THE CRAWLING PEG:

A THEORETICAL AND EMPIRICAL STUDY

by

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M.A.   ECONOMICS

In this study we have attempted to explore some of the
theoretical and empirical issues associated with a crawling
exchange peg. The problem here discussed is whether or not
the crawl of the exchange rate has destabilizing effects on
expectations. Two aspects of the crawling peg are explored:
the effects of capital movements induced by an appreciation
or depreciation on the balance of payments, where perhaps
short-term capital movements would offset net surpluses or
deficits in the rest of a country's balance of payments; and
the effects of capital movements induced by a crawl on domestic
monetary management. The ability to follow an independent
monetary policy will be affected by capital movements under
the crawling peg. The method of testing the stated problem
is based on the accepted theory of the forward foreign
exchange market, and examines the Canadian experience under
a fixed exchange rate system, 1962 to 1970, for answers to
the problem raised.

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Johann Ungar

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CHAPTER 1

INTRODUCTION

In this study we have attempted to explore some of the theoretical
and empirical issues associated with a crawling exchange peg.[1] The
principal problem here discussed is whether or not the crawl of the
exchange rate has destabilizing effects on expectations. Two related views
can be distinguished in the literature regarding the possible disequilibra-
ting effects of capital movements: a) J. Herbert Furth's view that during
any upward crawl capital inflows will be accelerated as long as the market
believes the rise in the exchange rate will continue;[2] b) Samuel Katz'
qualification that a self-reinforcing upward crawl would be limited only
to a country with a protracted surplus, and a downward crawl only to a
country in a continuing deficit.[3]

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1. In recent years interest in limited exchange flexibility has
increased and there has been a growing body of literature on a crawling
peg: John H. Williamson, The Crawling Peg, Essays in International Finance,
No. 50 (Princeton, New Jersey: Princeton University International Finance
Section, January, 1970); George N. Halm, Toward Limited Exchange Rate
Flexibility, Essays in International Finance, No. 73 (Princeton, New
Jersey: Princeton University International Finance Section, March, 1969);
George W. McKenzie, "International Monetary Reform and the 'Crawling Peg',"
Federal Reserve Bank of St. Louis Review, (February, 1969), pp. 15-23,
and "International Monetary Reform and the 'Crawling Peg' - Reply," ibid.,
(July, 1969), pp. 26-31; J. Herbert Furth, "International Monetary Reform
and the 'Crawling Peg' - Comment," ibid., (July, 1969), pp. 21-25; Thomas
D. Willet, S.I. Katz and W.H. Branson, Exchange-Rate Systems, Interest
Rates and Capital Flows, Essays in International Finance, No. 78
(Princeton, New Jersey: Princeton University International Finance Section,
January, 1970).
2. J.H. Furth, "International Monetary Reform and the 'Crawling Peg'
- Comment," Federal Reserve Bank of St. Louis Review, (July, 1969), p. 2.
3. S.I. Katz, "The Interest Rate Constraint and the Crawling Peg" in
T.D. Willet, S.I. Katz and W.H. Branson, Exchange-Rate Systems, Interest
Rates, and Capital Flows, Essays in International Finance, No. 78
(Princeton, New Jersey: Princeton University International Finance Section,
January, 1970), p. 18.

Two aspects of the crawling peg need to be explored: the effects of capital movements induced by an appreciation or depreciation on the balance of payments, where perhaps short-term capital movements would offset net surpluses or deficits in the rest of a country's balance of payments; and the effect of capital movements induced by a crawl on domestic monetary management. The ability to follow an independent monetary policy will be affected by capital movements under the crawling peg.

Recent Literature

Discussion of capital movements has traditionally emphasized interest-rate arbitrage. In the past several years there has been a growing body of empirical research on the "sensitivity" of short-term capital movements to interest rate differentials.[4] This paper, however, looks at speculative periods and the behaviour of the premium or discount, i.e., the forward rate expressed as a per cent of the spot rate, during these periods.

An examination of the effects of capital flows induced by a crawl on monetary policy is made from the point of view of: a) the height and variability of short-term interest rates needed to neutralize a crawl;

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4. Philip W. Bell, "Private Capital Movements and the U.S. Balance-of-Payments Position," in U.S. Congress, Joint Economic Committee, Factors Affecting the United States Balance of Payments, Part 6, 87th Congress, 2nd Sess. (Washington D.C.: U.S. Government Printing Office, 1962), pp. 395-482; Peter B. Kenen, "Short-term Capital Movements and the U.S. Balance of Payments," in U.S. Congress, Joint Economic Committee, The United States Balance of Payments Hearings, Part 1, 88th Congress, 1st Sess., (Washington, D.C.: U.S. Government Printing Office, 1963), pp. 153-191, and B.J. Cohen, "A Survey of Capital Movements and Findings Regarding their Interest Sensitivity," ibid., pp. 192-208; Jerome L. Stein, "International Short-Term Capital Movements," American Economic Review, Vol. LVII (March, 1965), pp. 40-66.

b) the impact of the central bank foreign exchange operations on the money supply when it is necessary to keep the currency crawling in an orderly way. (Strong central bank support would be inevitable if flows under the crawling peg were as large and as volatile as the analyses of Furth and Katz suggest). This study contributes towards the analysis of disequilibria in balance of payments within the framework Robert A. Mundell's work on capital mobility and stabilization policies under fixed and flexible exchange rates.[5] Detailed explanations of the mechanism of balance of payments adjustment have not been completely worked out. This study should provide some indication of such adjustment mechanisms.

The method for testing the stated problem is within the accepted theory of short-term capital movements based on short-term interest differentials and speculation.on changes in the exchange rate.

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5. The analysis is based extensively on R.A. Mundell's article, "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," Canadian Journal of Economics and Political Science, Vol. XXIX (November, 1963), pp. 475-485. Other related articles by the same author are: "The Monetary Dynamics of International Adjustment under Fixed and Flexible Exchange Rates," Quarterly Journal of Economics, Vol. LXXIV (May, 1960), pp. 227-57; "Flexible Exchange Rates and 'Employment Policy'," Canadian Journal of Economics and Political Science, Vol. XXVII (1961), pp. 509-17; "Capital Mobility and Size," ibid., Vol. XXX (August, 1964), pp. 421-31; "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability," International Monetary Fund Staff Papers, Vol. IX (March, 1962), pp. 70-77; "Problems of Monetary and Exchange-Rate Management in Canada," National Banking Review, Vol. II (September, 1964), pp. 77-86.

The analysis builds to a large extent on the works of Keynes, Einzig,

Spraos, Jasay and Reading and on the more recent works of Stein, Grubel

and Branson.[6]

Methodology

The empirical analysis stems from the hypothesis that "during normal

times forward rates should be such that interest arbitrage is not profit-

able and that during times of speculation sizable profit opportunities

from arbitrage should exist."[7] Normal times are defined in the paper to

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6. J.M. Keynes, Monetary Reform, (New York: Harcourt, Brace and Co.,
1930); P. Einzig, A Dynamic Theory of Forward Exchange, (London: Macmillan
and Co., 1961) and "Some Recent Changes in Foreign Exchange Practices,"
Economic Journal, Vol. LXX (September, 1960), pp. 485-495; J. Spraos,
"The Theory of the Forward Exchange and Recent Practice," Manchester
School of Economics and Social Studies, Vol. XXI (May, 1953), pp. 87-
117, and "Speculation, Arbitrage and Sterling," Economic Journal,
Vol. LXIX (March, 1959), pp. 1-21; A.E. Jasay, "Bank Rate or Forward
Exchange Policy," Banca Nazionale del Lavoro Quarterly Review, No. 44
(March, 1958), pp. 56-73. B. Reading, "The Forward Pound 1951-59,"
Economic Journal, Vol. LXX (June, 1960), pp. 304-19; J.L. Stein,
"International Short-Term Capital Movements," American Economic Review,
Vol. LV (March, 1965), pp. 40-66; H.G. Grubel, "A Multicountry Model of
Forward Exchange: Theory, Policy, and Empirical Evidence," Yale Economic
Essays, Vol. VIII (Spring,1963), pp. 105-169; W.H. Branson, "The
Minimum Covered Interest Differential Needed for International Arbitrage
Activity," Journal of Political Economy, Vol. LXXVII (November, 1969),
pp. 1023-1035.
7. H.G. Grubel tests this hypothesis in "A Multicountry Model of
Forward Exchange: Theory, Policy, and Empirical Evidence," Yale Economic
Essays, Vol. VIII (Spring, 1963), pp. 105-169; he finds the hypothesis
essentially correct, p. 104 and p. 142.

include periods when the covered incentive is within ± 0.18% per annum
of interest parity. The ± 0.18% p.a. separation of arbitrage from
speculation represents the minimum critical covered interest differential
needed for international interest arbitrage, i.e., the elastic range of
the spot arbitrage supply curve.[8] In cases where the net incentive
exceeds the arbitrage limits so that sizeable profit opportunities exist,
speculation is said to exist. When differences between the unhedged short-
term interest differential and the premium, i.e., the forward rate
expressed as a per cent of the spot rate, become temporarily abnormal
because of speculation the differences between the unhedged interest
differential and the premium will exceed ± 0.18% per annum and lie outside
the arbitrage limits. We call such differences "speculative values."
The argument is that the differences, i.e., speculative values, give a
reasonable reflection of speculative pressure for or against the U.S.
dollar in the Canadian foreign exchange market. These values are then
compared to the behaviour of the spot rate to see whether speculation is
stabilizing or destabilizing.

Empirical Research

The crawling peg has never been tested as a possible system in opera-
tion. The aim here is to examine the Canadian experience under a fixed
rate system, 1962 to 1970, and delve into the issues surrounding the

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8. I would like to thank Professor Alex Vicas for suggesting this
technique of separating arbitrage from speculation and using William H.
Branson's 0.18% figure for the arbitrage limits. W.H. Branson calculated
this differential for professional arbitrage to be 0.18% per annum in
"The Minimum Covered Interest Differential Needed for International
Arbitrage Activity," Journal of Political Economy, Vol. LXXVII (November,
1969), pp. 1028-1035.

operation of this peg for answers to the problem raised. A fixed rather than a floating exchange rate period was chosen because the variation of the crawling peg as discussed in this thesis is a mutation of the present I.M.F. system and resembles more closely a fixed rate rather than a floating rate system, and the Canadian money market institutions were more developed in the nineteen-sixties than in earlier periods, reducing the importance of market imperfections as a factor explaining international flows of funds.[9]

The computation of the speculative values involves data on 90-day premiums or discounts on the U.S. dollar and on 90-day Canadian minus U.S. Treasury bill differences. Previous investigations about the equilibrating or disequilibrating nature of exchange rates and short-term capital flows employed quarterly balance of payments statistics.[10] In this thesis, the effects of forward transactions are included and weekly data are used.

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9. For a more detailed discussion on the development of the Canadian money market see the following: R.M. MacIntosh, "Broadening the short-term Money Market," The Canadian Banker, Vol. LXI (Autumn, 1954), pp. 63-73; Bruce K. MacLaury, The Canadian Money Market: Its Development and its Impact (Cambridge, Massachusetts: Harvard University, 1961); J.J. Dowsley and B. Hart, "The Short-Term Money Market and Instruments," The Canadian Banker, Vol. LXXIII (Autumn, 1966), pp. 79-90; G.E. King and P. Campbell, "The Bank Act and the Money Market," ibid., Vol. LXXIV (Summer, 1967), pp. 90-99.

10. Samuel Katz, Two Approaches to the Exchange Rate Problem: The United Kingdom and Canada, Essays in International Finance, No. 26 (Princeton, New Jersey: Princeton University International Finance Section August, 1956), p. 9. Paul Wannacott, The Canadian Dollar: 1948-1962, (Toronto: University of Toronto Press, 1965), pp. 67-75 and 170-79. Both authors look at quarterly short-term flows whether they supplement or offset surpluses or deficits on the combined current and capital accounts.

Outline of the Work

Chapter II presents the main advantages of the crawling peg. The variation of the crawling peg is basically Professor Meade's which allows for parity changes of 1/6 of 1% per month or about 2% per year. The present one per cent margin around par is retained.

In Chapter III, we examine the possible disequilibrating effects of a crawl, as suggested by the analyses of Samuel Katz and J. Herbert Furth. This examination considers the effects of short-term capital flows induced by a crawl on the balance of payments and domestic monetary management.

Chapter IV derives from the theory of the forward exchange, the method of testing the probelm stated. Speculative values as well as stabilizing and destabilizing speculation are defined.

In Chapter V the empirical analysis is presented. The speculative values are calculated and compared to the behaviour of the spot rate. Special attention is paid to the forward exchange operations by the Canadian Exchange Fund Account which show that the speculative values did not result from the operations (since official sales or purchases cannot be separated from those of speculators). In order to see whether or not short-term capital flows are equilibrating or disequilibrating during speculative periods, the analysis is supplemented by looking at Canadian quarterly balance of payments statistics.

Chapter V summarizes the empirical and theoretical work.

CHAPTER II

THE ADJUSTABLE AND CRAWLING PEGS

The Adjustable Peg

The international monetary system presently in operation will be re-
ferred to as the adjustable peg. The term is used to define a system
where changes in the peg are "carried out infrequently, suddenly and in
a sizeable discrete step."[1] The provisions of its operation are outlined
in the Articles of Agreement of the International Monetary Fund. Some of
the main provisions of these articles are as follows. In the case of spot
exchange transactions a member nation's currency cannot differ from parity
by more than one per cent. The only limitation on forward exchange trans-
actions is that the deviation must not exceed those margins for spot
transactions by more than what the Fund considers reasonable. The par
value of a currency can be changed but only to correct a fundamental dis-
equilibrium. For a change exceeding ten per cent of the initial par in-
cluding all previous changes, whether there be increases or decreases in par,
the concurrence of the fund is necessary; for lesser changes it is not.[2]

Although under the adjustable peg a country can make suitable adjust-
ments in the rate in cases of fundamental disequilibrium, the present sys-
tem has evolved into a fairly rigid one. Two aspects of this system stand

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1. J.H. Williamson, The Crawling Peg, Essays in International Finance,
No.50 (Princeton, New Jersey: Princeton University International Finance
Section, December, 1965), p.2.
2. L.B. Yeager, International Monetary Relations (New York: Harper
and Row, 1962) pp. 348-49.

out: adjustments in the par value are rare, and they are made in large
steps. The idea of periodic adjustments has been neglected. People
holding a currency threatened by devaluation - entrepreneurs and traders -
will tend to move out of that currency because of the risk of substantial
capital losses, while to speculators the likelihood of such a devaluation
will signify a possibility for substantial profit. If the peg is not
changed the cost to the speculator will have been relatively small. In
order to discourage speculation against a country's currency the im-
probability of a change is stressed and a change will appear improbable if
it is infrequent.[3] The next point is that the peg tends to be changed in
sizeable discrete steps. Usually a great deal of disequilibrium must be
built up before devaluation is admitted to be inevitable. Since a new
fixed parity must be chosen a sufficiently large change in parity is made
rendering a second alteration unnecessary.

A fundamental disequilibrium can be corrected by an alteration in the
exchange rate but because the fixity of the rates is stressed adjustment
is in domestic prices and costs. Deficit countries should have restrictive
monetary and fiscal policies, the aim of which is to reduce expenditures
and thereby slow down the rise in prices, making the country internationally
more competitive. Surplus countries should adopt expansionary policies, the
excess demand adjusting prices and costs upward.

There is, however, a tendency for the mechanism to malfunction. A country
with a balance of payments surplus can accumulate reserves almost indefinitely

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3. James E. Meade, "Exchange Rate Flexibility", The Three Banks Review,
No. 70 (June, 1966), p. 11.

without adjusting; the deficit country only so long as it has reserves or can borrow, and is more likely to be forced to adjust. Too, prices and wage rates are often inflexible and may not be readily adjustable; prices and wages in the modern economy in particular are generally flexible upward in response to excess demand, but they tend to be rigid downward. This makes it more difficult for the deficit country to adjust. Furthermore, an upward creep in prices can take place despite growing over-capacity, slack in the labour market and slow real growth.[4] The great dilemma comes to deficit countries who have slack in the domestic economy and at the same time a deficit in the balance of payments. Domestic conditions require that demand be expanded to encourage growth and employment; balance of payments equilibrium may, in turn, require that demand be restricted further, and prolonged deflation may then be in order to put sufficient downward pressure on prices and costs.

The Crawling Peg

The crawling peg is a mutation of the present system. The term will be used to mean a "system under which par changes as occur are implemented slowly over time, in such a large number of small steps as to make the process of exchange rate adjustment continuous for all practical purposes."[5] The object of the crawling peg is to introduce more flexibility in the parity exchange rate, the assumption being that the system should allow for the peg to reflect basic changes in supply and demand for foreign exchange.

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4. Charles L. Schultze, "Recent Inflation in the United States: A Summary", in W. Smith and R. Teigen, Readings in Money, National Income and Stabilization Policy (Homewood, Illinois: Irwin Inc., 1965), p.128.
5. J.H. Williamson, The Crawling Peg, Essays in International Finance, No. 50 (Princeton, New Jersey: Princeton University International Finance Section, December, 1965), p.2.

Long-run adjustments in the balance of payments can be facilitated by allowing the exchange rate, at which the domestic currency is traded for that of the foreign, to vary, i.e., by raising the peg when there is a balance of payments surplus and lowering the peg when there is a deficit. This is perhaps a more appropriate way of altering relative costs and prices between countries. For example, if foreign currencies are allowed to appreciate in terms of the currency under pressure, the prices and costs of the deficit country will be reduced internationally, the foreign demand for its goods and services increased and, eventually, the deficit eliminated.

The above holds true, however, only under the Marshall-Lerner conditions where the " 'sum of the elasticities of (home) demand for imports plus the elasticity of (foreign) demand for imports' should be greater than unity."[6] If this sum is equal to one, the accepted corrective measures, i.e., an appreciation for a surplus and a depreciation for a deficit, will leave the balance of payments unchanged; if it is less than one, these measures will increase any surplus or deficit. But the preceding case is not likely to occur in advanced industrial countries whose products are competitive. Where products are not competitive substitution to buy from cheaper producers will not take place, nor will variable exchange rates function.

The second aspect of the crawling peg is the spreading of the exchange rate adjustment over long periods of time, the aim being to avoid the

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6. G. Haberler, "The Market for Foreign Exchange and the Stability of the Balance of Payments", Kyklos, Vol. III (1949), p.203.

periodic exchange crises and uncertainty of the present system of distur-
bing exchange rate alterations. The fear of such considerable changes in
parity - ten to twenty per cent - gives the foreign exchange market the
one way option. If the change in the peg occurs gradually, the prospect
of devaluation presumably provides no great incentive for huge positions
to be built up, since after devaluation the currency will differ but
slightly from its previous value.

Operation of the Crawling Peg

There are two possible alternatives for changing the peg: (a) have
the timing of such changes subject to official discretion; (b) make the
peg's crawl automatic. Today's rate may be considered as a mean (e.g.,
geometric mean) of the daily observations over part of a year, and could
be announced as the registered par exchange rate between the currencies
concerned.[7] National monetary authorities would then be required to keep
actual market rates within a price range of, say, $\pm$ one per cent of the
registered par. Thus, any currency under persistent pressure would decrease
in a value relative to the stronger currency.

James Meade suggests that the peg be allowed to crawl at a maximum of
one-sixth per cent per month, the timing of such changes being subject to
official discretion;

> "Further, within this narrow limit they would undertake to de-
> preciate their currencies if, but only if, they were faced with
> what appeared to be a continuing balance of payments deficit and

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7. J. Black, "A Proposal for the Reform of Exchange Rates", *Economic
Journal*, Vol. LXXVI (June, 1966), pp. 238-95.

to appreciate if, but only if, they were faced with what appeared to be a continuing balance of payments surplus. If the right to change the parity were exercised every month, the exchange value of the currency would be changed at a maximum rate of 2 per cent per annum."[8]

Any proposal, however, is subject to numerous variations. The variation of the crawling peg discussed in this paper is basically that of Professor Meade's.

An essential corrollary of the crawl is that the monetary authorities must maintain short-term interest rates at levels to keep creeping changes in par values from giving rise to capital flows. Supposing that Canada's currency were confidently expected to depreciate (assuming that the U.S. dollar stayed unchanged) then, in order to prevent a wholesale movement of short-term funds from Canada to the U.S. to take advantage of the expected 2 per cent change in the rate Canada's interest rates would eventually have to rise 2% above those of the U.S., in step with the depreciation of the exchange rate. This procedure would enable Canada to alter its prices and costs internationally up to 2% per annum. Assuming at the same time that the U.S. were in a surplus, appreciating its rate anywhere up to 2% per annum, relative prices and costs through movements of both exchange rates could be adjusted anywhere up to a maximum of 4% a year.[9]

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8. J.E. Meade, "The International Money Mechanism", The Three Banks Review, No. 63 (September, 1964), p.16. J.H. Williams advocates even shorter intervals, i.e., weekly changes of parity at a maximum 1/26%. If the changes were to occur in discrete steps of any size, there would be difficulty in avoiding occasions just before a peg changed, when it would be worth switching out of a currency (J.H. Williamson, loc. cit., p.2).

9. J.E. Meade, "Exchange Rate Flexibility", The Three Banks Review, No.70 (June, 1966), pp. 22-23.

CHAPTER III

PATTERN OF PRIVATE CAPITAL FLOWS

A principal problem in examining the crawling peg arises whether or not the crawl of the exchange rate has destabilizing effects on expectations. It is possible that investors and entrepreneurs may have greater incentives to place funds abroad under the crawling peg than under the adjustable peg. Two aspects of this problem need to be explored: firstly, the effects of such capital movements on the balance of payments, where perhaps such capital movements would offset net surpluses or deficits in the rest of a country's balance of payments; secondly, the effect of these capital movements during a crawl on domestic monetary management. This second aspect is related to whether or not the ability to follow an independent monetary policy as implied by capital movements under the crawling peg is reduced. While the same capital movements affect both the balance of payments and monetary management, it is useful to keep the two aspects conceptually distinct.

Two views can be deduced from the literature regarding the possible disequilibrating effects of capital flows on the balance of payments; (a) J. Herbert Furth's view that during any upward crawl capital inflows will be accelerated as long as the market believes that the rise in the exchange rate will continue;[1] (b) Samuel Katz' qualification that "the critical role of the expectation of a further upward crawl in the exchange rate would limit the likelihood of a self-reinforcing upward crawl only to

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1. J.H. Furth, "International Monetary Reform and the 'Crawling Peg' - Comment", _Federal Reserve Bank of St. Louis Review_, (July, 1969), p.2.

a country with a protracted surplus, and a downward crawl only to a country in continuing deficit."[2] The disequilibrium crawl under Furth's view is a function of the exchange rate; under Katz' of the balance of payments. Under the Furth assumption a built in mechanism of disequilibrium exists where there is any tendency of the spot rate to move in the same direction. Even if, for example, the exchange rate structure were in balance when the crawling peg is adopted disequilibrium could easily result. The mechanism could be set in motion when a currency begins to depreciate because of some new strain on the balance of payments. Here, speculators may expect a further fall as they observe the present decline. By driving forward domestic exchange to a discount, i.e., driving forward foreign exchange to a premium, a crawl incentive for reinforcing capital outflows would be set up. A forward discount on domestic currency, i.e.,a premium on foreign currency, tends to turn the arbitrage margin against the domestic economy. When sales of speculators and arbitrageurs are added to the other pressures on the balance of payments an additional drain on reserves is created.

A second aspect consists of the effect of capital movements induced by a crawl on domestic monetary management. The following is based extensively on Robert A. Mundell's article "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates."[3] Mundell's main assumptions are:

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2. S.I. Katz,"The Interest-Rate Constraint and the Crawling Peg" in T.D. Willet, S.I. Katz and W.H. Branson, Exchange-Rate Systems, Interest Rates, and Capital Flows, Essays in International Finance, No. 78 (Princeton, New Jersey: Princeton University International Finance Section, January, 1970), p.18.

3. R.A. Mundell, Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates", Canadian Journal of Economics and Political Science, Vol. XXIX (November, 1963), pp. 475-485.

1. Perfect capital mobility (meaning that all securities in the system are perfect substitutes).

2. Existing exchange rates expected to persist indefinitely, even when the exchange rate is not pegged and spot and forward rates are identical. (Complications, associated with speculation as well as with the forward market and exchange rate margins, are thereby assumed away).

3. Unemployed resources, constant returns to scale, and fixed money wage rates, implying that the supply of domestic output is elastic and its price level constant.

4. Savings and taxes increasing with income, the balance of trade depending on income and the exchange rate, investment on the rate of interest, and the demand for money on income and the rate of interest.

5. A country being in itself too small to affect either the world level of interest rates or foreign income. Thus, under this assumption a country cannot maintain an interest rate different for any length of time from the general level prevailing abroad, the interest rate being determined externally through international arbitrage.[4]

Monetary policy is here defined as open market purchases or sales; fiscal policy as an increase in government spending, on home goods, financed by an increase in the public debt.[5]

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4. Ibid., pp. 475-477. Even if we assumed that the country was large and able to affect the world level of interest rates, it could not under perfect capital mobility maintain a spread in the rates.
5. Ibid., p. 476.

Supposing the domestic economy to be under inflationary pressures with its balance of payments in equilibrium, restrictive monetary policy - the sale of securities by the central bank - tends, then, to lower bond prices and raise interest rates, making these assets attractive to the foreign investor. This capital inflow, however, under a pegged rate creates a balance of payments surplus. Since the central bank must purchase the excess supply of foreign exchange to maintain the peg, there results an increase in the money supply tending to offset the effect of the original restrictive credit policy, the foreign exchange operation for the maintaining of the peg thwarting the goal towards slowing the price rise through monetary policy. The process would continue until the accumulation of reserves, i.e., official purchases of foreign exchange, is equal to the open market purchase, and the money supply returns to its original level. Monetary policy under a fixed rate of exchange, therefore, has no sustainable effect on the level of income; under the adjustable peg, however, the effects would be somewhat stronger.

An object of introducing the crawling peg is to increase the flexibility of the exchange rate. Looking once again at the case of inflationary pressure, if the exchange rate is allowed to vary and the government sells securities to restrict the money supply, as interest rates rise domestic assets become more attractive to foreign investors; the resulting capital inflow causes the exchange rate to appreciate over the duration of the restraint, increase the price of exports and reduces that of imports. As exports fall and domestic residents substitute foreign for domestic goods, demand slackens and inflationary pressures are dampened.

There is no offsetting monetary effect through the foreign exchange opera-
tion for the maintaining of the peg. This holds for flexible exchange
rates, as for the crawling peg, if the exchange rate is variable enough
to be allowed to adjust. However, if the peg is allowed to crawl too
slowly monetary policy may scarcely be more effective than under the
present I.M.F. system.

Added exchange flexibility implies that monetary policy be focused
on achieving internal balance.[6] Though this be true, the crawling peg
does not categorically increase the effective use of monetary policy as
that would imply possibly disequilibrating capital flows. Furth points
out, "The institution of the 'crawling peg' would not eliminate such
countervailing flows - on the contrary it would tend to magnify them."[7]
Much of the analysis depends on the behaviour of the forward rate. In
practice spot and forward rates are not identical; complications associated
with speculation and forward exchange rates, therefore, do arise.
According to Furth:

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6. This suggestion is made by several writers on the crawling peg:
George W. McKenzie, "International Monetary Reform and the 'Crawling Peg',"
Federal Reserve Bank of St. Louis Review, (February, 1969), p.21, and
W.H. Branson and T.D. Willet, "Policies Regarding Short-Term Capital
Movements" in T.D. Willet, S.I. Katz and W.H. Branson, Exchange-Rate
Systems, Interest Rates, and Capital Flows, Essays in International Finance,
No. 78 (Princeton, New Jersey: Princeton University International Finance
Section, January, 1970), p.31.

7. J. Herbert Furth, "International Monetary Reform and the 'Crawling
Peg' - Comment," Federal Reserve Bank of St. Louis Review, (July, 1969),
p. 22.

"Under the 'crawling peg' system, too, tight monetary policies will result in a capital inflow; with the difference, however, that the flow will result in an appreciation of that country's exchange rate. This 'crawling' appreciation will indeed tend to increase imports and reduce exports; but at the same time, it will accelerate the capital inflow as long as the market believes that the rise in the rates will continue: the effect of the gross interest rate differential resulting from the action of the central bank will be magnified by the effect of the rise in the forward exchange rate, resulting from the expectation of continued appreciation . . . . Actually, it seems more likely that the effect of the appreciation on exports and imports will be small, while a forward exchange premium equivalent to 2 per cent per year, added to an interest rate difference of, say ½ of 1 per cent, may well attract large amounts of money - market funds - in any case, much larger amounts than would be by the gross interest rate difference without the addition of a forward exchange premium! Hence, anti-inflationary monetary policy would probably be less effective, not more effective, than under the present system."[8]

There seems to be no problem where the capital inflow is not sufficient to offset the contractive effects of the deterioration of the trade balance on the level of domestic economic activity so that there is a decrease in aggregate spending. This seems, however, to be the case as long as there is no balance of payments surplus or deficit. The currency, under the crawling peg, however, is not completely free to fluctuate and a national currency under considerable pressure might still have to be strongly supported by purchases of foreign exchange to prevent it from crawling up more than the maximum permissable amount, say 1/6% per month. Such would be the case if short-term capital flows were as large and volatile as Furth suggests and strong central bank support to keep it crawling in an orderly way would then be inevitable. To prevent an excessive depreciation, domestic currency would have to be supported by sales of foreign exchange

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8. _Ibid._, p. 22-23.

during a downward crawl, i.e., an upward crawl in terms of foreign exchange, and by purchases of foreign exchange during an upward crawl, i.e., a downward foreign exchange crawl, to prevent an excessive appreciation of the domestic currency. The flows as well as supportive operations could be great as the exchange rate changes from one equilibrium to another.

Katz remarks that a self-reinforcing upward crawl would be limited only to cases where a protracted surplus caused an upward crawl and a continuing deficit a downward crawl.

> "Because adjustments through the trade accounts could necessarily proceed only slowly, however, a temporary self-reinforcing process of disorderly capital flows could develop. During the transition in these circumstances, in fact, the monetary authorities might well find that these unwanted capital flows would continue over a longer period of time and be as difficult to bring under control as they had been during the temporary speculative crises under the adjustable peg."[9]

Such flows might greatly reduce the flexibility of monetary policy under various conditions. For example, a country with a balance of payments surplus and an upward crawl would tend to have its surplus increased by the self-reinforcing capital inflow. If at the same time it tries to reduce the money supply to fight inflation, its attempt could be complicated by the capital inflow, or the foreign exchange surplus resulting from the crawl. The operation by the foreign exchange authorities tends to replace funds which the central bank has withdrawn through open market operations.

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9. S.I. Katz, "The Interest-Rate Constraint and the Crawling Peg," in T.D. Willet, S.I. Katz and W.H. Branson, Exchange Rate Systems, Interest Rates and Capital Flows, Essays in International Finance, No. 78 (Princeton New Jersey: Princeton University International Finance Section, January, 1970), p.20.

A country threatened with a deficit and a downward crawl, on the other hand, would tend to have its deficit increased. If at the same time it has an unemployment problem, the increased capital outflow could frustrate its efforts to ease the money supply at home. The purchase of foreign bonds takes the newly created domestic money out of the hands of the public and places it with the foreign exchange authorities, who must draw on their foreign exchange reserves to provide the foreign currency which buyers of securities need to pay the sellers abroad. Thus the government may find it more difficult to control the amount of money in the economy.

The flows need not be perfectly offsetting, i.e., equal the purchases or sales of securities with which the central bank has undertaken to change the money supply. This case is only true under Mundell's assumption of a fixed rate. Flows may be partially offsetting (less), offsetting (equal), or more than offsetting (greater), depending on the magnitude of the flows and the support necessary through the foreign exchange authorities, though the flows are likely to be greater where speculation is destabilizing. When the central bank buys or sells foreign exchange the money supply increases or decreases. To offset these effects, the central bank would have to sell securities at the same rate it is buying foreign exchange, and to buy securities at the same rate it is selling foreign exchange.[10] In this latter instance to obtain a given effect on interest rates and expenditures, the central bank would have to

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10. R.A. Mundell, Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," Canadian Journal of Economics and Political Science, Vol. XXIX (November, 1963), p. 493.

increase the volume of its operations. Whether the short-term flows upset domestic monetary management depends on the magnitude and volatility of these flows.

An alternative or supplementary policy to reduce capital flows would be that of raising interest rates to a level sufficient to reduce the outflow. Here, however, difficulties arise. Raising interest rates would neutralize those funds shifted on arbitrage considerations but not necessarily those shifted for speculative grounds, i.e., shifts of uncovered funds. Furthermore, the height and variability of interest rates necessary to neutralize the shift of arbitrage funds may be unsettling for the domestic economy, particularly if the forward rate moves in a destabilizing way.

As pointed out, in Chapter II, a country with a downward crawling domestic parity, i.e., an upward crawling foreign exchange parity, would have to increase its interest rate by the amount of the downward crawl; alternatively, a country with an upward crawling domestic parity, i.e., a downward crawling foreign exchange parity, would have to lower its interest rates below those abroad by the amount of the upward crawl. If the forward rate moves in a destabilizing way, the level of interest rates necessary to neutralize the incentive for the transfer of funds abroad during the downward crawl would have to be raised more by the amount of the premium and kept further below those abroad during the downward crawl by the amount of the discount. Thus, if a premium or discount of 1%, 1½%, or 2% p.a. has to be added to a spread of 2% p.a. in order to neutralize the spot crawl, the spread could become large and the constraint substantial.

Considering the spot crawl alone, the need to raise interest rates above those prevailing in non-depreciating countries need not imply that these rates are being raised above those required for internal reasons, if there is a tendency for those countries whose rates are depreciating also to have above average inflation. Where, for example, an expected downward crawl were due to an inflation of an equivalent amount, then the real crawl rate of interest would remain the same, while nominal rates would rise by an amount equal to the expected crawl. To the extent that this is the case, high nominal rates need not be high real rates such as to have deterrent effects on domestic investment and growth.[11]

If during the downward crawl the forward rate moves to a premium, and during an upward crawl to a discount, this would tend to reduce the amount to which interest rates have to rise for a downward crawl or have to fall for an upward crawl. This type of supportive speculation would reduce the restraint of having an abnormally high or low level of interest rates and mitigate the interest rate constraint induced by limited flexibility of the exchange rate.

The crucial variable in all the above analysis is the spot rate and associated with it is the signal-effect of a decline or rise. The question stands: will speculators faced with the prospect of a slowly declining par value sell forward, driving the forward rate to a discount, or buy forward,

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11. T.D. Willet, "Interest Rates and Capital Flows under Limited Flexibility of Exchange Rates," in T.D. Willet, S.I. Katz and W.H. Branson, Exchange-Rate Systems, Interest Rates, and Capital Flows, Essays in International Finance No. 78 (Princeton, New Jersey: Princeton University International Finance Section, January, 1970), p. 6-7.

driving the forward rate to a premium, when the spot rate is rising?
An exchange crawl may or may not induce flows additional to those under
the adjustable peg. Were Furth's and Katz' analyses correct, the system
of the crawling peg would be one of substantial disequilibrium.

CHAPTER IV

METHOD OF INVESTIGATION

This chapter will attempt to lay out the theoretical groundwork for testing the analysis of the previous chapter.

Covered Interest Arbitrage

Under ideal conditions, the premium or discount in per cent per year on forward exchange equals approximately the interest differential, as argued by Keynes in 1924:

> "If by lending dollars in New York for one month, the lender could earn interest at the rate of $5\frac{1}{2}\%$ per annum, whereas by lending sterling in London for one month he could only earn interest at the rate of 4%, then the preference observed above for holding funds in New York, rather than in London is wholly explained. That is to say, forward quotations for the purchase of the currency of the dearer money market tend to be cheaper than spot quotations by a percentage per month equal to the excess of the interest which can be earned in a month in the dearer market over what can be earned in the cheaper."[1]

This statement supports the interest parity theory. The premium or discount, however, tends to equal the interest differential only under "ideal" conditions. Such conditions are seldom realized in the real world. Among the main conditions for interest parity are:

1. political stability at home and abroad;

2. no probability of devaluation or revaluation;

3. the absence of any exchange restrictions;

4. zero transactions costs;

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1. J.M. Keynes, _Monetary Reform_ (New York: Harcourt, Brace, and Company, 1924), p. 135

5. the supply of arbitrage funds sufficient to achieve interest rate parity;

6. domestic and foreign assets as perfect substitutes.

By putting the interest differential, the Canadian minus the U.S. rate, Ic-Ia, on the vertical axis and the premium or discount, p, on the horizontal one, we can show the interest parity relationship with a 45° line through the origin.
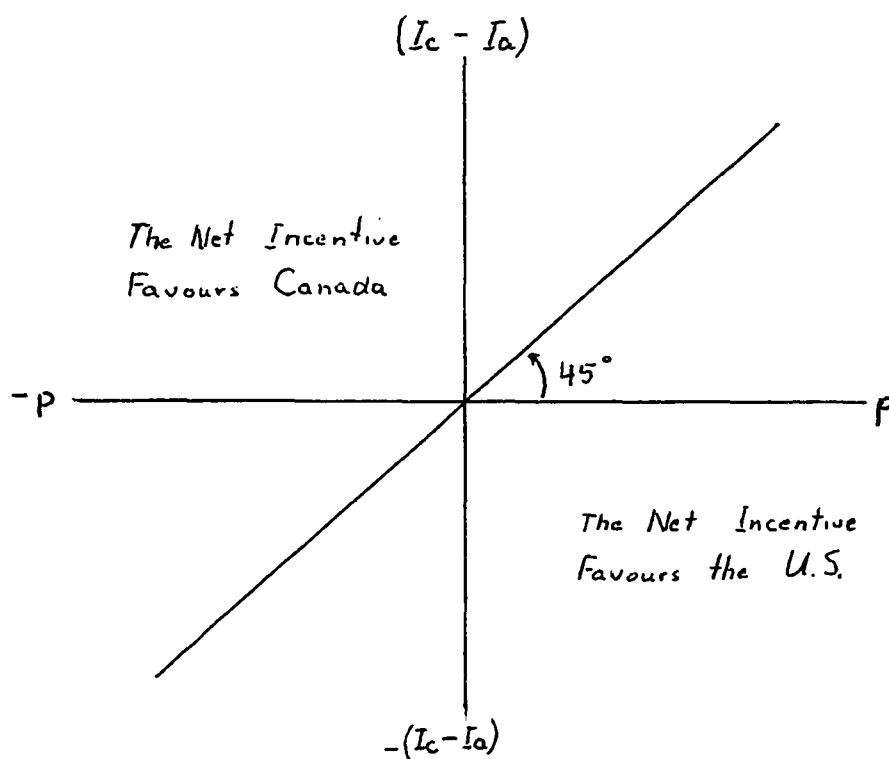
Figure 1 - The interest parity relationship

The premium (or discount) tends to equal the interest differential all along this line. When $p < Ic-Ia$ (all points above the dividing line) the net interest incentive favours Canada. When $p > Ic-Ia$ the incentive favours the U.S. If $p < Ic-Ia$ arbitrageurs will sell U.S. dollars spot and purchase U.S. dollars forward; if it is greater they will purchase U.S. dollars spot and sell U.S. forward. The demand for U.S. spot dollars is a decreasing function of the net interest incentive in favour of Canada; the supply is an increasing function. (The demand for U.S. forward, on the other hand, is an increasing function of the differential in favour of the domestic economy; here the supply is a decreasing function). The greater the net profit incentive, the greater the gain and the larger the volume of arbitrage funds coming forth.

The above analysis deals with interest or professional arbitrage, engaged in primarily by financial institutions with spare liquid funds available for investment abroad in short-term money market instruments. Arbitrage in this paper is loosely defined to include trader or borrower arbitrage and commercial demand and supply.

In theory trader or borrower arbitrage originates from the fact that trade can be financed by borrowing in either the importers or the exporters country. This is borrowing to meet specific trade payments. If the importer covers forward, he is paying the interest of the exporting country; if he covers spot he is paying the interest of the importing country. Traders would borrow in whatever center the net cost were less; for $p > Ic-Ia$ they would borrow in Canada, for $p < Ic-Ia$ they would borrow in the U.S.

In discussions with officials belonging to a Canadian subsidiary of a major international company, it was revealed that international short-term borrowing in practice, however, depends not only on trade but on business needs as well. Businesses have particular cash needs during certain parts of the year depending on tax payments and the nature of their business; and it is to meet these needs that borrowing is undertaken. This type of borrowing, it was revealed, comes not from foreign banks, i.e., American, but is carried out through brokers in the money market. Alternatively, during periods of cash surplus companies engage in interest arbitrage lending out funds either at home or abroad depending on the returns available.

These borrowing activities have the same effects on exchange rates, interest rates and the flow of funds as has the decision of interest arbitrageurs. The shift in finance takes place until all advantages of shifting are eliminated, i.e., when the relationship indicated by the equation $Ic-Ia-p=o$ is reached. The difference between professional and trader or borrower arbitrage is, therefore, only one of degree and not of substance.[2] Financial institutions can also borrow for arbitrage purposes, borrowing funds where the interest rate is low and moving them where rates are high. This analysis is analogous to that of the borrowers, with the exception that the flow probably takes place at a smaller margin.

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2. For empirical purposes, one point should, however, be noted; while for pure arbitrage the treasury bill is likely to be more relevant, for trader arbitrage it is probably the commercial differential.

Commercial demand and supply can also be included in a loosely defined arbitrage function. Commercial demand and supply arise from receipts and payments in foreign currencies originating in international trade. Exports and imports are defined to include goods and non-financial services. Assuming that the domestic importer pays in foreign currency, i.e., U.S. dollars, the import contract leads to a demand of foreign exchange. The export contract, on the other hand, gives rise to a supply of U.S. dollars. We are assuming throughout 90-day contracts.[3]

Direct investment and foreign direct investment in plant and equipment, bond and stock purchases and long-term banking loans are excluded from the arbitrage definition. Such long-term transactions do not involve the forward exchange market. There is no purpose in covering, for example, a 10-year bond. We can safely assume that the commercial demand for and supply of forward exchange results completely from contracts of exports and imports.

The Canadian importer has the choice of covering himself by either purchasing U.S. dollars spot or purchasing them forward. A spot purchase of U.S. dollars costs the importer either the interest he could have received lending out his funds in Canada, or the interest he has to pay to borrow the Canadian dollars less the interest in the U.S. If this cost is less, $p > Ic-Ia$, (or profit greater) than buying U.S. dollars

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3. It is not entirely realistic to assume that commercial traders deal only in the 90-day forward market. Traders will normally use the forward market of the maturity date closest to the time their payments or receipts fall due. This also applies to borrower and professional arbitrageurs. They may find it convenient to use forward markets of 2, 6, 9 or 12 months or any other maturity for which they can get contracts. Nevertheless, 3-month contracts have traditionally been the most widely used.

forward, the importer will cover in the spot market; if, on the other hand, $p < Ic-Ia$, he will buy U.S. dollars forward. The reasoning for the U.S. importer, who has to make payments in Canadian dollars, or that of the Canadian exporter with a contract to receive payment in U.S. dollars and who always covers himself is analogous. In each case the demand for U.S. spot dollars is a decreasing function of the net interest differential in favour of the domestic economy - the excess costs of a spot purchase or the excess of p over $Ic-Ia$; the supply is an increasing function.

There are some good reasons for including commercial demand and supply in our analysis. Since we are dealing with the balance of payments, we should consider the total possible flow in response to a differential induced by speculation. For example, if the Canadian dollar were expected to depreciate, Canadian exporters could delay repatriation of their earnings and importers accelerate their payments. This would reduce the flow of foreign exchange accruals and accelerate drawings for import payment. Including just short-term portfolio flows would give an erroneous underestimation of a total outflow. The inclusion of both commercial demand and supply and trader arbitrage funds tends to lengthen the elastic portion of the supply curve. It is assumed, however, that this inclusion does not change the shape of the supply curve.[4]

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4. B. Reading, "The Forward Pound 1951-59," Economic Journal, Vol. LXX (June, 1960), p. 308.

The Minimum Covered Interest Differential
 for International Arbitrage

A further assumption is made, namely, that some minimum covered

differential exists before covered arbitrageurs will move funds from one

currency to another. William H. Branson has calculated this differential

for professional arbitrage to be 0.18% per annum.[5] Therefore, at least

0.18% p.a. must be grossed before arbitrageurs will move funds between

the U.S. and the Canadian dollar, the reasoning being that some minimum

costs of transfer must be covered.[6]

The preceding arguments imply the following individual spot supply

curve of professional arbitrageurs, with the supply of foreign exchange,

fx, on the horizontal axis and the net incentive, Ic-Ia-p, on the vertical.

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5. W.H. Branson, "The Minimum Covered Interest Differential Needed
for International Arbitrage Activity," Journal of Political Economy,
Vol. LXXVII (November, 1969), p. 1028. The traditional figure suggested
by Keynes was $\frac{1}{2}$ of 1 per cent. Branson's figure lies somewhere in between
this figure and the one suggested by Einzig - 1/10 of 1 per cent - in
"Some Recent Changes in Forward Exchange Practices," Economic Journal,
Vol. LXX (September, 1960), p. 487. Branson examined both U.S. - U.K.
and U.S. - Canadian arbitrage independently to arrive at the 0.18% p.a.
minimum.

6. This is a simplifying assumption, though it could be argued that
traders are probably less responsive to interest disparities and enter
at larger differentials, according to John Spraos, "The Theory of the
Forward Exchange and Recent Practice," Manchester School of Economics
and Social Studies, Vol. XXI (May, 1953), pp. 95-96. Nevertheless, as
a minimum for arbitrage activity the 0.18% p.a. assumption for traders
is reasonable; at least the differential will not be less though it may
be somewhat greater.

$$(I_c - I_a - p)$$

A

$+0.18$

$-f_x$ ——————————— f_x

-0.18

A

$$-(I_c - I_a - p)$$
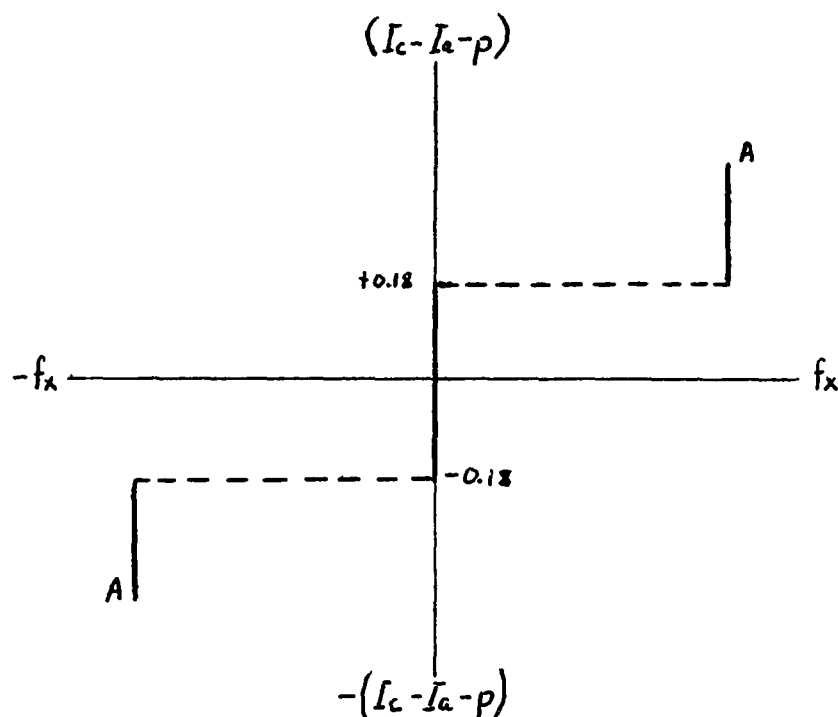
Figure 2 - Individual professional arbitrage supply curve for spot exchange.

At rates above $\pm$ 0.18% p.a. all spare liquid funds are invested abroad for international arbitrage.

Each transaction requires the payment of a broker's fee. Costs are, however, unlikely to be identical for all participants. Paul Einzig has suggested costs for professional arbitrage as low as 1/10 of 1% p.a.[7]

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7. P. Einzig, "Some Recent Changes in Forward Exchange Practices, Economic Journal, Vol. LXX (September, 1960), p. 487.

For professional arbitrage banks may not only require that costs be

covered but that their foreign exchange departments earn a larger yield

than domestic departments[8], and this as well is not likely to be identical

for all banks. Similarly, the critical differentials are likely to differ

among traders, though on the whole, costs are probably higher for traders

than for banks. Traders are required to pay other charges, such as bank

charges and acceptance commissions, of which professional arbitrageurs

are free.[9] Rates at which companies are prepared to borrow abroad may

differ.

Individual investors, as well as different groups, therefore, vary

in their critical rates. In actual practice, since different groups as

well as individuals do not have the same critical differentials, the supply

curve only approximates that of Figure 2. Applying this fact to Figure 2

we obtain the following aggregate arbitrage supply curve.
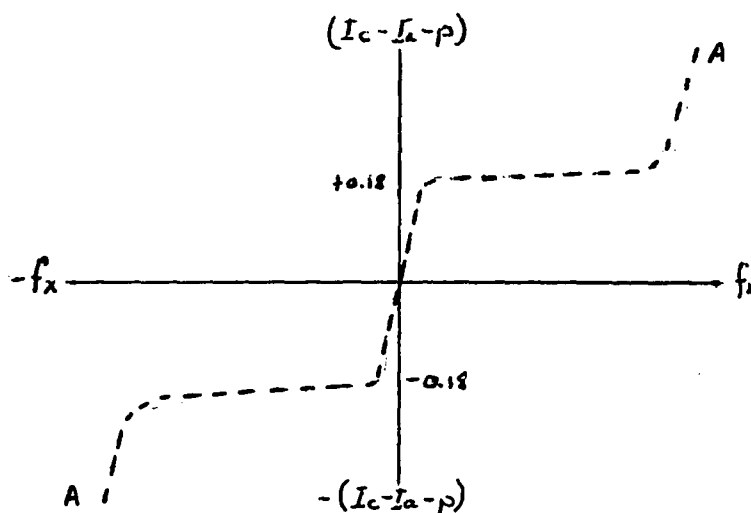
Figure 3 - Aggregate arbitrage supply curve.

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8. Ibid., p. 487.
9. J. Spraos, "The Theory of the Forward Exchange and Recent Practice," Manchester School of Economics and Social Studies, Vol. XXI (May, 1953), p. 96.

The supply of spot foreign exchange tends to rise slowly as the net incentive rises from 0 to approximately 0.18% p.a. But as the net incentive reaches above 0.18% p.a., however, the supply of spot dollars increases rapidly as most of the funds available to interest arbitrageurs are used.[10]

It follows from the above analysis that as long as Ic-Ia - p $<\pm$ 0.18% p.a., arbitrage will be inactive and the premium is free to wander through a 0.36% wide band around Ic-Ia - p = 0 without exciting any significant movement of funds.[11] Applying this fact to Figure 1 we reach the following modification.
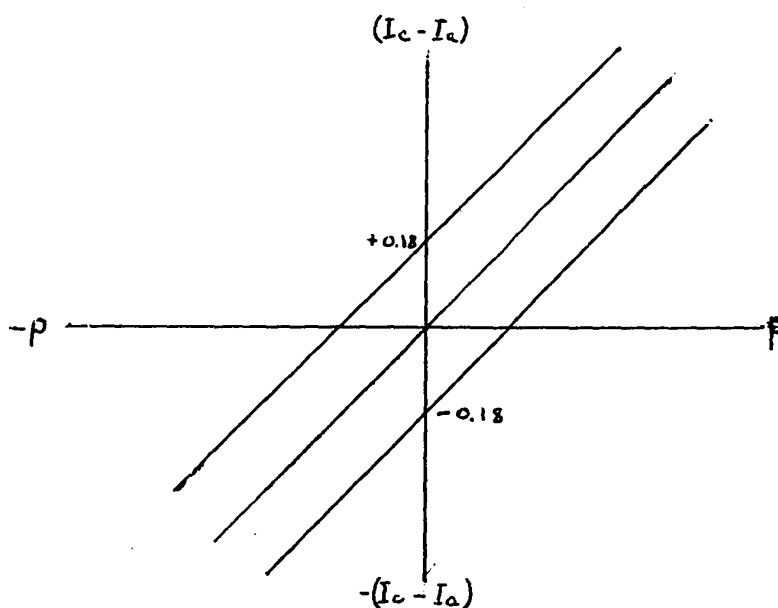
Figure 4 - Minimum critical interest differentials and speculation.

10. This is the classical supply curve of the type suggested in the literature by Keynes, Jasay, Reading and Einzig and has the shape as shown. The diagram was adapted from W.H. Branson.

11. Branson, "The Minimum Covered Interest Differential Needed for International Arbitrage Activity," Journal of Political Economy, Vol. LXXVII (November, 1969), p. 1031.

Empirically, in the absence of speculative activity, the elastic portion of the supply curve is expected to be relevant and the premium or discount will be kept from moving outside the UU and LL limits by arbitrage. In such a case the flow of funds is sufficient to equate the premium with the simple interest differential at the $\pm$ 0.18% margins.

As the net incentive rises above 0.18% p.a., however, the supply of dollars becomes inelastic again and the profit from interest arbitrage will have to rise significantly before the arbitrageurs can procure new funds or operators, who do not normally deal in interest arbitrage, start entering the market. This explains the steeply upward sloping portion of the spot arbitrage schedule.[12] When differences between the forward rate and the spot rate become temporarily abnormal, the combinations of Ic-Ia and p will be outside the arbitrage limits UU and LL and this, it will be argued, is due to speculation.

Speculation

Speculation now necessitates some elucidating. A professional speculator expecting a currency to depreciate will sell it forward with the intention of buying it spot (Or renewing it forward again) when his contract has matured. The speculator in this case makes a profit if the spot rate at maturity is below the forward rate at which he commited himself. If he expects a currency to appreciate he will buy it forward with the purpose of selling it spot (or forward). Here a profit is obtained when the speculator finds the spot rate at maturity above the

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12. B. Reading, "The Forward Pound 1951-59," Economic Journal, Vol. LXX (June, 1960), p. 307.

forward rate. In both cases the strategic variable constitutes the difference between the existing forward rate for a given maturity and the expected spot rate on the same date. Presumably, the larger this difference, the greater the supply or demand of speculative commitments.[13]

Speculators have no single value of the exchange rate they expect; they have instead, to form individual judgements about the rates expected on future dates, appropriate to the length of the expectations they operate on, and these judgements may differ widely.[14] In the aggregate, the supply of speculative commitments can be taken to represent a decreasing function of the excess of the expected spot rate, r^*, over the forward rate, r_f :

$$\text{Supply} = f_1 \ (r^*-r_f) \text{ where } \frac{df_1}{d(r^* -r_f)} < 0.$$

Speculative forward demand, on the other hand, is an increasing function of this differential:

$$\text{Demand} = f_1(r^*-r_f) \text{ where } \frac{df_1}{d(r^*-r_f)} > 0.$$

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13. Theoretically, the speculator does not need capital, since the day the contract matures the speculator has offsetting obligations. The pure speculator buys or sells forward exchange and never actually takes possession of any currency; should he have guessed erroneously, he pays his market partners the difference between the spot and the forward rate when his contract falls due. Therefore, his cash requirement is limited to the loss he might incur on his commitments should the spot rate be found unfavourable. There may be the implicit cost that the speculator is known by the bank, meaning that he does his business with the bank and has some balances as compensation there. There is no explicit investment or margin which the pure speculator incurs. We can probably assume away the costs of pure speculation without sacrificing accuracy to a significant degree.

14. These judgements would probably differ more under the crawling peg than the adjustable peg. Under a crawling peg system uncertainty about the future spot rate would be greater since there would be no single peg to back or oppose; under the adjustable peg, on the other hand, there is often the presumption that the spot rate can only rise or fall, depending on whether the rate is basically under or overvalued. On the whole, speculative demand and supply elasticities are probably higher under the adjustable peg, than they would be under a crawling peg. (Speculators may also have a "normal" rate. In this case expectations may not differ widely even under a flexible rate system, since the exchange rate is

When speculators expect a fall in the U.S. spot rate, they will sell
U.S. dollars forward, and drive the forward rate, expressed as a per
cent of the spot rate to a discount, outside the 0.18% p.a. arbitrage
margin, $(p < Ic-Ia - 0.18\%)$.

Traders too can speculate. Those who always cover forward or
spot were considered as arbitrageurs; traders, on the other hand, who
sometimes cover forward, and at other times do not, depending on what is
cheaper will be considered as speculators.[15] Commercial traders like
professional speculators have expectations as to the future movements
of exchange rates. When merchants deliberately leave part of their
commitments uncovered, they are in essence making the same type of
decision as professional speculators.

For the Canadian importer, who has to make payments in U.S. dollars,
the cost of purchasing forward depends on $r(1 + p)$, where p is the
discount or premium on the U.S. dollar, and r is the spot rate for the
U.S. dollar in terms of the Canadian dollar. The cost of leaving his
obligations to pay U.S. dollars uncovered depends on the expected spot
price of U.S. dollars, r^*. If the cost of covering, $r(1 + p)$, in purchas-
ing U.S. dollars forward, exceeds the spot price of the U.S. dollar he
expects, $r(1 + p) > r^*$, the Canadian importer will leave his obligations

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15. There is a third possible case: that of traders who have
contracts requiring immediate payment. Such contracts, however, should
ordinarily be such a small fraction of international trade that they can
for practical purposes be excluded from the analysis. Egon Sohmen,
The Theory of the Forward Exchange, Princeton Studies in International
Finance, No. 17 (Princeton, New Jersey: Princeton University International
Finance Section, August, 1966), p. 4.

uncovered. If the cost of covering forward is less than what he expects the spot rate to be, $r(1 + p) < r^*$, he will cover, the gain being the difference between $r(1 + p)$ and r^* or the excess cost of the expected spot purchase. The greater the difference, the greater the speculative flow. The case for the Canadian exporter with a contract to receive payment in U.S. dollars or the U.S. importer, if he happens to have obligations to pay in Canadian or U.S. dollars is analogous.

Like professional speculators, individual traders differ in their judgements about the spot rates expected in the future. In the aggregate, the supply or sale of forward dollars by the Canadian importer with U.S. dollar receipts to convert (or the U.S. importer with Canadian dollar payments) is a decreasing function of the excess of the expected spot rate, r^*, over, $r(1 + p)$, i.e., the excess costs of a spot purchase:

$$\text{Supply} = f_2(r^* - r(1+p)) \text{ where } \frac{df_2}{d(r^* - r(1+p))} < 0.$$

Forward demand or purchases by the Canadian importer with U.S. dollar payments (or the U.S. exporter with Canadian dollar receipts to convert) is an increasing function of this differential:

$$\text{Demand} = f_2(r^* - r(1+p)) \text{ where } \frac{df_2}{d(r^* - r(1+p))} > 0.$$

So far the attention has been on profits per dollar. The above analysis holds only if the speculator has completely inelastic expectations; the trader-speculator in this case leaves all of his payments or sales uncovered or covers them all.

Risk, however, is attached to the speculative commitment since r*
is never a definite rate; a poor guess can produce a loss for the trader.[16]
The trader speculator may then be assumed to have a range of possible
outcomes. The mean of a probability function of possible outcomes
associated with leaving his purchases or sales uncovered is given by the
expected rate of return u . The risk attached to leaving obligations
uncovered may be measured by the standard deviation of r*, σ_r*. This
deviation is a measure of the dispersion of possible returns around the
mean value u_r*.

Turning to the upper half of Figure 5, the vertical axis represents
the expected return, u_r* and the horizontal axis risk.
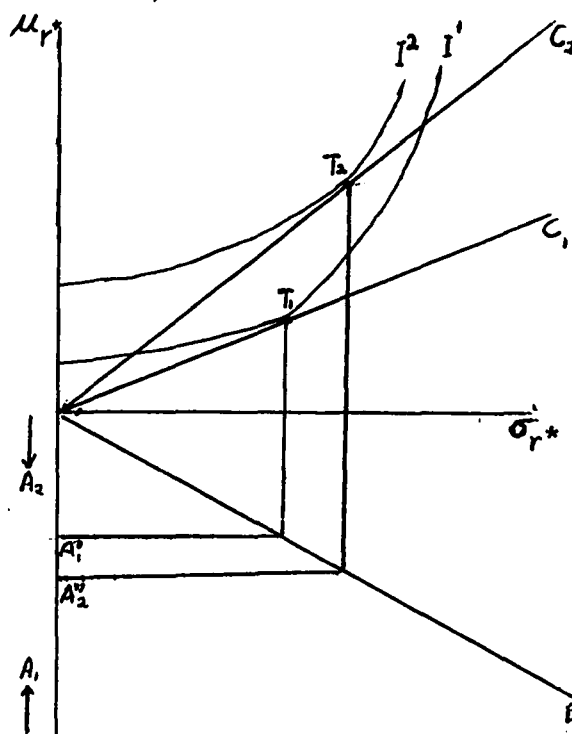
Figure 5 - Risk and speculative behaviour.

16. The treatment of risk depends on J. Tobin's article "Liquidity
Preference as Behaviour Towards Risk," The Review of Economic Studies,
Vol. LXV (October, 1957), pp. 65-86.

A line such as OC_1 (opportunity locus) represents the terms on which the trader-speculator can obtain greater expected return at the expense of assuming more risk. The higher the proportion of his payments which the speculator-trader leaves uncovered, the greater the risk that he assumes. In the lower half of the diagram the vertical axis gives the proportion the trader-speculator leaves uncovered. The line OB shows risk as proportional to the share of the total payments left uncovered. Total payments consist of $A_1 + A_2 = 1$ where A, is the portion covered and A_2 the part left uncovered.

The expected return on the uncovered portion is $A_2 \mu_r^*$ $(0 \leq A_2 \leq 1)$, when μ_r^* is the expected return per dollar on A_2. The risk undertaken per dollar depends on the standard deviation of r^*, σ_r^*, and on the amount left uncovered, and equals $A_2 \sigma_r^*$ $(0 \leq A_2 \leq 1)$.

The trader-speculator has preferences between expected return μ_r^* and risk σ_r^*. These preferences can be represented by the field of indifference curves I^1, I^2. Assuming that traders are risk averters, the curves are concave upwards as shown. Equilibrium is reached at point T_1, when indifference curve I^1 is tangent to the opportunity locus OC_1. Here the individual keeps OA_2 of his payments uncovered and covers the rest $1 - A_2$. It is unlikely that the highest indifference curve will go through O or C_1, the end points of the opportunity locus, i.e., that the trader will either cover completely or leave all of his funds uncovered. Hence the trader-speculator will generally cover a part and leave a part uncovered.

The expected return from speculating, $\mu_r{}^*$, is an increasing function of the differential $(r^*-r(1+p))$. Rewritten the speculative supply curve function is:

$$\text{Supply} = f_2 \left(r^* (\mu,\sigma) - r(1+p) \right) \text{ where } \frac{df_2}{d(r^* (\mu,\sigma)-r(1+p))} < 0.$$

Supposing the profit differential widens the expected return from speculation, $\mu_r{}^*$, increases and we have a new opportunity locus, say OC_2, tangent at T_2 to the higher indifference curve I^2. The trader-speculator now leaves OA_2'' of his obligations uncovered and covers $1-OA_2''$. Therefore an increase in $\mu_r{}^*$ increases the supply of speculative funds.

The analysis for the pure speculator is analogous - r^* is uncertain. In this case the supply function is:

$$\text{Supply} = f_1(r^* (\mu,\sigma)-r_f) \text{ where } \frac{df_1}{d(r^*(\mu,\sigma)-r_f)} < 0.$$

The choice here stands whether or not to speculate. Like the trader-speculator, the pure-speculator combines his risk and return in a way best suited to his personal preference.[17]

Trader-speculation is, however, not likely to be as influential as pure speculation. This is due to the fact that traders are generally risk averters to a greater degree than are pure speculators and are less likely to take a chance leaving their obligations uncovered. Foreign exchange operations are ancillary to their main operation which is trade and they are likely to speculate only when expectations of an over or under valuation is general and the expected change in the spot rate large. Trader

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17. The arbitrage supply curve for spot or forward exchange can also be derived from Tobin's work on the behaviour towards risk and the smooth curve thus derived provides an alternative to the classical type curve discussed in the preceding section. H.G. Grubel derives the supply curve for forward exchange based on Tobin in Forward Exchange, Speculation and the International Flow of Capital (Stanford: Stanford University Press, 1966).

speculators probably enter the market only after professional speculators.
Their actions are, however, likely to accentuate existing speculative
pressures on the premium or discount. There is, however, one important
difference: while pure or professional speculation does not involve an
actual flow of funds, trader speculation does and, thus, can either
mitigate or accentuate any existing drain on reserves or, alternatively,
increase a surplus.

Exposition of the Speculative Values

To summarize, the empirical test stems from the hypothesis that
"during normal times forward rates should be such that interest arbitrage
is not profitable and that during times of speculation sizeable profit
opportunities from arbitrage should exist."[18] Normal times have been
defined to include periods when the covered incentive is within ± 0.18%
per annum of interest parity. In cases where the net incentive exceeds
the arbitrage limits so that sizeable profit opportunities exist,
speculation is said to exist.

---

18. H.G. Grubel tests this hypothesis in "A Multicountry Model of
Forward Exchange: Theory, Policy, and Empirical Evidence," Yale Economic
Essays, Vol. VIII (Spring, 1963), pp. 105-167; he finds the hypothesis
essentially correct, p. 104 and p. 142.

All points above UU have positive values, p being less that Ic-Ia −

0.18, and can be taken to represent speculation against the U.S. dollar.
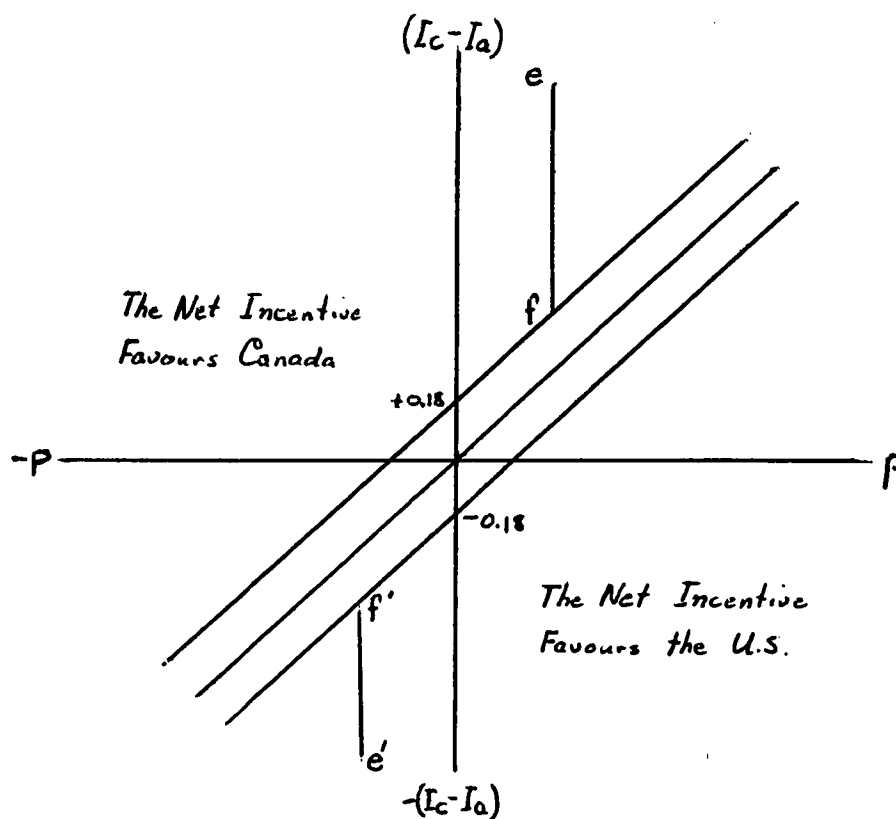
Figure 6 - Exposition of the speculative values.

ef is such a measure of speculation. Given the interest differential

the greater the supply of forward dollars, the greater the discount

compared to the interest differential, and the greater the speculative

value as represented by the vertical distance ef. It is assumed that

variations in these distances from week to week give a reasonable ordinal

measure of the pressure on the U.S. dollar. All that our method claims
to say is that if the premium diverges from the unhedged interest
differential, speculators sales are increasing, the vertical distance ef
increases and with it the pressure on the U.S. dollar also increases;
if the vertical distance ef decreases, so that the premium comes closer
in line with the interest differential forward sales are easing and with
it the intensity of speculative pressure on the U.S. dollar. Should the
interest differential be large and the premium small, the demand for
forward dollars is low. The preceding can also be taken to indicate
pressure on the U.S. dollar as demand is insufficient to move the premium
up to the interest differential. There is no effort to link specific numbers
to increases or decreases in the speculative values: when the distance ef
increases by one-quarter, speculative pressure, though it has increased,
is not assumed to have risen proportionately. Alternatively, any point
below LL, given by such distances as e^1f^1, can represent speculative
pressure in favour of the U.S. dollar or against the Canadian dollar. All
points below LL have negative values, the premium being greater than Ic-Ia
+ 0.18% p.a.

The introduction of these speculative values is an attempt to
separate the influence of speculation on capital movements from those
induced by interest rates. The argument maintains that the values are
a reasonable reflection of speculative pressure for or against the U.S.
dollar in the Canadian foreign exchange market.

Can the speculative values vary for reasons other than speculation?
Jerome L. Stein's use of a similar technique is criticized by Arthur B.

Laffer who claims that a separation between arbitrage and speculation is impossible, that Stein's index can vary simply on the basis of a change in exports.[19] Assuming that international traders hedge in the foreign exchange market, an increase in U.S. exports, for example, could increase the demand for forward dollars relative to the volume supplied. A sufficient premium on the U.S. dollar is possible, $p > Ic-Ia + 0.13\%$, even in the absence of speculative pressure.

The argument, however, seems to be based on the assumption that traders always cover forward; but as was seen earlier, traders are generally expected to have the choice of covering spot or forward depending on which is cheaper. And an increase in U.S. exports does not mean a unilateral increase in the forward rate: an increase in exports tends to increase both the spot and the forward rate.

Given the formula for the premium, $\frac{rf-r}{r}$, a rise in the U.S. spot rate, r, tends to reduce the cost of the forward cover while a rise in rf increases it. That an increase in U.S. exports turn the net incentive in favour of covering spot or forward depends on what proportion the forward rate rises relative to the spot. Starting from a zero net incentive position a proportional rise in rf and r would tend to turn the differential in favour of the domestic economy, encouraging Canadian traders to cover their import payments forward, at least until the increased forward demand eliminates the incentive. But the cost of the

19. J.L. Stein, "International Short-Term Capital Movements," American Economic Review, Vol. LV (March, 1965), pp. 58-59 and A.B. Laffer, "International Short-Term Capital Movements: Comment III", American Economic Review, Vol. LVII (June, 1967), p. 557.

cover also depends on relative interest rates, and on how speculators react to an upward movement in the spot foreign exchange rate.[20] The answer that an increase in U.S. exports augments the demand for forward dollars more than the demand for spot is by no means definite. The evidence afforded tends to disprove the variability of our speculative values due to a temporary change in exports.

Stability of Speculation

Speculation is said to stabilizing on the one hand when the spot foreign exchange rate is rising over a period of time (due to deficits on the combined current and long-term capital accounts) and speculators sell U.S. dollars forward, thus resisting the upward movement in the exchange rate; on the other hand, it is stabilizing when the spot rate is falling and speculators demand dollars forward.

Looking at Figure 7, speculation would be stabilizing for a rise in the spot rate if the speculative values were positive, (located above UU) and stabilizing for a decline if for the same period our values were negative (below the LL boundary).

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20. The empirical work showed that on occasions when the U.S. spot rate was rising and the values revealed speculative activity, the premium tended to be at a substantial discount; for spot rate declines it was at a premium. Moreover, on many occasions large movements in the exchange rate occurred without driving the premium or discount outside the arbitrage limits we had set.
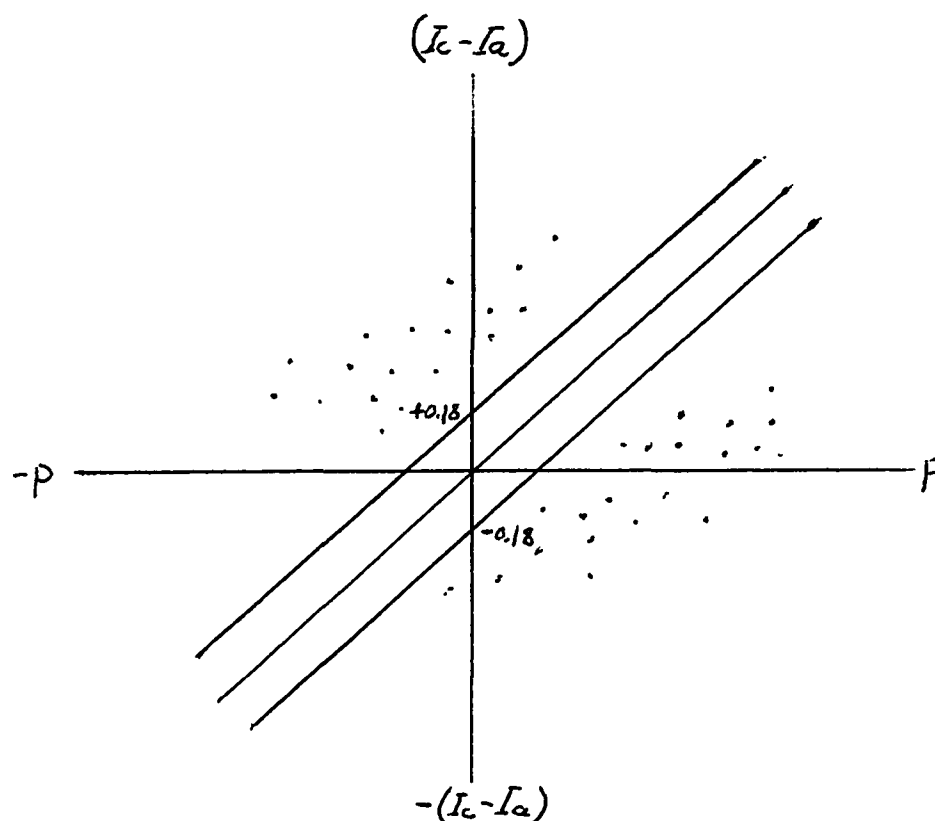
Figure 7 - Location of observations for stabilizing and
destabilizing speculation.

In the first case for a rise, speculation derives the forward rate to a
discount, turning the net incentive in favour of the domestic economy,
and setting in motion equilibrating short-term capital flows. In case
two, for a decline, speculation drives the forward rate to a premium,
again setting equilibrating short-term capital outflows in motion.

The economic explanation for the speculators actions is the following.
It was pointed out in Chapter II when a country's currency depreciates
(through deficits in its combined current plus long-term capital account

balances), its products become cheaper in the international market. It was argued that the growth of exports and the decline of imports for a country with a balance of payments deficit would eventually correct the disequilibrium. There is, however, a lag in the process from the point at which the domestic exchange rate depreciates, i.e., at which the foreign exchange rate appreciates, and exports expand and imports contract sufficiently to eliminate the disequilibrium. In the meantime there may be a heavy depreciation (appreciation of foreign exchange) before prices can adjust the balance of payments. If speculators realized that the difficulties are only temporary and that the currency will recover, there would be a profit incentive to support the currency while it is extraordinarily cheap, for, once the depreciation has its stimulative effects on exports, the exchange rate will be partially or completely reversed.[21] In such a case (for an excessive depreciation, i.e., excessive appreciation of foreign exchange), the professional speculator has the profit incentive to support the domestic rate by selling foreign exchange forward and purchasing it spot when the rate has recovered.

The equilibrating arbitrage flows occur in the manner indicated earlier. If due to forward sales the premium is less than the interest differential in favour of the domestic economy, arbitrageurs will find

21. James E. Meade, "The Future of International Payments," in U.S. Congress Joint Economic Committee, Factors Affecting the United States Balance of Payments, Part 3, 87th Congress, 2nd Sess., (Washington, D.C.: U.S. Government Printing Office, 1962), p. 246 and "Exchange Rate Flexibility," Three Banks Review, No. 70 (June, 1966), p. 14.

it profitable to move funds into Canada. Domestic importers, because
the cost of the forward premium has fallen, will be induced to lag
their payments; exporters will profit by leading domestic receipts.
At the same time borrower arbitrageurs would find it profitable to switch
financing abroad in order to take advantage of lower net international
borrowing rate. For a fall in the spot rate, the reasoning is analogous.
In this manner short-term capital flows offset temporary rate fluctuations.
This type of speculation would tend to disprove Furth and Katz' hypothesis.

Destabilizing Speculation

Destabilizing speculation, on the other hand, occurs when the
foreign exchange spot rate is rising (due to deficits on the current
plus long-term capital accounts) and speculators anticipating a further
rise demand U.S. dollars forward. This type of speculation is inclined
to magnify the fluctuation of the exchange rate. Were this the case,
looking at Figure 7, the points would be located in the area below LL.
Alternatively, when the spot foreign exchange is falling (due to surpluses
on the combined current plus long-term capital accounts) speculation is
destabilizing if speculators sell forward. The forward rate is thus
driven to a discount, $p < Ic-Ia - 0.18$, so that the points are positive,
i.e., located above UU.

Summarizing, for a rise in the foreign exchange rate speculation is
destabilizing if the points are below LL (the speculative values having
a negative value), and for a fall is destabilizing if the points are
above UU (the speculative values being positive). In both cases specula-
tion turns the arbitrage margin in a way so that equilibrating capital

flows will be thwarted when the foreign exchange rate is either rising
or falling.

We may question why speculators would sell forward and drive the
exchange rate below its long-run value since they will be involved with
considerable financial losses once the excessive depreciation comes to
an end and the exchange rate recovers. Several possible answers present
themselves. Speculators may have little awareness of when a currency is
temporarily excessively appreciated or depreciated. If speculators
expect a currency to fall further when it has already depreciated
considerably, they may sell a currency long after it has fallen sufficiently
to put the balance of payments into equilibrium in the long-run. Too,
some speculators may sell a currency even though aware that it is already
below its long-run value because they think that others are going to
continue to speculate against it while they themselves will be able to
repurchase the domestic currency before the decline ends.[22] Thus not
all speculators will lose, but only those still holding foreign exchange
when the depreciation of the domestic currency has ended.

The mechanism for disequilibrating capital flows proceeds as follows.
Let it be supposed that the spot foreign exchange rate rises because of
deficits in the combined current and long-term capital account balances.

22. James E. Meade, "The Future of International Payments," in U.S.
Congress, Joint Economic Committee, Factors Affecting the United States
Balance of Payments, Part 3, 87th Congress, 2nd Sess., (Washington, D.C.:
U.S. Government Printing Office, 1962), pp. 247-48, and "Exchange Rate
Flexibility," Three Banks Review, No. 70 (June, 1966), pp. 14-16.

Speculators demanding foreign exchange forward (or supplying forward domestic currency) will drive the U.S. dollar to a premium outside the 0.18% margin. Pure speculation itself is not a sufficient condition for an outflow of funds or a loss of reserves. A pure speculator when selling Canadian dollars forward must inevitably cancel his position by buying dollars on or before the maturity of his deal since he does not possess any actual currency. Trader-speculation does, however, involve an actual flow of funds as does arbitrage, and a premium on the U.S. forward dollar tends to turn the net incentive against the domestic economy —— $p < Ic-Ia - 0.18$.[23]

Under these circumstances interest arbitrageurs will tend to invest their short-term funds in the U.S. to take advantage of the higher relative yields induced by the discount. Borrower arbitrageurs will borrow in whatever center the net cost was less, i.e., they will switch their borrowing to Canada and move their funds to the U.S. for payment. Leads and lags can also become particularly troublesome when there is a speculative attack on the currency. For the Canadian importer the U.S. dollar debt would be settled immediately without risk on the spot exchange market (avoiding the costly forward cover). Alternatively the Canadian exporter will cover his U.S. dollar receipts forward (lagging his payments on similar considerations) and delaying the accruing of receipts.

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23. John Spraos states in "Speculation, Arbitrage, and Sterling," Economic Journal, Vol. LXIX (March, 1959), p. 9: "In fact it can be fairly said, that arbitrage, not speculation, is the source of drain on reserves." This view is supported by A.E. Jasay in "Forward Exchange: The Case for Intervention," Lloyd's Bank Review, (October, 1958), p. 41.

These operations reduce the flow of foreign exchange accruings and hasten drawings for import payment.

All these various transactions combine to accelerate the loss of reserves, adding the loss on the short-term account to the deficits on the rest of the balance of payments. This is the type of speculation envisaged by Furth and Katz under the crawling peg.

CHAPTER V

EMPIRICAL INVESTIGATION

Data and Sources

The question now arises which interest rate or rates are to be used.[1]
There is a wide variety of short-term assets, all with different rates of
interest. These include Treasury bills, government bonds nearing maturity,
commercial paper, provincial and municipal securities, trust and mortgage
loan company deposit receipts or investment certificates, various chartered
bank bearer deposits, deposit receipts, certificates of deposit, day to
day and call loans by banks, corporations and other institutions with
investment dealers and chartered bank foreign currency swap deposits.
There is no single interest rate on which arbitrageurs base their
decisions given the wide assortment of interest rates and instruments
available.

As the Canadian minus U.S. short-term interest differential, we,
however, will use the ninety-day Treasury bill difference. First it may
be useful to point out some of the limitations of the Treasury bill
differential as an indicator of short-term rates. The possibility lies
in that the flow of funds may be responsive to different rates at different

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1. Terrence Thomas compares various rates in "A Survey of the
Forward Exchange Market" (Unpublished Master's Thesis, Dept. of Economics,
McGill University).

times. Occasionally market imperfections could give rise to arbitrage profit in one direction between Treasury bills, and in the opposite direction to bank deposit accounts.[2] It may be that the differential between Canadian and U.S. Bill rates are less relevant than the differential between some other rate. The flow of private short-term capital may be responsive to differentials on finance company paper or commercial bank time deposits rather than to the Treasury bill differential. Other factors, apart from interest differentials, influence the instruments which will be negotiated in the money market. Some of these factors are term, credit, risk, character, and the requirements of lenders and borrowers. It is, therefore, extremely difficult to know which interest rate differential is responsible for any given capital flow. Nevertheless, the use of the Treasury bill comparison offers some important advantages. In spite of the large number of private instruments available, the bill rate is for international comparison probably the best indicator of money market rates in the two financial centers.[3] This is so even though international flows are not chiefly in Treasury bills. In fact, foreign holdings outstanding of Canadian Treasury bills have dwindled substantially during the nineteen-sixties.[4] Nevertheless, domestically Treasury bills

2. J. Spraos, "Speculation, Arbitrage, and Sterling," Economic Journal, Vol. LXIX (March, 1959), p. 5.
3. Samuel I. Katz, "Yield Differentials in Treasury Bills, 1959-1964," Federal Reserve Bulletin, (October, 1964), p. 1242.
4. This serves as an indication that Canadian Treasury bills have not offered competitive yields, the volume of transactions by U.S. residents in Canadian Treasury bills dropping from a monthly average of about 50-million in 1962 to about 20-million in the mid-sixties and 10-million in 1969. For more detail see Dominion Bureau of Statistics, Sales and Purchases of between Canada and other Countries, 1960-1970.

are traded actively in substantial volume each day and their rate is

probably the most widely quoted of all rates. They are assets of minimum

risk, both in Canada and the United States. Moreover, rates on short-term

private instruments tend to move with changes in the Treasury bill rates.[5]

The main data for the speculative values have been taken from various

issues of the United States Federal Reserve Bulletin. U.S. Treasury bill

rates represent market offer rates in New York for 91-day bills. Rates

are those for 11 a.m. Thursday, January 1962-December 27, 1962, and there-

after 11 a.m. Friday. Canadian Treasury bill rates are those quoted

for the 91-day bills; average Thursday tender January 1962 - December 27,

1962, and Friday 11 a.m. market offer rates January 4, 1963 to the present.

Yields on Canadian and U.S. Treasury bills are not strictly comparable

as quoted in each country. Canadian rates are quoted on a true yield

basis and for a 365-day year, while U.S. Bills are quoted on a 360-day

basis. In the data used, Canadian Bills are adjusted to the U.S.

quotation basis, thus making a better comparison of the yields possible.

The three month premium or discount is also taken from the Federal

Reserve Bulletin, but in the Bulletin each is given as a premium or

discount on the Canadian dollar, in per cent per annum in the New York

foreign exchange market. The formula for the discount or premium in per

cent per annum is $\left(\frac{r_f - r}{r}\right) \times 4$. Though r_f and r may differ somewhat in the

U.S. and Canadian markets, they are kept approximately equal by exchange

5. Samuel I. Katz, "Yield Differentials in Treasury Bills, 1959-1964," Federal Reserve Bulletin,(October, 1964), p. 1243; Jerome L. Stein, "International Short-Term Capital Movements," American Economic Review, Vol. LV (March, 1965), p. 58.

arbitrage. The premium or discount on the forward Canadian dollar (or forward U.S. dollar) in New York, therefore, approximately equals the premium or discount on the forward Canadian dollar (or forward U.S. dollar) in Canada. Premiums or discounts are those at noon on Thursday for the period January 2, 1962-December 27, 1962, at noon on Friday for the period January 4, 1963-December 27, 1963, and at 11 a.m. on Friday thereafter.

The data for U.S. spot rates (in terms of the Canadian dollar) was kindly supplied by the Foreign Exchange Department of the Royal Bank of Canada and represent closing rates on Fridays.

Procedure

Applying the technique described in the previous chapter, the combination of I_c-I_a and p was calculated. For somewhat less than half the time between May 1962 and December 1969 the points were located within ± 0.18 per cent indicating that supply was sufficient to equate demand at the ± 0.18% per annum margins. Out of a total of 399 weekly observations, on 159 weeks, or about 40 per cent of the time, the points were withing the margins. The calculations revealed speculative activity for the remaining 240 weekly observations or for approximately 60 per cent of the time.[6]

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6. Possibly, the market may not respond instantaneously to changes in the net incentive so that the speculative values contain effects of temporary disequilibrium. The continuity and length of most speculative periods, however, makes it unlikely that the values represent for the most part temporary disequilibrium rather than speculation.

Fourteen periods when the speculative values were outside the
arbitrage margins will now be discussed. These are:

May 11, 1962 – August 10, 1962	(14 weeks)
August 24, 1962 – July 5, 1963	(25 ")
February 28, 1964 – July 31, 1964	(22 ")
December 31, 1964 – February 26, 1965	(8 ")
May 28, 1965 – July 23, 1965	(9 ")
September 10, 1965 – March 11, 1966	(27 ")
March 25, 1966 – July 8, 1966	(12 ")
November 25, 1966 – February 24, 1967	(13 ")
May 12, 1967 – June 23, 1967	(7 ")
July 7, 1967 – November 24, 1967	(21 ")
December 1, 1967 – March 15, 1968	(9 ")
April 19, 1968 – June 21, 1968	(8 ")
July 12, 1968 – January 3, 1969	(26 ")
February 21, 1969 – November 21, 1969	(39 ")

The speculative values for these periods are plotted in Figure 22 (page 120)
as well as the corresponding spot rates.

We will divide the above cases into two parts: a) those occasions
when a change in parity was anticipated; and b) other cases when the values
were outside the arbitrage margins but no change in parity was expected.
We will begin by looking at the first part which embraces two crisis
periods, May 11, 1962 – August 10, 1962, and December 1, 1967 – March 15, 1968.

May 11, 1962 - August 10, 1962.

This period includes a serious speculative attack on the Canadian
dollar. Deficits had exceeded the capital inflow on long-term forms
each year following 1956 and there prevailed a general feeling that the
Canadian dollar was overvalued.[7] Capital movements in long-term forms
continued to contract during 1961 from $443-million in the first quarter
of 1961 to $24-million in the first quarter of 1962, whereas in the second
quarter they turned outwards.[8] There was also an enlargement of the current
account deficit from $62-million in the third quarter of 1961 to $272-
million in the fourth quarter and $333-million and $362-million in the
first and second quarter of 1962 respectively. According to Canadian
Government authorities the immediate difficulties in the second quarter
of 1962 were precipitated by the drying up of the net capital inflow.

On May 2, the government announced that the international value
of the Canadian dollar would be stabilized at 92.5 cents in terms of
U.S. currency, i.e., 108.108 in terms of the Canadian dollar. With the
stabilization of the exchange rate the decline in reserves abated
temporarily. In Table 1, the values revealed speculative activity
soon after the inception of the fixed exchange rate system.

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7. Dominion Bureau of Statistics, Quarterly Estimates of the
Canadian Balance of International Payments, Second Quarter of 1962, p. 6.
8. All quarterly data on the Canadian balance of payments have been
taken from the Dominion Bureau of Statistics, Quarterly Estimates of the
Canadian Balance of International Payments, 1962-1970.

TABLE 1

SPECULATIVE PERIOD: MAY 11, 1962 - AUGUST 10, 1962

Dates	Specu- lative Values	Change in Specu- lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen- tial in favour of Canada	Premium or dis- count on the U.S. Dollar	Net incentive in favour of Canada
May 11	0.05	+0.05	108.31	+0.31	0.53	0.30	0.23
18	0.23	-0.18	108.81	+0.50	0.61	0.20	0.41
25	0.22	-0.01	108.97	+0.16	0.74	0.34	0.40
June 1	0.33	+0.11	109.00	+0.03	0.78	0.27	0.51
8	0.18	-0.15	109.00	0.00	0.90	0.54	0.36
15	0.37	+0.19	109.00	0.00	1.15	0.61	0.54
22	0.01	-0.36	108.97	-0.03	2.09	1.90	0.19
29	0.57	+0.56	108.19	-0.78	2.50	1.75	0.75
July 6	0.26	-0.31	107.97	-0.22	2.39	1.95	0.44
13	0.19	-0.07	107.88	-0.09	2.39	2.02	0.37
20	0.21	+0.02	107.84	-0.04	2.41	2.02	0.39
27	0.11	-0.10	107.88	+0.04	2.44	2.15	0.29
Aug. 3	0.37	+0.26	107.78	-0.10	2.43	1.88	0.55
10	0.34	-0.04 -0.34	107.81	+0.03 -0.06	2.30	1.78	0.52

For the duration of the crisis, the speculative values are positive, p < Ic-Ia - 0.18, indicating that speculation was stabilizing. During a period when the U.S. spot rate was strengthening speculators were resisting a further weakening in expectation of a recovery in the rate. This is, at first glance what results show.

In May, speculators may still have expected the rate to recover. After the stabilization of the exchange rate, the decline in reserves did abate temporarily. In June, however, when the situation deteriorated, particularly during the second and third week, the central bank intervened in the market in a forceful way. In this case our speculative values

Figure 8 -- Scatter diagram:
May 11, 1962 -- August 10, 196
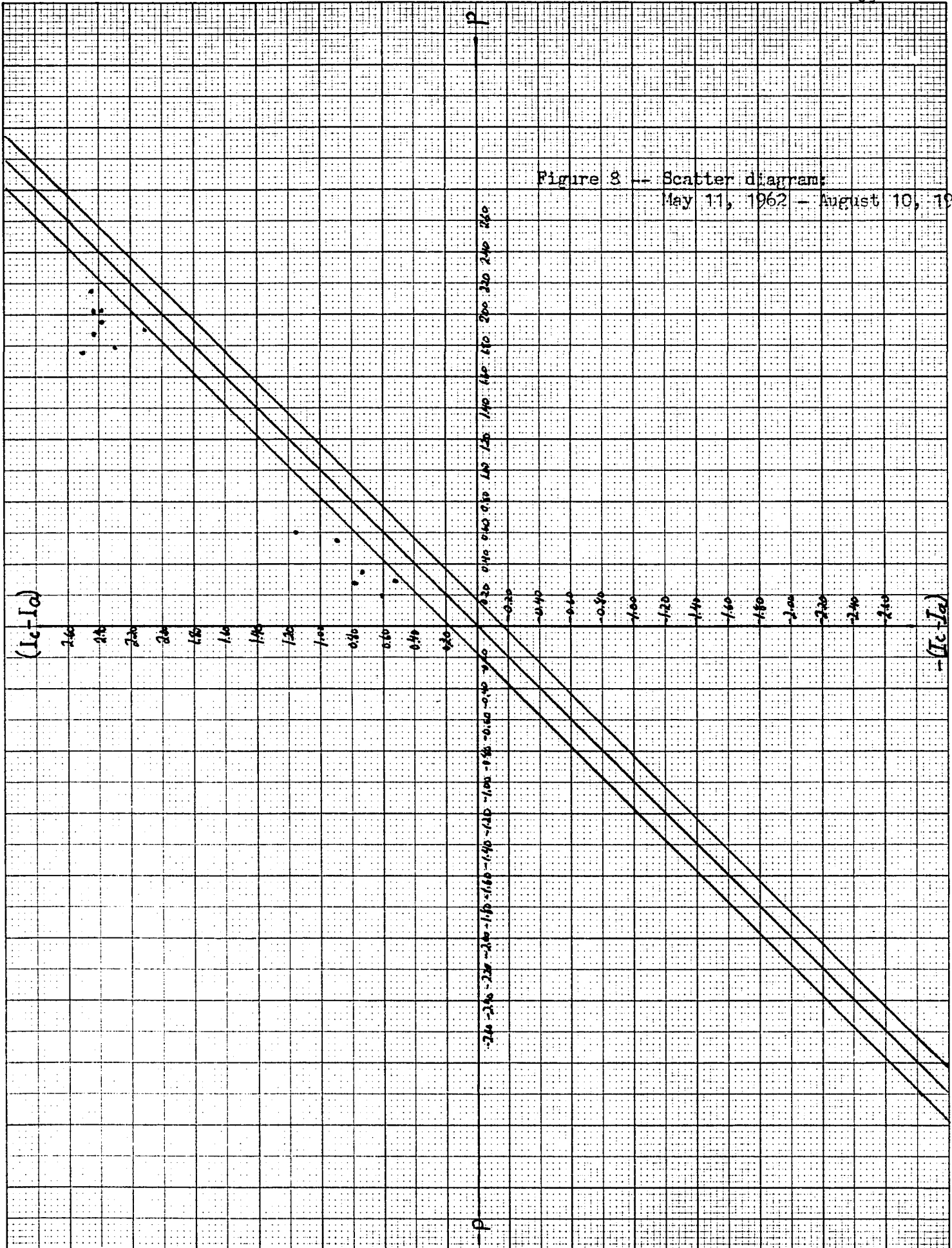
probably cease to be good indicators of what the market expects. As the

scatter diagram shows, (Figure 8) the values resulted from changes in

both the interest differential and the premium. On June 1, the Canadian

Treasury bill rate was raised substantially from a 0.78 per cent differ-

ential in favour of Canada, to 1.15 per cent on June 15, 2.09 per cent on

June 22, and 2.50 per cent on June 29. This was done consciously to

exceed the premium on the U.S. dollar which had become very large, and

helped to keep the values positive. Furthermore, the Bank of Canada,

entered the forward foreign exchange market with sales. Its commitments

to deliver forward U.S. dollars are given in Table 2.

TABLE 2

EXCHANGE FUND ACCOUNT FORWARD COMMITMENTS TO DELIVER
U.S. DOLLARS: MARCH - SEPTEMBER, 1962

(in millions)

March	4.5
April	50.9
May	103.4
June	255.3
July	213.9
August	114.6
September	11.8

Source: Bank of Canada, Statistical Supplement, 1967.

With the expectation of a devaluation there was a forward demand

for U.S. dollars. During June, a substantial premium appeared on the U.S.

spot dollar which reached 109.09, close to its upper spot limit of 109.11.

It was hoped that forward sales would exert a favourable influence on

speculators expectations and insert some confidence into the market.

Following June 15, the spot rate began to recover and rose to 108.97 on June 22, and dramatically to 108.19 on June 29. By July 6, the U.S. dollar had slipped below its par value.

Through this combination of interest rate policy and the sale of forward U.S. dollars the interest differential on 3-month Treasury bills was widened so as to exceed the premium on the forward dollar.by as much as 0.75% per annum in June. Thus a continuing incentive was offered to U.S. residents to move funds to Canada, at least on Treasury bills. In spite of the speculative outflow, some Canadian dollar holdings by non-residents actually rose, reflecting, a substantial increase in purchases of Canadian Treasury bills and in some deposits.

Without the large rise in interest rates and forward sales, the premium on the U.S. dollar would probably have exceeded the interest differential, indicating destabilizing speculation. Accordingly, the Bank of Canada provided a supply of forward foreign exchange which would not have been otherwise forthcoming from the market. Here the speculative values probably do not give an accurate reading of the markets' expectations. They indicate that speculation was stabilizing during the second quarter; in fact, a great speculative outflow occurred.

But our speculative values were destabilizing after the U.S. dollar fell below its par value early in July. Government support for the Canadian dollar on the forward market continued up to August while interest rates remained abnormally high till November 9. The values remained positive in spite of the progressive weakening of the U.S. dollar. Between July 13 and August 10, there was a general decline in the spot rate with two troughs in this decline. During each trough the speculative values tended to increase and moved in a way to accentuate the decline in the exchange rate.

The net incentive continued to favour Canada by as much as 0.55% per annum in August. During July, August and September the flows reversed themselves and a large inflow of approximately one-half billion dollars, primarily in the form of bank balances, took place.

Comparing the changes in the speculative values with those of the spot rate is again of limited use due to the preponderant influence of central bank policy on the two variables involved: the unhedged Treasury bill differential and the premium. Nevertheless, considering the period as a whole, out of 15 observed changes between May 11 and August 10, the changes coincided for 6 weekly observations, and were opposite during 9 others. The speculative values changed in a stabilizing way only about 40% of the time.[9]

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9. It is difficult to interpret exactly when there is a change in the speculative values but the spot rate does not change for the same period. In this case both rates are not clearly of the same or opposite sign. To solve this difficulty, when changes in the speculative values as compared to previous changes in the spot rate or those immediately following, seemed to represent a continuing trend, they were considered as being of the same sign or stabilizing. Otherwise, they were considered as having the opposite sign or being destabilizing. Perhaps this can best be shown by the following numerical example.

Some signs (or stabilizing changes)		Opposite sign (or destabilizing changes)	
−0.11	−0.03	+0.11	+0.13
−0.05	0.00	−0.15	0.00
or		or	
−0.05	0.00	−0.05	0.00
−0.11	−0.03	+0.11	+0.03

Due to some of the uncertainties raised by central bank intervention on the speculative values, the analysis will be supplemented by looking at the actual flows of funds. To aid us in our investigation we will use a technique employed by Paul Wonnacott and Samuel Katz.[10] The balance of payments as reported is an accounting identity. It consists of the current account balance, here called C, the long-term capital account balance, L, the short-term capital account balance, Y, and the net change in official reserves, R.

$$Y + C + L + R = 0$$

The difference between the short-term capital balance, Y, and the sum of the current plus long-term capital account balance, C+Y, is the change in reserves. If C+L and Y have opposite signs, the change in official reserves is reduced, and short-term capital movements are equilibrating. If C+L and Y have the same sign, the change in official reserves is increased and short-term capital flows are disequilibrating.[11] (Under flexible exchange rates the focal point of the analysis of equilibrating or disequilibrating movements in the balance of payments would shift from changes in the exchange reserves to movements of the exchange rate).[12]

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10. Paul Wonnacott, The Canadian Dollar: 1948-1962 (Toronto: University of Toronto Press, 1965), pp. 62-81 and 170-179; Samuel I. Katz, Two Approaches to the Exchange Rate Problem: The United Kingdom and Canada, Essays in International Finance, No. 26 (Princeton, New Jersey: Princeton University International Finance Section, August, 1956), p. 9.

11. A disadvantage of the technique is that it employs quarterly data. We do not know how the flows break down within the quarter. Flows occuring at the end of a quarter may reverse the preceding flows and thus obscure the results of the earlier period. Moreover, the technique does not permit a detailed examination of the effects of short-term capital flows on the exchange rate. Forward transactions are not included and there is no specific way of examining the effects of speculation on the exchange rate and the flow of funds.

12. Paul Wonnacott, The Canadian Dollar: 1948-1962 (Toronto: University of Toronto Press, 1965), pp. 170-171.

If one considers the behaviour of short-term capital flows during
both the second and third quarters, the flows are destabilizing. There
was a short-term outflow of $249-million added to a combined current and
long-term capital account deficit of $385-million in the second quarter.
In the third quarter there was a marked improvement on both the capital
and current account balance with a surplus of 212-million. Added to this
was a swing back of close to one-half billion dollars, as Canadians
repatriated funds moved abroad during the previous quarter to make a total
surplus approaching $700-million. Canadians themselves were largely
responsible for the speculative flows of short-term capital in both
quarters. "It seems clear from the analysis of the data available that a
major part of the movement both from Canada in the second quarter, and to
it in the third quarter represented the movement of Canadian capital."13
The largest part of this flow consisted of shifts in bank balances.
December 1, 1967-March 15, 1968.

A serious foreign exchange crisis occurred also in 1968. Both
international and domestic developments contributed to the strains on the
Canadian dollar early in the year. These included:

1. uneasiness in international financial circles over currencies
generally following the devaluation of sterling in November of 1967;

2. concern about the international financial system giving rise to
extremely large speculative purchases of gold in free markets of the world;

3. uncertainty from defeat in the House of Commons of a tax measure;

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13. Dominion Bureau of Statistics, _Quarterly Estimates of the
Canadian Balance of International Payments, Third Quarter of 1962_, p. 7 .

4. discussion of foreign ownership of Canadian industry prompted by the release of the Watkins Task Force;

5. of more immediate and greater significance still, the announcement on January 1, 1968 by the President of the United States of controls over capital flows designated to improve the country's balance of payments position.[14]

The values revealed speculative activity from December 1, 1967 to January 19, 1968 and for the week of March 14.

TABLE 3

SPECULATIVE PERIOD: DECEMBER 1, 1967 – MARCH 15, 1968

Dates	Specu- lative Values	Change in Specu- lative Values	U.S. Dollar Spot Rate	Change in U.S.Dollar Spot Rate	Treasury Bill Differen- tial in favour of Canada	Premium or dis- count on the U.S. dollar	Net Incentive in favour of Canada
Dec. 1	0.05	+0.05	108.06	+0.12	0.40	0.17	0.23
8	0.06	+0.01	108.03	-0.03	0.56	0.32	0.24
15	0.03	-0.03	108.09	+0.06	0.71	0.50	0.21
22	0.26	+0.23	108.09	0.00	0.92	0.48	0.44
29	0.17	-0.09	108.06	-0.03	0.84	0.49	0.35
Jan. 5	0.34	+0.17	108.22	+0.16	0.84	0.32	0.52
12	-0.03	-0.37	108.47	+0.25	0.64	0.85	-0.21
19	-0.92	-0.89	109.00	+0.53	0.64	1.74	-1.10
26		+0.92	108.62	-0.38	1.21	1.30	-0.09
Feb. 2			108.75	+0.13	1.34	1.20	0.14
9			108.72	-0.03	1.39	1.46	-0.07
16			108.75	+0.03	1.47	1.28	0.19
23			108.75	0.00	1.58	1.41	0.17
Mar. 1			108.75	0.00	1.60	1.50	0.10
8			108.63	-0.12	1.55	1.62	-0.07
15	-0.89	-0.89	108.63	0.00	1.32	2.39	-1.07
		+0.89		-0.41			

14. Dominion Bureau of Statistics, _Quarterly Estimates of the Canadian Balance of International Payments_, First Quarter of 1968, p. 13; Bank of Canada, _Annual Report of the Governor to the Minister of Finance, 1968_, pp. 35-37.

Following the weakening of the Canadian dollar, speculation showed up as stabilizing, the positive values, $p < Ic-Ia - 0.18$, indicating that until January 12, 1968 speculators were resisting the upward movement of the U.S. dollar by forward sales. During the succeeding two weeks, January 12 and 19, speculation proved to be destabilizing as indicated by the negative values. This coincided with a large rise in the U.S. spot rate from 108.22 cents in January 5, to 108.47 cents on January 12, a change of 0.25 cents; to 109.00 cents on January 19, a change of 0.53 cents. There is a corresponding change in the speculative value from 0.34 in favour of the Canadian dollar to 0.03 against it on January 12, a change of-0.37; to-0.92 against in on January 19, a change of -0.89——indicating a swing from supportive speculative forward purchases of Canadian dollars, i.e., sales of U.S. forward, to a heavy destabilizing sale of Canadian forward, i.e., purchases of U.S. forward, during this two week period. This is corroberated by available information. According to the Dominion Bureau of Statistics, "abnormally large sales of Canadian dollars occurred in the foreign exchange markets in the second and third weeks of January."[15] These abnormal sales occurred   despite the fact that under the U.S. guidelines announced on January 1, Canada would remain in a preferred position and special recognition would be given to the close economic relationship that existed with the U.S. The situation was indeed serious and on January 21, following discussion with Canadian officials, the U.S. Secretary of the Treasury, Henry H. Fowler, attempted to allay fears by

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15. Dominion Bureau of Statistics, Quarterly Estimates of the Canadian Balance of International Payments, First Quarter of 1968, p. 13.

announcing that the new United States program was not intended to

produce abnormal transfers from Canada to the U.S. by Canadian

subsidiaries of American corporations and that it left room for large

flows of capital to Canada.

As in 1962, the central bank intervened forcefully by dramatically

increasing the interest rate on Treasury bills and forward sales of

foreign exchange. In spite of the fact that the observations were within

the arbitrage limits after January 19 (March 15 excepted), market

speculation probably persisted. As the premiums on the U.S. dollar became

large, the central bank raised interest rates sufficiently to offset

the premium on most occasions. On January 26, the Treasury bill rate

was raised to create an unhedged differential of 1.21% in favour of Canada;

this reached 1.60% on March 1. Exchange fund forward sales were also large.

TABLE 4

EXCHANGE FUND ACCOUNT FORWARD COMMITMENTS TO
DELIVER U.S. DOLLARS: JANUARY - JULY, 1968

	(in millions)
January	46.4
February	274.3
March	454.5
April	328.0
May	222.6
June	76.3
July	33.2

Source: Bank of Canada, Annual Report of the Exchange Fund Account, 1968.

Figure 9--Scatter diagram: December 1, 1967 -- March 15, 1968.
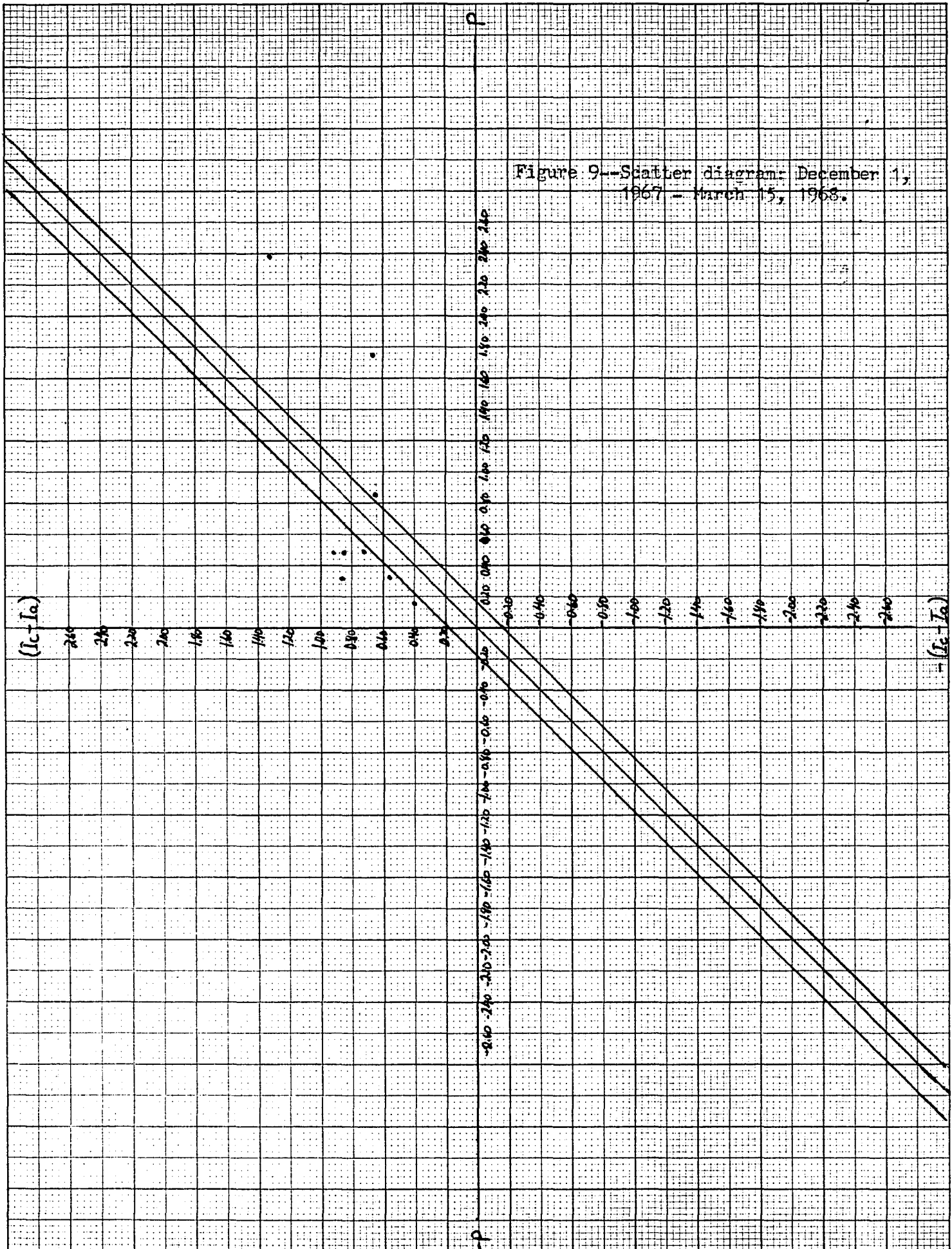
These sales reached as high as $454.5-million in March and $328.0-million
in April. They supplemented the raising of short-term rates beginning
the week of January 26, and helped maintain our observations within the
±0.18% limits.

The crisis lasted until the middle of March. On March 7, after
further discussions with U.S. officials, the U.S. undertook to exempt
Canada completely from all U.S. balance of payments measures affecting
capital flows administered by the Department of Commerce and the Federal
Reserve System. Following this date, the drain on Canada's foreign
exchange reserves slowed down. Nevertheless, during the week ending
March 14, our speculative values revealed abnormally large destabilizing
purchases of U.S. forward exchange. In spite of an unhedged differential
of 1.32% in favour of Canada, the premium on the U.S. dollar rose sharply
from 1.62% on March 8 to its peak level for the entire period—2.39% —
and dropped back to 1.67% the following week. The spot rate remained
unchanged at 108.63 between the 8th and the 15th of March. On March 17,
the Bank of Canada's reciprocal credit facility with the Federal Reserve
System was raised by U.S. $250-million to U.S. $1000-million. The bank
rate was likewise raised again from 7 to 7.5 per cent. Confidence in
the whole international monetary system was bolstered when on March 17 a
two tier system of pricing gold was introduced to halt the drain on gold
reserves caused by sales in free markets. After March 17, the U.S. spot
rate dropped markedly by 0.41 cents to 108.22 on March 22, and by April 11,
it fell below its par value. The drain on reserves stopped and began to
increase again during the second half of March. Comparing the changes in
the speculative values with the movements in the spot rate for the period

December 1, 1967 to March 15, 1968, the values did not change in a stabilizing way. In only 2 out of the 10 weeks which registered speculative activity or 20 per cent of the time did the changes coincide in a stabilizing way. This too can be seen from Figure 23 (page 123) where the changes in the two rates have been plotted. Looking at actual flows, destabilizing outward movements of short-term capital took place in a large scale during the first quarter of the year. A short-term capital outflow of $706-million aggravated a deficit of $59-million on the combined current plus capital account balance. The losses in reserves in this quarter were very heavy——$765-million.

The composition of the capital outflow in the first quarter of 1968 contrasted sharply with that of the second and third quarters of 1962. The outflow in bank balances in 1968 consisted only of $100-million out of $706-million while these balances predominated in the outflow of $249-million in the second quarter of 1962 and in the reverse inflow of $474-million in the third quarter. Most important in 1968 was a short-term account which included changes in loans and accounts receivable and payable, and also a balancing item representing the difference between direct measurements of current and capital accounts.[16] The outflow on this account was $509-million. Borrower arbitrage, and leads and lags in payments were thus probably very important in the outflow, much more so than during the 1962 crises when this account remained small.

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16. Dominion Bureau of Statistics, Quarterly Estimates of the Canadian Balance of International Payments, First Quarter of 1968, p. 12.

The first portion examined periods when a change in parity was anticipated. This section encompasses periods when our values revealed speculative activity but no change in parity was anticipated; it includes an examination of 12 cases.

August 24, 1962	- July 5, 1963	(25 weeks)
February 28, 1964	- July 31, 1964	(22 ")
December 31, 1964	- February 26, 1965	(8 ")
May 28, 1965	- July 23, 1965	(9 ")
September 10, 1965	- March 11, 1965	(27 ")
March 25, 1966	- July 8, 1966	(12 ")
November 25, 1966	- February 24, 1967	(13 ")
May 12, 1967	- June 23, 1967	(7 ")
July 7, 1967	- November 24, 1967	(21 ")
April 19, 1968	- June 21, 1968	(8 ")
July 12, 1968	- January 3, 1969	(26 ")
February 21, 1969	- November 21, 1969	(39 ")
August 24, 1962	- July 5, 1963	

For this period the speculative values are positive, $p < Ic-Ia-0.18$, in spite of the fact that the U.S. spot rate was continuously below its par value for the whole period. Though speculation was intermittent, it lasted for the entire period during which the spot rate remained below its par value and it ceased as soon as the spot rate rose again its par during the middle of July, 1963.

As the scatter diagram, (Figure 10), shows the values resulted from both changes in the premium and the interest differential. The speculative values for the most part were destabilizing and lasted well beyond the period of central bank intervention connected with the foreign exchange crisis in the first and second quarter of 1962. Substantial forward sales of U.S. dollars ceased in August though interest rates were allowed to remain abnormally high until November 9 and then dropped back sharply. The speculative values remained positive, in spite of Exchange Fund forward purchases of $103.6-million in October, 1962, and purchases of $48.5, $30.5 and $13.0 millions in April, May and June, 1963, respectively. These purchases were offsetting and probably reduced the speculative values somewhat as well as the net incentive in favour of Canada.

TABLE 5

SPECULATIVE PERIOD: AUGUST 24, 1962 - JULY 5, 1963

Dates	Speculative Values	Change in Speculative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differential in favour of Canada	Premium or discount on the U.S. Dollar	Net incentive in favour of Canada
Aug. 24	0.06	+0.06	107.75	0.00	2.19	1.95	0.24
31		-0.06	107.72	-0.03	2.04	2.22	-0.18
Sept. 7	0.21	+0.21	107.69	-0.03	2.14	1.75	0.39
14	0.31	+0.10	107.69	0.00	2.10	1.61	0.49
21		-0.31	107.66	-0.03	2.18	2.01	0.17
28			107.66	0.00	2.12	1.95	0.17
Oct. 5	0.14	+0.14	107.66	0.00	2.07	1.75	0.32
12		-0.14	107.59	-0.07	1.86	1.68	0.18
19			107.63	+0.04	1.40	1.54	-0.14
26	0.13	+0.13	107.56	-0.07	1.45	1.14	0.31

TABLE 5 cont'd

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differential in favour of Canada	Premium or discount on the U.S. Dollar	Net incentive in favour of Canada
Nov. 2	0.05	-0.08	107.56	0.00	1.37	1.14	0.23
9	0.07	+0.02	107.69	+0.13	1.19	0.94	0.25
16		-0.07	107.81	+0.13	0.74	0.87	-0.13
23	0.01	+0.01	107.72	-0.09	0.93	0.74	0.19
30		-0.01	107.69	-0.03	0.79	0.67	0.12
Dec. 7	0.05	+0.05	107.53	-0.16	0.90	0.67	0.23
14	0.22	+0.17	107.56	-0.03	0.93	0.53	0.40
21	0.22	0.00	107.56	0.00	1.00	0.60	0.40
28	0.20	-0.02	107.72	+0.16	0.98	0.60	0.38
Jan. 4	0.19	-0.01	107.75	+0.03	0.97	0.60	0.37
11		-0.19	107.91	+0.16	0.86	0.80	0.06
18			107.66	-0.25	0.89	0.87	0.02
25			107.66	0.00	0.77	0.87	-0.10
Feb. 1			107.78	+0.13	0.67	0.60	0.07
8			107.78	0.00	0.67	0.60	0.07
15	0.01	+0.01	107.84	+0.06	0.66	0.47	0.19
22	0.11	+0.10	107.75	-0.09	0.69	0.40	0.29
Mar. 1		-0.11	107.72	-0.03	0.70	0.80	-0.10
8			107.81	+0.09	0.66	0.74	-0.08
15			107.84	+0.03	0.69	0.80	-0.11
22			107.81	-0.03	0.64	0.53	0.11
29			107.81	0.00	0.65	0.67	-0.02
Apr. 5	0.18	+0.18	107.81	0.00	0.62	0.26	0.36
12		-0.18	107.66	-0.15	0.50	0.37	0.13
19	0.19	+0.19	107.63	-0.03	0.63	0.26	0.37
26	0.29	+0.10	107.59	-0.04	0.73	0.26	0.47
May 3	0.05	-0.24	107.59	0.00	0.66	0.43	0.23
10		-0.05	107.72	+0.13	0.37	0.20	0.17
17	0.15	+0.15	107.81	+0.09	0.33	0.00	0.33
24	0.04	-0.11	107.78	-0.03	0.22	0.00	0.22
31		-0.04	107.81	+0.03	0.16	0.00	0.16
June 7	0.13	+0.13	107.84	+0.03	0.25	-0.06	0.31
14		-0.13	107.91	+0.07	0.16	-0.00	0.16
21	0.12	+0.12	107.81	-0.10	0.17	-0.13	0.30
28	0.05	-0.07	107.81	0.00	0.17	-0.06	0.23
July 5	0.20	+0.15	107.84	+0.03	0.18	-0.20	0.38
		-0.20		+0.03			

Figure 10--Scatter diagram: August 24, 1962 – July 5, 1963.

$(I_c - I_a)$

$-(I_c - I_a)$

10 X 10 TO THE ½ INCH   358-12
KEUFFEL & ESSER CO.
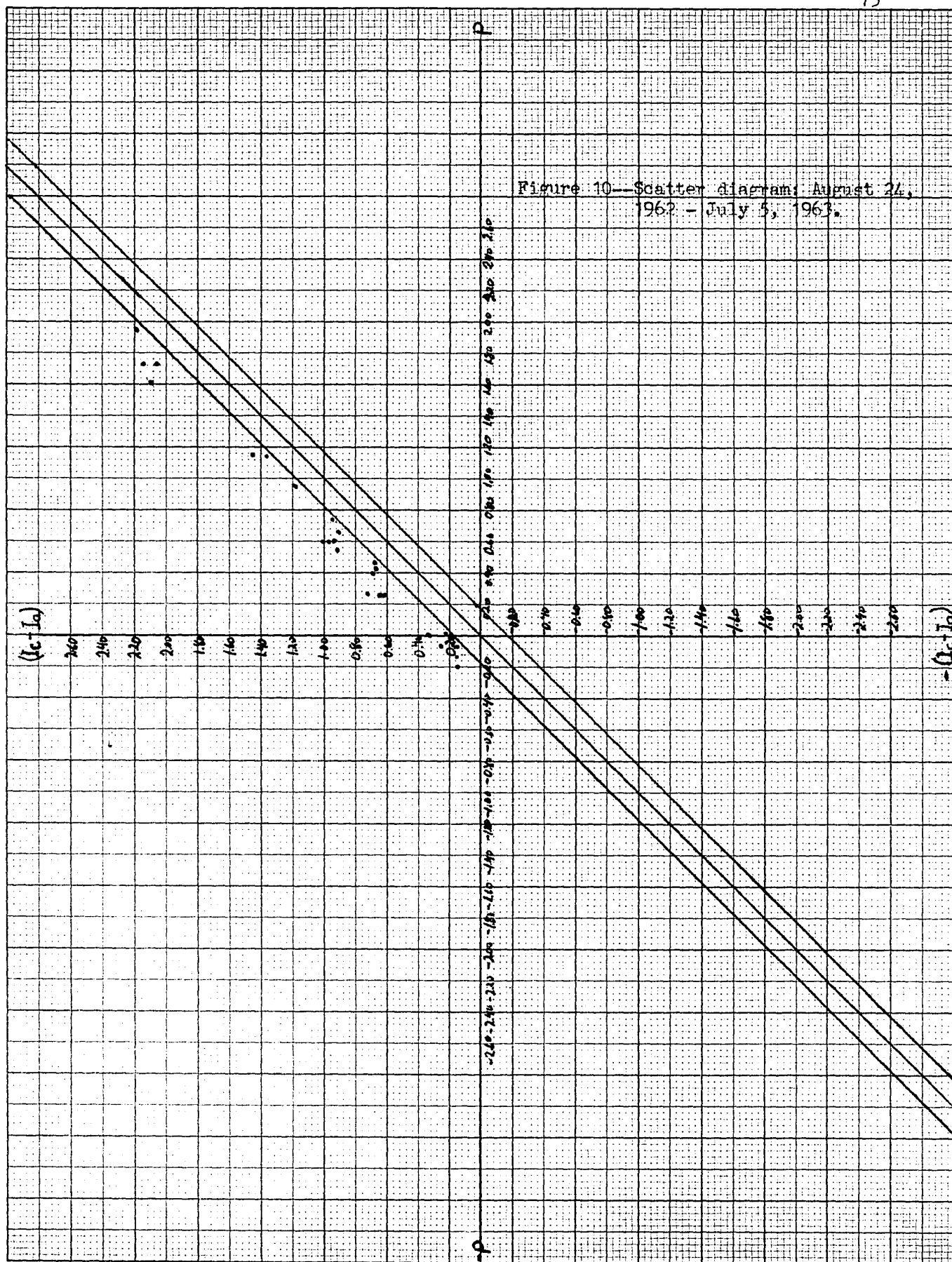
Speculation is not necessarily destabilizing because the U.S. dollar was below its par value and the speculative values turned out to be positive. Speculators may feel that a currency is over or undervalued anywhere within the official limits and may either resist or accentuate the fluctuations of the spot exchange rate. For speculation to be stabilizing the criterion is that speculators resist fluctuations in the exchange rate. This, however, was not the case for most of the 25 weeks observed. As can be seen from Figure 22, (page 120), on most occasions during weeks when the spot rate rose above some previous level, the speculative values ceased or were very small. During declines or troughs, on the other hand, the values tended to become large and positive, particularly so for the following spot declines: August 31 – September 21, 1962; September 28 – October 12, 1962; February 15 – February 22, 1963; March 29 – May 3, 1963; June 14 – June 28, 1963; and for the following trough: November 30, 1962 – January 4, 1963. In all of these cases the values moved in a destabilizing manner.

This is also reflected when changes in the speculative values are compared with the changes in the spot rate. Out of a total of 37 observed changes, speculative values coincided on but 15 occasions and were opposite on 22 or approximately 60 per cent of the time.

Looking at the actual flow of short-term funds during the fourth quarter of 1962, a combined current plus long-term capital account surplus of $222-million was supplemented by a short-term capital inflow of $156-million. The fist quarter of 1963 reveals very little speculative activity.

In this quarter, flows were stabilizing, a combined current and long-term capital account surplus of $135-million being offset by a net short-term outflow of $69-million. April, May and June show more irregular, destabilizing activity. Here too, flows were destabilizing, a combined current plus capital account balance of $5-million being supplemented by a short-term inflow of $106-million. For this period, the values are fairly representative of the direction of the flows.

February 28, 1964 - July 31, 1964.

The speculative values are positive, $p < Ic-Ia - 0.18$, for the 22 weeks involved, though the values are relatively small.

TABLE 6

SPECULATIVE PERIOD: FEBRUARY 28, 1964 - JULY 31, 1964

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen-tial in favour of Canada	Premium or dis-count on the U.S. Dollar	Net incen-tive in favour of Canada
Feb. 28	0.03	+0.03	108.03	+0.06	0.25	0.04	0.21
Mar. 6	0.05	+0.02	108.03	0.00	0.27	0.04	0.23
13	0.01	-0.04	108.03	0.00	0.23	0.04	0.19
20	0.09	+0.08	108.03	0.00	0.27	0.00	0.27
27	0.16	+0.07	108.09	+0.06	0.27	-0.07	0.34
April 3	0.12	-0.04	108.06	-0.03	0.26	-0.04	0.30
10	0.21	+0.09	108.06	0.00	0.29	-0.10	0.39
17	0.02	-0.19	108.09	+0.03	0.13	-0.07	0.20
24	0.10	+0.08	108.13	+0.04	0.18	-0.10	0.28
May 1	0.06	-0.04	108.13	0.00	0.17	-0.07	0.24
8		-0.06	108.13	0.00	0.12	-0.04	0.16
15	0.11	+0.11	108.13	0.00	0.15	-0.14	0.29
22	0.08	+0.03	108.03	-0.09	0.12	-0.14	0.26
29	0.04	-0.04	108.09	+0.06	0.08	-0.14	0.22

TABLE 6 cont'd

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen-tial in favour of Canada	Premium or dis-count on the U.S. Dollar	Net incen-tive in favour of Canada
June 5	0.01	-0.03	108.03	-0.06	-0.01	-0.20	0.19
12	0.08	-0.07	108.09	+0.06	-0.01	-0.27	0.26
19	0.12	+0.04	108.09	0.00	0.03	-0.27	0.30
26	0.20	+0.08	108.16	+0.07	0.05	-0.33	0.38
July 3	0.12	-0.08	108.16	0.00	0.03	-0.27	0.30
10	0.11	-0.01	108.22	+0.06	0.02	-0.27	0.29
17	0.09	-0.02	108.13	-0.09	0.13	-0.14	0.27
24	0.08	-0.01	108.06	-0.07	0.09	-0.17	0.26
31	0.11	+0.03	108.06	0.00	0.15	0.14	0.29
		-0.11		-0.13			

The dispersion of points along the upper 0.18% margin on Figure 11 indicates that the values resulted from changes both in the interest differential and in the discount. The unhedged differential varied from 0.01% in favour of the U.S. to 0.27% in favour of Canada; the range of variation for the premium was similar: from a modest premium of 0.04% to a discount of 0.27%. Except for a few weeks in February and March, there was a discount for the whole period.

The discount was sufficient to keep the speculative values positive, in spite of substantial offsetting forward purchases by the Bank of Canada, particularly in March ($104.5-million), and to a lesser extent in April ($38.0-million), and May ($31.5-million). In June and July the purchases were very small, $2.5 and $0.7-millions, respectively.

Figure 11--Scatter diagram: February 28, 1964 - July 31, 1964.
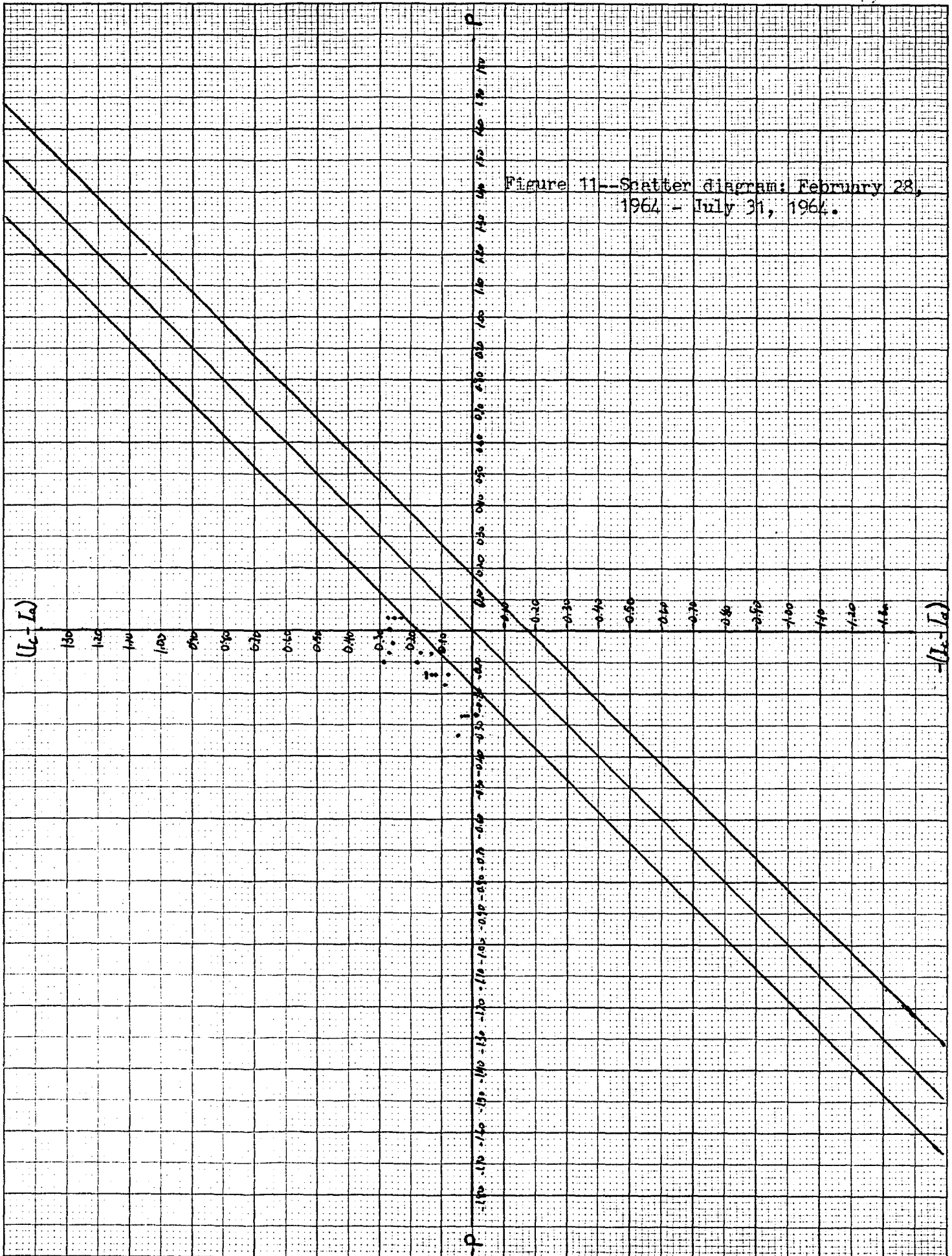
Examining the changes in our speculative values compared with those
of the spot rate, the latter coincide on 14 weekly changes and differ on
10, meaning that the changes themselves were stabilizing approximately 58
per cent of the time.

The positive speculative values obtained indicate on the whole a
resistance to the strengthening of the U.S. dollar between February 28
and July 31, 1964. The covered differential on Treasury bills moderately
favoured Canada in this period, remaining for the most part within 0.20
to 0.40 per cent in favour of Canada.

The actual flows of capital in short-term forms in the second quarter
of 1964 were stabilizing, an inflow of $108-million offsetting a deficit
of $40-million on the combined current plus long-term capital account
balance.

December 31, 1964 - February 26, 1965.

In the first quarter of 1965 Canada's current account deficit widened
to $397-million or $236-million over the $161-million deficit in the third
quarter of 1964. The Canadian dollar weakened appreciably during this
quarter as can be seen from Figure 22 (page 120). The speculative values
cover, however, only about two-thirds of this quarter or 8 weeks in all.

TABLE 7

SPECULATIVE PERIOD: DECEMBER 31, 1964 - FEBRUARY 26, 1965

Dates	Specu- lative Values	Change in Specu- lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen- tial in favour of Canada	Premium or Dis- count on the U.S. Dollar	Net incen- tive in favour of Canada
Dec. 31	-0.02	-0.02	107.34	0.00	-0.06	0.14	-0.20
Jan. 3	-0.02	0.00	107.44	+0.10	-0.06	0.14	-0.20
15	-0.03	-0.01	107.34	-0.10	-0.01	0.20	-0.21
22	-0.27	-0.24	107.34	0.00	-0.18	0.27	-0.45
29	-0.30	-0.03	107.50	+0.16	-0.21	0.27	-0.48
Feb. 5	-0.31	-0.01	107.50	0.00	-0.26	0.23	-0.49
12	-0.17	+0.14	107.50	0.00	-0.28	0.07	-0.35
19		+0.17	107.66	+0.16	-0.32	-0.14	-0.18
26	-0.12	-0.12	107.88	+0.22	-0.30	0.00	-0.30
		+0.12		+0.16			

The speculative values resulted from both changes in the unhedged differential and changes in the premium, the unhedged differential varying from 0.01 to 0.32 per cent in favour of the U.S. The premium ranged from -0.14 to 0.27 per cent in favour of the U.S. Exchange Fund Account purchases during January and February were $75.0-million per month. These purchases probably helped to increase the premium and with it the speculative values to some degree.

Nevertheless, the values are negative indicating resistance to the low level of the U.S. dollar, particularly between January 22 and February 12. As the U.S. dollar declined sharply during the following week, February 19, the values likewise dropped off to zero. Looking at

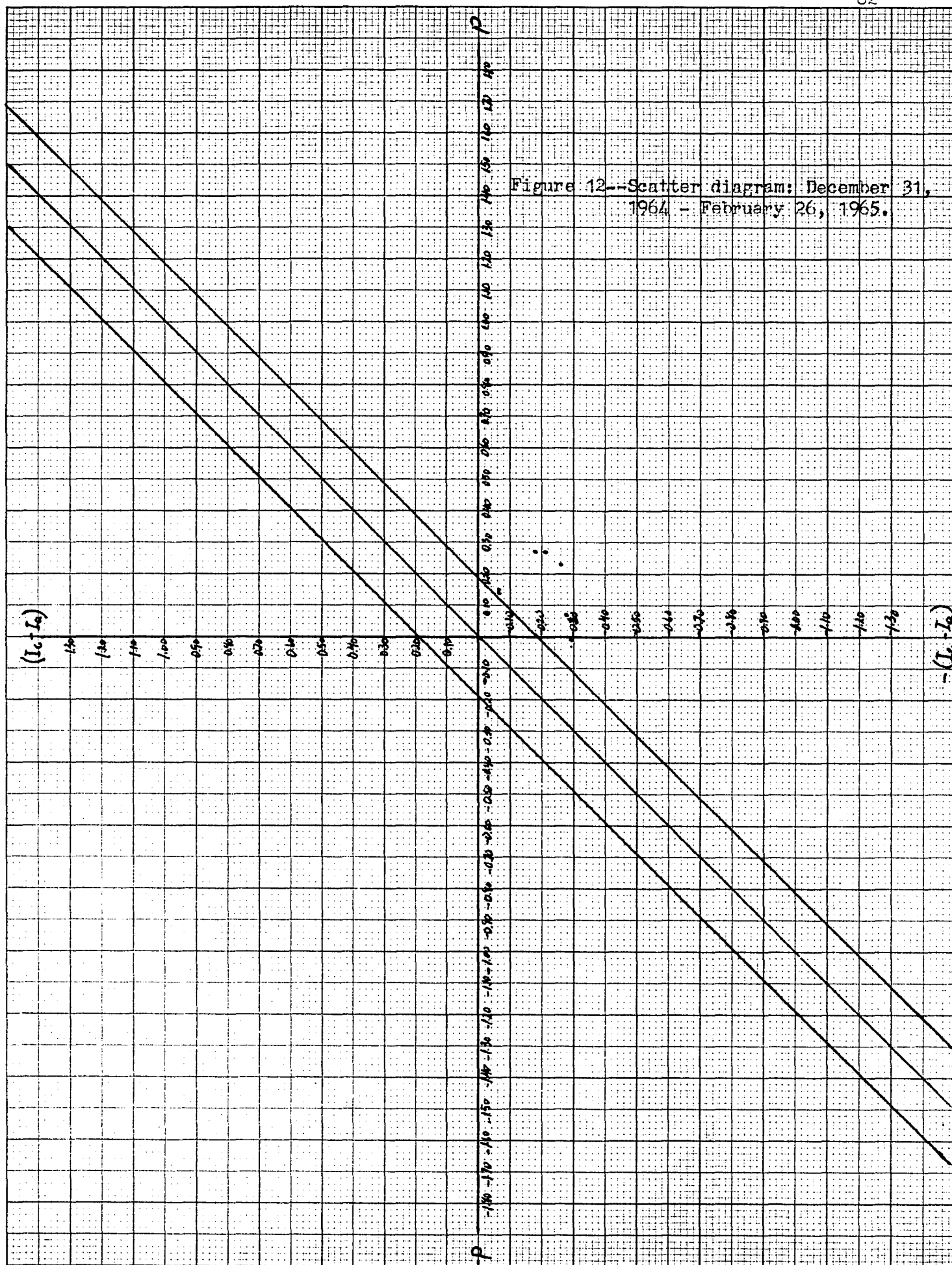Figure 12--Scatter diagram: December 31, 1964 - February 26, 1965.

Figure 22 (page 120), the speculative values do follow (excepting the week of February 26) the movements of the spot rate in a general way. The values are, therefore, usually stabilizing. It is, however, difficult to compare the changes in the speculative values with those of the spot rate in a precise way because of the many weeks when the spot rate or the speculative values remained unchanged.

The actual flow of funds for the first quarter of 1965 were stabilizing, a short-term capital inflow of $192-million offsetting a deficit of $264-million on the combined current and long-term capital account balance. The flows were, however, contrary to that indicated by the covered differential on Treasury Bills, which favoured the U.S. to a maximum of 0.49 per cent on February 5. This points out some of the problems of using the bill differential as an indicator of short-term flows.
May 28, 1965 - July 23, 1965.

In the second quarter of 1965, there was a large current account deficit of $360-million and a further weakening of the Canadian dollar, i.e., strengthening of the U.S. dollar, occurred. In the second half of the same quarter stabilizing speculation set in, resisting the appreciation of the U.S. dollar. The values (seen on Figure 22, page 120) revealed speculative activity for almost the entire time the U.S. spot rate was above its par value. The values showed up as positive, $p < Ic-Ia -$ 0.13, indicating that the Canadian dollar was supported by sales of U.S. dollars over this temporary period of weakness.

TABLE 8

SPECULATIVE PERIOD: MAY 28, 1965 - JULY 23, 1965

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differential in favour of Canada	Premium or Dis-count on the U.S. Dollar	Net incen-tive in favour of Canada
May 28	0.08	+0.08	108.00	+0.03	-0.01	-0.27	0.26
June 4	0.23	+0.15	108.13	+0.13	0.07	-0.34	0.41
11	0.32	+0.09	108.25	+0.12	0.09	-0.41	0.50
18	0.39	+0.07	108.28	+0.03	0.10	-0.47	0.57
25	0.34	-0.05	108.31	+0.03	0.11	-0.41	0.52
July 2	0.12	-0.22	108.38	+0.07	0.03	-0.27	0.30
9	0.12	0.00	108.47	+0.09	0.03	-0.27	0.30
16	0.01	-0.11	108.44	-0.03	0.05	-0.14	0.19
23	0.09	+0.08 -0.09	108.34	-0.10 -0.13	0.13	-0.14	0.27

The speculative values came almost entirely from the change in the discount. The largest ones were recorded between June 4 and July 9, during which time the unhedged differential was very small ranging from 0.03 to 0.11 per cent in favour of Canada. The discount varied considerably more. The fact that the speculative values resulted from the discount can be seen from the horizontal dispersion of points on Figure 13. The discount itself was not appreciably influenced by the central bank's forward exchange operations. The Bank of Canada did not enter the market in June when most speculation was registered. It did, however, enter in July with forward purchases of $40.0 million. These purchases were offsetting and probably reduced the discount and with it the speculative values somewhat.

Figure 13--Scatter diagram: May 28, 1965-
July 23, 1965.
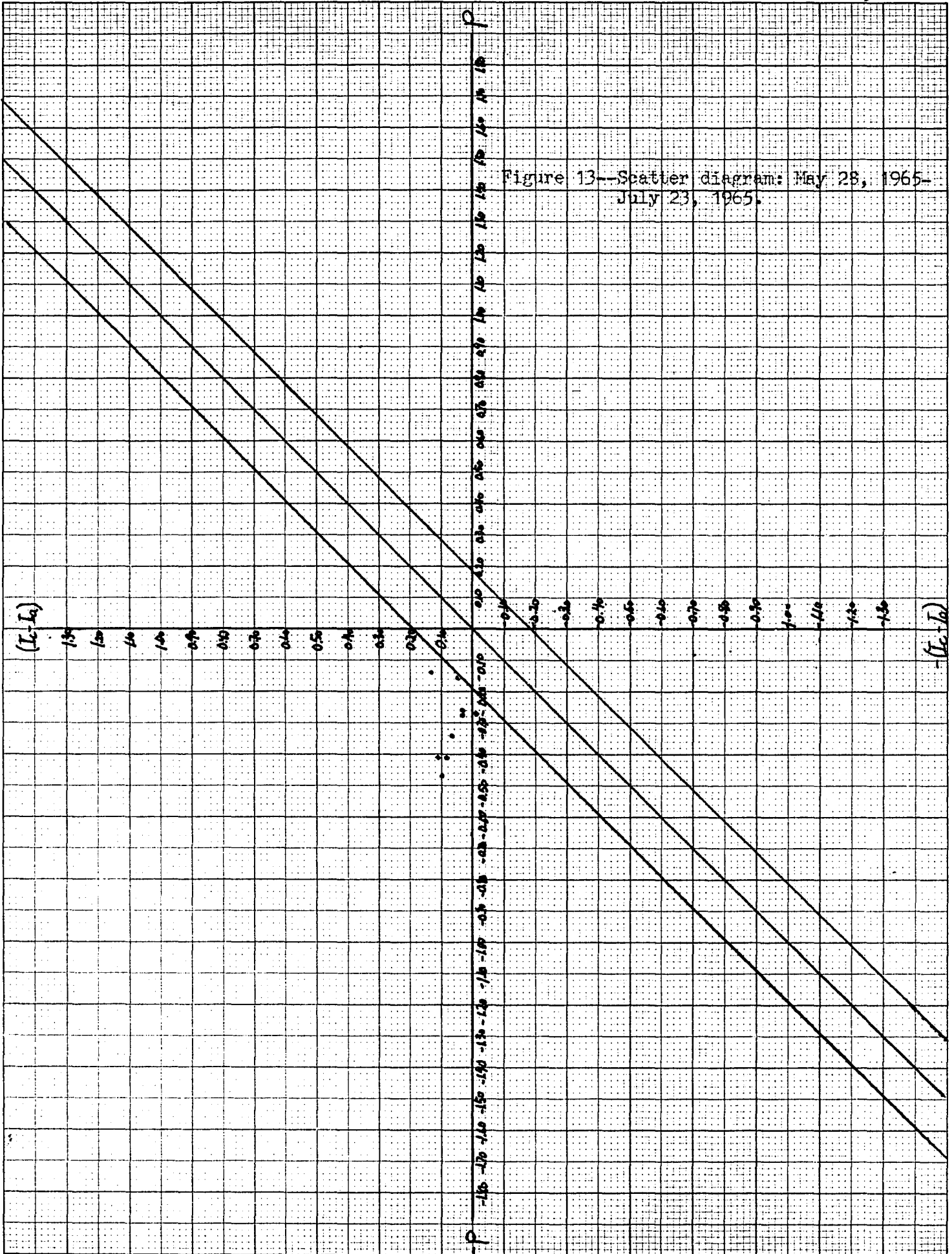
When the changes in the spot rate are compared with those of the speculative values, they coincide on 6 and differ on 4 occasions. These changes, were, therefore, stabilizing 60 per cent of the time.

The covered incentive favoured Canada for the period and reached a maximum of 0.57 per cent in favour of Canada on June 18, encouraging an inflow of capital in short-term forms.

In looking at the movements of short-term capital, we find that flows are stabilizing. During the second quarter of 1965 there occurred a current account deficit of $360-million, a long-term capital surplus of $134-million, leaving a combined deficit of $226-million. The offsetting short-term capital inflow amounted to $227-million.

September 10, 1965 - March 11, 1966.

This period is one of relative strength for the Canadian dollar and relative weakness for the American one. The U.S. dollar slipped below its par value on August 13, 1965 and remained below for well over a year. Speculative activity as revealed by our values set in on September 10, when the spot rate had dropped to 107.72 cents.

The speculative values for this period are negative, $p > Ic-In - 0.13$. As seen from the dispersion of points along the horizontal axis on Figure 14, the values resulted primarily from the level of the premium, meaning forward purchases. The interest differential itself on three-month Canadian and U.S. Treasury bills did not vary greatly. It varied from 0.16 per cent in favour of Canada on September 10, 1965 to 0.10 in favour of the U.S. on January 14, 1966, most of the differentials being well within this range. The premium on the other hand varied a great deal more — from 0.21 per cent on July 7 to 1.44 per cent during the third and fourth week of October.

TABLE 9

SPECULATIVE PERIOD: SEPTEMBER 10, 1965 – MARCH 11, 1966

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differential in favour of Canada	Premium or Dis-count on the U.S. Dollar	Net Incentive in favour of Canada
Sept. 10	-0.20	-0.20	107.72	0.00	0.16	0.54	-0.38
17	-0.09	+0.11	107.69	-0.03	0.13	0.40	-0.27
24	-0.39	-0.30	107.66	-0.03	0.04	0.61	-0.57
Oct. 1	-0.29	+0.10	107.59	-0.07	0.07	0.54	-0.47
8	-0.40	-0.11	107.53	-0.06	0.02	0.60	-0.58
15	-0.45	-0.05	107.53	0.00	0.04	0.67	-0.63
22	-0.49	-0.04	107.38	-0.15	0.07	0.74	-0.67
29	-0.45	+0.04	107.44	+0.06	0.04	0.67	-0.63
Nov. 5	-0.38	+0.07	107.44	0.00	0.04	0.60	-0.56
12	-0.43	-0.05	107.66	+0.22	0.06	0.67	-0.61
19	-0.62	-0.19	107.47	-0.19	0.01	0.81	-0.80
26	-0.52	+0.10	107.53	+0.06	-0.03	0.67	-0.70
Dec. 3	-0.65	-0.13	107.59	+0.06	-0.02	0.81	-0.83
10	-0.50	+0.15	107.69	+0.10	0.07	0.61	-0.54
17	-0.45	+0.05	107.56	-0.13	0.04	0.67	-0.63
24	-0.58	-0.13	107.50	-0.06	-0.02	0.74	-0.76
31	-0.53	+0.05	107.50	0.00	-0.04	0.67	-0.71
Jan. 7	-0.68	-0.15	107.38	-0.12	-0.05	0.81	-0.86
14	-0.59	+0.09	107.50	+0.12	-0.10	0.67	-0.77
21	-0.58	+0.01	107.47	-0.03	-0.02	0.74	-0.76
28	-0.38	+0.20	107.41	-0.06	-0.02	0.54	-0.56
Feb. 4	-0.39	-0.01	107.59	+0.18	-0.08	0.49	-0.57
11	-0.36	+0.03	107.63	+0.04	-0.09	0.45	-0.54
18	-0.29	+0.07	107.69	+0.06	-0.10	0.37	-0.47
25	-0.42	-0.13	107.69	0.00	-0.10	0.50	-0.60
Mar. 4	-0.24	+0.18	107.63	-0.06	-0.02	0.40	-0.42
11	-0.04	+0.20	107.63	0.00	-0.07	0.15	-0.22
		-0.04		-0.03			

Figure 14--Scatter diagram: September 10, 1965 - March 11, 1966.
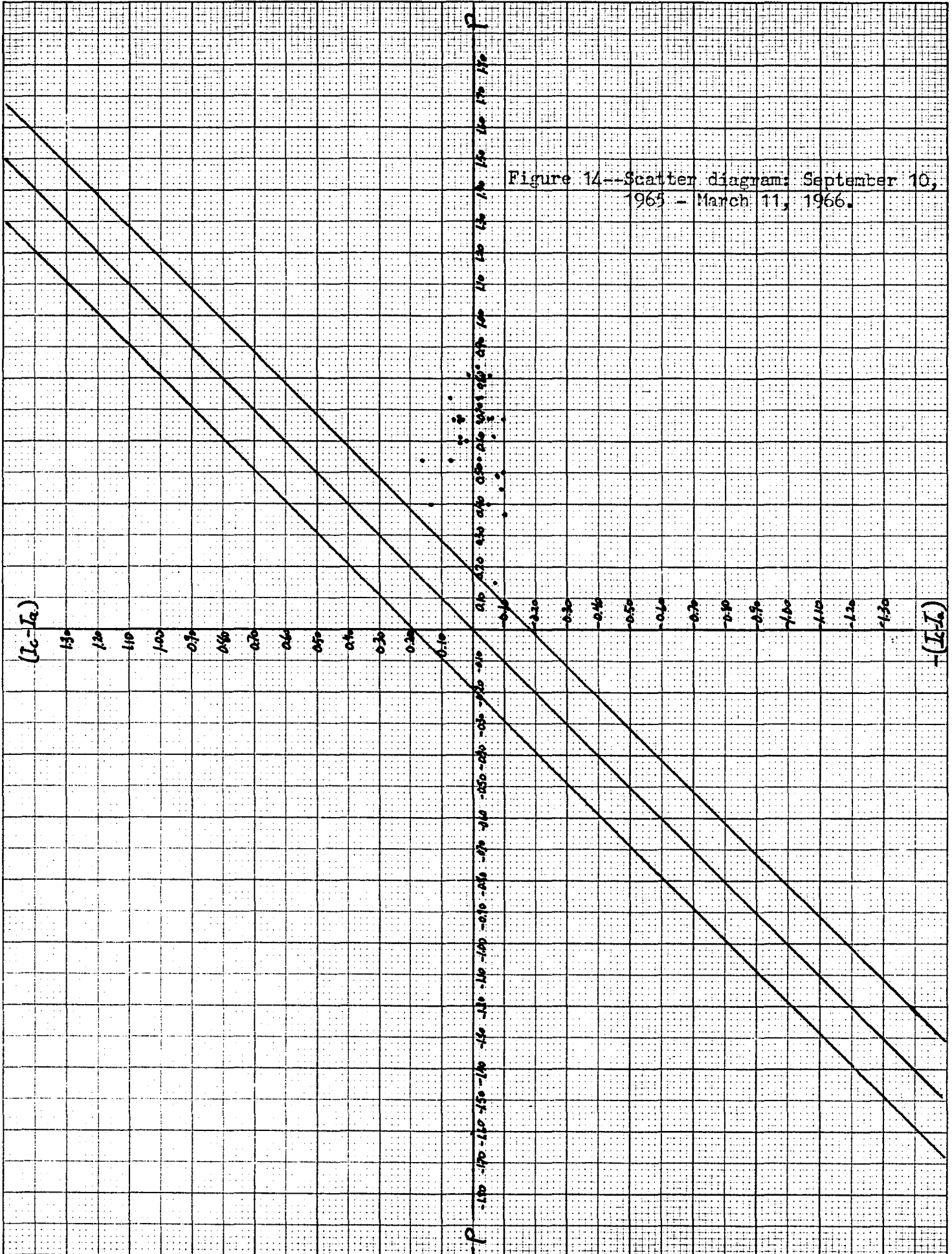
The premium on the U.S. dollar did not result from central bank purchases, though the central bank intervened in September with purchases of $72.0-million, $36.0-million in October, $2.9-million in November; sales of $10.0-million in December; and purchases again of $39.9-million, $9.7-million and $4.9-million in January, February, and March 1966, respectively. There is no relationship between the magnitude of the forward purchases and the level of the speculative values. For example, in September when our values indicated the least speculative activity the central bank intervention was at its greatest. The speculative values increased despite a decline in purchases in October, November and sales in December; although purchases were larger again in January 1966, the values did not increase in magnitude. Moreover, during 4 months - November, December, February and March - intervention was very small. With the exception of the above 4 months and the offsetting $10-million sales in December the central bank action did probably increase the premium on the U.S. dollar and with it the speculative values as well as the net incentive in favour of the U.S. Nevertheless, it is argued that these operations did not create the values we obtained.

Comparing the movements of the spot rate with the changes in the speculative values, we find that out of a total of 28 observed changes, the changes coincided on 16 and were opposing on 12 occasions. Thus our speculative values changed in a stabilizing manner 57 per cent of the time or slightly more than half of the time.

If we consider the actual movement of funds in short-term forms
for the two quarters involved, these flows are stabilizing. In the
fourth quarter of 1965 a combined deficit of $129-million on the
current plus long-term capital account balance was offset by an inflow
of $131-million in short-term forms, and a combined surplus of $66-million
in the first quarter of 1966 was offset by a short-term outflow of
$204-million. For the fourth quarter of 1965 the Treasury bill differ-
ential did not serve as a good indicator for the direction of the flow.
There was an inflow in spite of the fact that the hedged differential
on Treasury bills favoured the U.S. This again raises the problems
of using the Treasury bill differential as an indicator of actual flows.
Nevertheless, given the decline of the spot rate to levels well below
the par value, during this quarter, the premium that developed was
stabilizing.

March 25, 1966 - July 8, 1966.

The speculative values proved to be positive during the 12 weeks
involved, despite the fact that the U.S. dollar was well below its par
value for the period. The values were intermittent but stabilizing for
the greater part of the period.

TABLE 10

SPECULATIVE PERIOD: MARCH 25, 1966 - JULY 8, 1966

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen-tial in favour of Canada	Premium or Dis-count on the U.S. Dollar	Net incen-tive in favour of Canada
Mar. 25	0.21	+0.21	107.69	+0.09	0.43	0.04	0.39
Apr. 1	0.23	+0.03	107.72	+0.03	0.41	0.00	0.41
7	0.22	−0.01	107.72	0.00	0.40	0.00	0.40
15	0.08	−0.14	107.69	−0.03	0.32	0.06	0.26
22	0.02	−0.06	107.66	−0.03	0.35	0.15	0.20
29		−0.02	107.63	−0.03	0.33	0.15	0.18
May 6			107.69	+0.06	0.33	0.17	0.16
13	0.03	+0.03	107.69	0.00	0.38	0.17	0.21
20		−0.03	107.63	−0.06	0.34	0.17	0.17
27			107.69	+0.06	0.37	0.19	0.18
June 3	0.03	+0.03	107.72	+0.03	0.43	0.22	0.21
10	0.05	+0.02	107.72	0.00	0.40	0.17	0.23
17	0.06	+0.01	107.66	−0.06	0.46	0.22	0.24
24	0.39	+0.33	107.56	−0.10	0.57	0.00	0.57
30	0.15	−0.21	107.53	−0.03	0.44	0.11	0.33
July 8	0.13	−0.02	107.56	+0.03	0.31	0.00	0.31
		−0.13		−0.06			

The interest differential did not alter greatly over the period, ranging from a minimum of 0.31% in favour of Canada to a maximum of 0.57%; the premium as well varied little from 0.00 to a premium of 0.22% per annum. The speculative values came from both changes in the interest differential and the level of the forward premium. This is reflected by the dispersion of most points along the upper 0.18% boundary.

The values as well as the net incentive in favour of Canada remained positive, however, regardless of offsetting forward purchases by the central bank, possibly in an effort to increase the rate and reduce the net incentive in favour of Canada.

Figure 15--Scatter diagram: March 25, 1966-
July 8, 1966.
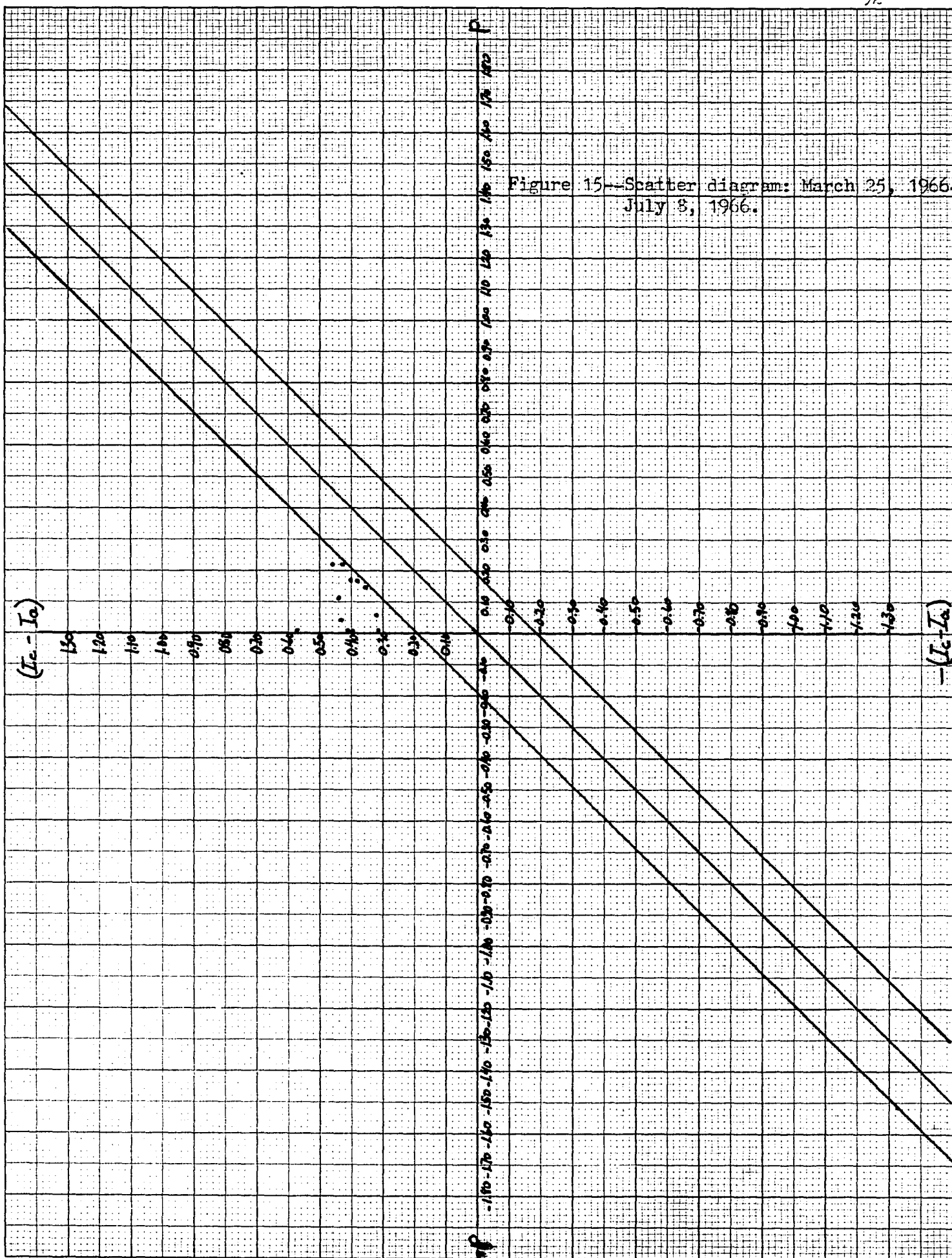
Purchases in April, May and June amounted to $3.3, $57.2 and $63.0-millions, respectively.

The speculative values were particularly stabilizing between March 25 and May 13. The values changed in a way to offset the upward fluctuations that occurred in the exchange rate between March 18 - April 29, and April 29 - June 3. When compared with the movements of the spot rate for these seven weeks all the changes in our speculative values coincide. Between June 10 and July 15, however, some large and positive values are indicated, in spite of certain substantial declines in the spot exchange rate and in these cases the values are not offsetting. The period as a whole fared relatively well, the changes coinciding for 12 weeks and differing for only 3. The movements were, therefore, stabilizing about 80 per cent of the time.

The hedged differential on Treasury bills favoured Canada, ranging up to 0.41 per cent for the period. The flow of funds for the second quarter of 1966 was stabilizing. There was a moderate short-term capital inflow of $34-million, offsetting somewhat a deficit of $151-million in the combined current plus long-term capital account balance.

November 25, 1966 - February 3, 1967.

The speculative values are positive from November 25 to December 30 and negative till February 24.

TABLE 11

SPECULATIVE PERIOD: NOVEMBER 25, 1966 - FEBRUARY 24, 1967

Dates	Specu- lative Values	Change in Specu- lative Values	U.S. Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen- tial in favour of Canada	Premium or Dis- count on the U.S. Dollar	Net incen- tive in favour of Canada
Nov. 25	0.02	+0.02	108.22	0.00	-0.21	-0.41	0.20
Dec. 2	0.07	+0.05	108.38	+0.16	-0.12	-0.37	0.25
9	0.09	+0.02	108.31	-0.07	-0.14	-0.41	0.27
16	0.21	+0.12	108.25	-0.06	0.06	-0.33	0.39
23	0.13	-0.08	108.28	+0.03	0.05	-0.26	0.31
30	0.01	-0.12	108.75	+0.47	0.04	-0.15	0.19
Jan. 6		-0.01	108.06	-0.69	0.07	0.05	-0.01
13	-0.02	-0.02	108.00	-0.06	-0.01	0.19	-0.20
20	-0.16	-0.14	107.84	-0.16	-0.02	0.32	-0.34
27	-0.28	-0.12	107.81	-0.03	-0.05	0.41	-0.46
Feb. 3	-0.18	+0.10	108.00	+0.19	0.07	0.43	-0.36
10	-0.18	0.00	108.03	+0.03	-0.01	0.35	-0.36
17	-0.11	+0.07	108.06	+0.03	-0.10	0.19	-0.29
24	-0.12	-0.01	108.25	+0.19	-0.15	0.15	-0.30
		-0.12		-0.06			

The values as pointed out in Figure 22 (page 120) followed the general movement of the exchange rate and changed from positive to negative as the rate passed below parity on January 6.

The dispersion of points along the upper and lower boundaries on Figure 16, indicates the values resulted from changes both in the interest differential and the premium. The unhedged interest differential varied from 0.21 per cent in favour of the U.S. to 0.06 per cent in favour of Canada for the first period and for the second, from 0.07 per cent in favour of Canada to 0.15 per cent in favour of the U.S. The premium in

Figure 16--Scatter diagram:
November 25, 1966 -
February 22, 1967.
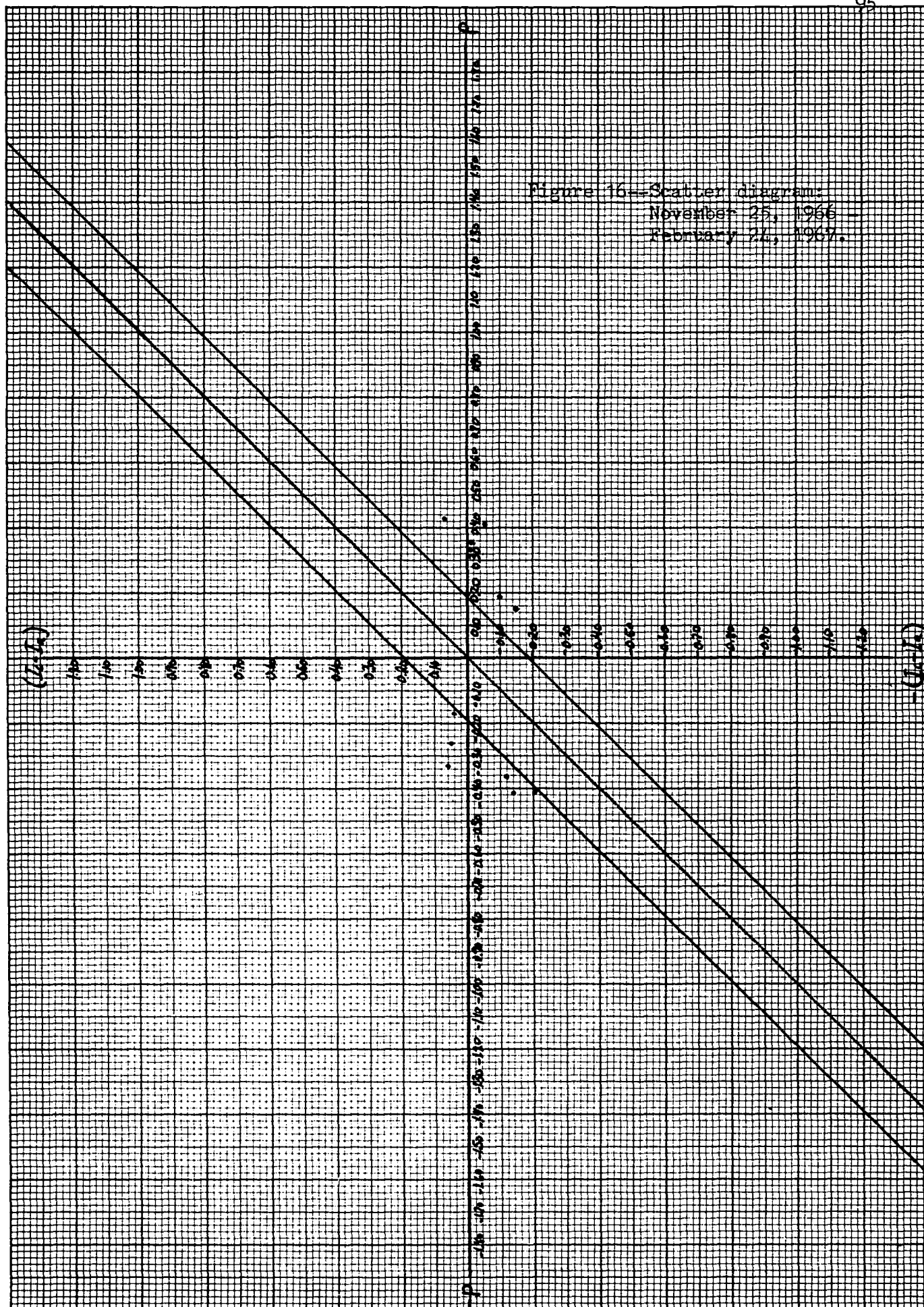
turn varied from-0.41 to-0.15 per cent between November 18 and December 30; and for January 13 to March 3 there was a premium that varied from 0.08 to 0.43 per cent.

The values for November and December were positive in spite of large central bank purchases of forward exchange— $165-million both in November and December. These forward purchases were offsetting and probably helped reduce the discount resulting from sales by the other market participants and with it our speculative values. Forward purchases by the Exchange Fund continued for January ($90-million), and February ($40-million). These latter purchases no doubt increased our speculative values somewhat.

Examining the changes in the values with the movements of the exchange rate between November 1966 and February 1967, the changes coincide for 10 observations and differ for 5. These movements were, therefore, stabilizing about 66 per cent of the time.

The hedged incentive reached a maximum of 0.41 per cent in favour of Canada in December and a maximum of 0.43 per cent in favour of the U.S. early in February, thus encouraging an inflow on Treasury bills in the first period and an outflow in the second.

The speculative values cover only one-half of the fourth quarter of 1966 and 2 out of 3 months of the first quarter of 1967. Nevertheless, in examining the flows in these two quarters we find they are stabilizing. In the fourth quarters of 1966 a deficit of $288-million on the combined current plus long-term capital account balance was offset by an inflow of $269-million. During the first quarter the deficit fell to $57-million which was offset by an inflow of $44-million in short-term forms. Although the flows in this quarter

were contrary to those indicated by the net incentive on Treasury bills, there was a sharp reduction in the inflow from the previous quarter when the incentive had favoured Canada.

May 12, 1967 - June 23, 1967.

During this period the U.S. dollar was above its par value. The speculative values for this seven week period are positive, p< Ic-Ia - 0.18.

TABLE 12

SPECULATIVE PERIOD: MAY 12, 1967 - JUNE 23, 1967

Dates	Speculative Values	Change in Speculative Values	U.S. Dollar Spot Rate	Changes in U.S. Dollar Spot Rate	Treasury Bill Differential in favour of Canada	Premium or Discount on the U.S. Dollar	Net Incentive in favour of Canada
May 12	0.04	+0.04	108.22	0.00	0.39	0.17	0.22
19	0.27	+0.23	108.22	0.00	0.54	0.09	0.45
26	0.33	+0.06	108.19	-0.03	0.66	0.15	0.51
June 2	0.31	-0.02	108.19	-0.00	0.77	0.28	0.49
9	0.43	+0.12	108.06	-0.13	0.83	0.22	0.61
17	0.28	-0.05	108.13	+0.07	0.76	0.30	0.46
23	0.49	+0.21	107.94	-0.19	0.89	0.22	0.67
		-0.49		+0.03			

In this example speculation was stabilizing as the values were positive while the U.S. dollar was still relatively strong and above its par value (though it was declining). According to the scatter diagram (Figure 17), the values resulted from both changes in the premium and changes in the interest differential, with the unhedged interest differential probably more important as shown by the vertical dispersion of the

Figure 17--Scatter diagram:
May 12, 1967 -- June 23, 1967

98
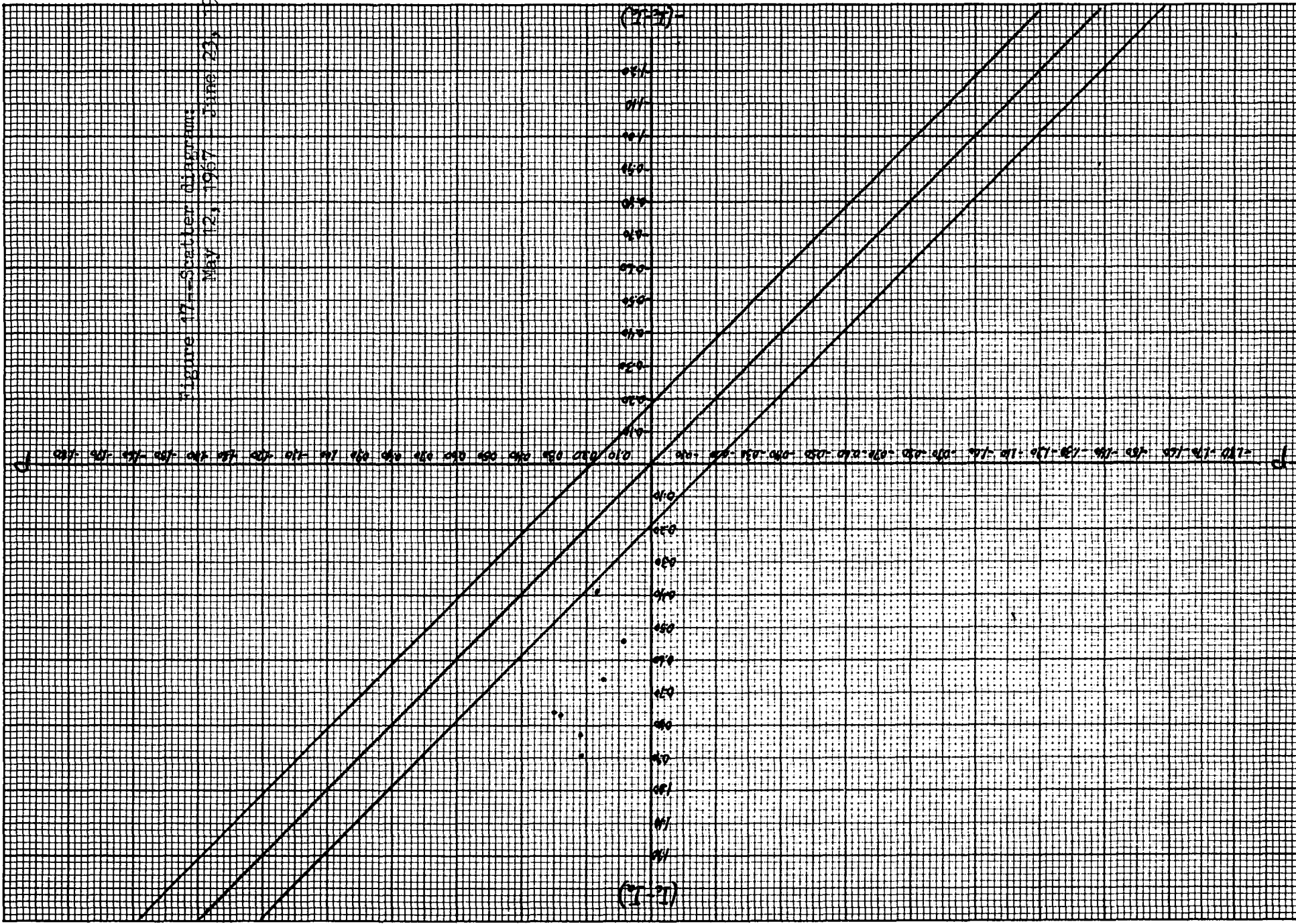
points. The unhedged differential ranged from 0.28 per cent in
favour of Canada on May 5 to 0.89 per cent on June 23. The premium
ranged from 0.09 per cent on May 19 to a maximum of 0.30 per cent on
June 16. The values for this period do not provide a good indication
of speculators expectations as reflected by forward sales, since changes
in the interest differential were more important in determining the specu-
lative values. The premium is influenced by arbitrage on a wide variety
of short-term instruments. Although short-term rates tend to move
together, when changes in the Treasury bill differentials are large, it
is unlikely that the premium will move in a way to wipe out the net
incentive.

The central bank did enter the forward exchange market in this period
with purchases of forward exchange: $70.0-million in May and $20.0-
million in June. This possibly helped to increase the premium and bring
it closer in line with the interest differential. The speculative values
may have been somewhat reduced by these purchases (as well as the
interest differential in favour of Canada).

Changes in the speculative values compared with changes in the spot
rate indicate movements which were not stabilizing. These changes
coincide on 3 occasions while differing on 5. Thus the movements in the
2 rates were stabilizing in only 3 out of 8 observations or about 35 per
cent of the time. The fact that the values resulted from changes in the
interest differential rather than in the premium probably helps to explain
the low number of concurrences between the changes in the speculative
values and those of the spot rate.

The net incentive favoured Canada up to 0.61 per cent on June 9.
Flows of funds which occurred in the second quarter were mildly
destabilizing. A current plus capital account deficit of $24-million
was supplemented by a short-term capital outflow of $30-million
increasing the loss of reserves to $54-million. An outflow began in this
quarter which accelerated dramatically during the next two quarters as
the Canadian dollar strengthened and the net incentive turned against
Canada.

July 7, 1967 - November 24, 1967.

The demand for spot Canadian dollars steadied during the third and
fourth quater of 1967 and remained above the official par value in terms
of the U.S. dollar from June 23 to November 24. The U.S. dollar in
terms of the Canadian, on the other hand, as seen in Figure 22 (page120)
maintained itself below its par value. The speculative activity indicated
by the values dates from July 7 or soon after the spot rate passed below
its par value at a spot level of 107.94.

TABLE 13

SPECULATIVE PERIOD: JULY 7, 1967 – NOVEMBER 24, 1967

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S.Dollar Spot Rate	Treasury Bill Differen-tial in favour of Canada	Premium or Dis-count on the U.S. Dollar	Net incentive in favour of Canada
July 7	-0.05	-0.05	107.94	-0.03	-0.02	0.21	-0.23
14	-0.16	-0.11	107.84	-0.10	0.03	0.37	-0.34
21	-0.38	-0.22	107.72	-0.12	0.00	0.58	-0.58
28	-0.38	0.00	107.59	-0.13	0.13	0.71	-0.58
Aug. 4	-0.36	+0.02	107.66	+0.07	0.09	0.65	-0.56
11	-0.47	-0.11	107.56	-0.10	0.10	0.75	-0.65
18	-0.73	-0.26	107.50	-0.06	0.06	0.97	-0.91
25	-0.91	-0.18	107.69	+0.19	-0.12	0.97	-1.09
Sept. 1	-0.90	+0.01	107.69	0.00	-0.11	0.97	-1.08
8	-0.86	+0.04	107.59	-0.10	-0.01	1.03	-1.04
15	-0.96	-0.10	107.53	-0.06	0.00	1.14	-1.14
22	-1.16	-0.20	107.44	-0.09	-0.16	1.18	-1.34
29	-0.74	+0.58	107.41	-0.03	0.30	1.22	-0.92
Oct. 6	-0.54	+0.20	107.41	0.00	0.18	0.90	-0.72
13	-0.77	-0.23	107.25	-0.16	0.21	1.16	-0.95
20	-0.95	-0.18	107.25	0.00	0.31	1.44	-1.13
27	-0.91	+0.04	107.28	+0.03	0.35	1.44	-1.09
Nov. 3	-0.57	+0.34	107.44	+0.16	0.26	1.01	-0.75
10	-0.52	+0.05	107.69	+0.25	0.20	0.90	-0.70
17	-0.44	+0.08	107.25	-0.44	0.28	0.90	-0.62
24	-0.12	+0.32	107.38	+0.63	0.51	0.81	-0.30
		+0.19		+0.19			

For virtually the whole period when the U.S. dollar was below its

par value, speculation is indicated. All the values are negative, p> Ic-Ia +

0.18. The horizontal dispersion of points on the scatter diagram (Figure 18)

shows that the values for the most part resulted from changes in the

premium, i.e., forward purchases. The interest rate differential was

fairly stable during this period, ranging from 0.16 per cent in favour of

Figure 18—Scatter diagram: July 7, 1967—
November 24, 1967.
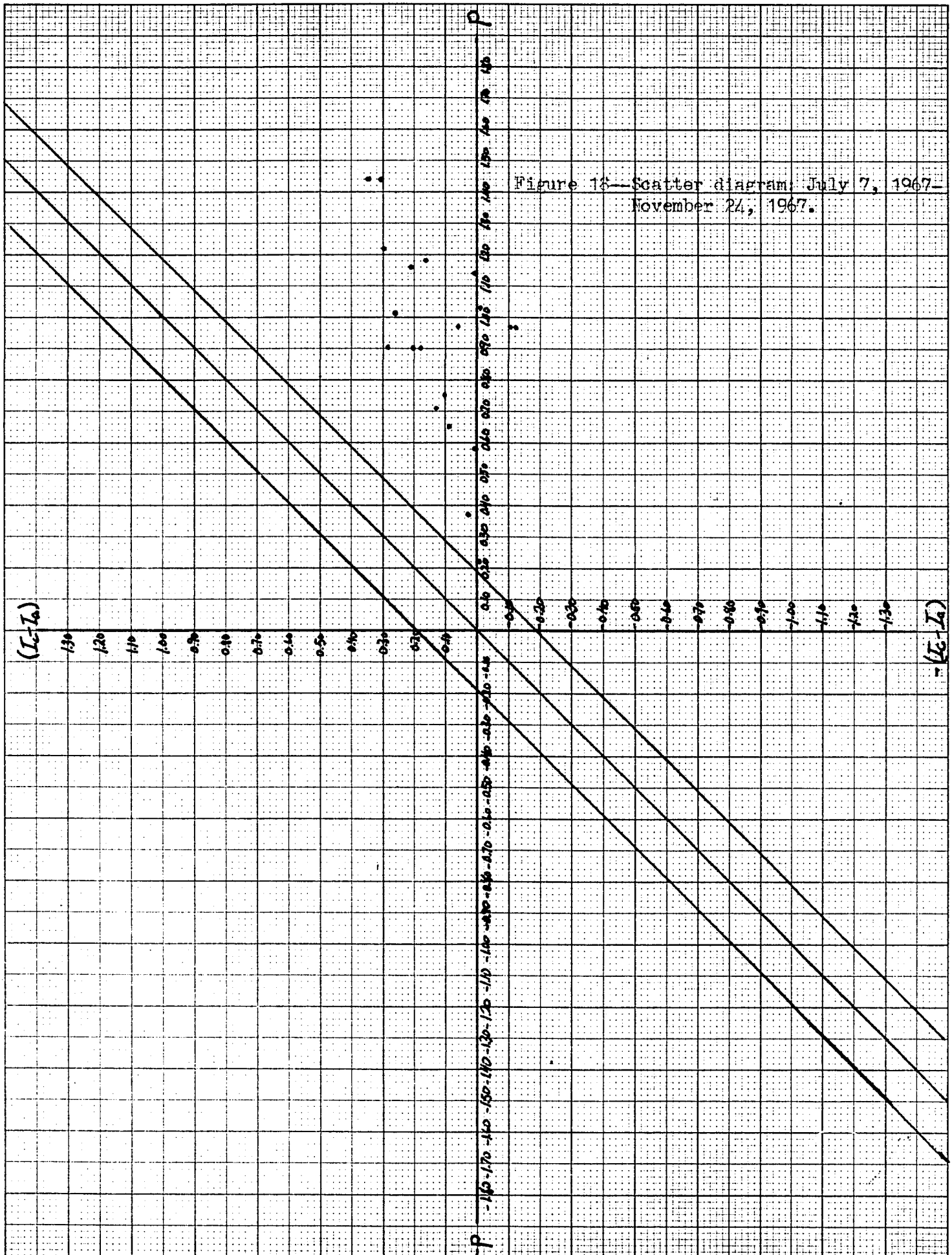
the U.S. on September 22, to a maximum of 0.51 per cent in favour of Canada on November 24. Between November 17 and 24, the last date to register speculative activity, there was a large increase in the interest differential. If this last date is omitted, the previous maximum stands as 0.35 per cent in favour of Canada on October 27. Most of the differentials were well within this latter range and did not change notably from week to week. The premium on the U.S. dollar, however, varied significantly from 0.21 per cent on July 7 to 1.44 per cent for October 20 and 27. The large negative values resulted, therefore, mostly from a rise in the premium caused by substantial forward purchases.

Too, forward purchases were made by the Exchange Fund Account for this period: $90.0-million in July, $40.0-million in August, $17.0-million in September, $35.0-million in October and $52.0-million in November. It is impossible to separate the influence of these purchases from those of the other market participants. Although these purchases unquestionably affected the level of the premium and thus our speculative values, there is no relationship between these monthly purchases and the general level of our values. For example, in July when the Exchange Fund Account purchases were at their greatest ($90.0-million), our speculative values were at their lowest levels, while in September when Account purchases were least ($17.0 million), our values attained their peaks. Central bank purchases probably increased the values we obtained, yet they did not create the variations of the combination of the premium and the interest differential from the -0.18 per cent margin.

When provision for the forward exchange cover is made, the differential in favour of U.S. Treasury bills becomes substantial ranging from 0.23 on July 7 to 1.34 per cent on September 22. Thus, during this period of relative strength of the Canadian dollar, the premium and with it the hedged differential moved in a manner to encourage a stabilizing outflow of funds.

The results of the changes in the speculative values, and those in the exchange rate, are very encouraging. Out of a total of 22 weekly observations, the changes coincided on 16 and differed only on 6 occasions. This means that these movements were stabilizing approximately 73 per cent of the time.

When considering the actual movement of funds in short-term forms for the two quarters involved, there was an outflow of $447-million during the third quarter and an outflow of $345-million during the fourth quarter. In each case, these flows were stabilizing, offsetting a surplus of $503-million and $374-million respectively on the combined current and long-term capital account balance in each of the quarters. April 19, 1968 - June 21, 1968.

As seen from Figure 22 (page 120) the Canadian dollar strengthened markedly after the exchange crisis of 1968 ended sometime in mid-March. The U.S. dollar passed below its par value early on April 11. Stabilizing speculation resisting a further fall set in at the same time.

TABLE 14

SPECULATIVE PERIOD: APRIL 19, 1968 – JUNE 21, 1968

Dates	Specu-lative Values	Change in Specu-lative Values	U.S.Dollar Spot Rate	Change in U.S. Dollar Spot Rate	Treasury Bill Differen-tial in favour of Canada	Premium or Dis-count on the U.S. Dollar	Net Incen-tive in favour of Canada
Apr. 19	-0.07	-0.07	107.94	-0.13	1.22	1.47	-0.25
26	-0.05	+0.02	107.88	-0.06	1.30	1.53	-0.23
May 3	-0.09	-0.04	107.81	-0.07	1.35	1.62	-0.27
10		+0.09	107.81	0.00	1.19	1.25	-0.06
17	-0.06	-0.06	107.78	-0.03	0.97	1.21	-0.24
24	-0.16	-0.10	107.75	-0.03	1.06	1.38	-0.32
31	-0.08	+0.08	107.84	+0.09	1.08	1.36	-0.28
June 7	-0.61	-0.53	107.69	-0.15	1.11	1.90	-0.79
14		+0.61	107.75	+0.06	0.93	0.91	0.02
21	0.12	+0.12	107.63	-0.12	1.14	0.84	0.30
		-0.12		-0.03			

The dispersion of points on the scatter diagram (Figure 19), along the lower 0.13 per cent margin shows that the speculative values resulted from both changes in the interest differential and from the level of the premium. The unhedged differential varied from 0.93 per cent in favour of Canada on June 14 to a maximum of 1.40 per cent on April 5, though the bulk of the differentials were well within this range. The premium on the other hand, ranged from 0.91 per cent on June 14 to a maximum of 1.62 per cent on May 3, exceeding the interest differential for most of the period. This occurred in spite of the fact that the Bank of Canada was still selling forward exchange in large amounts—$328-million in April, 222.0-million in May, and 76.3-million in June, and that the abnormally high short-term

Figure 19—Scatter diagram: April 19, 1968-June 21, 1968.
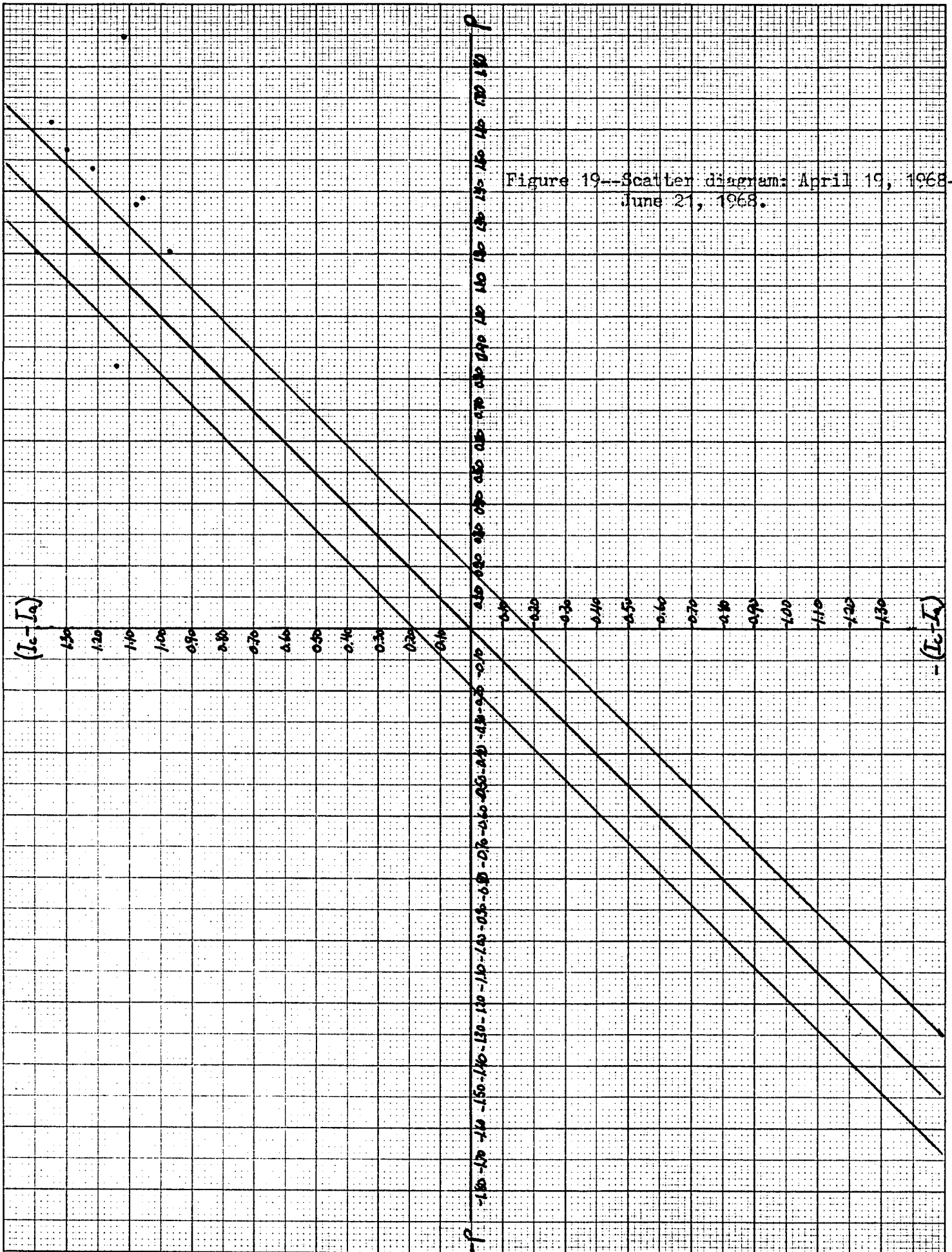
interest differentials connected with the exchange crisis in the first quarter of 1968 were allowed to continue until the end of June. It is because of this central bank intervention connected with the 1968 crisis that we are keeping this period conceptually separate from the following period, July 5, 1968 – January 3, 196$\overset{9}{\cancel{8}}$.

The speculative values are stabilizing except for one observation when the values for June 21, suddenly reversed themselves to become positive, indicating a switch on balance from forward purchases to forward sales during a drop in the exchange rate. Nevertheless, the values for the period as a whole are negative, denoting that speculators were purchasing U.S. forward thus resisting a further fall in the exchange rate.

When changes in the spot rate are compared with changes in the speculative values, the movements coincided for 9 observations and differed for 2. Movements in the speculative values were, therefore, stabilizing 82 per cent of the time.

The net arbitrage incentive on 90-day Treasury bills began to change moderately in favour of the U.S. during this period thus beginning a trend which accelerated in the remaining two quarters of 1968. A survey of the actual flows of funds in short-term forms, shows them as moderately stabilizing. A moderate short-term outflow helped to offset somewhat a combined current plus long-term capital account surplus of $704-million. July 12, 1968 – January 3, 1969.

The speculative values reveal constant speculative activity for 26-weeks beginning July 5. In all these cases the values were negative, $p > Ic-Ia + 0.13$. Figure 20 shows a dispersion of points along the lower
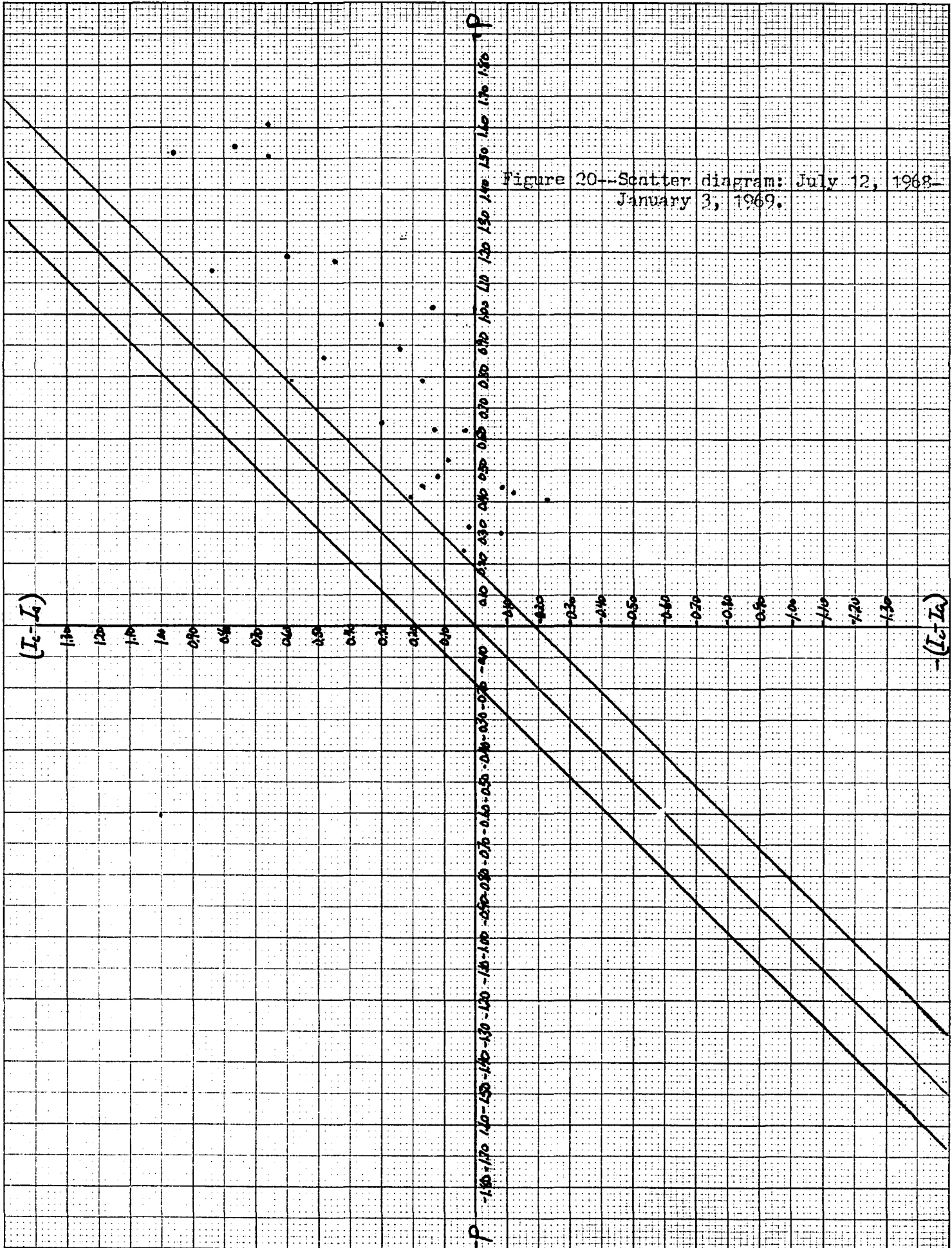
0.18 per cent margin; these points resulted from a combination of changes in the interest differentials and changes in the premium. Unhedged interest differentials varied substantially for this period, the largest differentials occurring in July, August and September and ranging from 0.14 per cent in favour of Canada on August 30 to 0.96 per cent on July 5 and August 9. The premium on the U.S. dollar, however, was sufficient to exceed the differentials by a substantial margin. During October, November, and December, the differentials narrowed from a moderate 0.21 per cent in favour of Canada on October 11, to a moderate 0.23 per cent in favour of the U.S. on December 13. The premium also dropped substantially and the speculative values showed up less strongly during these months.

Exchange Fund Account intervention was also significant during this period and must be considered. In July, the values reached their highest negative levels in spite of offsetting sales of $33.2-million of forward exchange. In August the central bank switched to purchases of forward exchange: $31.7-million in August, $27.0-million in September; purchases increased dramatically to $134.5-million in October, and $117.0-million in November, and then fell back to $27.8-million in December. There is, however, no direct relationship between the speculative values and the level of forward purchases by the Bank. During October and November, when official purchases were greatest the values turned out to be least. These large forward purchases probably did influence the premium and helped to keep the incentive in favour of the U.S., and no doubt increased the speculative values. Nevertheless, although the Exchange Fund influenced these values, the values themselves resulted primarily from the activities, i.e., forward purchases, of the other participants in the foreign exchange market.

TABLE 15

SPECULATIVE PERIOD: JULY 12, 1968 - JANUARY 3, 1969

Dates	Specu-lative Values	Change in Specu-lative Values	U.S. Dollar Spot Rate	Change in U.S.Dollar Spot Rate	Treasury Bill Differen-tial in favour of Canada	Premium or Dis-count on the U.S. Dollar	Net Incen-tive in favour of Canada
July 12	-0.12	-0.12	107.50	+0.12	0.84	1.14	-0.30
19	-0.67	-0.55	107.28	-0.22	0.66	1.51	-0.85
26	-0.77	-0.10	107.25	-0.03	0.66	1.61	-0.95
Aug. 2	-0.38	+0.39	107.25	0.00	0.96	1.52	-0.56
9	-0.59	-0.21	107.31	+0.06	0.77	1.54	-0.77
16	-0.41	+0.18	107.25	-0.06	0.60	1.19	-0.59
23	-0.50	-0.09	107.25	0.00	0.47	1.15	-0.68
30	-0.70	-0.20	107.25	0.00	0.14	1.02	-0.88
Sept. 6	-0.47	+0.23	107.28	+0.03	0.24	0.89	-0.65
13	-0.44	+0.03	107.38	+0.10	0.17	0.79	-0.62
20	-0.49	-0.05	107.28	-0.10	0.30	0.97	-0.67
27	-0.20	+0.29	107.25	-0.03	0.48	0.86	-0.38
Oct. 4	-0.17	+0.03	107.28	+0.03	0.30	0.65	-0.35
11	-0.02	+0.15	107.31	+0.03	0.21	0.41	-0.20
18	-0.10	-0.08	107.28	-0.03	0.17	0.45	-0.28
25	-0.35	-0.25	107.25	-0.03	0.13	0.63	-0.50
Nov. 1	-0.46	-0.11	107.25	0.00	-0.02	0.62	-0.64
8	-0.41	+0.05	107.31	+0.06	0.04	0.63	-0.59
15	-0.18	+0.23	107.34	+0.03	0.12	0.48	-0.36
22	-0.27	-0.09	107.25	-0.09	0.09	0.54	-0.45
29	-0.12	+0.15	107.28	+0.03	0.02	0.32	-0.30
Dec. 6	-0.20	-0.08	107.34	+0.06	-0.08	0.30	-0.38
13	-0.46	-0.26	107.31	-0.03	-0.23	0.41	-0.64
20	-0.37	+0.09	107.28	-0.03	-0.12	0.43	-0.55
27	-0.36	+0.01	107.28	0.00	-0.09	0.45	-0.54
Jan. 3	0.02	+0.34	107.25	-0.03	0.04	0.24	-0.20
		+0.02		+0.03			

Figure 20--Scatter diagram: July 12, 1968-
January 3, 1969.

When we compare the changes in the speculative values with the weekly movements of the spot exchange rate, these changes are stabilizing. They coincide for 13 weeks and differ for 9, making the changes stabilizing 67 per cent of the time.

The hedged differential favoured an outflow of funds during this period of relative weakness of the American dollar. The differential reached as high as 0.95 per cent in favour of the U.S. on July 26 but this dropped to a moderate level throughout the remaining months.

There occurred a large outflow of short-term capital on $532-million in the third quarter of 1968. This more than offset the balance of payments surplus of $27-million on the combined current plus long-term capital account balance. The flows during the fourth quarter, however, proved destabilizing and counter to that indicated by the hedged differential on Canadian and U.S. Treasury bills. In the fourth quarter, an inflow of $178-million of funds in short-term forms was added to a surplus of 159-million on the combined current plus capital account balance. It is, however, likely that this destabilizing inflow reflected the flight of speculative capital abroad from Britain in anticipation of the devaluation that took place in November.

February 21, 1969 – November 21, 1969.

Figure 22 (page 121) shows speculative activity starting from February 7, when the U.S. dollar began moving above the low it had maintained during the previous 23 weeks. This present period is the longest period of speculation indicated by the values and encompasses 39 weekly observations. As can be seen by the horizontal dispersion of points on

the scatter diagram (Figure 21), the speculative values resulted primarily from the discount on the U.S. forward dollar. The unhedged differential on Canadian and U.S. treasury bills varied from 0.05 per cent in favour of the U.S. on February 21 to 0.31 per cent in favour of Canada on June 27. Most of the differentials, however, were well within this range and did not change much from week to week.[17] The U.S. forward rate expressed as a discount or premium varied much more. It ranged from a premium of 0.13 per cent on November 14 to a discount of 1.64 per cent on June 20 and July 11. The values resulted, therefore, primarily from the discount, meaning forward sales.

Exchange Fund forward operations did not contribute to the positive nature of the values. Forward U.S. dollar operations for the Exchange Fund Account in 1969 were large: purchases of $60.0-million per month in February and March, $110.0-million in May, $160.0-million in June, July and August, $152.5-million in September, $132.5-million in October, and $95.0-million in November. Nevertheless, the speculative values reached their highest levels in June and July (as high as 2.04 on June 24) when the purchases were at their greatest. The purchases were offsetting, tending to reduce the level of the discount, and thereby, the speculative values.

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17. There was a sharp rise of short-term interest rates both in the U.S. and in Canada. The Canadian increases coincided with increases in the bank rate which was raised to 7% on March 3, to 7½% on June 1, and to 8% on July 16. Nevertheless, the unhedged differentials remained quite small.
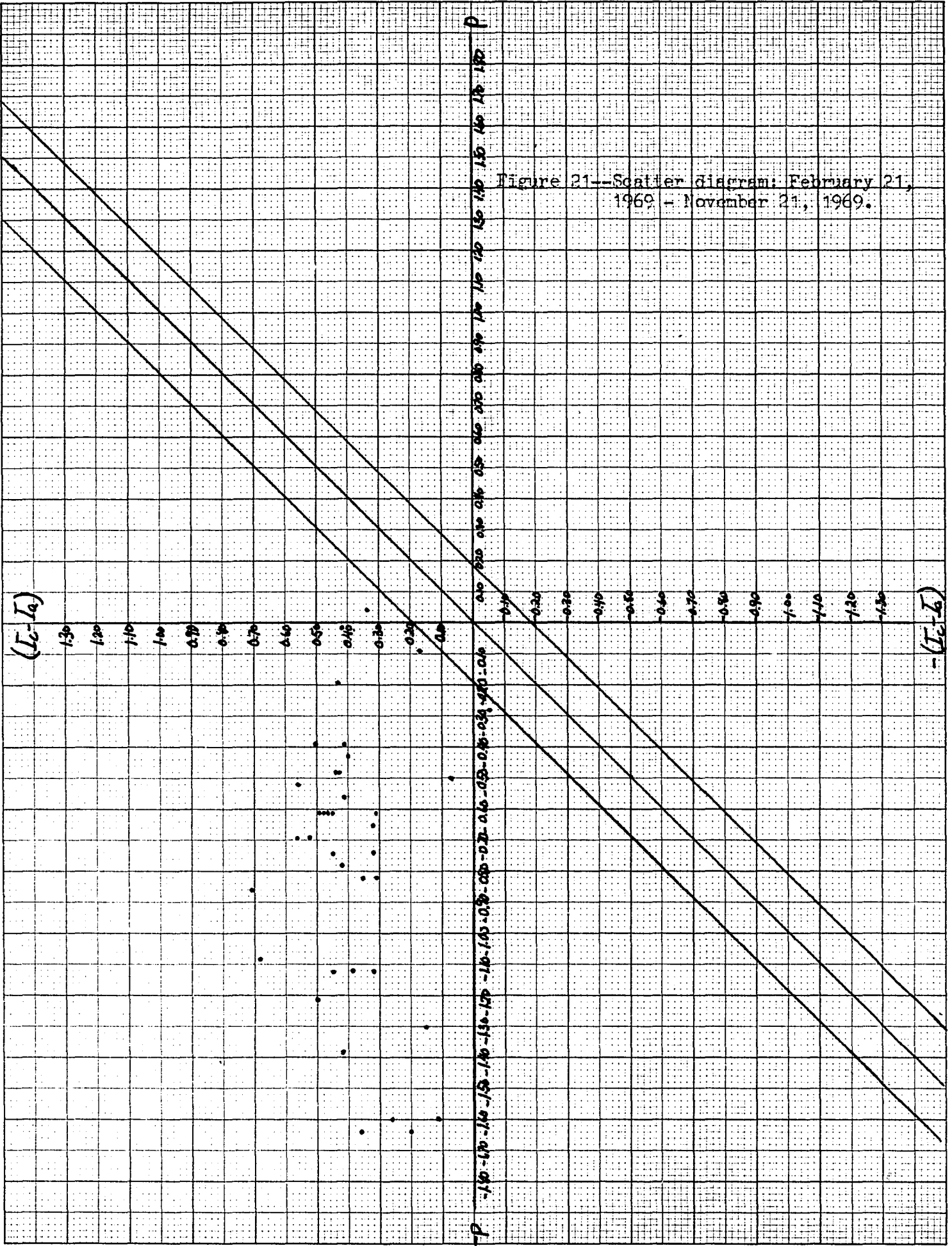
Figure 21--Scatter diagram: February 21, 1969 - November 21, 1969.

TABLE 16

SPECULATIVE PERIOD: FEBRUARY 21, 1969 – NOVEMBER 21, 1969

Dates	Speculative Values	Change in Speculative Values	U.S. Dollar Spot Rate	Change in U.S. Spot Rate	Treasury Bill Differential in favour of Canada	Premium or Discount on the U.S. Dollar	Net Incentive in favour of Canada
Feb. 21	0.05	+0.05	107.56	+0.15	−0.05	−0.28	0.23
28	0.39	+0.34	107.59	+0.03	0.07	−0.50	0.57
Mar. 7	0.65	+0.26	107.69	+0.10	0.40	−0.43	0.83
14	0.74	+0.09	107.69	0.00	0.44	−0.48	0.92
21	0.91	+0.17	107.75	+0.06	0.48	−0.61	1.09
28	1.01	+0.10	107.69	−0.06	0.45	−0.74	1.19
Apr. 3	0.95	−0.06	107.72	+0.03	0.31	−0.82	1.13
11	0.74	−0.21	107.66	−0.06	0.31	−0.61	0.92
18	0.79	+0.05	107.59	−0.07	0.32	−0.65	0.97
25	0.88	+0.09	107.53	−0.06	0.32	−0.74	1.06
May 2	1.39	+0.51	107.59	+0.06	0.71	−0.86	1.57
9	1.58	+0.19	107.72	+0.03	0.68	−1.08	1.76
16	1.39	−0.19	107.63	−0.09	0.45	−1.12	1.57
23	1.53	+0.14	107.78	+0.15	0.50	−1.21	1.71
30	1.62	+0.09	107.78	0.00	0.42	−1.38	1.80
June 6	1.68	+0.06	107.78	0.00	0.26	−1.60	1.86
13	1.27	−0.41	107.91	+0.13	0.15	−1.30	1.45
20	1.82	+0.55	108.09	+0.18	0.36	−1.64	2.00
27	2.04	+0.22	108.09	0.00	0.81	−1.41	2.22
July 4	1.53	−0.51	108.09	0.00	0.11	−1.60	1.71
11	1.66	+0.13	108.25	+0.16	0.20	−1.64	1.84
18	1.33	−0.33	108.06	−0.19	0.39	−1.12	1.51
25	1.26	−0.07	108.03	−0.03	0.32	−1.12	1.44
Aug. 1	0.99	−0.27	107.94	−0.09	0.35	−0.82	1.17
8	1.02	+0.03	107.91	−0.03	0.42	−0.78	1.20
15	1.03	+0.01	107.88	−0.03	0.52	−0.69	1.21
22	1.07	+0.04	107.72	−0.16	0.56	−0.67	1.25
29	0.73	−0.34	107.72	0.00	0.43	−0.48	0.91
Sept. 5	0.90	+0.17	107.84	+0.13	0.47	−0.61	1.08
12	0.88	−0.02	107.84	0.00	0.45	−0.61	1.06
19	0.62	−0.26	107.78	−0.06	0.41	−0.39	0.80
26	0.71	+0.09	107.84	+0.06	0.50	−0.39	0.89
Oct. 3	0.90	+0.19	107.94	+0.10	0.56	−0.52	1.08
10	0.90	0.00	107.91	−0.03	0.47	−0.61	1.08
17	0.79	−0.11	107.78	−0.13	0.41	−0.56	0.97
24	0.44	−0.35	107.63	−0.15	0.43	−0.19	0.62
31	0.24	−0.20	107.63	0.00	0.40	−0.02	0.42
Nov. 7	0.12	−0.12	107.59	−0.04	0.34	0.04	0.38
14		−0.12	107.56	−0.03	0.29	0.13	0.16
21	0.09	+0.09	107.59	+0.03	0.17	−0.09	0.26
		−0.09		−0.19			

Most of the speculative activity took place while the U.S. dollar in Canada was still below its par value. The speculation, nevertheless, occurred while the U.S. dollar was strengthening over a period of time relative to the previous period. The spot rate of the U.S. dollar in the Canadian foreign exchange market rose between February and June, moved above its official par value of 108.108 cents for a week in July. A substantial surplus appeared again in the third and fourth quarter in the combined current and capital account balances and the rate on the U.S. dollar weakened once more. All the speculative values are positive, $p < Ic-Ia - 0.13$, denoting that as the U.S. dollar was strengthening, speculators were selling U.S. forward or resisting the upward trend in the spot exchange rate. This resistance began while the U.S. dollar was still relatively weak and below the official par value——at 107.41 Canadian cents. The basis for the speculators actions, thus, need not be the par value. Speculators can expect the spot rate to be over or under valued at any level above or below the official limits.

The general movement of the speculative values (Figure 22, page 121) mirrors closely the movements of the spot rate between February and November of 1969. This is reflected in the high concurrence when movements in the exchange rate are compared with changes in the speculative values. These movements coincide for 31-weekly observations and differ for but 10; the movements were thus stabilizing approximately 75 per cent of the time. The closeness of the direction of changes can be seen in Figure 23 (page 123) where the changes in the two rates have been plotted.

The year 1969 was marked by surpluses on the combined current plus long-term capital account balance: $285-million in the first quarter, $172-million in the second, $657-million in the third, and $326-million in the fourth quarter. In each case the surpluses were offset by short-term capital outflows of $323-million, $226-million, $662-million and $164-million in the first, second, third, and fourth quarters respectively.

These outflows occurred in spite of the fact that the hedged differential as calculated on Treasury bills favoured Canada, and except for a few occasions between March and October the differentials remained above 1.00 per cent per annum in favour of Canada; they reached an exceptional maximum of 2.22 per cent in favour of Canada on June 27.

When discussing the Treasury bills merit as an indicator of short-term interest rates, it was pointed out that the flow of funds may be responsive to different rates at different times. Market imperfections can give rise to arbitrage in one direction between Treasury bills and in the opposite direction between bank deposit accounts. This is precisely what happened during 1969. Very high interest rates offered for funds placed on deposit abroad attracted a large volume of short-term capital from Canada.[13] One of the main channels for the international flow of short-term capital was the foreign currency operations of the Canadian chartered banks. The banks net foreign currency liabilities to Canadian residents increased by over $1000-million in 1969 mainly through

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13. The expected revaluation of the deutschmark could also have contributed to the outflow of funds, though the bulk of the flows probably responded to interest arbitrage induced by high interest differentials rather than on speculative considerations.

a sharp build up of swapped deposits in response to the sharp rise in interest rates abroad.[19]

A premium on the U.S. forward dollar tends to increase the yield obtainable on swapped deposits by the exchange profit resulting from the premium, and encourages the acquisition of swapped deposits. A discount, on the other hand, tends to increase the cost of the forward cover, and reduces the return available to the banks on swapped deposits. Although a substantial discount developed during the second and third quarter of 1969, however, it was insufficient to offset the profitability of foreign deposits. For example, Eurodollar rates on 3-month deposits rose to exceptionally high levels during the second, third and fourth quarter of 1969. For three months money the rate in London started the year at 7 per cent, touched a maximum of 13 per cent on June 10, and dropped back to fluctuate around 10 and 11 per cent for the rest of the year.[20]

The rise in swapped deposits increased so rapidly during the second quarter that in July the Bank of Canada imposed a temporary ceiling to halt the build up of swapped deposits. The Bank requested that these liabilities be limited to the then current level of $1,724-million.[21] Following this request resident holdings of these deposits declined.[22]

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19. Bank of Canada, Annual Report of the Governor to the Minister of Finance, 1969, p. 70.
20. The Economist, 1969.
21. Dominion Bureau of Statistics, Quarterly Estimates of the Canadian Balance of International Payments, Fourth Quarter of 1969, p. 15.
22. Ibid., p. 15.

There were, however, large countervailing movements of funds.
Yields on hedged short-term company paper and Treasury bills were
considerably higher than those on comparable investments in the U.S.
and non-residents increased their holdings of this type of paper during
1969. Foreign holdings of Canadian Treasury bills and short-term paper
increased $248-million in the year.

Even though the hedged Treasury bill differential in this case is
not indicative of the direction of the bulk of the flows, the 90-day
forward rate expressed as a premium did behave in a stabilizing way.
Our speculative values resulted primarily from the level of the premium
as did the net incentive in favour of Canada on short-term paper. The
premium tended to discourage outflows in swapped deposits and at the
same time encouraged inflows in short-term paper.

TABLE 17

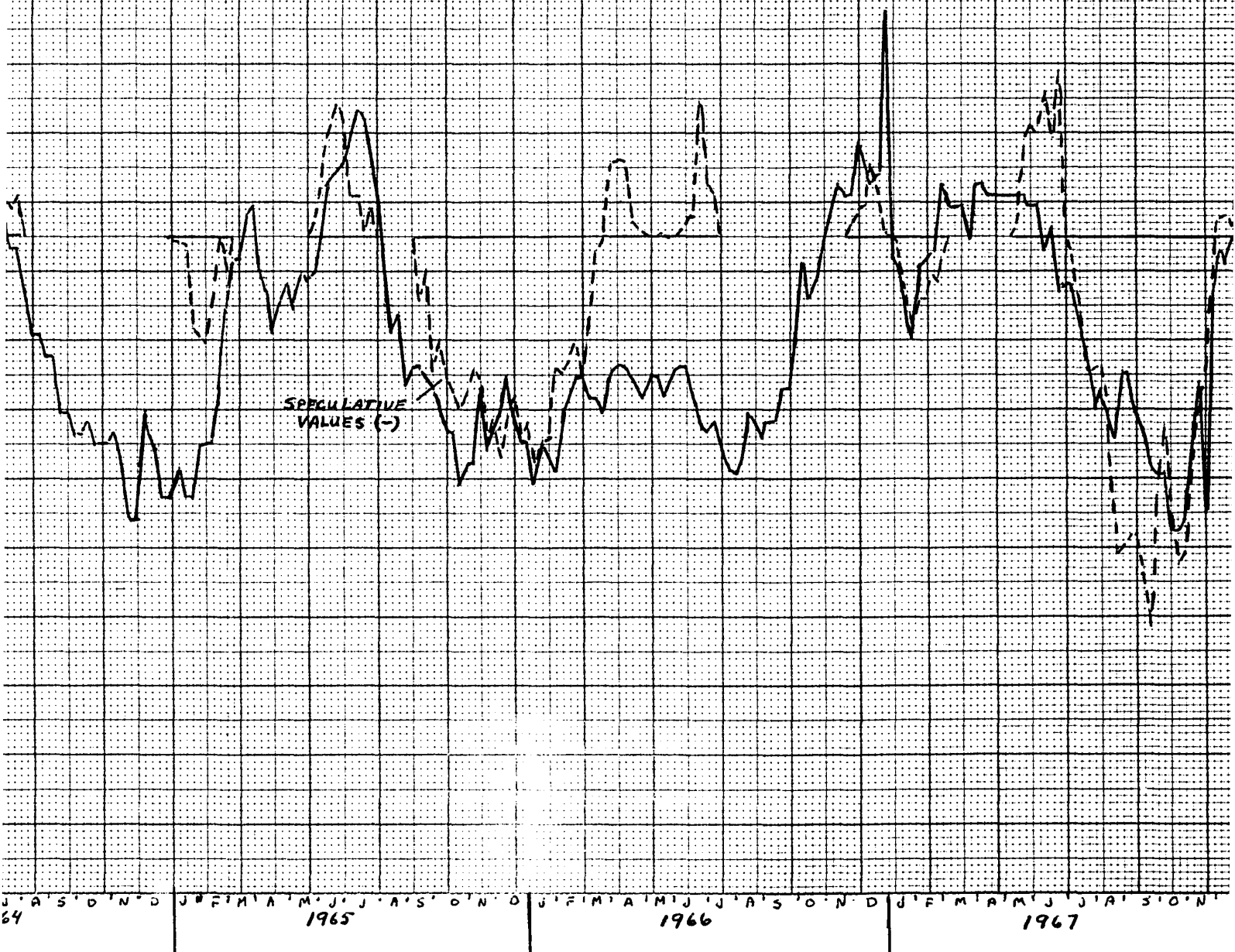CANADA'S BALANCE OF INTERNATIONAL PAYMENTS: 1962-1969

	1962				1963			
	I	II	III	IV	I	II	III	IV
Current Account	-333	-362	-34	-119	-238	-204	+16	-121
Long-term Capital Account	+24	-23	+246	+441	+373	+209	+33	-4
Short-term Capital Account	-65	-249	+474	+156	-69	+106	-108	+153
Reserves	-374	-634	+686	+478	66	+111	-59	+28

	1964				1965			
	I	II	III	IV	I	II	III	IV
Current Account	-343	-156	+214	-161	-397	-360	+36	+364
Long-term Capital Account	-37	+116	+223	+493	+133	+134	+216	+235
Short-term Capital Account	+338	+108	-281	-151	+192	+227	-26	+131
Reserves	-42	+68	+156	+181	-72	+1	+226	+2

	1966				1967			
	I	II	III	IV	I	II	III	IV
Current Account	-396	-375	+41	-407	-334	-280	+202	-131
Long-term Capital Account	+462	+224	+219	+119	+277	+256	+301	+505
Short-term Capital Account	-204	+34	-345	+269	+44	-30	-447	-345
Reserves	-138	-117	-85	-19	-13	-54	+56	+29

	1968				1969			
	I	II	III	IV	I	II	III	IV
Current Account	-228	-19	+333	-187	-258	-311	+33	-186
Long-term Capital Account	+169	+723	+360	+356	+543	+483	+624	+512
Short-term Capital Account	-706	-84	-532	+159	-323	-226	-662	-164
Reserves	-756	+620	+161	+337	-38	-54	-5	+162

Source: Dominion Bureau of Statistics, Quarterly Estimates of the Canadian Balance of International Payments, 1962-1970.

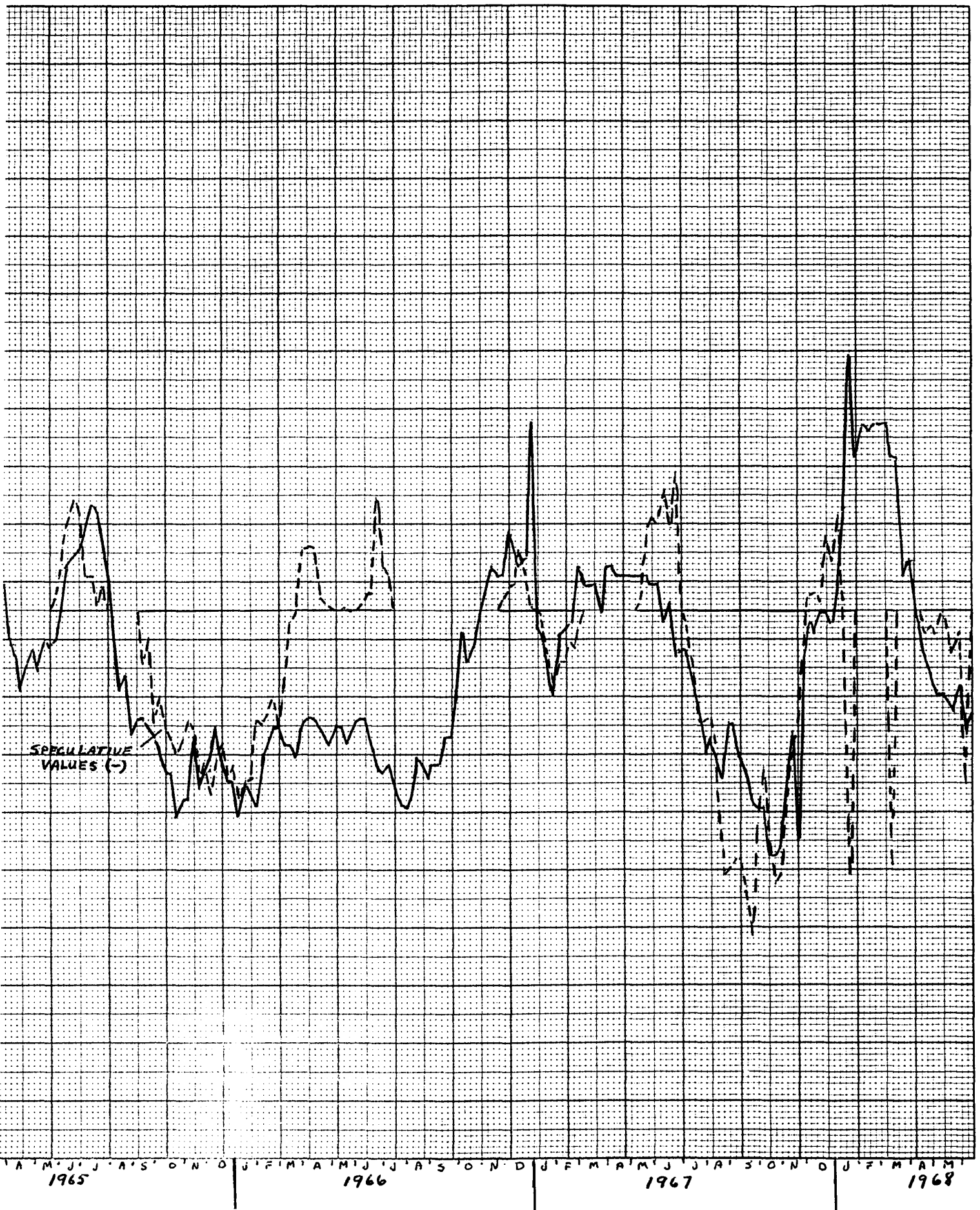Figure 22.—Comparison of the Speculative Values with the U.S. dollar Spot Rate.
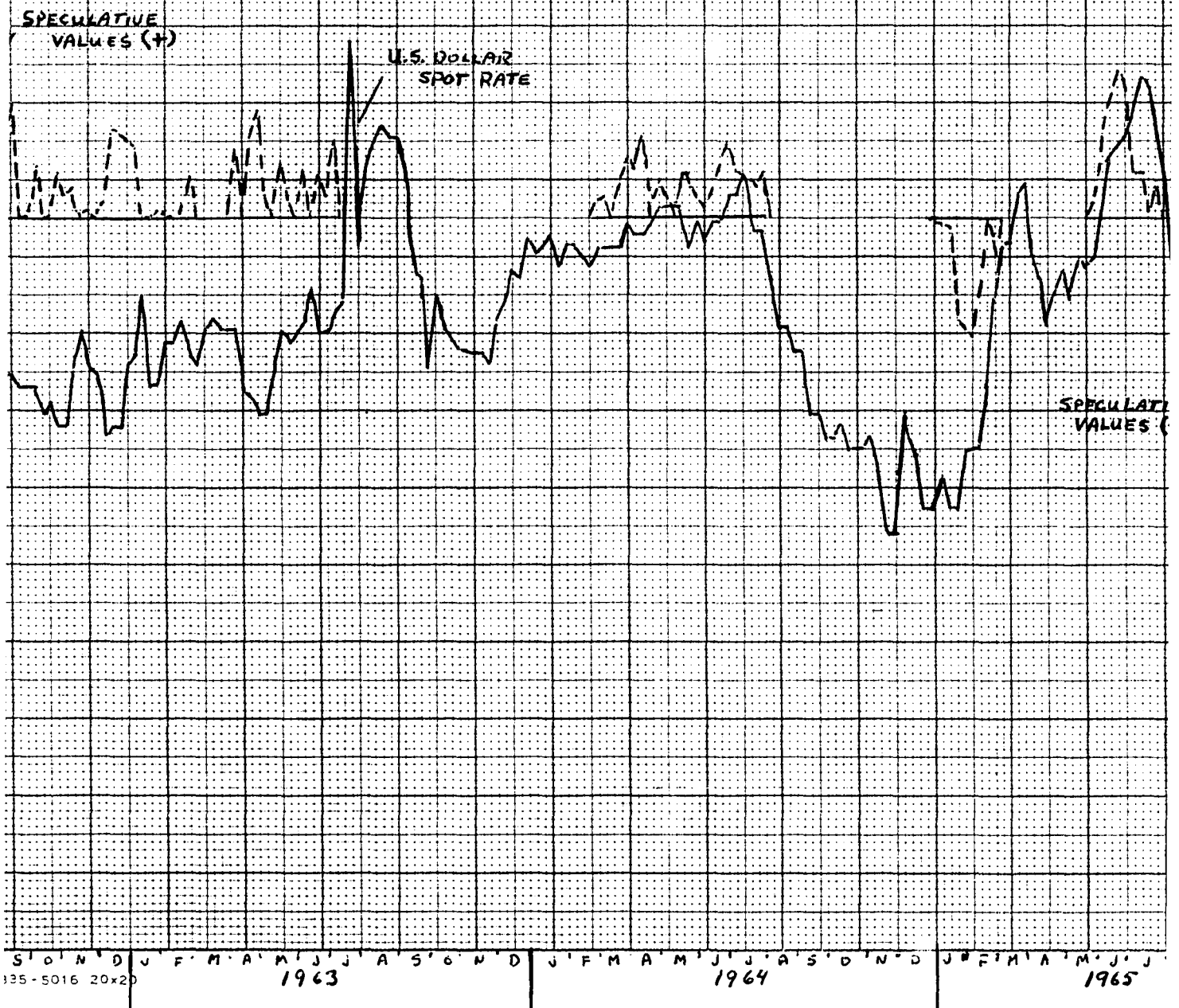
Figure 22—Comparison of the Speculative Values with the U.S. dollar Spot Rate.

SPECULATIVE
VALUES (--)

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llar Spot Rate.

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1965   1966   1967

SPECULATIVE
VALUES (—)

1965   1966   1967   1968

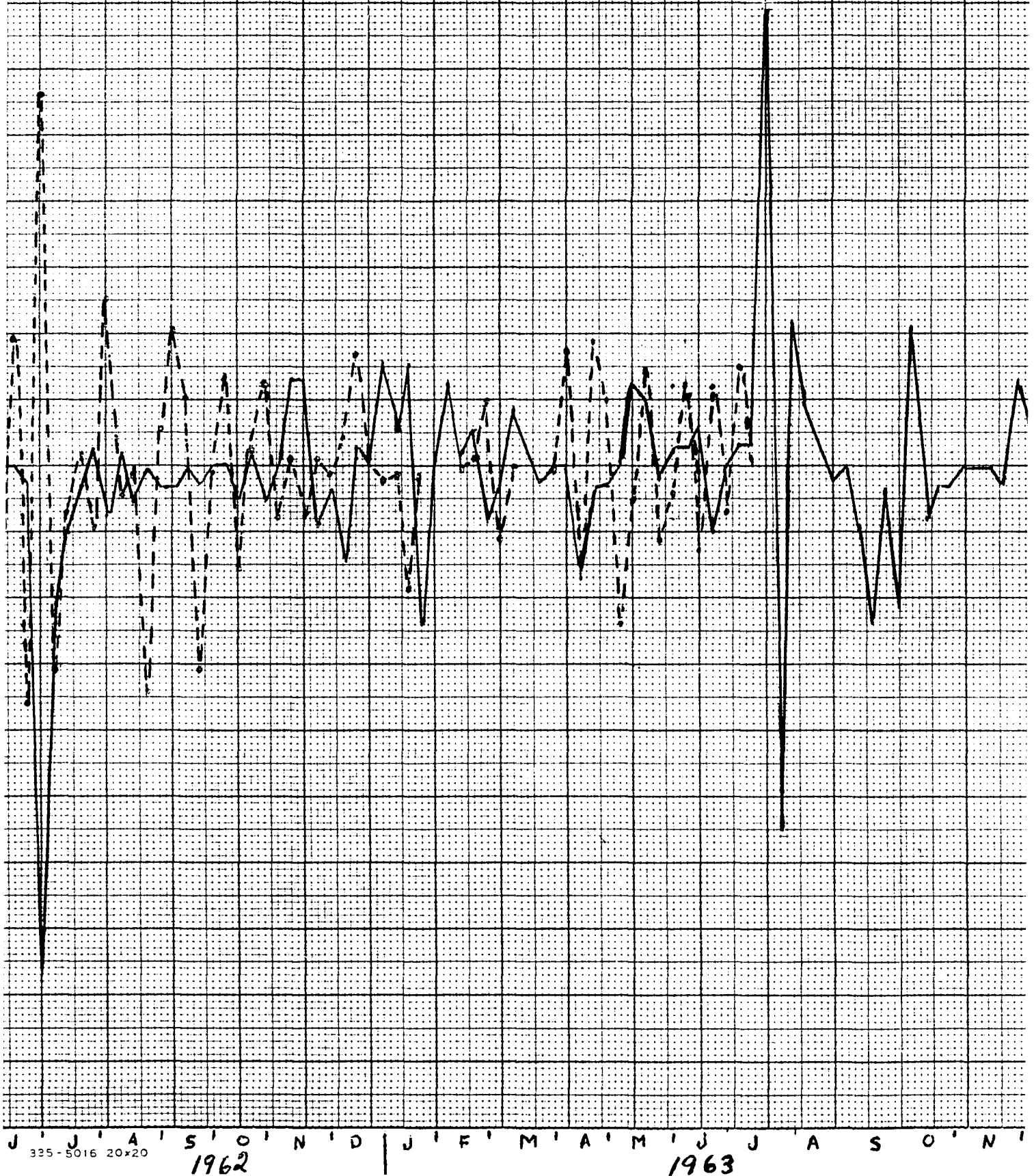Figure 22.--continued

1969

Figure 22--continued

O N D J F M A M J J A S O N D
1969
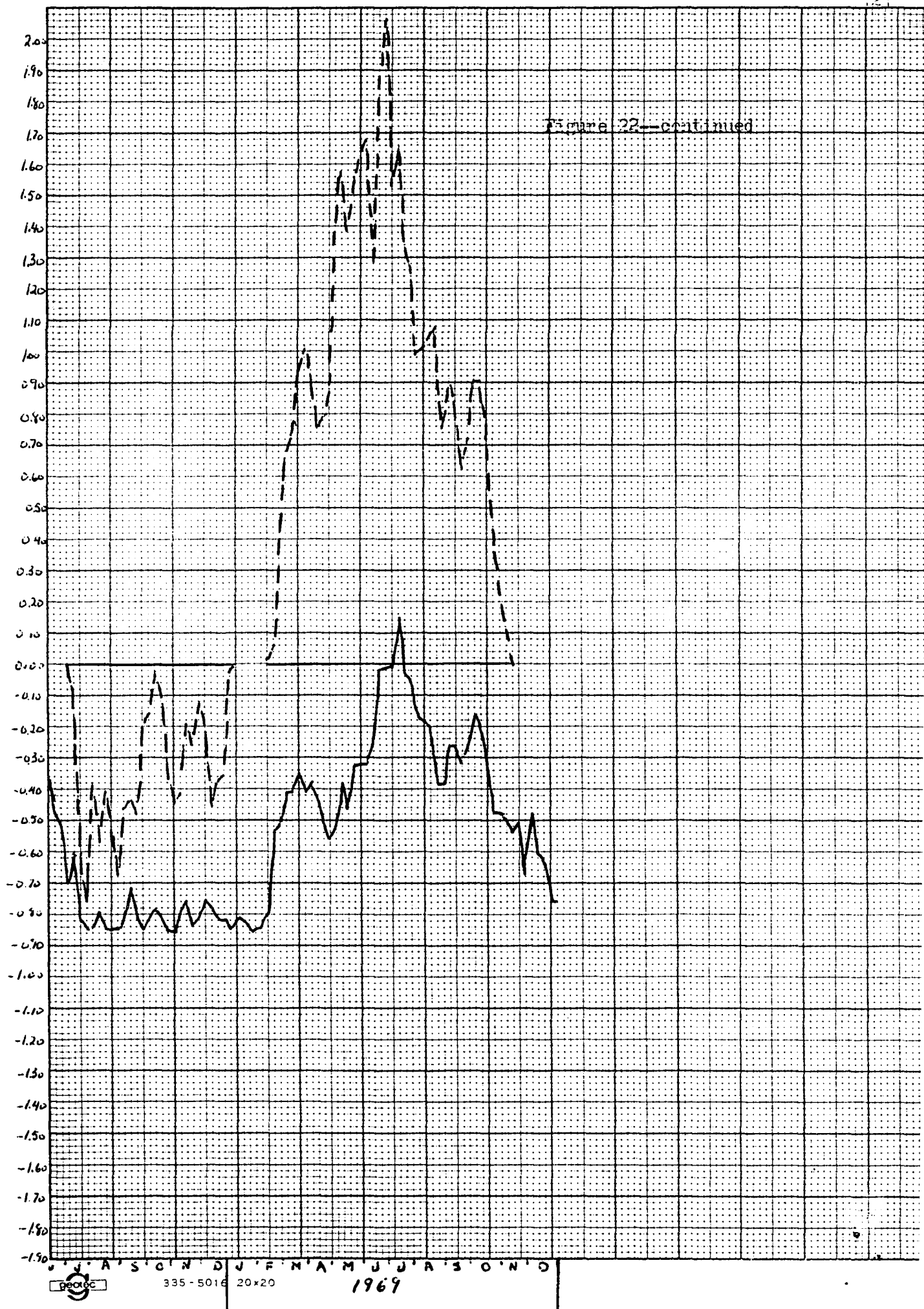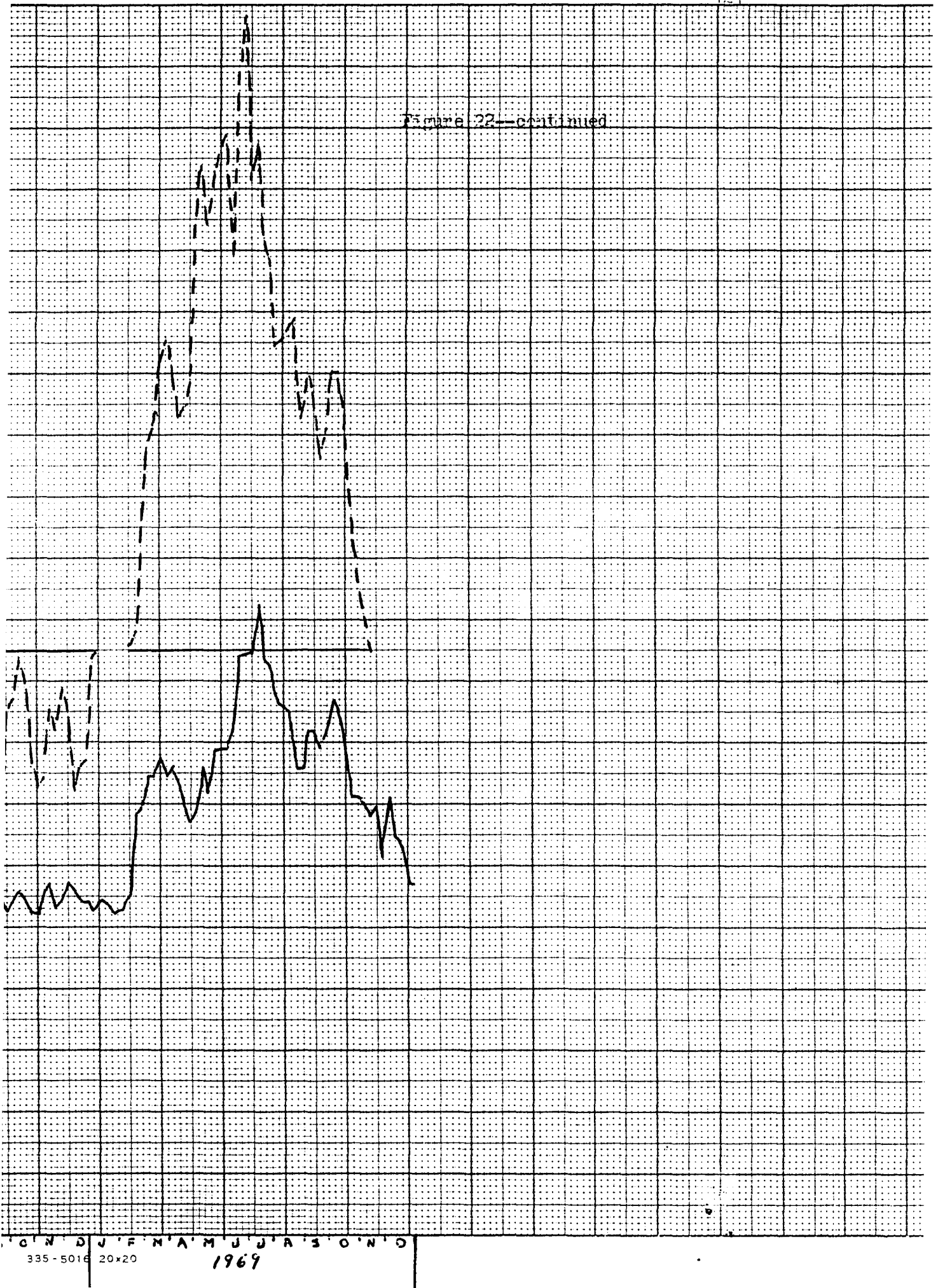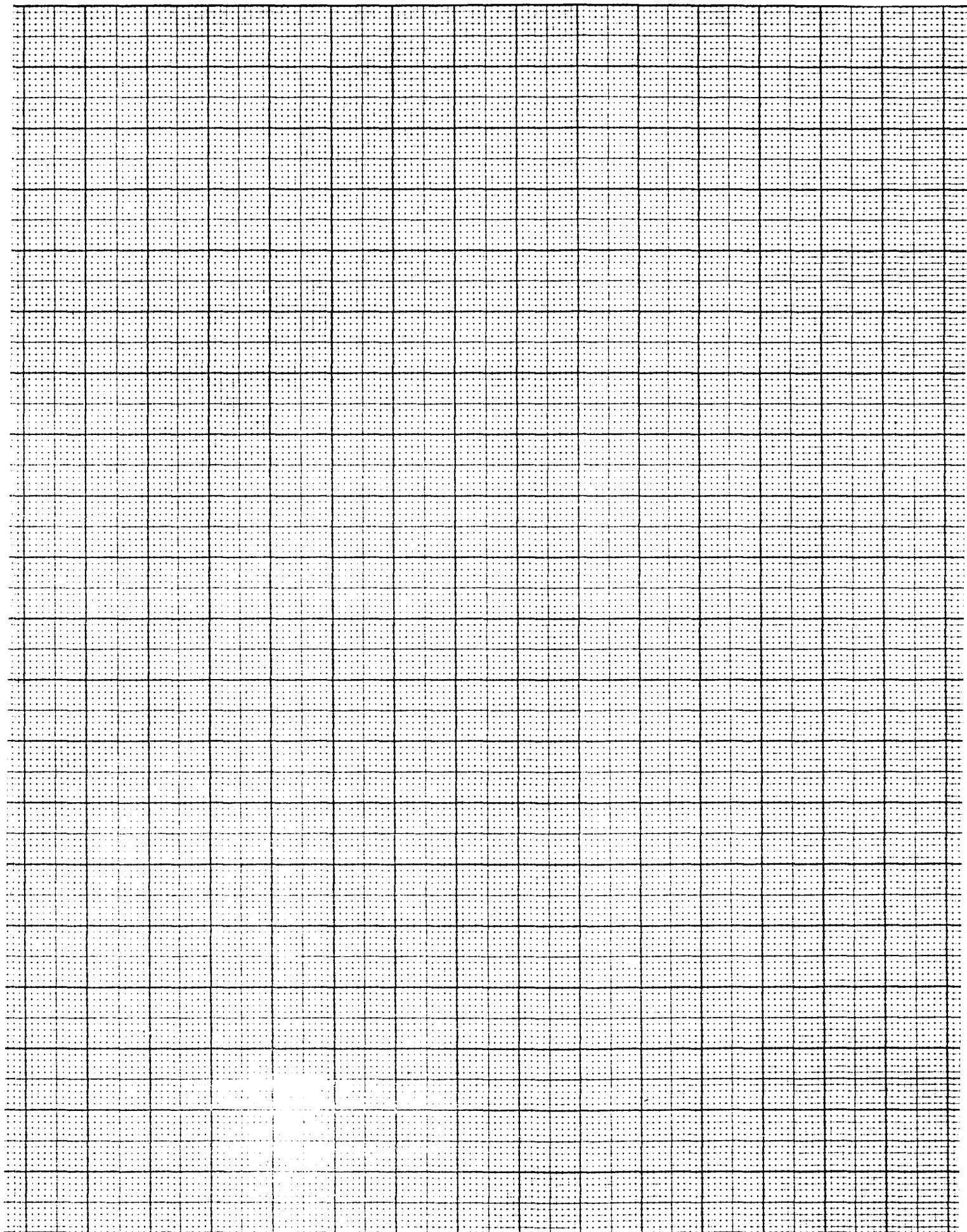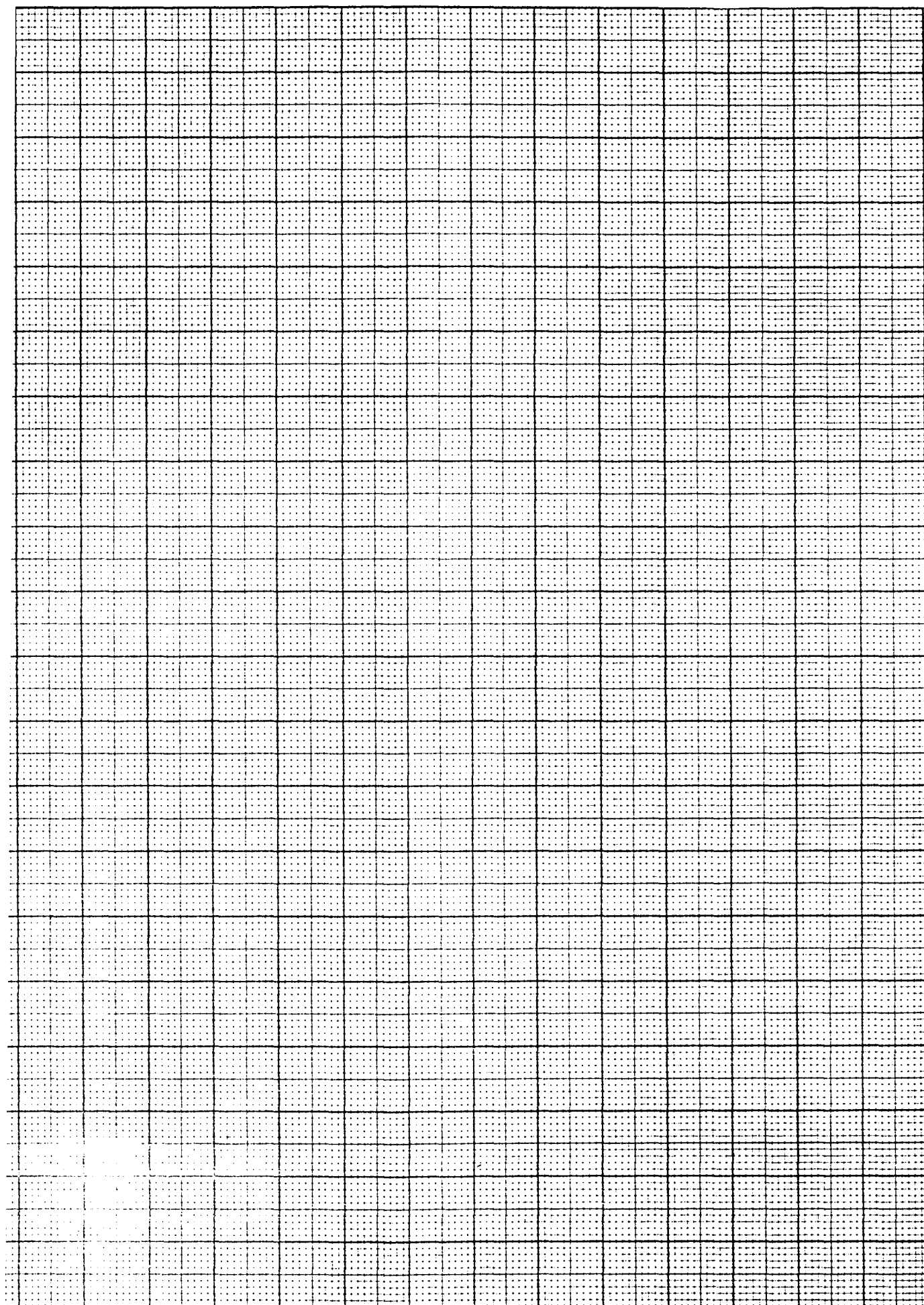
Figure 23--Comparison of Changes in the Speculati
Values with those of the U.S. dollar
Spot Rate.

Figure 23—Comparison of Changes in the Speculative
Values with those of the U.S. dollar
Spot Rate.

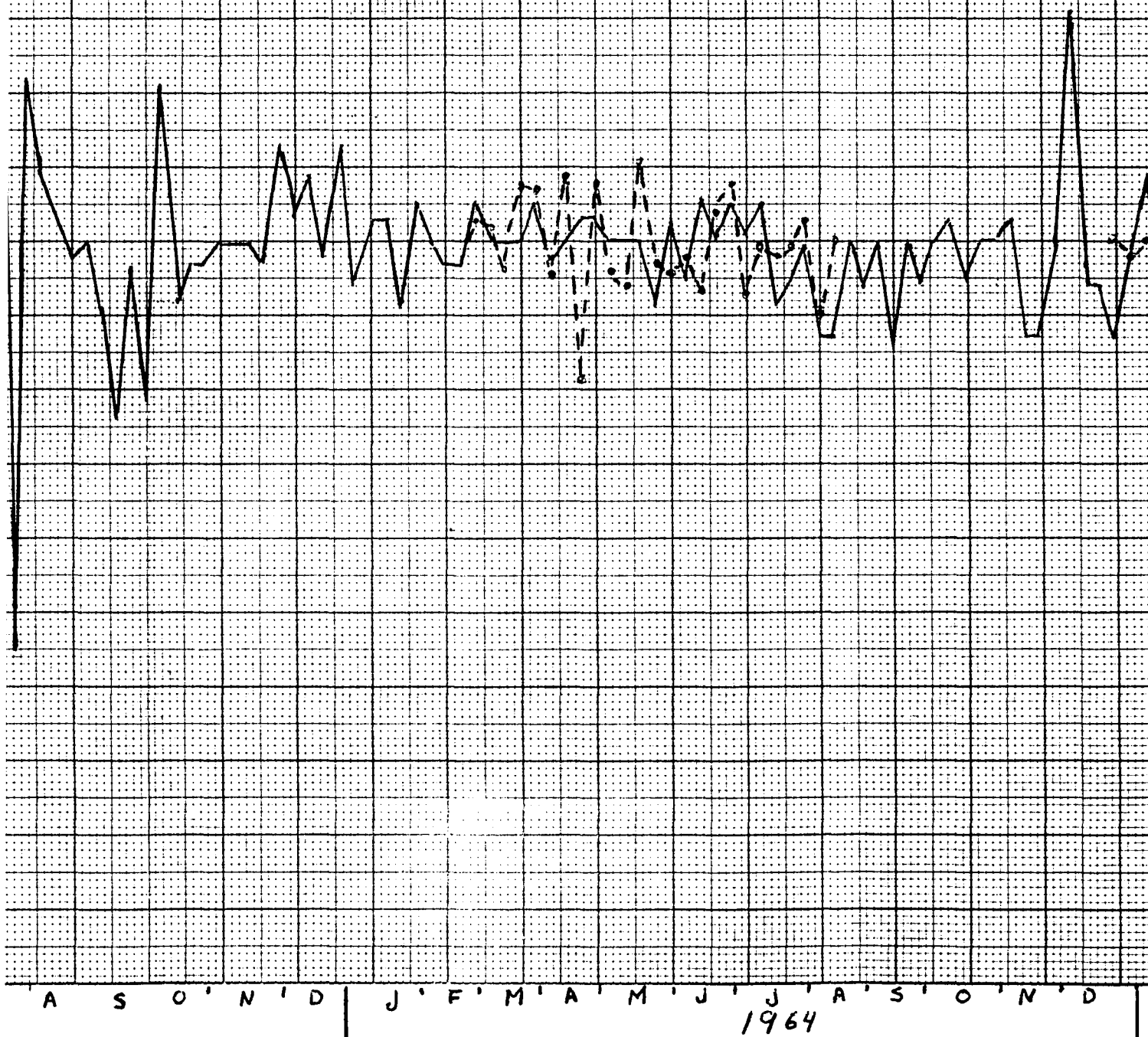J J A S O N D J F M A M J J A S O N

335-5016 20x20   1962   1963
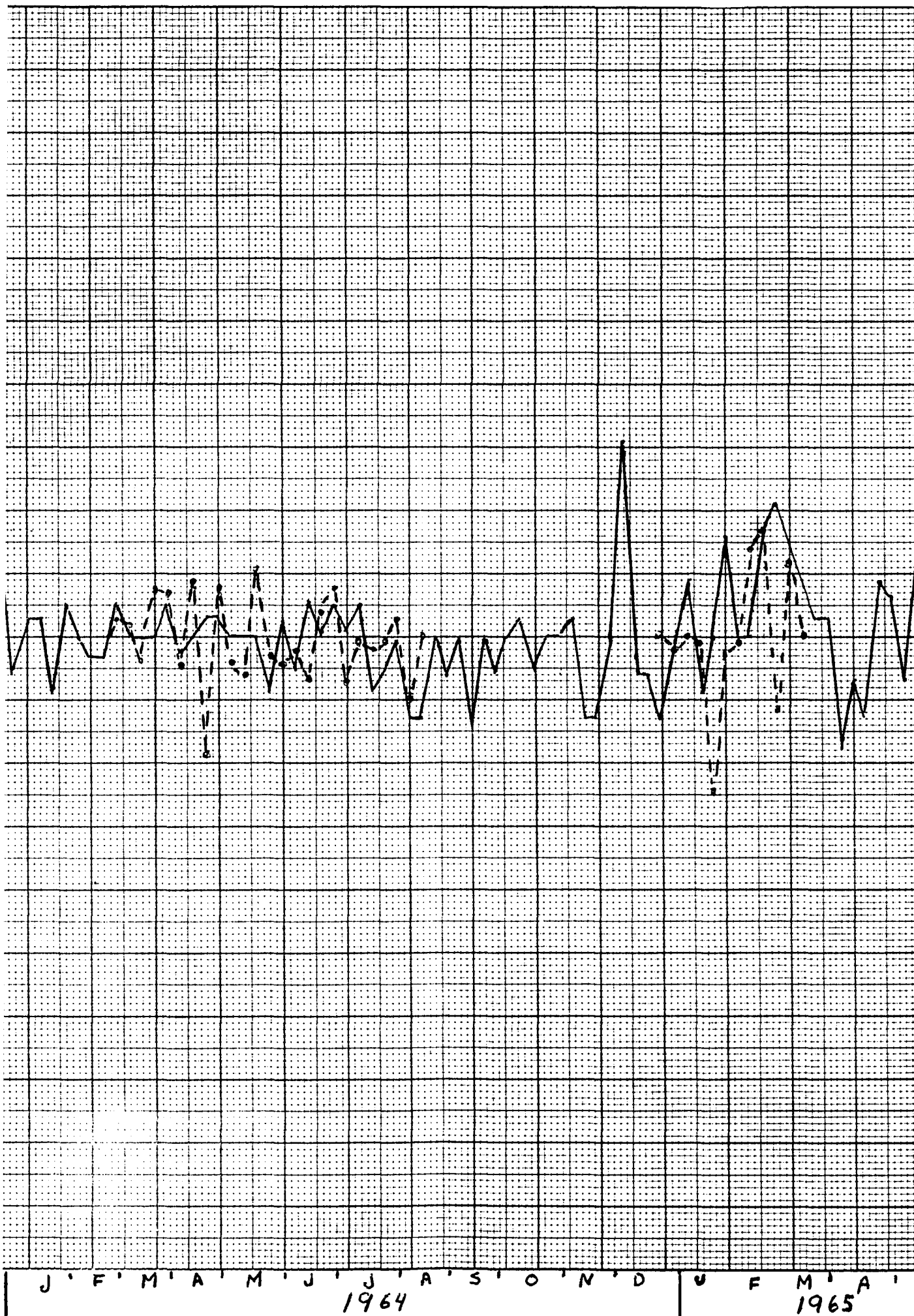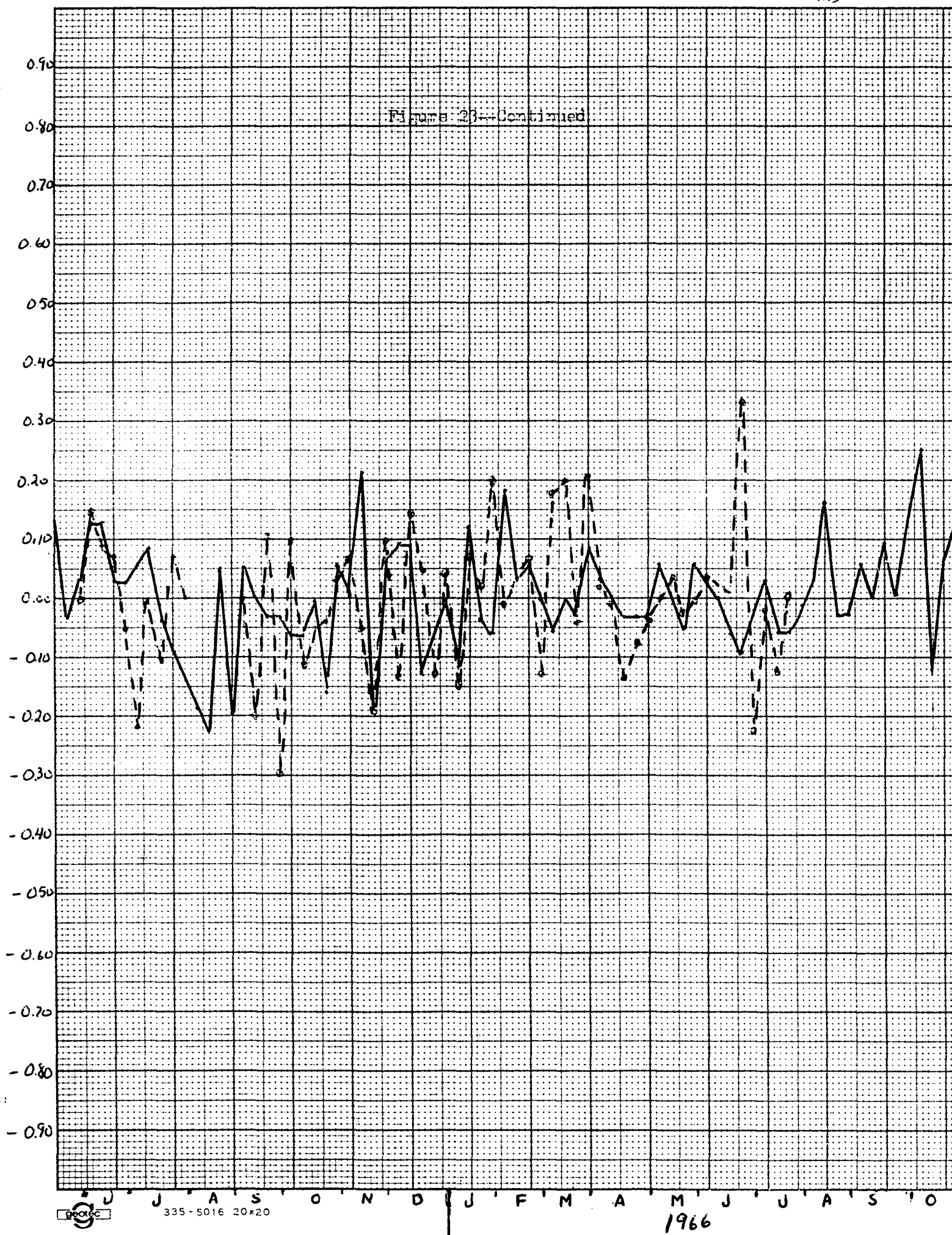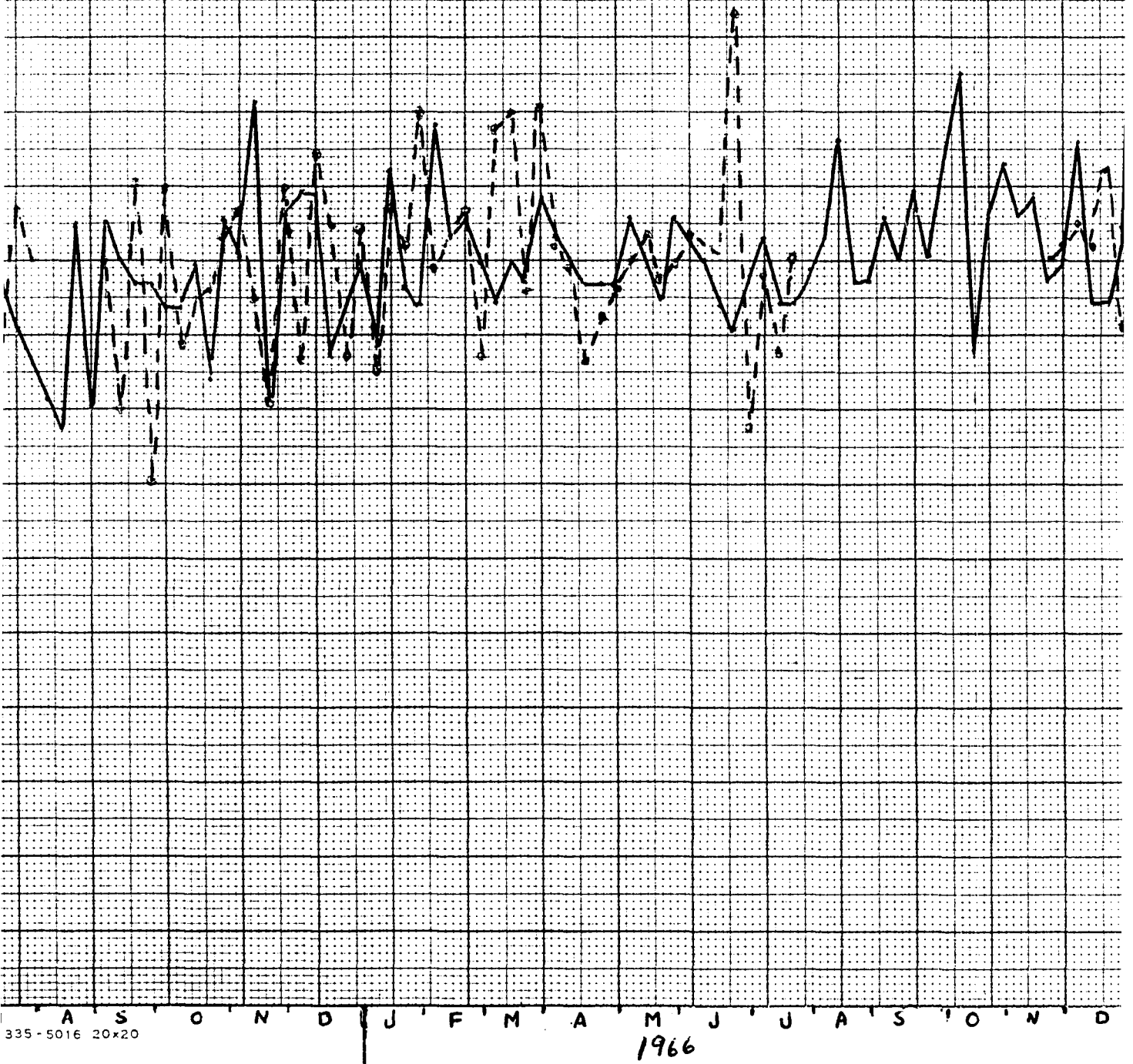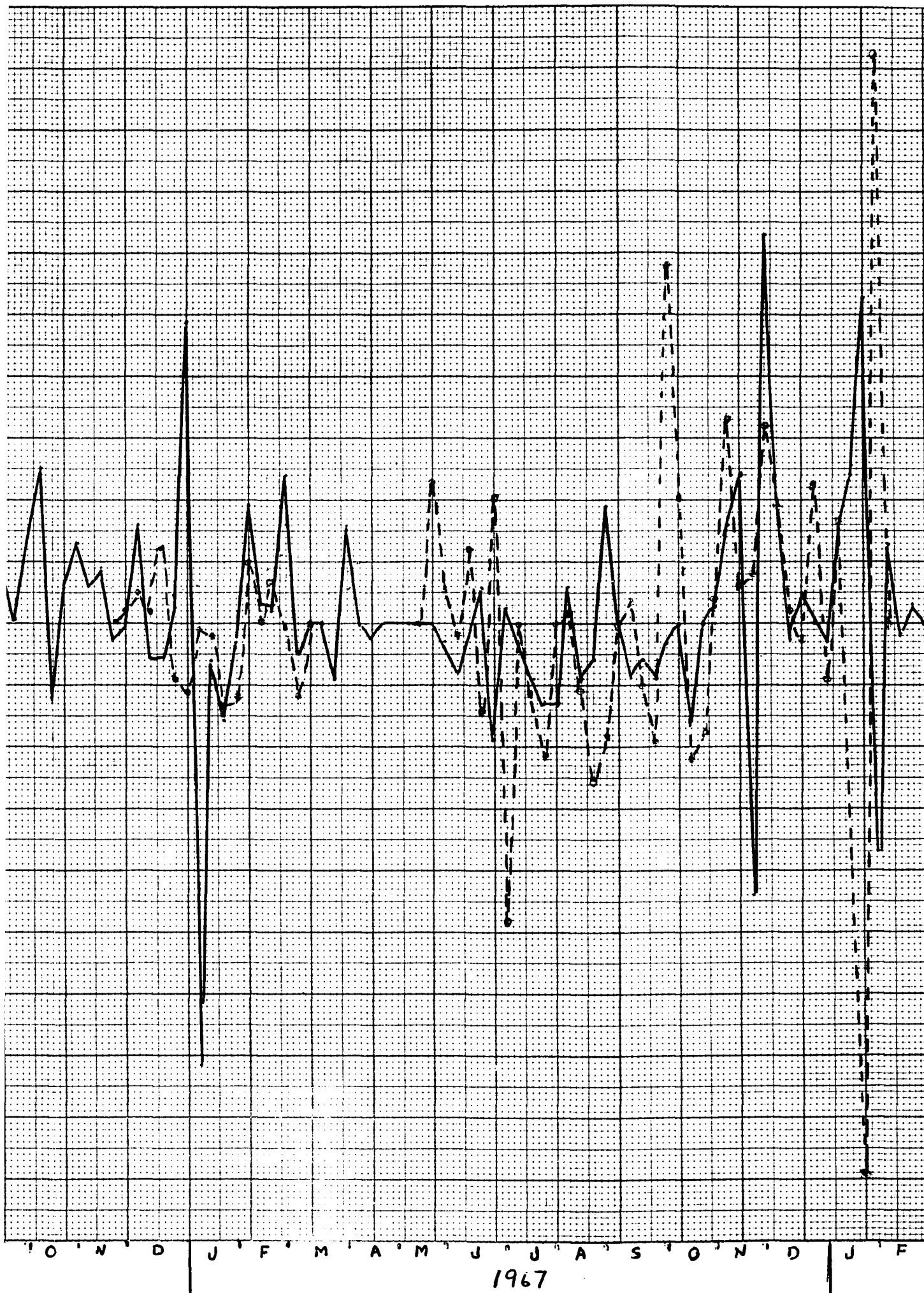
Speculative
Dollar

A S O N D J F M A M J J J A S O N D
1964
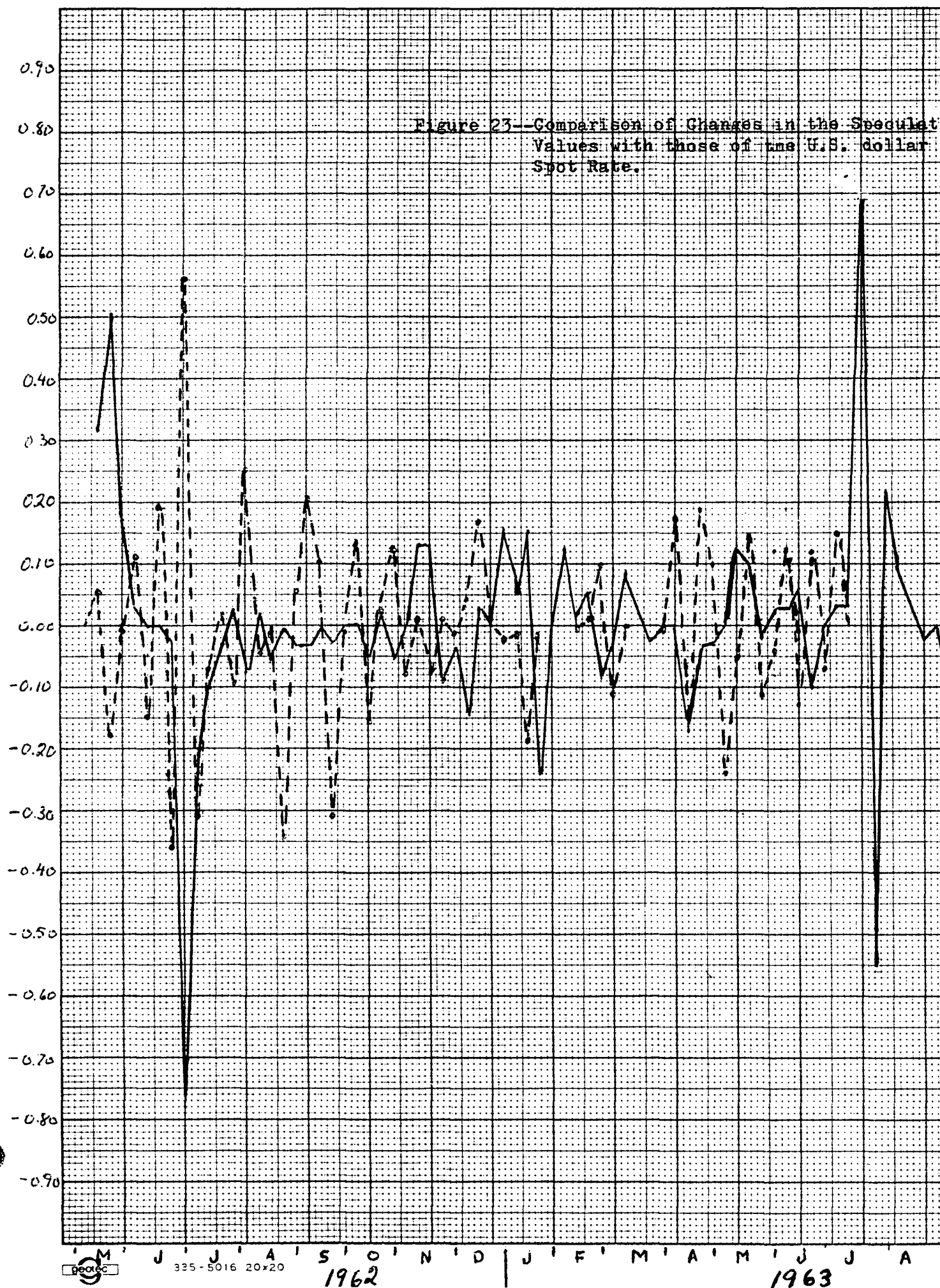
Figure 23.--Continued

Figure 23--Continued

A S O N D J F M A M J J A S O N D

1966

'O'N'D J'F'M'A'M'J'J'A'S'O'N'D J'F

1967

F M A M J J A S O N D J F M A M

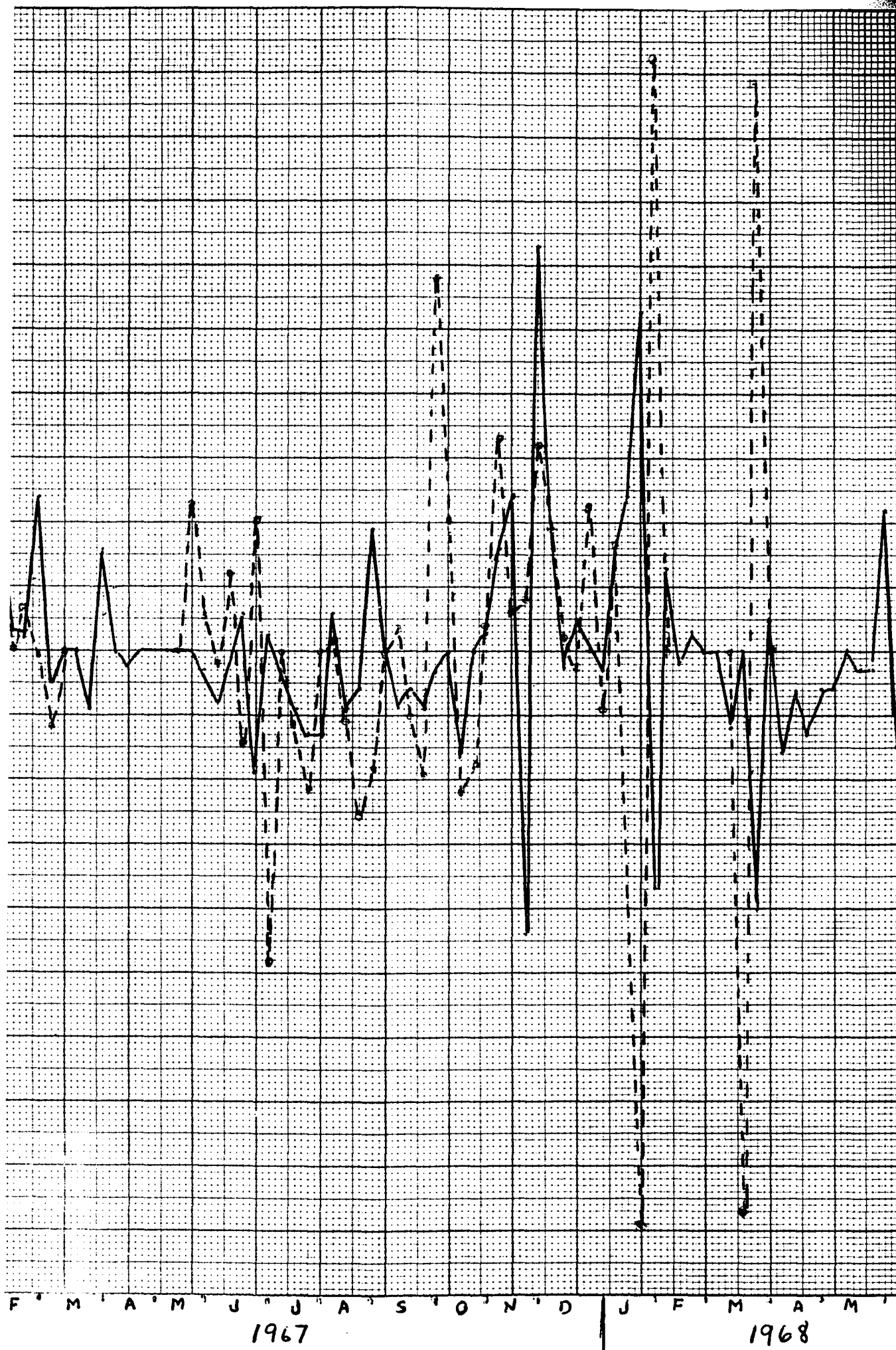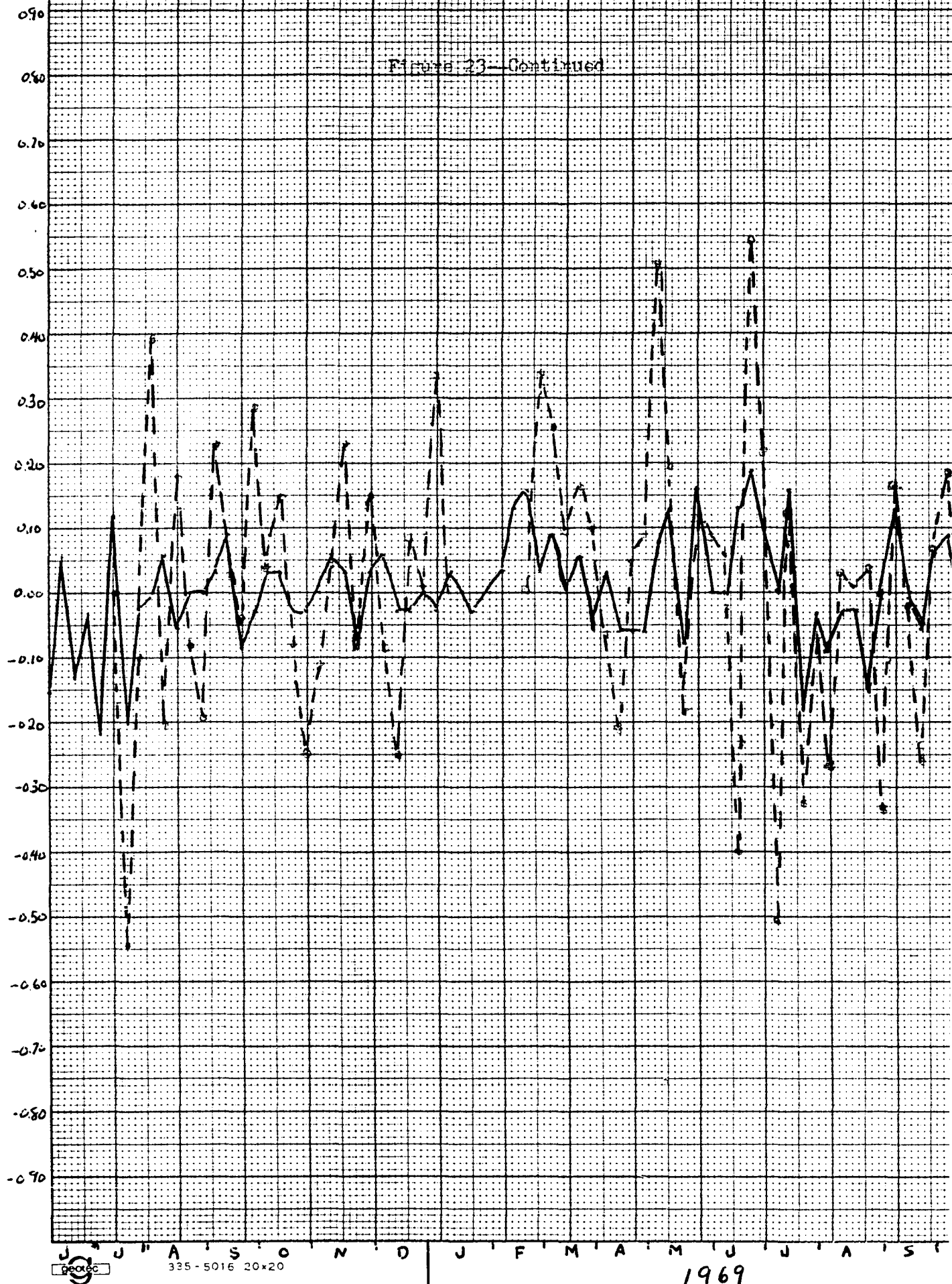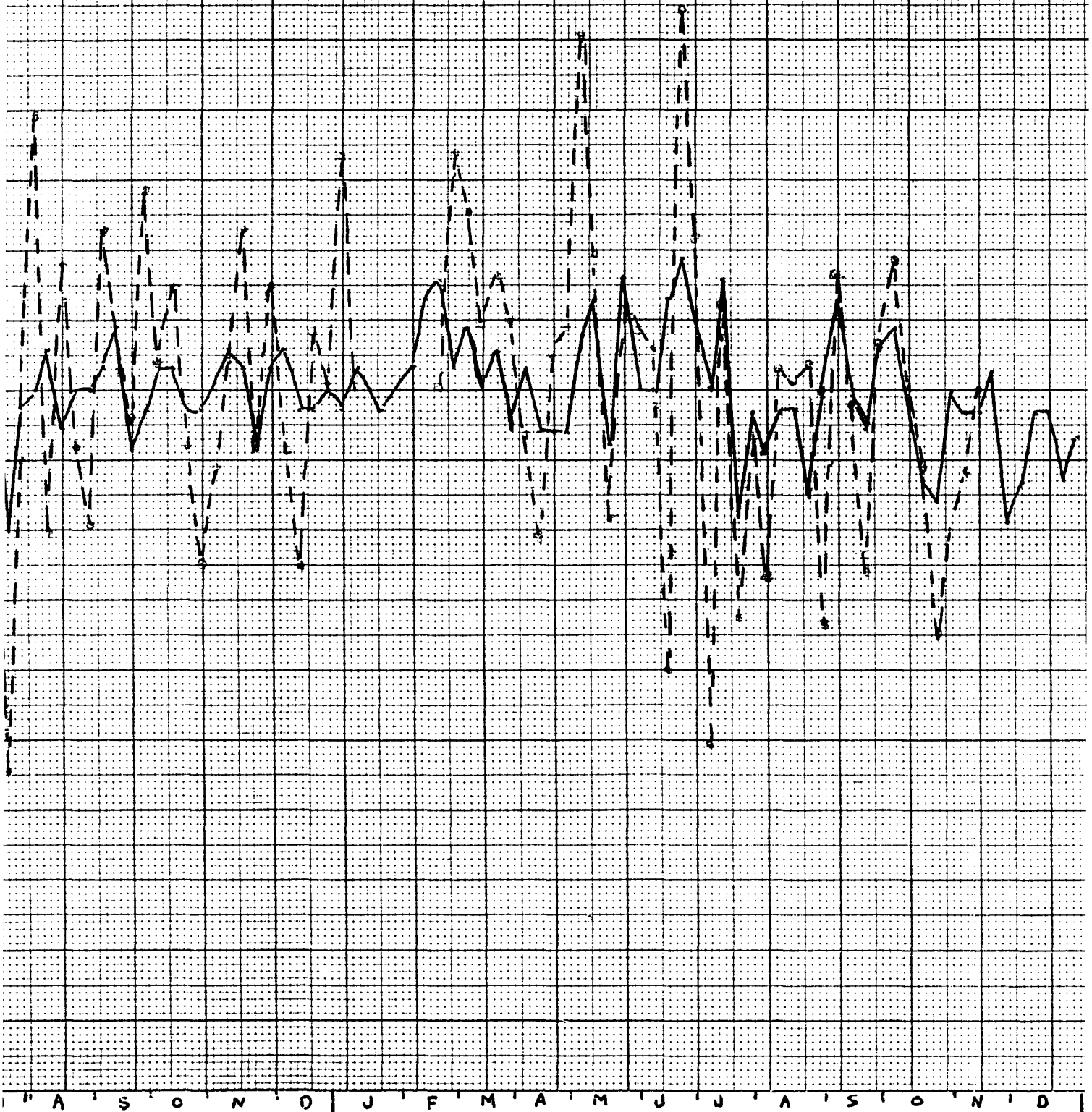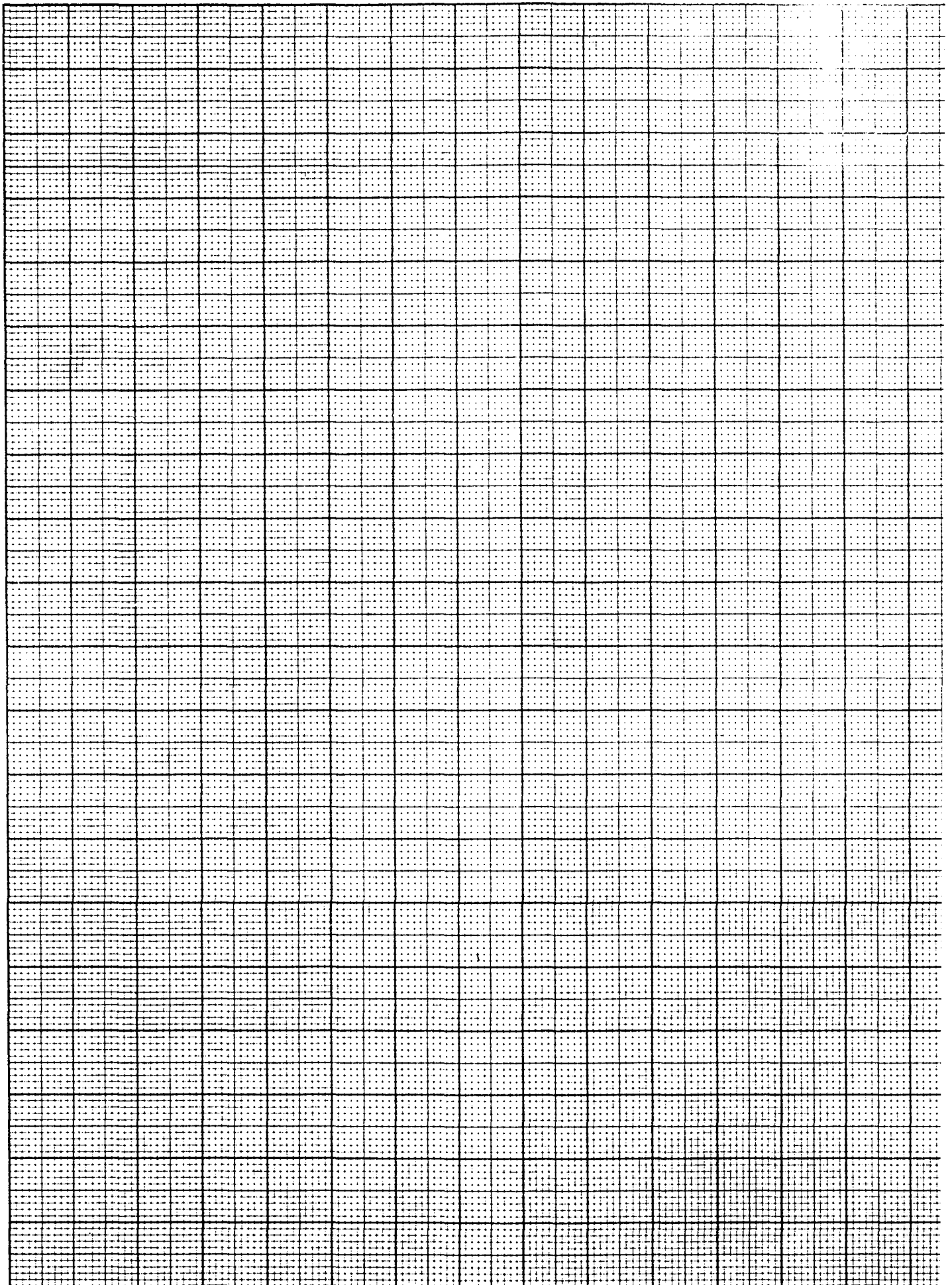1967   1968

Figure 23—Continued

1969

Figure 23—Continued

SUMMARY AND CONCLUSION

Empirical Summary

In 1962 and 1968 a change in parity was expected. In all of the three quarters involved short-term capital flows were destabilizing.

During the crisis May 11, 1962 - August 10, 1962, the speculative values were kept positive by forceful central bank intervention - by raising the treasury bill rate dramatically and by large forward sales of U.S. dollars to offset some of the purchases made by speculators. In 1962, though there was a net inflow on treasury bills and finance paper, a large speculative shift of funds occurred, particularly bank balances to the U.S. During the third quarter of that same year when the crisis had passed a large speculative flow ensued as Canadians repatriated funds they had moved abroad the previous quarter.

During the crisis of 1968, speculative values presented a better reflection of actual flows. For the week of January 19, there appeared a large discount. This arose before the Bank of Canada had raised the treasury bill rates drastically attempting to offset the increase of the premium, and began large forward sales to limit the rise of the premium. In spite of this supportive intervention, an exceptional forward premium on March 14 also took place. These movements were destabilizing and a better indication of what was really happening though government policies were sufficient most of the time to keep the combination of interest differential and premium within the $\pm$ 0.18% limits.

Summarizing the changes in our speculative values compared to changes in the spot rate for both speculative periods, out of a total of 25 observed changes, the changes were destabilizing (i.e., of opposite sign) on 17 occasions, or 68% of the time, and stabilizing on 8 occasions, or 32% of the time.

The speculative values should represent a better indicator of the flows when no change in parity is anticipated. Twelve such periods were examined when the combination of the unhedged differentials and premium or discount were outside the $\pm$ 0.18% margins. Out of the 12 periods, speculative activity, as indicated by our values, proved destabilizing for only one of these periods, August 10, 1962 - July 5, 1963, though this period was a long one, encompassing 25 weeks of speculative activity. Our speculative values were destabilizing for a period covering about 10% of our observations or stabilizing about 90% of the time.

Though the government had intervened through forward purchases and sales for all 12 periods, it is unlikely as was shown earlier that the values actually resulted from these operations; yet unquestionably they were influenced by them. Forward operations by the Exchange Fund cannot be separated from the purchases or sales by professional speculators. In either case, a forward contract has to be renewed or offset by a spot purchase on or before the maturity of the contract. The transaction is identical for both market participants. This does not detract from the stabilizing nature of the results. If the central bank has contributed to this in some measure in the present system, it can contribute by the same operations under a crawling peg and help speculators smooth fluctuations in the exchange rate through forward operations.

TABLE 18

SUMMARY OF EMPIRICAL RESULTS

Speculative Periods	No. of weeks of Speculative Activity	Speculative Values From Premium Discount P	Interest Differential Id	Speculative Values Stabilizing S	Destabilizing D	No. of Changes in Speculative Values	Changes in Speculative Values Stabilizing S %	Destabilizing D %	Quarters Involved	Quarterly short-term Capital Flows Stabilizing Quarters	Destabilizing Quarters
May 11/62-Aug.10/62	14	P	Id	S		15	6 40	9 60	II, III		II, III
Dec. 1/67-Mar.15/68	9	P	Id	S	D	10	2 20	8 80	I		I
TOTALS	23			2	1	25	8 32	17 68	3		3
Aug.24/62-Jul. 5/63	25	P	Id		D	37	15 40	22 60	IV, 62 I, II, 63	I	IV II
Feb.28/64-Jul.31/64	22	P	Id	S		24	14 58	10 42	II	II	
Dec.31/64-Feb.26/65	8	P	Id	S		10	Unable to tell adequately		I	I	
May 28/65-Jul.23/65	9	P		S		10	6 60	4 40	II	II	
Sep.10/65-Mar.11/65	27	P		S		28	16 57	12 43	IV, 65 I, 66	IV I	
Mar.25/66-Jul. 8/66	12	P	Id	S		15	12 80	3 20	II	II	

TABLE 18 (continued)

SUMMARY OF EMPIRICAL RESULTS

Speculative Periods	No. of weeks of Speculative Activity	Speculative Values From Premium Discount	From Interest Differential	Speculative Values Stabilizing	Destabilizing	No. of Changes in Speculative Values	Changes in Speculative Values Stabilizing	Destabilizing	Quarters Involved	Quarterly short-term Capital Flows Stabilizing Quarters	Destabilizing Quarters
		P	Id	S	D		S %	D %			
Nov.25/66-Feb.24/67	13	P	Id	S		15	10 66	5 33	IV, 66 I, 67	IV I	
May 12/67-Jun.23/67	7		Id	S		8	3 35	5 65	II		II
Jul. 7/67-Nov.24/67	21	P		S		22	16 73	6 27	III IV	III IV	
Apr.19/68-Jun.21/68	8	P	Id	S		11	9 82	2 18	II	II	
Jul.12/68-Jan. 3/69	26	P	Id	S		27	18 67	9 33	III IV	III	IV
Feb.21/69-Nov.21/69	39	P		S		41	31 75	10 25	II III, IV	II III, I	
TOTALS	217			11	1	248	150 63	88 37	20	16	4

Furthermore as shown previously, the speculative values can result from both changes in the interest differential and changes in the premium or discount. In the cases where changes in the premium or discount were predominant our values probably offer a better reflection of whether the market thinks the rate to be over or undervalued, and a better reflection of their reaction as measured by the premium or discount caused by forward purchases or sales.

There was only one case, May 12, 1967 - June 23, 1967, where the values were primarily due to changes in the interest differential. The values themselves were stabilizing, but the changes in the values compared with those in the spot rate coincided only in 3 out of 8 cases or only approximately 35% of the time. The premium is influenced by commercial transactions and interest arbitrage on a wide range of short-term money market instruments. The treasury bill differential is a selected differential and although money market rates tend to move together, it is unlikely that the premium will move correspondingly to eliminate the covered incentive on treasury bill differentials, when weekly changes in these differentials are large.

In 7 cases the changes in the premium and the interest differential were equally important, these being:

August 24, 1962 - July 5, 1963	(25 weeks)
February 28, 1964 - July 31, 1964	(22 weeks)
December 31, 1964 - February 26, 1965	(8 weeks)
March 25, 1966 - July 8, 1966	(12 weeks)
November 25, 1966 - February 24, 1967	(13 weeks)
April 19, 1968 - June 21, 1968	(8 weeks)
July 12, 1968 - June 3, 1969	(26 weeks)

Only for the first case were our speculative values destabilizing.
Speculation occurred intermittently while the U.S. dollar was below its
par value, and accentuated the fluctuations of the exchange rate. On
most occasions during weeks when the spot rate rose above some previous
level, the speculative values ceased or were very small; during declines
or troughs, on the other hand, the values tended to be large and positive.
The changes in the speculative values when compared to those in the spot
rate were likewise destabilizing and coincided but 40% of the time. In
the other 6 cases the speculative values were stabilizing, as were the
changes in these values themselves, 58% for the second case listed, 80%
for the fourth, 66% for the fifth, 82% for the sixth and 67% for the
seventh. (The third case, however, offered insufficient comparisons for
adequate results).

In the following 4 cases the values were primarily due to the levels
in the premium or discount:

May 28, 1965 - July 23, 1965	(9 weeks)
September 10, 1965 - March 11, 1965	(27 weeks)
July 7, 1967 - November 24, 1967	(21 weeks)
February 21, 1969 - November 21, 1969	(39 weeks)

In each of these periods our speculative values were stabilizing. Since
the values came primarily from the premium or discount, they resulted
primarily from forward purchases or sales in the foreign exchange market.
This fact probably makes these periods a better reflection of whether the
market participants considered the U.S. spot rate either over or under-
valued, since their expectations are expressed either through forward pur-
chases or sales. In the above cases, the forward rate moved in a stabilizing

way resisting appreciation or depreciation of the exchange rate. The changes in the values were moderately stabilizing for the first two cases, 60% and 57% respectively, and highly stabilizing for the third and fourth ones, 73% and 75% respectively. The last case constitutes the longest period during which values registered speculative activity, or 39 weeks.

If we use the coinciding of changes in the spot rate with those of the speculative values as a measure of the foresight with which speculators were able to predict changes in the spot rate, it appears that for some periods this foresight is reasonably good. Supposing now the spot rate is falling (or has fallen) over a period of time and speculators resist this fall by forward purchases; this tends to produce a premium on the forward rate. If in any one week during which the spot rate falls more, speculators increase their forward purchases, the premium increases; if, on the other hand, as the spot rate fluctuates upward a subsequent week, speculators reduce their forward purchases, this tends to reduce the premium. (Speculators may also sell some forward exchange with the intention of purchasing spot on some future date when the spot rate has fluctuated down again). The preceding operations help to smooth out weekly fluctuations of the exchange rate and are profitable for speculators. This type of forward purchases and sales would tend to produce a general coinciding of the changes in the speculative values with those of the spot rate similar to those we often obtained. It would also tend to make speculation profitable, the profit being the difference between the forward rate and the expected spot rate.

Exchange Fund operations may have contributed to the concurrence of changes in speculative values and the spot rate. This, however, does not detract from the validity of our findings but indicates that the forward rate can be helped to move in this stabilizing way, even on a daily or weekly basis; and the stabilizing nature of our speculative values is no less relevant to the crawling peg for it.

Looking at the actual flows during which the values indicated speculative activity, but no change in parity being anticipated, out of a total of 20 quarters involved, short-term capital flows offset surpluses or deficits on the current plus long-term capital account balances for 16 quarters, i.e., 80% of the time. The figure is on the low side because it probably includes one quarter where the destabilizing effects of an exchange crisis spilled over into other quarters. The situation applies for the fourth quarter of 1962. If we omit this destabilizing quarter, the flows are stabilizing in 17 out of 20 quarters or 85% of the time. Using weekly data our test rendered somewhat higher results, being destabilizing only for one long period encompassing nearly 10% of our observations.

Theoretical Summary

As was pointed out earlier, when a country's currency depreciates, i.e., foreign exchange appreciates, its products become cheaper on the international market. It was argued that the growth of exports and the decline of imports of a country with a balance of payments deficit would correct the disequilibrium. There is, however, a lag in this process

from the point where the domestic exchange rate depreciates and exports expand, and imports contract sufficiently to eliminate the disequilibrium. In the meantime, there may be a heavy depreciation before prices can adjust to the balance of payments. If speculators realize that the difficulties are only temporary and that the currency will recover, there is a profit incentive to buy the currency while it is cheap. Once the depreciation has its stimulative effects on exports and contractive effect on imports, the exchange rate will in some measure be reversed. This support by private speculative funds to a currency which has excessively depreciated would serve to finance temporary deficits in the balance of payments. Alternatively there would be an outflow of funds from a country whose currency has excessively appreciated.

This type of behaviour is rational and is profitable for the speculator. For both an excessive depreciation or excessive appreciation, the speculator if he anticipates correctly makes a profit. Our speculative values seem to indicate such a type of speculation. As the analysis has shown, speculators do not operate as though they expected rises or falls in the exchange rate to continue. Looking at the foreign exchange rate, for an appreciation of the U.S. dollar, the forward rate tended to be at a discount; for a depreciation at a premium. Correspondingly, for an appreciation, the speculative values were positive, for a depreciation negative. The quarterly flows themselves were extremely stabilizing, except when a change in parity was anticipated. Furthermore, the concurrence between the weekly changes in the speculative values and the changes in the U.S. spot rate were quite high for several cases, thus

indicating that speculators were able to anticipate even these very short-run, i.e., weekly, fluctuations in the exchange rate with some accuracy.

Speculation is less likely to be profitable if a currency falls in value and speculators base their actions on the expectation of a further fall, because of a present or past decline. Such actions are likely to intensify the fluctuation in the exchange rate and drive it below its long-run value. Here the spot rate would be more unstable than even in the absence of speculation. Once, the stimulative effect of the depreciation begins to have effect, however, the decline in the exchange rate will be totally or partially reversed. If speculators actions drive the spot rate below its long-run value by destabilizing forward sales, speculators would find themselves involved in large financial losses. The majority would be selling cheap and buying dear once the rate had begun to recover.

The analysis tends to support the stabilizing rather than the destabilizing form of speculation. It is unlikely that a change in the spot rate will produce the destabilizing effects suggested by J. Herbert Furth and Samuel Katz. The spot rate does not seem to have this signal effect. Both the speculative values obtained as well as the examination of the actual flows of funds support the fact that speculation tends to smooth out temporary fluctuations in the exchange rate.

One of Furth's contentions is that even if the exchange structure is in balance when the crawling peg is adopted, the system could easily become unbalanced from any new strain on the balance of payments because of a destabilizing forward rate. There is a built in mechanism of dis-

equilibrium where there is a tendency of the spot rate to move in the same direction. This is unlikely, according to our analysis.

Samuel Katz, on the other hand, feels that a self-reinforcing upward crawl would be limited to a country with a protracted surplus, and a downward crawl to one with a protracted deficit. The analysis, however, seems to indicate that speculators are likely to finance a more fundamental disequilibrium in the balance of payments (where a more permanent adjustment is necessary), if no discreet change in parity is expected.

Turning to monetary policy it might be useful to briefly restate the argument.

A country with a balance of payments surplus and a downward crawling foreign exchange rate, i.e., upward crawling domestic rate, would tend to have its surplus increased if the forward foreign exchange rate moved to a discount, (as Samuel Katz and J. Herbert Furth thought likely due to a signal-effect of a spot decline). If at the same time, the country was experiencing internal inflation, its effort to reduce the money supply might be complicated by the surplus resulting from the crawl. Under Robert A. Mundell's assumption of a fixed rate and perfect capital mobility, the surplus is perfectly offsetting, the foreign exchange authorities replacing all the funds the central bank has withdrawn through open market sales of securities. For a country with a deficit, on the other hand, and an upward crawling foreign exchange rate, i.e., downward crawling domestic rate, a forward foreign exchange premium induced by the expectation of a further rise would tend to increase the deficit by additional flows. If at the same time the country were experiencing a deflation, the bank might have

difficulty in easing the money supply, where it has to support the rate
with a supply of foreign exchange. In such an instance the foreign ex-
change authorities would be withdrawing the funds the central bank had
injected by purchases of securities. Under R.A. Mundell's assumptions,
the flows would be completely offsetting - exchange rate flexibility would
be gained at the expense of monetary policy.

Under the crawling peg, as discussed in this paper exchange rates
would not be fixed but would be able to vary within a 1% margin of par as
in the present system. The countervailing flows need not equal the pur-
chases or sales the central bank has undertaken in order to change the
money supply, (these flows may be greater, equal or less). Here to ob-
tain a given effect on interest rates and eventually expenditures, the
central bank would have to change the money supply in a greater proportion
than if there were no countervailing flows depending on the magnitude of
the flows produced by the forward premium or discount during the crawl.

If the forward rate moved in the destabilizing manner suggested by
Katz and Furth, strong central bank support to keep a currency within the
official limits and to keep it crawling in an orderly way would be in-
evitable. To prevent an excessive depreciation of domestic currency, the
latter would have to be supported by sales of foreign exchange while pur-
chases of foreign exchange would prevent an excessive appreciation. The
flow could be considerable when the exchange rate changes from one equili-
brium to another before adjustments in prices and costs have had time to
take effect. During the transition large short-term flows could supplement
either surpluses or deficits on the rest of the balance of payments, thus
requiring substantial supportive purchases or sales.

As seen, speculation, however, was found to be stabilizing. Our speculative values tended to resist appreciation or depreciation of the foreign exchange rate. Actual short-term capital flows proved to be extremely stabilizing so long as no change in parity was expected. They offset surpluses or deficits on the combined current and long-term capital account 80% of the time. Even in the 4 quarters flows were destabilizing, but only moderately so, and in no case were they sufficient to make the currency suspect to devaluation. As long as speculation is stabilizing a currency can fluctuate within the parity band without abnormal supportive purchases or sales. Even during periods of weakness when a currency is near the support level, speculators and traders are likely to continue to buy this currency as long as they are satisfied that the authorities can defend the spot rate.[1]

The other aspect of monetary policy concerns the interest rate constraint. It was pointed out in Chapter II, that a country with a downward crawling currency, i.e., an upward crawling foreign exchange parity, would have to keep its interest rate above those abroad by the amount of the downward crawl; a country with an upward crawling currency, i.e., a downward crawling foreign exchange parity, would have to keep its rates below those abroad by the amount of the upward crawl. If the forward rate moved in a destabilizing way, interest rates during a downward crawl would have to rise further by the amount of the discount to neutralize the interest

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1. S. Katz, Two Approaches to the Exchange Rate Problem: the United Kingdom and Canada, Essays in International Finance, No. 26 (Princeton, New Jersey: Princeton University International Finance Section, August, 1956), p.11.

incentive to transfer funds abroad; in an upward crawl, they would have to fall further by the amount of the premium. Supportive speculation would tend to reduce the amount that interest rates have to rise for a downward crawl, or have to fall for an upward crawl. Stabilizing speculation would, therefore, reduce the constraint from having an abnormally high or low level of interest rates and mitigate the interest rate constraints induced by limited flexibility of the exchange rate. To the extent the interest rate constraint is less, a faster maximum rate of crawl may become feasible.[2]

Limited exchange rate flexibility is unlikely to complicate domestic monetary management by large unwanted inflows or outflows of short-term capital, however, provided that no change in parity is anticipated. Under the adjustable peg the emphasis has been placed on maintaining the initial parity, but once substantial disequilibrium has been built up a discreet change in parity becomes likely. Under the crawling peg emphasis should be laid on allowing the parity to change in a prompt though orderly manner so as to eliminate disequilibrium. Were such the case, greater exchange flexibility should reduce considerably the type of volatile capital movements that have occurred under the adjustable peg when the parity has come under suspicion. If, however, corrective exchange rate action is postponed, or the exchange rate is not allowed to crawl sufficiently so that, for example, a 10 or 15% devaluation to restore equilibrium becomes

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2. T.D. Willet, "Interest Rates and Capital Flows under Limited Flexibility of Exchange Rates" in T.D. Willet, S.I. Katz and W.H. Branson, Exchange-Rate Systems, Interest-Rates, and Capital Flows, Essays in International Finance, No. 78 (Princeton, New Jersey: Princeton University International Finance Section, January, 1970), p.13.

credible, one would still obtain the type of destabilizing short-term
capital outflows as has occurred in Canada during the exchange crises in
1962 and 1968. Unless a discrete change in parity is still considered
likely, there is no reason for the forward rate to move in a disequili-
brating way or for massive shifts of speculative funds to take place.
The system will probably function with greater success the closer the
level of the exchange rate corresponds to equilibrium; if substantial
disequilibrium were permitted to develop the crawling peg would probably
not be more effective than the present system.

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