable Economics: Some European Experience After World War I." IMF Staff Papers, VII (October, 1959), 244-273.

Yeager, Leland. "Some Facts About the Canadian Exchange Rate." Current Economic Comment, XX (November, 1958), 39-54.

Books and Reports

Brewis, T. N., et al. Canadian Economic Policy. Toronto: The Macmillan Company of Canada Ltd., 1961.

Christ, C. F. Econometric Models and Methods. New York: John Wiley and Sons, Inc., 1966.

Clement, M. O.; Pfister, R. K.; and Rothwell, K. J. Theoretical Issues in International Economics. Boston: Houghton Mifflin Co., 1967.

Cornell, Peter M. "Exchange Flexibility in Canada: Some Underlying Factors." Public Policy. A Year Book of the Graduate School of Public Administration, Harvard University, 1958.

Dhrymes, P. J. "Efficient Estimation of Distributed Lags with Autocorrelated Error Terms." Discussion Paper No. 23, Department of Economics, University of Pennsylvania, 1968.

Friedman, Milton. Essays in Positive Economics. Chicago: University of Chicago Press, 1953.

Friedman, Milton, and Roosa, R. V. The Balance of Payments: Free Versus Fixed Exchange Rates. Washington, D.C.: American Enterprise Institute, 1967.

Haberler, G. Currency Convertibility. No. 541 in the series "National Economic Problems." Washington, D.C.: American Enterprise Association, 1954.

Hicks, John R. Value and Capital. 2d. ed. London: Oxford University Press, 1946.

Johnson, Harry G. The Canadian Quandary: Economic Problems and Policies. Toronto: McGraw-Hill Co. of Canada Ltd., 1963.

Johnston, J. Econometric Methods. New York: McGraw-Hill, 1963.

Kemp, M. The Demand for Canadian Imports 1926-1955. Toronto: University of Toronto Press, 1962.

Kindleberger, C. E. "Flexible Exchange Rates." Monetary Management. Prepared for the Commission on Money and Credit, 1963.

Kindleberger, Charles P. International Economics. 4th ed. Homewood, Illinois: Richard D. Irwin, Inc., 1968.

Klein, L. R. A Textbook of Econometrics. Evanston, Illinois: Row, Peterson & Co., 1953.

Meade, J. E. The Balance of Payments and Mathematical Supplement. London: Oxford University Press, 1951.

Nerlove, Marc. Distributed Lags and Demand Analysis for Agricultural and Other Commodities. USDA Agricultural Handbook No. 141, Washington, D.C., 1958.

Neufield, E. P. Bank of Canada Operations and Policy. Toronto: University of Toronto Press, 1958.

Nurkse, Ragnar. International Currency Experience. Geneva: League of Nations, 1944.

Officer, L. An Economic Model of Canada Under the Fluctuating Exchange Rate. Harvard Economic Series. Cambridge: Harvard University Press, 1968.

Samuelson, P. A. "Disparity in Postwar Exchange Rates." Foreign Economic Policy for the United States. Edited by S. E. Harris. Cambridge, Mass.: Harvard University Press, 1947.

Scammell, W. M. International Monetary Policy. 2d ed. London: Macmillan, 1961.

Sohmen, Egon. Flexible Exchange Rates - Theory and Controversy. Chicago: University of Chicago Press, 1961.

_____. International Monetary Problems and the Foreign Exchanges. Princeton, N.J.: Princeton University International Finance Section, Special Papers in International Economics, No. 4, 1963.

Stackelberg, H. von. "Die Theorie des Wechselkurses bei vollständiger Konkurrens." Jahrbucher fur National-Okonomie und Statistik, CLXI (1949), 1-65. Translated in "international Economic Papers," No. 1, pp. 104-159. London and New York: Macmillan, 1951.

Stuvel, G. The Exchange Stability Problem. New York: Augustus M. Kelley, 1951.

Vanek, J. International Trade: Theory and Economic Policy. Homewood, Ill.: Richard D. Irwin, Inc., 1962.

Watkins, M. H., and Forster, D. F., eds. Economics: Canada. Toronto: McGraw-Hill Company of Canada Ltd., 1963.

Wonnacott, R. The Canadian Dollar 1948-1958. Toronto: University of Toronto Press, 1958.

Yeager, L. B. International Monetary Relations. New York: Harper & Row Publishers, 1966.

Young, J. H., and Helliwell, J. F. "The Effects of Monetary Policy on Corporations." Royal Commission on Banking and Finance. Ottawa: 1964.

Zellner, A., and Geisel, M. S. "Analysis of Distributed Lag Models with Applications to Consumption Function Estimation." Manuscript, Department of Economics, University of Chicago (January, 1968).

Public Documents

Bank of Canada. Statistical Summary, Supplement. Ottawa: Various issues.

Dominion Bureau of Statistics. National Accounts. Income and Expenditures by Quarters. Ottawa: various issues.

_____. Sales and Purchases of Securities Between Canada and Other Countries. Ottawa: Cat. No. 67-002.

_____. The Canadian Balance of International Payments. Ottawa: Cat. Nos. 67-201 and 67-001.

International Monetary Fund. International Financial Statistics. Washington, D.C.: various issues, 1950-1964.

Meade, J. E. "The Future of International Payments." Factors Affecting the United States Balance of Payments. U. S. Congress, 87th Cong., 2d Sess., 1962.

United Nations. Monthly Bulletin of Statistics. New York: Statistical Office of the United Nations, various issues 1950-1964.