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Money and politics in a small open economy*

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Abstract

A time series analysis indicates monetary growth and the Gallup Poll in Canada are systematically related at 'electoral cycle' periodicities (5 to 20 quarters) under flexible exchange rates, and demonstrates the absence of an electoral component in Canadian monetary growth under fixed rates. These results confirm *empirically* a widely accepted extension of the Mundell-Fleming argument that monetary policy is effective only under flexible rates, which to my knowledge has not before been directly investigated: international constraints on the small open economy under fixed rates lead to the abandonment of monetary policy as an active instrument in electoral politics.

1. Introduction

The purpose of this paper is to contribute to the body of stylized fact that can serve as an anchor for theorizing about the 'political business cycle' in the small open economy context.[1]

The role of political factors in the macroeconomy has been investigated most often in terms of the relationship between macroeconomic events and political popularity (e.g. Hibbs and Fassbender, 1981; Kiewiet, 1983). But if there is a political element in the macroeconomy, then as Laney and Willet (1983) have emphasized, it should also be observed in the behavior of policy variables as well.

In the small open economy context an important, but empirically neglected, issue concerning the relationship between electoral politics and macropolicy instruments such as monetary growth is the extent to which this relationship is affected by the choice of exchange rate regime. The case for a flexible rate regime rests to a large extent on the contention that it is the

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only one under which autonomy is guaranteed for the domestic authorities to pursue whatever monetary policy is required to promote the national interest. However as Mundell (1976, 1983) has argued, this case may not be robust with respect to a behavioral analysis of how the exchange regime influences the choice of monetary policies actually pursued. The problem according to Mundell is that exchange flexibility may cause a loss of monetary 'discipline' by attenuating the influence of the balance of payments on domestic policy. In his view, the threat of bankruptcy posed by a run on foreign exchange reserves is a far more ominous discipline for the monetary authority than the thin reed of depreciation and/or inflation after the public has become accustomed to depreciation. Consider, for example, what would have happened during its fiscal crisis if New York City had the right to print her own money and maintain a flexible exchange rate (Mundell, 1976). A fairly safe prediction is that New York would have experienced rampant inflation and her currency would have had a low and depreciating value.

Mundell's argument raises three distinct general issues. First, there is the prior question of whether the behavior of the various agents who influence monetary growth differs across exchange regimes. The second issue concerns the danger that analyses of open economies under alternative exchange regimes may be biased by their failure to incorporate an empirically significant relationship between the nature of this behavior and the type of exchange rate regime. Third, there is the normative question of how a systematic relationship between such behavior and exchange regime should be reflected in the decision about which regime is to be preferred. This paper addresses the first issue only. More specifically, it is concerned with the possibility that the role of electoral politics in the determination of monetary growth differs substantially across exchange regimes.[2]

Economic theory gives us a good reason for suspecting this to be the case. One of the most well known and enduring of all theoretical results in the international macroeconomics literature is the argument due to Mundell (1963) and Fleming (1962), that monetary policy is effective in influencing nominal incomes under flexible exchange rates but completely ineffective in this respect (with perfectly mobile capital) in a small open economy under fixed rates.[3] If political popularity and electoral success are influenced by macroeconomic events, it is reasonable, in view of the Mundell-Fleming result, to expect governments to try to use monetary growth more actively as an instrument of electoral politics under flexible rates than under fixed rates. Political agents need not be trained international macroeconomists for such behavior to occur. Given the conditions of the Mundell-Fleming model, experience under fixed rates will quickly demonstrate the futility of domestic monetary manipulation in the face of an overwhelming balance of payments constraint.

The strength of the relationship between money and politics under alternative exchange regimes remains an empirical issue, however, despite the theoretical insight given to us by the Mundell-Fleming model. The extent of international capital mobility is an empirical question. And in a fixed rate regime, given less than perfectly interest-elastic capital flows and a substantial buffer stock of foreign reserves, it is both possible and tempting to buy votes via monetary expansion. This is so under these conditions, as Friedman (1953: 179) and Willet and Mullen (1982) have argued, because monetary expansion and the resulting trade deficit then have the politically advantageous effect of temporarily increasing current real absorption above domestic real output. Moreover, these and other authors have noted that depreciation following monetary expansion will tend to increase the steepness of the short-run inflation-unemployment trade-off relative to a situation with fixed rates. Consequently the incentives (as in Nordhaus, 1975) for a political business cycle, or for inflationary monetary policy in general, may be much less under flexible rates than Mundell appears to believe. In any case it is evident that the relationship between money, politics and exchange regime depends on several factors, including the international mobility of capital and the effect of exchange rate flexibility on the slope of the short-run Phillips curve, the exact role of which in the political economy cannot be determined on a priori grounds and which may vary from economy to economy.

In this paper the link between money and politics under flexible and fixed exchange regimes is empirically investigated in the Canadian context using measures of conditional linear feedback from the Canadian Gallup Poll to Canadian monetary growth. Section two briefly and informally introduces the concept of conditional linear feedback due to Geweke (1982, 1984), which is well suited to the investigation of political business cycles, develops its application in the present context, and compares this methodology with the more familiar monetary reaction-function approach. A complete description of the methodology used here may be found in the work of Geweke cited above. The relevant estimates are presented and discussed in section three. Some concluding remarks are offered in a final section. An Appendix presents complementary results based on estimation of monetary reaction-functions.

2. A time-series approach to the relationship of money and politics under alternative exchange regimes

A novel method of investigating the relationship between money and politics in a small open economy is to consider linear feedback between political popularity and monetary growth, conditional on economic activity

in the 'rest of the world'. In the Canadian case explored here this involves estimation of the measure of conditional linear feedback $F_{POP} \rightarrow m_1 \mid p^*, U^*$, and its frequency decomposition, for each exchange regime, where:[4]

POP = Popularity of governing party, based on the Canadian Gallup Poll question, 'If a federal election were held today, which party's candidate do you think you would favour?', in percent;

m_1 = First difference in logs of the Canadian money stock (M1 definition);

p^* = First difference in logs of the U.S. GNE deflator;

U^* = U.S. unemployment rate.

The use of the Canadian Gallup poll variable POP is much more interesting in the investigation of the link between money and politics than the analogous question in the U.S. Gallup poll would be. In the U.S. context, the standard popularity variable employed in political business cycle studies measures opinions concerning the overall performance of the current president.[5] This is not as closely related to potential electoral success as the Canadian question because it does not require the respondent to explicitly evaluate the opposition.

Linear feedback F indicates the extent to which the past history of the Canadian Gallup poll contributes to the prediction of current Canadian monetary growth *over and above* the contribution of past monetary growth, given the past history of the U.S. economy. More precisely, F measures the reduction in the variance of the error in one-step-ahead forecasts of current m_1 which may be achieved by using lagged observations on POP in addition to lagged observations on m_1, p^* and U^* in a linear regression explaining current m_1. Feedback in the opposite direction, from m_1 to POP, is defined in analogous fashion; it is the reduction in the predictive variance of POP that can be achieved by adding lagged observations on m_1 to a regression equation for current POP that already contains lagged observations on POP and on the conditioning variables p^* and U^*.

In the context of investigations of the political business cycle, an exciting feature of the feedback measure F is that it can be decomposed by frequency λ or equivalently, by periodicity $2\pi/\lambda$. It is the case that[6]

$$F_{POP} \rightarrow m_1 \mid p^*, U^* = \frac{1}{2\pi} \int_{-\pi}^{\pi} f_{POP} \rightarrow m_1 \mid p^*, U^* (\lambda) d\lambda. \qquad (1)$$

Here f represents the importance, at a given frequency or periodicity, of variance in the innovation of the process determining current POP in explaining overall feedback from POP to m_1, after the influence of the U.S.

economy has been appropriately accounted for. Equation (1) indidates that estimation of f across frequencies makes it possible to determine what proportion of overall feedback from POP to m_1 can be attributed to the variance in the innovation of the POP process at particular frequencies or periodicities. Feedback at high frequencies (at short periodicities) corresponds to a 'short-run' relationship, while f at $\lambda = 0$ (at the infinite periodicity) represents the 'long-run'. For the study of the relationship between money and politics, the contribution to overall feedback of f at 'electoral cycle' periodicities, say 5 to 20 quarters, is obviously of special interest. Even if the trend in monetary growth can be predicted well using past values of monetary growth alone, it may still be the case that prediction of shorter-term fluctuations around this trend is substantially enhanced by the use of lagged observations on political popularity.

2.1 *The role and choice of conditioning variables*

Conditioning feedback on the past history of the U.S. economy is a parsimonious way of controlling for changes in international constraints on domestic policy. Failure to acknowledge changes in the international environment in which domestic monetary policy is made could lead to discovery of a role for political polls in the determination of monetary growth in an open economy that is not in fact warranted.

In the first instance, conditioning on the state of the U.S. economy controls for foreign events which may induce a spurious correlation between monetary growth and popularity, especially via the balance of payments under fixed rates. Assume, for example, that monetary growth under fixed exchange rates is not regarded by the government as an instrument of electoral politics and is determined solely by the balance of payments. In this case m_1 will be correlated with any exogenous shock which has balance of payments implications, such as a change in p^* or in U^*. If the domestic macroeconomic consequences of such shocks (e.g. domestic inflation or unemployment) affect the government's popularity, we may observe unconditional feedback from m_1 to POP or from POP to m_1 even though monetary growth is not used actively for electoral purposes.[7]

Conditional feedback *from* POP *to* m_1 is not likely to suffer as much from this sort of spurious correlation between money and politics, since lagged values of m_1, p^* and U^* control for macroeconomic influences on current m_1 via the balance of payments. In other words, conditional feedback from POP to m_1 gives an indication of the extent to which domestic political responses to the Gallup poll determine current m_1 over and above those influences on m_1 operating via the balance of payments under fixed rates.

Conditioning may also be important when monetary growth is politi-

cized. The state of the U.S. economy will in part determine the domestic economic consequences of any change in macropolicy and therefore may influence the macropolicy response to a given change in popularity. For example, even if the government is doing very poorly in the polls close to an election, it may not be able to resort to more rapid monetary growth if, given the state of the U.S. economy, this response to unfavourable polls leads to a large currency depreciation or loss of international reserves, events which are likely to have negative electoral repercussions.

A further reason for conditioning is that the information content of the Canadian Gallup poll may change with the state of the U.S. economy, so that a given popularity rating might not always lead to the same policy response regardless of conditions in the U.S. If, for example, the American economy appears to be performing relatively better than that in Canada, a decline in the government's Gallup poll rating may provoke a stronger monetary response than it would if the Canadian economy was the 'healthier' of the two.

The set of variables used to represent the state of the U.S. economy includes one nominal variable, p^*, and one real variable, U^*.[8] Only two variables were chosen because of the length of available time series and the consequent degrees of freedom problems. Other pairs of conditioning variables might be chosen to represent the U.S. economy. But in this paper the emphasis has been placed on extensive investigation of alternative lag structures and consideration of the effect of other sets of conditioning variables has been left for future research.

2.2 *Comparison with a monetary reaction-function approach*

It is instructive to compare the approach outline above with one based on monetary-reaction functions, estimates of which are presented in the Appendix.[9] Measures of linear feedback reported in the next section are based on a vector autoregression of the set $\{POP, m_1, p^*, U^*\}$. A key assumption is that such a vector autoregression is adequate as a representation of the reduced form of the underlying and unknown structural model governing the relationship between politics and monetary growth. Moreover, since the regression coefficients of the estimated vector autoregressions are used to produce summary measures (F and its frequency decomposition) of association between time series, the results reported below do not allow one to sign the direction of the effect on m_1 of a given change in POP.

The monetary reaction-function is also a reduced form approach, but it begins with more structure than simply a listing of potentially related economic and political variables. The standard approach to the derivation of monetary reaction-functions assumes that a monetary authority or government chooses instrument values so as to minimize a quadratic loss

function whose arguments are deviations of instruments and targets from their respective optimal values, subject to linear constraints reflecting the links between instruments and targets imposed by the structure of the economy and the political system. This setup permits one to form expectations concerning the sign of the reduced form coefficients; e.g. with unemployment and inflation as targets one expects increases in unemployment to lead to monetary expansion and increases in inflation to lead to monetary contraction. However, a monetary reaction-function does not permit direct empirical investigation of the relative strength of short-run, electoral cycle and long-run relationships, which is the most novel feature of the present work.

It should be noted that neither the present approach nor the use of monetary reaction-functions is a substitute for a structural model of the interaction between the Bank of Canada, the Department of Finance, the Government of Canada, and the private sector, all of which can be expected to have some degree of influence on monetary growth. Rather, as in Laney and Willet (1983), the focus of this paper is on the generation of stylized facts concerning two factors thought to be related to the underlying causes of monetary growth, namely political popularity and the choice of exchange rate regime, stylized facts which any good structural model should be able to replicate.

3. Estimation of conditional feedback between popularity and monetary growth

The basic classification of exchange regimes used in the empirical work reported below is: 1953: 2 to 1962: 1 – a flexible period; 1962: 3 to 1970: 1 – a fixed rate period; and 1973: 1 to 1982: 4 – a flexible period. All data are quarterly and seasonally adjusted when appropriate. The quarters in which there was a de jure change in exchange regime between 1953 and 1982 have been omitted. Since there is some doubt as to whether or not the first few years of the de jure float which began in 1970: 2 should be considered de facto flexible, the period beginning in 1973: 1 is chosen to represent the most recent floating rate experience in Canada.[10]

The vector autoregressions for the set $\{POP, m_1, p^*, U^*\}$ upon which the estimates of measures of feedback are based have been truncated at lag length q. The approach to the specification of q used here is to choose a value thought to be large enough to include most relevant lags subject to degrees of freedom considerations. The value of q is then allowed to vary and the sensitivity of the results to this variation is considered. Many of the results discussed here are based on $q = 4$; in this case current monetary growth is assumed to be influenced by popularity from 1 to 4 quarters in

the past. Some results for lags of 2 and 3 quarters are also reported.[11] A more complete set of results is contained in Winer (1984).

Once the vector autoregressions have been truncated at lag length q, point estimates of linear feedback and their decomposition by frequency are computed after replacing the population coefficients in the autoregressions with their point estimates.[12] Tests of the null hypothesis that these measures are zero are not reported since the asymptotic distribution theory involved is extremely difficult. Instead, estimates corrected for small sample bias and confidence intervals are computed using a bootstrap procedure (Efron, 1982; and Geweke, 1984).[13]

3. Results

In view of the need to control for the influence of the U.S. economy on m_1 via the balance of payments (see Section 2.1 above), the discussion of results will focus on the estimates of conditional feedback from popularity to monetary growth which are given in Tables 1a to 2.

In the tables, the 'Adjusted Estimate' column provides the estimates adjusted for small sample bias based on 25 replications of synthetic data. The figures in parentheses indicate the percentage of variance explained corresponding to the estimated measure of feedback. The last two columns indicate the lower and upper quartile for the adjusted estimates, based on the 25 replications of synthetic data. For example, in Table 1a the adjusted point estimate of the measure of conditional feedback from POP to m_1 is .042; this corresponds to a 4.1 percent reduction in the one-step-ahead mean square forcast error for monetary growth when four lagged values of POP are added to 4 lagged values of m_1, p^* and U^* over the flexible rate period of 1953: 2 to 1962: 1. The lower and upper quartiles for the adjusted estimate are .016 and .069 respectively. In the decomposition by frequency of this estimated measure of feedback, at the infinite periodicity (zero frequency or long-run), for example, the adjusted point estimate ascribes 3.0 percent of the variance in monetary growth to the innovation in POP.[14] Note that in the tables decomposition of feedback by frequency λ is reported by periodicity ($= 2\pi/\lambda$).

Tables 1a to 1c present measures of conditional feedback using POP as the political popularity variable. Table 2 and Figure 1 reports on the use of PO, an alternative popularity variable that is defined as:

$$PO = POP - OPP, \tag{2}$$

where OPP is the percentage vote for opposition parties. PO may reflect the relative electoral strength of the governing party more accurately than POP

Table 1. Conditional feedback between money and politics (POP) under alternative exchange regimes[a] – 4 lags

Table 1a. Flexible: 1953: 2 – 1962: 1

	Adjusted	Estimate	25.0%	75.0%
F(POP to m_1|Z)	0.042	(4.1%)	0.016	0.069
F(m_1 to POP|Z)	0.035	(3.5%)	0.019	0.038
f(POP to m_1|Z) Period				
Infinite	0.031	(3.0%)	0.004	0.022
160.000	0.034	(3.4%)	0.004	0.025
80.000	0.044	(4.3%)	0.007	0.035
40.000	0.079	(7.6%)	0.018	0.085
30.000	0.108	(10.3%)	0.026	0.158
20.000	0.154	(14.3%)	0.044	0.213
16.000	0.165	(15.2%)	0.049	0.216
12.000	0.152	(14.1%)	0.042	0.195
10.000	0.133	(12.4%)	0.041	0.185
9.000	0.119	(11.2%)	0.040	0.179
8.000	0.104	(9.8%)	0.040	0.171
7.000	0.086	(8.2%)	0.029	0.140
6.000	0.065	(6.3%)	0.023	0.097
5.000	0.043	(4.2%)	0.014	0.067
4.000	0.023	(2.3%)	0.006	0.034
3.000	0.013	(1.3%)	0.003	0.021
2.000	0.011	(1.1%)	0.002	0.016

Table 1b. Fixed: 1962: 3–1970: 1

	Adjusted	Estimate	25.0%	75.0%
F(POP to m_1|Z)	0.023	(2.2%)	0.006	0.040
F(m_1 to POP|Z)	0.052	(5.1%)	0.029	0.074
f(POP to m_1|Z) Period				
In finite	0.000	(0.0%)	0.000	0.000
160.000	0.000	(0.0%)	0.000	0.000
80.000	0.000	(0.0%)	0.000	0.000
40.000	0.000	(0.0%)	0.000	0.000
30.000	0.000	(0.0%)	0.000	0.000
20.000	0.000	(0.0%)	0.000	0.000
16.000	0.000	(0.0%)	0.000	0.000
12.000	0.000	(0.0%)	0.000	0.000
10.000	0.000	(0.0%)	0.000	0.000
9.000	0.000	(0.0%)	0.000	0.000
8.000	0.000	(0.0%)	0.000	0.000
7.000	0.000	(0.0%)	0.000	0.000
6.000	0.000	(0.0%)	0.000	0.000
5.000	0.001	(0.1%)	0.000	0.001
4.000	0.006	(0.6%)	0.001	0.010
3.000	0.023	(2.3%)	0.004	0.037
2.000	0.197	(17.9%)	0.019	0.250

Table 1c. Flexible: 1973: 1–1982: 4

	Adjusted	Estimate	25.0%	75.0%
F(POP to m_1|Z)	0.057	(5.5%)	0.032	0.082
F(m_1 to POP|Z)	0.160	(14.8%)	0.092	0.231
f(POP to m_1|Z) Period				
Infinite	0.006	(0.6%)	0.001	0.010
160.000	0.007	(0.7%)	0.001	0.010
80.000	0.008	(0.8%)	0.001	0.012
40.000	0.012	(1.2%)	0.002	0.018
30.000	0.018	(1.8%)	0.004	0.029
20.000	0.046	(4.5%)	0.012	0.074
16.000	0.091	(8.7%)	0.029	0.139
12.000	0.239	(21.3%)	0.095	0.323
10.000	0.378	(31.5%)	0.171	0.487
9.000	0.395	(32.6%)	0.156	0.563
8.000	0.330	(28.1%)	0.137	0.529
7.000	0.246	(21.8%)	0.126	0.374
6.000	0.144	(13.4%)	0.062	0.168
5.000	0.070	(6.8%)	0.027	0.093
4.000	0.028	(2.8%)	0.011	0.035
3.000	0.007	(0.7%)	0.002	0.010
2.000	0.004	(0.4%)	0.000	0.006

[a]Z represents the U.S. conditioning variables p* and U*. Adjusted estimates based on 25 replications. The 'infinite periodicity' represents the zero frequency or long-run.

Table 2. Conditional feedback from PO to monetary growth (and % reduction in forecast error for m_1 due to lagged PO)'[a]

Exchange regime (time period)	Number of lags 4	3	2
Flexible (53–62)	.124 (11.6%)	.132 (12.3%)	.156 (14.4%)
Fixed (62–70)	.018 (1.8%)	.009 (0.9%)	.004 (0.4%)
Flexible (73–82)	.058 (5.7%)	.081 (7.8%)	.041 (4.0%)

[a]Estimates are adjusted (bootstrapped) estimates based on 25 replications. PO = POP − OPP.

when the undecided vote varies over time as a percentage of the total.[15]

Consider first Tables 1a to 1c which report results with POP and 4 lags. Looking across exchange regimes, it appears that conditional feedback from POP to m_1 (F(POP to $m_1 | Z$) in the first row of the tables where Z refers to lagged values of p* and U*) is about twice as high in the flexible regimes of the 1950s and 1970s (Tables 1a and 1c) as in the fixed rate regime of the 1960s (Table 1b). Moreover, the frequency decomposition of this

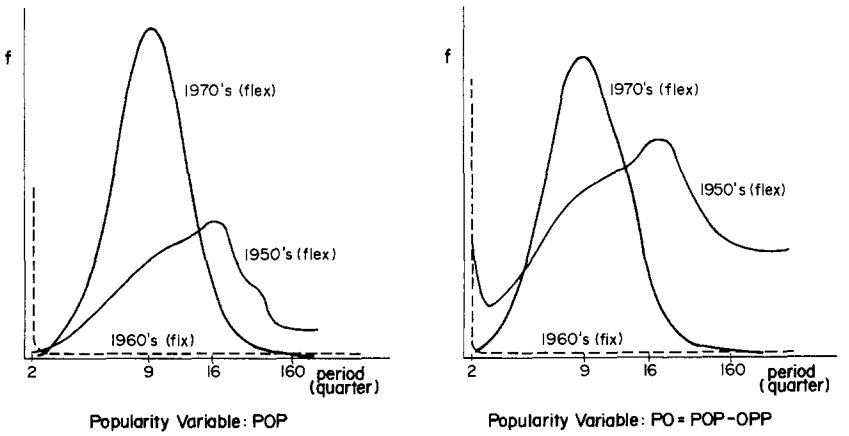

Figure 1. Feedback from popularity to monetary growth under alternative exchange regimes*
4 Lags

*Source: Tables 1a to 1c and Winer (1984).

feedback in the second panel of the tables (labelled f(POP to $m_1 | Z$)) indicates a possible electoral cycle under flexible rates, but not under fixed rates. Feedback peaks at 16 quarters in the 1950s and at 9 quarters in the 1970s.[16] But at any plausible electoral periodicity, say 5 to 20 quarters, feedback from POP to m_1 during the fixed rates of the 1960s is zero. The confidence intervals given in the last two columns of Tables 1a to 1c overlap to some extent for overall feedback, but are well separated at electoral periodicities.[17]

The corresponding frequency decomposition for 3 lags, not shown in the tables, peaks at between 7 and 9 quarters in the flexible rate periods and is essentially flat during the fixed rate regime of the 1960s. (The frequency decomposition with 2 lags isn't very interesting because this short lag structure too severly constrains the decomposition.) Results for overall feedback using 2 and 3 lags are also similar to those presented in Table 1.

Overall feedback based on the use of PO as the popularity variable is reported in Table 2 for 2, 3 and 4 lags. The pattern across exchange regimes here is the same as that found when using POP as the popularity variable.

A graphical summary of the frequency decomposition using POP given in Tables 1a to 1c and of the corresponding frequency decomposition using PO (not reported in the tables) is presented in Figure 1. Note the peaks in the graphs of f by periodicity at 9 and 16 quarters for flexible regime episodes and the flat graphs along the horizontal axis for the fixed exchange regime of the 1960s.[18]

On comparing the results for the 1950s with those for the 1970s, Figure 1 indicates that with both popularity variables, the frequency decomposition for 4 lags tends to peak at lower periodicities in the 1970s than in the 1950s. This may suggest that responses to economic and political events by private and political agents were faster in the 1970s. It may also reflect a difference in the timing of elections. Table 2 and the corresponding results using POP (found in Tables 1a to 1c and Winer, 1984) reveal another interesting difference between the 1950s and the 1970s. It is generally the case that overall feedback from POP or PO to m_1 during the flexible rate period of the 1970s is smaller for a given lag length than that during the flexible rate period of the 1950s. This might reflect relatively greater exchange market intervention by the Government of Canada in the float of the 1970s than in the earlier float of the 1950s.[19] To the extent that intervention fixes the exchange rate, it creates a direct link between the balance of payments and the money supply and forestalls the use of monetary growth as an instrument of electoral politics.

4. Concluding remarks

The estimates of linear feedback discussed in this paper indicate the existence of an electoral component in Canadian monetary growth under flexible exchange rates, in the sense that conditional feedback from the Gallup poll to monetary growth overall and at 'electoral cycle' periodicities is positive. This estimation also demonstrates the absence of an electoral component in monetary growth under fixed rates. As a whole, the results confirm empirically an intuitively plausible extension of the Mundell-Fleming argument that monetary policy is effective only under flexible rates: international constraints on the open economy under fixed rates lead to the abandonment of monetary policy as an active instrument of electoral politics.[20] This last conclusion is commonplace as a working assumption in much of the international finance literature. But it is a statement about an empirical issue which, to my knowledge, has never before been directly investigated.[21]

The above results bear to some extent on other interesting issues in international finance, two of which will be raised here although their resolution lies beyond the scope of the present paper. The first is the positive question of why small open economies ever choose to fix their exchange rate when, empirically speaking, a fixed exchange regime would appear to effectively forestall the use of monetary growth for political ends. The results presented here should heighten interest in the answer to this question.[22]

Secondly, the empirical results are relevant to the normative question of which exchange regime is best for a small open economy. They suggest, following Simons (1936) and others, that fixed rate regimes for economies like Canada can be viewed as a sort of second best monetary rule. This is so in the sense that a fixed exchange rate in such an economy appears to isolate monetary growth from day to day electoral politics. Upon further confirmation of its robustness, such a stylized fact ought to have some weight in the choice of exchange regimes, although other factors such as the desirability of monetary policy in the United States, to which domestic monetary policy is to be 'fixed', must also be considered.

NOTES

1. The nature of the links between public support for political authorities and macroeconomic policy and outcomes is the subject of much theoretical debate. See, for example, the review of the Hibbs and Fassbender (1981) volume by Atkinson (1982) and the reviews of the literature by Paldam (1981) and Schneider and Frey (1984).
2. Willet and Mullen (1982) provide an interesting theoretical discussion of the third issue. For a useful discussion of Mundell's view in the Canadian context, see Purvis (1977). An early statement of essentially the same view is found in Viet (1957: 21).
3. See also Mundell (1968: Ch. 18). Empirical evidence which tends to confirm this hypothesis

in the Canadian context is found in Winer (1979).

4. Sources of data. POP: Canadian Gallup Poll Limited; m_1: Cansim B1609; p*: Citibase GD; U*: U.S. Department of Labour, Bureau of Statistics, average of monthly seasonally adjusted data. All data are quarterly, and seasonally adjusted, except for POP which is the quarterly average of appropriate monthly observations. Data are available at cost from the author upon request.
5. The U.S. popularity variable is usually based on the U.S. Gallup poll question: 'Do you approve or disapprove of the way Mr. X is handling his job as President?'
6. Strictly speaking, this is true only under certain conditions, which always hold in the empirical work reported below. See Geweke (1982, 1984) for a statement of these conditions.
7. For evidence of the influence of general macroeconomic events on political popularity and electoral success, see, for example, Kiewiet (1983) or Kernell and Hibbs (1981), and the survey in Frey and Schneider (1984).
8. The set of conditioning variables does not include either the exchange change in foreign reserves or the exchange rate. This is because holding constant the former under fixed rates or the latter under flexible is, in effect, the empirical analogue to closing the economy to international transactions. This defeats the purpose of the paper, which is to investigate the link between money and politics in an *open* economy context. It is a considerable understatement to say that in such an economy, the choice between monetary policies is likely to be significantly influenced by their international repercussions. Moreover, since the central concern of this paper is with the influence of the openness of the Canadian economy on the domestic link between money and politics, it is important to control for the state of the U.S. economy (for reasons outlined above), even though this precludes, for degrees of freedom considerations, the addition of other domestic economic and political variables to the conditioning set. The importance to the empirical results of conditioning on the state of the U.S. economy is investigated in Winer (1984).
9. A general discussion of the monetary reaction-function approach is found in Alt and Chrystal (1983: Ch. 6). The Appendix reviews Canadian research along these lines.
10. See Winer (1986) for further discussion. The start of the sample period reflects the public availability of quarterly money stock data.
11. The idea is to be as agnostic as possible concerning lag structure. Generally, longer lags are to be preferred because they constrain the frequency decomposition of feedback least. Of course, using long lags relative to available observations may risk under-estimation of error variances. When $q = 4$ it is necessary to estimate 17 parameters including a constant term in each equation of the vector autoregression using from 31 to 40 observations, depending on the exchange regime. However, the bootstrapping procedure described below will tend to correct any bias that does arise. And in any case, results for 3 lags lead to essentially the same conclusions. Again, see Winer (1986).
12. All computations were performed using the MTSM program (Geweke, 1983). It should be noted that estimation is conducted entirely within each exchange regime. Results for one regime do not depend, via lag structure, on data generated by the previous regime.
13. See also Winer (1986).
14. More precisely, 3.0 percent of the spectral density of m_1 evaluated at $\lambda = \emptyset$ may be ascribed to the innovation in the linear regression of POP on current and lagged m_1, lagged POP and lagged p* and U*.
15. POP + OPP + (percentage undecided) = 100%. Thus if the percentage undecided is constant and equal to K, PO = 2 POP + (K − 100) and so in this case PO will not contain any electoral information not available in POP.
16. The apparent shortening of the electoral cycle evident in a comparison of Tables 1a and 1c is discussed below.
17. It may also be of interest to note the suggestion in Table 1 (and in the more complete set

of results in Winer, 1984) that overall feedback *from* m_1 *to* POP is greater under fixed rates than under flexible rates. Since monetary growth is highly correlated with the balance of payments when exchange rates are fixed, such a result may stem from the direct or indirect influence of the balance of payments on political popularity, an influence which may be proxied in part by a distributed lag on m_1.

18. The frequency decomposition using PO and 3 lags, not shown in the tables or in Figure 1, is similar to that for 4 lags, and thus also indicates a possible electoral cycle under flexible rates.
19. For evidence that the 1970s float involved greater exchange intervention than in the 1950s, see Winer (1986).
20. If money and politics are more closely linked when exchange rates are flexible than when they are fixed, as measures of conditional feedback suggest, what about the complementary result for fiscal policy? Is it the case that, as is suggested by the Mundell-Fleming model, fiscal policy decisions are influenced to a greater extent by electoral politics under fixed rates than under flexible? The answer awaits further research that lies outside the scope of the present paper. However, there is less reason for this extension of the Mundell-Fleming theorem to hold than that regarding monetary policy, because fiscal policy may not be, in fact, ineffective under flexible rates. The influence of fiscal policy under flexible rates may be due to the non-traded goods component of government purchases but, in any case, it has been confirmed empirically for Canada by Carr et al. (1976), Prachowny (1977), and Winer (1979) amongst others.
21. It should be noted that the results do not conclusively rule out the existence of unsuccessful attempts to use monetary growth for political advantage under fixed rates, attempts that have been unsuccessful because of the influence of the balance of payments on monetary growth and which have continued despite their failure. Consideration of this possibility requires measures of political *intentions*, which have not been constructed here.
22. For an interesting attempt to construct a positive model of the choice of exchange regime, see Fried (1973).

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Appendix: Estimation of monetary reaction-functions

In this Appendix, new estimates of Canadian monetary reaction-functions are presented along with a brief survey of previous work along these lines. Both new and old results are consistent with the view that monetary behavior differs substantially across exchange regimes.

Two versions of this reaction-function are considered here.[1] The first is Reuber's original explanation for Canadian monetary growth during the flexible rate period of the 1950s (Reuber 1964: 123):

$$\ln M1_t = a + b_1\, 1/U_t + b_2 \ln \Theta_t + b_3 \ln P_t + c_1 \ln M1_{t-1} + c_2 \ln M1_{t-2} + e_t \qquad \text{(A1)}$$

where[2]:

M1 = nominal money stock, U = unemployment rate, Θ = average output in manufacturing per man hour, and P = GNE deflator.

The second function has the general form:

$$m1_t = a + B_1(L)1/U + B_2(L)y_t + B_3(L)p_t + B_4(L)\,\Delta R + C(L)m1_t + e_t \qquad \text{(A2)}$$

where $B_i(L)$ and C(L) are polynomials in a lag operator, $B_i(0) = C(0) = 0$, so that no current values appear on the right side of (A2) and where[3]:

m1 = first difference in logs of the money stock, p = first difference in the logs of the GNE deflator, y = first difference in logs of real GNP, and ΔR = domestic currency equivalent of the change in foreign reserves. Data are quarterly and seasonally adjusted except ΔR which is adjusted.

Reaction function (A2) is to be preferred to (A1) for several reasons. The use of rates of growth in (A2) should reduce multicollinearity problems associated with using levels in (A1). The absence of current period variables on the right side of (A2) eliminates the possible bias in OLS estimation of this equation due to simultaneity of money, output and prices. Equation (A2) also acknowledges the potential importance of lags in the underlying behavioral model of the monetary authority. The presence of lags in the targets (U, y, p and ΔR) can be viewed as stemming from a model of behavior in which governments optimize with respect to deviations of *expected* targets from their ideal values, and in which expectations are roughly approximated by distributed lags of past target values.[4] Lags in the instrument (m1) can be regarded as stemming from the influence on the underlying government loss function of the act of macroeconomic intervention, as measured by deviations of current from lagged values of instruments.[5] The presence of ΔR in (A2) allows for policy responses to the balance of payments under the fixed exchange regime of the 1960s. This also serves as a crude proxy for reserve ceilings imposed on Canada by the U.S. government in the 1966 to 1968 period.

Both reaction-functions may be regarded as having been derived from a loss function for a consolidated central government and central bank sector, in which the optimal target and instrument values and the weights in the loss function placed on deviations from optimal target and instrument values are considered as the stable outcome of interaction between the Bank and the Government.[6] In this case, as in the main text, the focus of the model underlying (A1) and (A2) may be regarded as being on the underlying causes of monetary growth rather than on the best possible description of how the central bank actually formulates day-to-day policy.[7]

Neither (A1) nor (A2) allows explicitly for the possibility that monetary autonomy, and

Table A1. Canadian monetary reaction-functions, quarterly data, flexible and fixed exchange rate regimes

Eqtn (A1): ℓn M1	1/U		$\ell n\Theta$	ℓnP			ℓn M1$_{-1}$	ℓnM1$_{-2}$	intercept	$\bar{R}^2$	D.W.
1949: 1–1961: 1	−.087**		.249**	.091*			1.33**	−.560**			
(Reuber; flexible)	(−4.52)		(3.45)	(2.72)			(12.17)	(−6.32)	.521	.999	1.89
1961: 1–1968: 4	−.027		.073	.411			1.03**	−.182			
(Hay; fixed)	(.814)		(.812)	(1.56)			(5.12)	(.830)	−.457	.997	1.92
Eqtn (A2): m1	1/U$_{-1}$	1/U$_{-2}$	y−1	P−1	ΔR$_{-1}$	ΔR$_{-2}$	m1$_{-1}$	m1$_{-2}$	intercept	$\bar{R}^2$	D.W.
1954: 2–1962: 1	−.374**	.288**	.50**	.315			.609**	−.205			
(flexible)	(−3.82)	(3.07)	(3.07)	(1.07)			(3.81)	(−1.25)	.001	499	2.11
1962: 3–1970: 1	−.015	.12	.473*	−.716	1.62E−06*	−5.13E−06					
(fixed)	(−.100)	(.831)	(1.92)	(−1.58)	(1.962)	(−.691)			−.001	.252	2.02

Notes. M1 = money stock; m1 = $\Delta\ell n$ M1; Θ = average output/manhour in mfg.; y = $\Delta\ell n$ (real GNP); P = GNE deflator; p = $\Delta\ell nP$; ΔR = change in foreign reserves. t statistics in brackets; (**) = significant at 5%; (*) = significant at 10%. R^2 is adjusted. D.W. = Durbin-Watson statistic. Estimation of (A2) based on search over one to four lags for right hand variables, with only 'best' equation reported. Estimation of (A1) from Hay (1971, Table 5).

hence the link between money and politics, is substantially altered by the nature of the exchange regime. At the very least, therefore, the conditional feedback results in the text suggest the coefficients on target variables ought to shift when the exchange regime changes. And this is what the results in Table A1 do indicate, whether Grant Reuber's equation (A1) is used (as re-estimated by Keith Hay (1971)) or whether (A2) is estimated.[8] Both reaction-functions appear to work well for the flexible regime of the 1950s, though they do not give similar results. (It appears that Reuber's equation overemphasizes the importance of inflation to monetary decisions in the 1950s, since no lag from one to four quarters on inflation rates is significant in (A2) for this period.) But neither equation could be said to perform adequately for the fixed rate period of the 1960s, and at the very least it is clear that the coefficients have shifted. For example unemployment does not remain a significant variable in either (A1) or (A2) when they are estimated over the fixed rate period of the 1960s. Only the lagged money stock, real output or the change in reserves is statistically significant during the fixed rate period, depending on the form of the reaction function.

APPENDIX NOTES

1. For a general discussion of the reaction-function approach to the modelling of political behavior, see Alt and Chrystal (1983: Ch. 6) and Pissarides (1972).
2. The exact sources of data used by Reuber are unclear. Presumably the data are seasonally adjusted. The M1 data for 1961–1968 are given in Hay (1971). The re-estimation of (A1) reported below is from Keith Hay's paper, and he has assured me that his data is identical to Reuber's. In this respect, it should be noted that Hay was able to reproduce Reuber's results exactly.
3. Sources of data for equation (A2): M1: Cansim B1609, U: Cansim D767611, y: Cansim D40593, p: Cansim D40625, ΔR: Cansim D50712.
4. This is essentially the same assumption as that made in Abrams et al. (1983), although they use a more complex lag structure to create expected target values than is implied by the versions of (A2) used here.
5. Intervention may focus undue attention on certain problems with negative consequences for government credibility or involve temporary reallocations unfavourable to certain voters. See Alt and Chrystal (1983).
6. The government of Canada essentially fired the governor of the Bank of Canada in 1961 (see Pesando and Smith, 1973, on the 'Coyne affair'). But this episode in Canadian monetary history occured at the end of one exchange regime, and so long as reaction-functions are estimated for each exchange regime separately, this event by itself does not invalidate the interpretation of (A1) and (A2) as representing a consolidated Government-Bank sector. See Frey and Schneider (1981) for an attempt to model directly the relationship between a central bank and a central government.
7. For a reaction-function model which is concerned with the details of Bank of Canada operations, using interest rates as the dependent variable, see Fortin (1975). Fortin considered only the fixed rate period after 1962.
8. Results for the flexible rate period of the 1970s are not shown in Table A1 since the results for both equations were unsatisfactory.