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by

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I. INTRODUCTION

This paper attempts to arrive at some generalizations about announcement effects of changes in a country's discount rate on the foreign exchange value of that country's currency, analyzing the experiences of the United Kingdom, Germany, Japan, Canada and Belgium. It concludes that such announcement effects depend largely on the nature of the discount rate mechanism and how it is used by monetary authorities.

If a discount rate increase were to signal a subsequent general increase in a country's interest rates, one would expect assets denominated in that country's currency to become relatively more attractive, and the ensuing demand for that currency to raise its foreign exchange value. The reverse would be true for discount rate decreases. However, when monetary authorities move the discount rate with a lag behind market interest rates, market participants generally have sufficient information to anticipate the change. When this is the case, announcement effects -- immediate and discernible market responses to discount rate changes -- would not be expected to occur.

While interest rates are a very important influence on foreign exchange rates, they are certainly not the only influence.

*In writing this paper, I have benefitted from the advice of Edwin M. Truman, Karen H. Johnson, Charles J. Siegman and Scott B. Brown, as well as from the comments of several other people. I am responsible for any errors which remain, however, and the views expressed in this paper are solely my own and do not necessarily reflect the views of the Board of Governors of the Federal Reserve System or its staff.

This paper does not attempt to derive a comprehensive model of exchange rate determination, but simply to develop some perspective on the influence of one of the instruments of monetary policy on the foreign exchange market.

II. METHODOLOGY

The sample period for this analysis is January 1, 1975 to December 31, 1979, and the data in all cases are daily. The estimation of announcement effects seems most appropriately performed on daily data since announcement effects, per se, are very short-lived. Instantaneous market communications allow financial variables to adjust rapidly to the news of a discount rate change. After a very short time, any further movements in these financial variables are market adjustments to generally higher (lower) market interest rates rather than to the announcement of a higher (lower) discount rate. It is difficult, if not impossible, to separate these two types of responses when using time series of lower frequency.

The variables used are changes rather than levels,[1/] measured in percentage points in the case of the discount rate, and percent of a geometric index in the case of the exchange rate. Discount rate observations are close-of-business. Exchange rate observations are noon buying rates in the New York market, approximately the close of the European business day and about seven hours after the close of business in Tokyo.

1/When regressions are run on levels, positive serial correlation is a problem. The Cochrane-Orcutt correction yields a RHO nearly equal to one, indicating that a first difference formulation is appropriate.

Three types of econometric tests are applied: (1) simple ordinary least squares regressions to determine the significance of independent variables, with no lag structure since announcement effects are nearly instantaneous; (2) Chow tests[2/] for structural change; (3) Granger tests[3/] for causality, where causality is defined as predictability.

2/ A Chow test measures the existence of structural change in an economic relationship using the residuals of three ordinary least squares regressions: on the entire time series (n), on that segment of the time series before the change is thought to have occurred (n_1), and on that segment of the time series after the change is thought to have occurred (n_2). The null hypothesis is no structural change; where K is the number of regressors, the formula is

$$F^{k}_{n-2k} = \frac{(e' e_n - [\, e' e_{n_1} + e' e_{n_2}\,]\,) / k}{(e' e_{n_1} + e' e_{n_2}\,) / (n-2k)}$$

3/ A Granger test measures causality, or predictability, using the residuals and standard errors of ordinary least squares regressions on equations in the following forms:

(1) $Y_t = a + b\text{Time} + c_i Y_{t-i} + D_i X_{t-i}$

(2) $Y_t = a + b\text{Time} + c_i Y_{t-i}$

The null hypothesis is no causality of Y by X and the formula is

$$F^{i}_{n-k} = \frac{e' e_2 - e' e_1}{4(SER_1)^2}$$

The test measures the additional explanatory power provided by X beyond that provided by the history of Y. The dependent and independent variables are reversed and the experiment is repeated to test for causality in the opposite direction.

III. DISCOUNT RATES AND EXCHANGE RATES

Exchange rates are the relative prices of national monies. The actions of monetary authorities impact on the foreign exchange market ultimately by altering relative money supply growth rates and relative rates of return on financial assets. These actions may have immediate effects on exchange rates by affecting the expectations of market participants about future monetary conditions, particularly about interest rate differentials. A rise in a given country's interest rates relative to foreign interest rates will, unless expectations of inflation or other underlying determinants of exchange rates change, make assets denominated in that country's currency relatively more attractive and hence stimulate the demand for that currency. Similarly, a tightening of a country's monetary policy leads to expectations of a decleration in that country's inflation and, ceteris paribus, will increase the amount of that country's currency people are willing to hold. If such policy moves are perfectly anticipated in the foreign exchange market no announcement effects will be evident. If they are not perfectly anticipated, on the other hand, such actions will contain news which may be utilized by the market. The result will be a change in the exchange value of the currency in the same direction as the change in the discount rate.

What follows is an analysis of the experiences of five countries - the United Kingdom, Germany, Japan, Canada and Belgium - over the years 1975 to 1979, which will attempt to answer the following questions: (1) Have discount rate changes in these countries followed other interest rate changes and therefore been anticipated by market participants? (2) Have discount rate changes in these countries had

any announcement effects in the foreign exchange market? (3) Under what conditions have such announcement effects occurred?

The British Experience

From October 13, 1972 until May 25, 1978 the Bank of England each week set its discount rate - the Minimum Lending Rate - equal to the average Treasury bill rate at that week's tender, rounded up to the nearest 1/4 percentage point, plus an additional 1/2 percentage point. Thus, foreign exchange market participants could easily predict changes in the MLR on the basis of movements in market interest rates. Given efficient markets, no announcement effects were possible during the period of a tied discount rate.

After May 25, 1978 the Bank of England set the discount rate in a discretionary manner. This did not indicate a major change in policy, since even under the tied discount rate system, the Bank of England could intervene to affect the Treasury bill rate and other market interest rates and hence indirectly control the MLR. However, the new discount rate mechanism did afford British monetary authorities the option of leading, rather than lagging, changes in market interest rates and, hence, of using the discount rate as a signal of the future course of British monetary policy. Since market participants could no longer predict with as much precision the timing and magnitude of MLR changes, announcement effects were theoretically possible.

Table 1 shows the results of Granger tests for econometric causality on changes in the MLR and changes in the daily 3-month interbank sterling rate (as proxy for general movements in British market interest rates) during the discretionary discount rate period.

TABLE 1

Granger Test Results: United Kingdom

Equation	Dependent Variable	Independent Variable(s)	Sample Period	Granger F Statistic[c]
(1)	ΔDR_t[a]	$\Delta I3M_{t-i}$[b], ΔDR_{t-i}	May 25, 1978-Dec. 31, 1979	
(2)	ΔDR_t	ΔDR_{t-i}		4.24
(3)	$\Delta I3M_t$	ΔDR_{t-i}, $\Delta I3M_{t-i}$	May 25, 1978-Dec. 31, 1979	
(4)	$\Delta I3M_t$	$\Delta I3M_{t-i}$		31.13

[a] i = 1 to 5
[b] change in British discount rate (MLR)
[c] change in interest rate on 3 month interbank sterling
[c] critical F value (α = .05) = 2.21

Changes in the discount rate have been somewhat predictable on the basis of changes in market interest rates, as is indicated by the significant Granger F statistic of 4.24. However, the reverse has been much more noticeably the case. The second Granger F statistic of 31.13 indicates that changes in British interest rates since May 1978 have been predictable on the basis of changes in the discount rate. This is evidence that the tendency in British discount rate policy after May 1978 was to precede movements in market interest rates.

Table 2 highlights the difference in the effects of unexpected MLR changes (as measured by the residuals of the first Granger equation) on the weighted-average value of the British pound between the tied and discretionary discount rate periods, estimated by ordinary least squares regressions. The significant Chow F statistic of 6.07 indicates a structural change in the relationship between the discount rate and the exchange rate after May 25, 1978. The change is emphasized by the shift in the estimated coefficient. A regression on data for the tied-rate period yields a statistically insignificant discount rate coefficient, evidence that no discount rate change announcement effects were occurring in the foreign exchange market.[4/] When a regression is run on data for the discretionary period, the effect of the discount rate changes on sterling's foreign exchange value is statistically significant, and the coefficient of the discount rate variable has the expected sign.

4/ There were exceptions. Because of the sharp decline in the pound's foreign exchange value in the fall of 1976, the Bank of England on two occasions raised the MLR by more than was warranted by the formula, explicitly to bring about announcement effects in the foreign exchange market. Statistical tests on these months alone indicate that, while there were no significant changes in the level of sterling's exchange value, there were significant slowdowns in sterling's downward trend. For a discussion of Bank of England policies during this period, see OECD Economic Survey: United Kingdom March 1977.

TABLE 2

Chow Test Results: United Kingdom

Dependent Variable	Independent Variable	Sample Period	Coefficient ($t^{c/}$)	Chow F Statistic[d/]
$\Delta WAX^{a/}$	$E(\Delta DR)^{b/} - \Delta DR$	1975-1979	0.14 (2.20)	
		1/1/75-5/24/78	0.01 (-0.14)	
		5/25/78-12/31/79	0.31 (3.41)	6.07

[a/] change in weighted-average foreign exchange value of the U.K. pound, using the Federal Reserve Board's index of G-10 countries and Switzerland. Weights are 1972-1976 global trade shares.

[b/] the expected discount rate change, as measured by the fitted values of the first Granger equation: $\Delta DR_t = a\ \text{Time} + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

[c/] critical t value ($\alpha = .05$) = 1.64

[d/] critical f value ($\alpha = .05$) = 3.84

In summary, after May 25, 1978 the Bank of England had the option of leading rather than lagging the market in changing the Minimum Lending Rate and of thereby using the MLR as a signal of the future course of British monetary policy. The option appears to have been exercised, and changes in the British discount rate had some announcement effects in the foreign exchange market during this period as demand for sterling responded to these signals.

The German Experience

The Bundesbank has had a rather complex discount mechanism consisting of a discount rate and Lombard rate, with quantitative restrictions on the total amounts that can be borrowed. The Bundesbank has utilized the discount mechanism as a major tool of monetary policy. Monetary authorities have set both the interest rates and the quotas in a discretionary manner. While the discount rate and Lombard rate have frequently been changed at the same time and by the same magnitude, this has not always been the case. The same has been true of quotas; in fact, Lombard quotas were instituted only toward the end of the sample period discussed here and have since been discontinued.

German monetary authorities have used the discount facility in a discretionary manner and have been able to choose either to lead or lag the movements in other market interest rates, thereby making the discount mechanism either signal or respond to monetary conditions. The caveat, however, is that the Bundesbank has had more than one policy instrument within its discount facility, but the announcement effects of only one are analyzed here.

Table 3 shows the results of Granger tests for causality on the German discount rate and the German 3-month interbank rate over the entire sample period and for each relevant year within the sample period. The calculated F statistics of 2.32 and 7.20 are both statistically significant, suggesting that in changing the discount rate German monetary authorities have, at various times, both led and lagged the movements in other German interest rates. This evidence is supported by the results for individual years.

While exchange market announcement effects are theoretically possible under such a discount rate system, since actual discount rate changes can differ from expected discount rate changes, Table 4 indicates that none have occurred. The discount rate variable is statistically insignificant for the 1975-to-1979 sample period as a whole, and for each individual year within the sample period.

In summary, although the Bundesbank has had the option of using the German discount rate as a signal of the future course of monetary policy by leading rather than lagging movements in other interest rates and appears to have done so on occasion, changes in the German discount rate have not, in general, impacted significantly on the weighted-average value of the mark.[5/] It is possible that the exchange market has looked to other instruments of German monetary

5/ An announcement effect can be measured not only by the change in a currency's value, but by the change in the change, or movement in the trend (i.e. a dependent variable $\Delta WAX_t - \Delta WAX_{t-1}$). This test was performed for each of the countries under discussion. One of the few cases where the announcement effect on the trend differed remarkably from the announcement effect on the level was Germany in 1977. By lowering the discount rate in December 1977, German authorities appear not to have caused a significant depreciation of the mark, but to have brought about a significant slowdown in the mark's upward trend.

TABLE 3

Granger Test Results: Germany

Variables	Sample period	Granger F Statistic[c/] (equation 1)	Granger F Statistic[c/] (equation 2)
ΔDR[a/], $\Delta I3M$[b/]	1975-1979	2.32	7.20
	1975	3.34	14.03
	1976	(no discount rate changes)	
	1977	0.47	9.74
	1978	(no discount rate changes)	
	1979	0.75	0.28

a/ change in German discount rate
b/ change in German 3-month interbank rate
c/ critical F value (α = .05) = 2.21

equation 1: $\Delta DR_t = a\ Time + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

equation 2: $\Delta I3M_t = a\ Time + b_i \Delta I3M_{t-i} + c_i \Delta DR_{t-i}$
i = 1 to 5

TABLE 4

Regression Results: Germany

Dependent Variable	Independent Variable	Sample Period	Coefficient	T Statistic[c/]
ΔWAX[a/]	$E(\Delta DR)$[b/] - ΔDR	1975-1979	0.19	1.23
		1975	0.19	0.66
		1976	(no discount rate changes)	
		1977	0.47	0.95
		1978	(no discount rate changes)	
		1979	0.16	1.05

[a/] change in weighted-average exchange value of the DM, using the Federal Reserve Board index.

[b/] the expected discount rate change, as measured by the fitted values of the Granger equation: $\Delta DR_t = a\ Time + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

[c/] critical t value ($\alpha = .05$) = 1.64

policy -- perhaps quotas, or other interest rates -- for signals and has thereby anticipated many of the changes. It is also possible that institutional features of German exchange market policy -- daily exchange rate fixes and intervention done publicly at the fixes -- serve to dampen any sharp exchange market fluctuations in response to German discount rate changes.

The Japanese Experience

The Bank of Japan employs a graduated, two-tier discount rate system with the category of eligible paper submitted for discount determining the interest rate. The two rates, over the time period being considered here, have always been changed at the same time and by the same amount. Changes in the Japanese discount rate have been discretionary with respect to both timing and magnitude, so Japanese monetary authorities have been free to choose either to lead or lag movements in other Japanese interest rates.6/

Table 5 provides evidence that, over the years 1975 to 1979, changes in Japanese interest rates have been predictable on the basis of changes in the discount rate. The significant Granger F statistic of 25.22 indicates that, in changing the discount rate, Japanese monetary authorities have generally tended to precede movements in other Japanese interest rates. The results for individual years suggest that this was the case in 1975 and 1977. There is evidence of some lagging in 1979.

6/ The ideal interest rate for these experiments would be the free yen deposit rate, since non-residents deal in that market. Data on the free yen deposit rate are scarce, however. Hopefully, the interest rate used here reflects what was happening to the free yen rate over the sample period.

TABLE 5

Granger Test Results: Japan

Variables	Sample Period	Granger F Statistic[c/] (equation 1)	Granger F Statistic[c/] (equation 2)
ΔDR[a/], $\Delta I3M$[b/]	1975-1979	1.70	25.22
	1975	0.06	16.20
	1976	(no discount rate changes)	
	1977	0.15	11.47
	1978	0.00	0.51
	1979	5.94	0.39

a/ change in Japanese discount rate
b/ change in Japanese call money rate over 2 month-ends
c/ critical F value (α = .05) = 2.21

equation 1: $\Delta DR_t = a\ Time + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

equation 2: $\Delta I3M_t = a\ Time + b_i \Delta I3M_{t-i} + c_i \Delta DR_{t-i}$

i = 1 to 5

With this type of discount rate mechanism and policy, one might expect Japanese discount rate changes to have had announcement effects in the foreign exchange market, since there can be a gap between expected and actual discount rate changes. In fact, Table 6 shows that the one discount rate change which occurred in 1978 did have a significant impact in the expected direction on the weighted-average value of the yen. An important qualification is necessary here, however. On March 15, 1978 Japanese monetary authorities announced a lowering of the discount rate in the context of a package of measures designed to control the flow of capital into Japan and to stop the rapid appreciation of the yen. The other measures included bans on the purchases of some yen bonds by non-residents, and an increase to 100 percent in the reserve requirement on non-resident free yen accounts. It would be impossible to separate the impact of the announcement of the discount rate change, if in fact there was one, from any impact of the announcement of the capital control measures.

Even assuming that a discount rate announcement effect did occur in 1978, one has to wonder why others are not evident in 1975 and 1977 given the Bank of Japan's discretionary discount mechanism and apparent policy of using the discount rate as a signal of the future course of monetary policy. Some part of the explanation may lie in institutional factors unique to Japan such as the following: (1) Capital controls existed off and on throughout the sample period. (2) Many interest rates in Japan are administered and changes must be negotiated. In some cases, the fact that the discount rate "leads" may reflect only this institutional constraint and not the expectations of

TABLE 6

Granger Test Results: Japan

Dependent Variable	Independent Variable	Sample Period	Coefficient	T Statistic[c/]
ΔWAX[a/]	$E(\Delta DR)$[b/] - ΔDR	1975-1979	0.44	2.20
		1975	0.06	0.23
		1976	(no discount rate changes)	
		1977	0.32	1.28
		1978	2.03	2.29
		1979	0.47	1.11

[a/] change in weighted-average exchange value of the yen, using the Federal Reserve Board index.

[b/] the expected discount rate change, as measured by the fitted values of the Granger equation: $\Delta DR_t = a\ Time + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

[c/] critical t value ($\alpha = .05$) = 1.64

market participants. (3) Frequently, fundamental economic factors in Japan have indicated a need for discount rate changes long before those changes were actually made. To the extent that market participants have looked to fundamentals as signals of the future course of Japanese economic policy, discount rate changes may have been anticipated and announcement effects, therefore, prevented.

The Canadian Experience

In 1962, Canada ended a six-year experiment with a tied discount rate, at a time of exchange rate crisis for the Canadian dollar. The Bank of Canada, as a means of dealing with the crisis, wished to exploit the announcement effects of large discretionary changes in the discount rate and to use those changes to lead other market interest rates. The discretionary discount rate system remained in use until early 1980 and therefore spans the sample period discussed here. The fact that the Bank of Canada explicitly sought the announcement effects of a discretionary discount rate, combined with the fact that the Canadian discount rate has on occasion been changed explicitly for international purposes, makes Canada a particularly interesting case for this analysis.

Table 7' shows the results of Granger tests for econometric causality on the Canadian discount rate and the Canadian 3-month interbank rate over the entire 1975-to-1979 sample period, and for each individual year within the sample period. The F statistics in the last column suggest that, in 1976 and 1979, Canadian monetary authorities were exercising their option of leading other interest rates and thereby

TABLE 7

Granger Test Results: Canada

Variables	Sample Period	Granger F Statistic[c/] (equation 1)	Granger F Statistic[c/] (equation 2)
ΔDR[a/], $\Delta I3M$[b/]	1975-1979	2.94	2.71
	1975	3.05	1.60
	1976	0.76	7.06
	1977	1.30	1.42
	1978	4.38	0.62
	1979	2.91	2.94

[a/] change in the Canadian discount rate
[b/] change in the Canadian 3-month interbank rate
[c/] critical F value (α = .05) = 2.21

equation 1: $\Delta DR_t = a\ Time + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

equation 2: $\Delta I3M_t = a\ Time + b_i \Delta I3M_{t-i} + c_i \Delta DR_{t-i}$

i = 1 to 5

using the discount rate as a signal of the future course of Canadian monetary policy.

Table 8 suggests that, in 1976 and 1979, changes in the Canadian discount rate impacted significantly on the weighted-average value of the Canadian dollar. It is useful to note that three of the discount rate increases in 1979 -- January 4, July 23 and September 10 -- were, according to official statements at the time of their announcements, intended explicitly to shore up the foreign exchange value of the Canadian currency.

It is also important to note that the Canadian authorities in 1979 were not only leading other interest rate changes by the timing of discount rate increases, but were changing the discount rate by unusually large magnitudes. Throughout most of the year, the discount rate and the 3-month interbank rate were about equal. On two occasions, however -- January 4 and July 23 -- the discount rate was raised fifty basis points above what the interbank rate had been the day before, and on one occasion -- October 9 -- the spread was made nearly one hundred basis points. (This was also the largest single discount rate change in the sample period.) Even if market participants had been led to expect some increase in the Canadian discount rate on the basis of what was happening to U.S. interest rates, it seems likely that they were taken by surprise by the sheer magnitude of these changes, and movements in the Canadian dollar exchange rate reflected the revision of their expectations.

TABLE 8

Regression Results: Canada

Dependent Variable	Independent Variable	Sample Period	Coefficient	T Statistic[c/]
ΔWAX[a/]	$E(\Delta DR)$[b/] - ΔDR	1975-1979	0.39	2.61
		1975	-0.09	-0.26
		1976	0.94	2.89
		1977	0.28	0.64
		1978	0.13	0.31
		1979	0.55	2.23

[a/] change in weighted-average exchange value of the Canadian dollar, using the Federal Reserve Board index.

[b/] the expected discount rate change, as measured by the fitted values of the Granger equation: $\Delta DR_t = a\ \text{Time} + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i}$

[c/] critical t value ($\alpha = .05$) = 1.64

In summary, the Bank of Canada has sought to use the announcement effects of discount rate changes to influence the foreign exchange market and has successfully exercised the available means of obtaining them.

The Belgian Experience

Belgium has a graduated discount rate system, with the category of paper submitted for discount determining the rate. Quotas on discount borrowing exist, except at the highest rate. There are also different minimum maturity terms for borrowing at different rates. There are actually four Belgian discount rates, and one qualification to the analysis which follows is that the rates do not always change together, and the particular rate considered here does not always change first.

To a greater extent than the countries considered before, Belgium is a small country whose economic policies must be closely aligned with the policies of its neighbors. Throughout the sample period considered here, Belgium was a member of the European monetary arrangements -- the "snake" prior to March 1979 and the EMS subsequently. Belgium has been bound by these agreements to defend its exchange rate within certain limits, and this has necessitated an alignment of interest rate policies with those of other EMS members.

On several occasions in the 1975-to-1979 sample period, Belgian monetary authorities announced that they were changing the discount rate explicitly to stabilize the value of the Belgian franc and added that this was necessary due to interest rate movements in

other countries. Germany and the Netherlands were singled out a number of times in this regard, most often the latter. In fact, nearly half of the twenty-five Belgian discount rate changes which occurred during this time period occurred within five business days of a Dutch and/or German discount rate change. For this reason, the appropriate explanatory variables in the Granger equation seem to be not only changes in domestic Belgian interest rates, but also changes in the Dutch discount rate (as an important factor in itself and as a proxy for other EC discount rates).

Table 9 shows the results of such a undirectional Granger test. In general, changes in the Belgian discount rate appear to have been predictable over the sample period on the basis of movements in domestic Belgian interest rates and changes in the Dutch discount rate. The one year in which this clearly does not seem to have been the case is 1977, and Table 10 shows that discount rate changes in 1977 were largely unanticipated and had significant impacts on the weighted-average value of the Belgian franc.

It should be noted that an absence of announcement effects as they are defined here does not imply a failure of the Belgian policy of using the discount rate for international purposes. A discount rate can be used not to bring about a change in the exchange rate but to prevent one; not to alter a currency's value in relation to others' but to maintain it. While the results of such a policy cannot be effectively measured without a more fully specified structural model, if this what the Belgian authorities intendend, they may well have succeeded.

TABLE 9

Granger Test Results: Belgium

Variables	Sample Period	Granger F Statistic[d] (equation 1)
ΔDR[a], $\Delta I3M$[b], ΔDRN[c]	1975-1979	4.13
	1975	13.00
	1976	2.13
	1977	0.45
	1978	5.89
	1979	1.83

[a] change in the Belgian discount rate
[b] change in Brussels 3-month interbank rate
[c] change in Dutch discount rate
[d] critical F value (α = .05) = 2.21

Equation 1: $\Delta DR_t = a\ \text{Time} + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i} + d_j \Delta DRN_{t-j}$

i = 1 to 5

j = 0 to 5

TABLE 10

Regression Results: Belgium

Dependent Variable	Independent Variable	Sample Period	Coefficient	T Statistic[c]
ΔWAX[a]	$E(\Delta DR)$[b] - ΔDR	1975-1979	0.09	1.25
		1975	0.17	0.62
		1976	0.25	1.65
		1977	0.22	2.32
		1978	-0.07	-0.26
		1979	-0.15	-1.29

[a] change in weighted-average value of the Belgian franc, using the Federal Reserve Board index.

[b] the expected discount rate change, as measured by the fitted values of the Granger equation:

$$\Delta DR_t = a\ \text{Time} + b_i \Delta DR_{t-i} + c_i \Delta I3M_{t-i} + d_j \Delta DRN_{t-j}$$

[c] critical t value ($\alpha = .05$) = 1.64

IV. CONCLUSION

An earlier paper by this author[7/] examined the impact of changes in the Federal Reserve's discount rate on the foreign exchange value of the U.S. dollar and concluded that such policy actions generally do not generate announcement effects. The exceptions have been (1) those instances in which the Federal Reserve, in changing the discount rate, led rather than lagged movements in other market interest rates; (2) those instances in which the discount rate change was larger than the market had been led to expect, given the spread between the discount rate and the Federal funds rate; (3) those instances in which the change in the discount rate was accompanied by other shifts in policy which had exchange market implications. This paper has attempted to extend that analysis to the experiences of the United Kingdom, Germany, Japan, Canada and Belgium. Whether and to what extent the announcement of a change in the discount rate in one of these countries has an effect on the foreign exchange market appears to depend on a number of factors.

(1) The type of discount mechanism used. A change in a discount rate which is tied to other market interest rates cannot generally have an announcement effect since market participants have sufficient information to anticipate the change. When the timing and magnitude of discount rate changes are discretionary, however, announcement effects can occur, since such changes can act as a signal of future monetary

7/ Kathleen H. Brown, "Impact of Changes in the Discount Rate on the Dollar's Foreign Exchange Value", International Finance Dicussion Paper Number 144, June 1979.

conditions. The United Kingdom provides a rather dramatic example of this dichotomy. Only after the British monetary authorities moved from a tied discount rate to a discretionary discount rate on May 25, 1978 do changes in the British discount rate appear to have had an impact on the foreign exchange value of the pound.

(2) Whether monetary authorities, in changing a discretionary discount rate, lead or lag movements in other interest rates. Leading the market means using the discount rate as a signal of forthcoming movements in other interest rates, and announcement effects may occur. The Canadian authorities, in changing their discount rate, appear to have led interest rate movements during the period considered here, at least in 1976 and 1979. Even under a discretionary discount rate system, however, monetary authorities can choose to have discount rate changes lag behind other interest rate changes. This generally ensures an absence of announcement effects, since discount rate changes will tend to be anticipated. Belgian monetary authorities, for example, in changing their discount rate, appear to have followed movements in both domestic Belgian interest rates and other EC discount rates. Monetary authorities can also opt for a mix of these two alternatives, as the Germans seem to have done over the 1975-to-1979 sample period.

(3) The existence of special institutional factors. Announcement effects cannot occur, even in the most likely scenario for their existence -- i.e., a discretionary discount mechanism where changes in this rate lead other interest rates changes, as appears to have been the case in Japan over the period considered here -- if institutional factors such as capital

controls prevent an exchange market response to policy actions. Exchange market intervention and administered interest rates can also mean that the expectations and reactions of market participants are not clearly or immediately reflected in exchange and interest rates.

In summary, the discount rate is one among several instruments available to central monetary authorities in attempting to achieve their policy targets, which can include the level of other interest rates, growth rates of the monetary aggregates, as well as the foreign exchange value of their currency. Countries differ widely in how actively the discount rate is used, in what other policy instruments are used simultaneously, and in what immediate and ultimate targets are chosen for monetary policy. Whether and to what extent the announcement of a discount rate change has an effect on foreign exchange rates depends on these institutional and policy differences.

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