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Political Competition, Convergence to Fundamentals and the Size of the Public Sector: With Application to the Study of Political Business Cycles

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Abstract

For a direct relationship between aggregate economic activity and opportunistic or partisan political events to be meaningful, there must be a transmission mechanism through actual public choices. We construct a framework in which it is assumed that political competition forces public choices to converge on an equilibrium defined only by economic fundamentals in order to consider whether public expenditure could serve as a transmission mechanism. (A quantitatively important political business cycle in real growth is also estimated, and it is reasonable to expect public expenditure to play a role in explaining this apparent stylized fact.) The general idea we implement empirically is that politics can clearly be said to influence the evolution of public choices if it can be shown to lead to departures from a dynamic path defined by the evolution of the usual economic factors alone.

Using Canadian data for a period covering almost the entire history of the modern state, we show that public expenditure cannot serve as a transmission mechanism for an observed relationship between politics and real growth in the Canadian case. Of the political factors considered, only variation in the degree of political competition leads to substantial short run departures of public expenditure from its long run path defined by economic fundamentals.

Key Words: public expenditure, size of government, long run versus short run, opportunism, partisanship, political competition, cointegration.
JEL Categories: H1, H3, H5

1. Introduction: Politics versus Economics in the Evolution of Public Choices

Many authors, including Nordhaus (1975), Hibbs (1977), Schneider and Pommerehne (1980) and Alesina, Roubini and Cohen (1997) among others have argued that the time series data of many countries are broadly consistent with the types of macroeconomic activity predicted by opportunistic or partisan political business cycle theories. Such theories go far beyond the idea that macroeconomic outcomes, resulting from allocation decisions made in both economic and political markets, reflect the underlying endowments, technology and tastes of the community. Rather, the argument is that overtly political factors, such as the timing of elections or the ideology of the party in power, independently affect the level and variation of macroeconomic aggregates such as the rate of growth of real output and the rate of inflation. Implicitly these authors argue for the centrality of distinctly political determinants of aggregate economic outcomes (Bartels and Brady, 2003).

In this paper we examine the relationship between political and economic factors by first asking whether political cycles can be found in Canadian macroeconomic data. We do so using annual data from 1870 to 2000, a period that spans almost the entire history of the modern state that began with Confederation in 1867. After finding evidence of political cycles in real output, but not for inflation, we take up the challenge posed by Bartels and Brady to make such correlations meaningful by exploring the plausible transmissions routes that could connect these political factors to economic outcomes.[1] Since a more compelling case for political factors being the cause of real macroeconomic activity can be made only if we identify a route by which such political influence was exercised, we examine in detail one plausible candidate lying behind the evolution of real output - namely, public expenditure by the central government. We investigate whether systematic variations in the (relative) size of the central government that have a political origin could have produced such observed cycles in aggregate economic activity.

To test whether politics can explain the changes in government size quantitatively required to produce the observed political cycles, we consider whether the data allow us to distinguish between two competing hypotheses: the *economic convergence* and *the nonconvergence* hypotheses. We define economic convergence as the hypothesis that political competition forces public expenditure to converge on the level dictated by endowments, tastes and technology - that is, to converge on the level determined by economic 'fundamentals' alone. In contrast, nonconvergence is taken to mean that political factors other than the degree of political competition prevent convergence to that long run level. The general idea we implement here is that opportunism and partisanship or, indeed, any kind of overtly political factor or process, can be said to play a separate or distinct role in the evolution of public choices if it can be shown to lead to departures from a dynamic path defined by the evolution of economic fundamentals in a competitive political system.[2]

To operationalize this approach, we use an error correction model to identify as nonconvergent, situations

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1. After reporting on the effects of partisan differences in the US, Bartels and Brady (p.159) write, "(o)ne might imagine economists reacting to Hibb's work by launching a major effort to understand the processes by which partisan politics shapes economic policies and performance. Unfortunately, no such effort seems to be forthcoming.." It should also be noted here that the unemployment rate is also often used in political business cycle investigations. However, in Canada the unemployment rate is available only from the 1920's onward.

2.By discussing the general issue in the context of the political business cycle literature, and by investigating government expenditure as a possible transmission mechanism, we have of course narrowed the list of economic and political factors that may be relevant.

where at least part of long run government size, or short run variations about that long run can be explained by the partisan nature of politics (which party is in power, whether the party in power had a majority or not), or by the opportunistic nature of political competition (the specific timing of events during the electoral cycle). Although nonconvergence could arise in either the long or the short run, and we test for both, our focus on cycles leads us to be concerned primarily with the short run.

While the methodology we use here may be applied to any competitive political system, Canada provides an interesting focus for our investigation. First, there are good data for a period covering the lengthy and entire economic and political history of the modern state, in which the basic nature of the majoritarian, parliamentary system at the central level has remained essentially unaltered. Second, Canada has an economy that is highly integrated with the much larger economy of United States, so that it is relatively easy to control for important variations in economic activity that must have arisen independently of domestic political events.[3]

Finally, consideration of the Canadian case is interesting because there is little consensus concerning the nature of the empirical relationships between politics and macroeconomic aggregates.[4] Winer (1986a), using quarterly data, provided some of the earliest evidence linking politics and policy by finding two way causality running between monetary growth and Gallup Poll data over the post 1970 period of flexible exchange rates, but not under fixed rates of 1962-1970.[5] More recently Reid (1998), using pooled time series, cross section data from Canada's provinces (1962-1992) found evidence of an electoral budget cycle, but not of the opportunistic timing of elections. Kneebone and McKenzie (2001), on the other hand, find evidence consistent with opportunism but not with partisanship. At the federal level, Heckelman (2002) tested for the presence of an asymmetric incumbency effect on growth between 1965 and 1996 and found evidence consistent only with a temporary symmetric effect on the level but not the rate of growth of output.

Over a slightly longer time period (1961 to 1998), Kneebone and McKenzie (1999) used a Hodrick-Prescott filter to control for longer run factors behind federal and provincial government deficits and found evidence of 'pronounced' opportunism and 'strong evidence' of partisanship at all levels of government and in all stages of the fiscal structure. This stands in strong contrast to the findings of Serletis and Afxentiou (1998) who find, using annual data for 1926 to 1994, no evidence of any regularity

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3. In so doing, we take account of the role of the exchange rate mechanism.

4. As in most developed countries, there is also a substantial history of controversy about the appropriate nature of macroeconomic policy, and about the links between policy and economic outcomes. For example, the Royal Commission on Banking and Finance (1964) considered the use of fiscal versus monetary policy as the appropriate instrument for federal stabilization policy (Reuber, 1978). And while the overwhelming Keynesian tenor of that report gave support to a post-WWII period of more intensive reliance on fiscal policy (investigated in a companion paper, Ferris and Winer 2003), the same time period witnessed the beginnings of the monetarist counter revolution by Canadian economists like Harry Johnson, Thomas Courchene and David Laidler. As a result of these debates, and the changing fortunes of different viewpoints, there is reason the believe that federal governments in Canada were encouraged to, and likely did vary the nature of macroeconomic policy, likely giving rise to a varied history of macroeconomic policy choices that provides fertile ground for the present study.

5. Winer's evidence for political cycles in monetary growth - using answers to the Gallup poll question: "if there was an election today, which party would you vote for" - is relatively weak, arising only in high frequency quarterly data under flexible exchange rates, and explaining only a small percentage of the overall variation in monetary growth.

arising between a large set of Hodrick-Prescott filtered policy target variables (output, unemployment) and a large set of similarly filtered government policy instruments (such as government consumption and government investment).[6]

Our contributions to the ongoing debate, in Canada and elsewhere, are twofold: First we look for evidence of a transmission mechanism using error-correction methodology to implement the convergence hypothesis as a base from which to test for the role of overtly political factors in the evolution of public choices (Engel and Granger 1987, Johansen 1991).[7] Because the approach requires explicit modeling of the long run process governing public expenditure, it has the added virtue that it permits us to improve upon the current use of Hodrick-Prescott filtered residuals to test hypotheses about the shorter run on which the political business cycle literature focuses. The longer run time path of public choices may be highly volatile if the economic environment is, and for this reason alone, a simple deterministic method of detrending may hide as much as it reveals (see for example, Canova, 1998). Moreover, implementation of a dynamic model permits us to deal with possible interconnections between economic fundamentals in the longer run and political factors that play a role over shorter horizons, interconnections which may arise because of intertemporal optimization by voters and by political parties[8];

A second contribution, one that arises as a complement to the implementation of the convergence hypothesis, is that we empirically investigate the role of political competition. Competition underlies public choices in democratic societies, yet it has not been explicitly and empirically studied in the present context.

We begin our analysis in the next section by presenting an overview of real growth, inflation and government size in Canada since 1870. At the same time, it is convenient to present the economic variables used to implement the convergence model of government expenditure. This is followed in section three by a discussion of opportunistic and partisan political cycle hypotheses, the data that is suggested by this literature, and our test for whether the Canadian data is consistent with the presence of traditionally defined political cycles in real growth or the rate of inflation.

After finding evidence of a quantitatively important political cycle in real growth, but not in inflation, we turn in section four to a discussion of the methodology used to consider whether government size could have served as the mechanism to generate the observed results. Section five examines the evidence for a *long run* relationship between politics and the relative size of federal non-interest government

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6. Further discussion of the political business cycle literature in general is provided below.

7. We extensively use the Engle-Granger rather than Johansen approach to estimating an error-correction model that implements the convergence hypothesis, and to test for departures from this. We are interested in the long run equilibrium relationship running ***to*** government size ***from*** income per capita and a set of other exogenous determinants. In the present context, there is less interest in the structure of the cointegrating relationships running among the variables we used to explain government size. However, we also apply the Johansen methodology to consider the robustness of our results and as a complement to the Engel-Granger approach.

8.Haynes and Stone (1990) have empirically identified the interconnection between short and long runs (in the United States) as issue that needs to be addressed when considering political business cycles. We agree in principle: rational political agents will always plan on carrying out programs that extend over time, at least because political competition forces them to listen to voters who optimize over time. Political parties may help to insure that such plans last well beyond the current electoral period.

expenditure including the role of political competition, and section six complements this investigation by testing for nonconvergence - that is, for the presence of political variables reflecting opportunism and partisanship in the short run adjustment process. A concluding section summarizes our main results. Data sources are presented in an Appendix.

2. An Overview of Canadian Macroeconomic History and the Long Run Economic Model of Government Size

Figures 1 and 2 present the dependent variables used in the various stages of our investigation. Annual series for real growth and inflation in Canada since 1870 are presented in Figure 1. Real growth (GROWTH) is measured as the rate of growth rate of real Gross National Product (GNP) and inflation (INFLATION) as the rate of change of the GNP deflator. The figure shows that both series exhibit somewhat more variability before 1945 than after, and that the correlation between growth and inflation has changed with the decades.[9]

[Figures 1 and 2 here]

When assessing whether political factors can explain these measures, as we do in section three, it is important as we implied earlier to account for the fact that much of the variation in output and inflation will arise in the United States, Canada's major trading partner, for reasons that are clearly exogenous to domestic Canadian electoral politics. For this reason, USGROWTH, the rate of growth of the U.S. Index of Industrial Production, and USINFLATION, the rate of growth of the U.S. GDP price deflator, are used as exogenous factors to control for important forces shaping the Canadian economy and polity.

Figure 2 presents the dependent variable for our examination in section four of whether federal government expenditure could serve as a transmission mechanism for the direct relationship between output and politics that we present in section three. Here central government size is measured by total federal non-interest expenditure net of intergovernmental grants as a fraction of GNP (GSIZE). By netting out equalization payments and other grants to the provinces (labeled GRANTS) from federal expenditures, we control for changes in total federal spending that arise as a result of federal-provincial bargaining and the fact that the federal government has a greater capacity to levy taxation on mobile factors than do lower levels of government. The difference this makes to our measure of federal government size is shown as the smaller of the two lines in Figure 2. In proportional terms, intergovernmental grants were most important in the period from the great depression until WWII and in the period following 1950.

As Figure 2 illustrates, Canada's central government has grown in size more or less constantly over the entire 1870 -2000 time period. Only since 1992 has there been some sign that this upward trend may be ending. What is perhaps most striking is the dramatic effect of the two world wars. In WWII, for example, the federal government grew from less than ten percent of GNP in 1939 to almost fifty percent by 1944, and then reversed most but not all of that gain by 1949. Figure 2 also suggests the existence of a

9. The standard deviation of the inflation rate falls from 5.24 over the 1870 to 1938 time period to 3.26 between 1945 and 2000. Over the same periods, the standard deviation of the growth rate falls from 6.17 to 2.73. The correlation coefficient for inflation and real growth over the whole sample period is 0.127.

displacement effect (Peacock and Wiseman 1961); that is, that the country reacted to the large scale temporary spending increase during WWII with an upward ratchetting of government size afterwards. To allow for a displacement in public expenditure, we include a dummy variable for the post WWII time period (WWIIAftermath) to test for a discrete jump in the constant of the cointegrating relationship we use to describe the long run evolution of the public sector, in addition to the dummy variables used to control for the temporary breaks arising during the two world wars.[10]

Concerning the history of public expenditure in Figure 2 one should also note the appearance of increasing variance after the second world war as well as a shift in mean. To allow for the rise in variance, we model the logarithm of government size (and other variables) in empirical work. The log of GSIZE (denoted LNGSIZE in Table 1a) has a standard deviation that is roughly constant across our two subperiods - 0.336 over 1870 - 1939 and 0.328 from 1939 to 2001.[11]

To capture the economic determinants of government size over the long run that form the basis for implementation of the convergence hypothesis, a set of variables is needed that both span the long time period covered (1870-2000) and reflect the deeper structure of the Canadian economy. The variables chosen are standard in the literature and have been widely used in other studies.[12] The starting point is almost always Wagner's Law, the hypothesis that the size and scope of government increases more than in proportion as society grows in scale and complexity. This is usually interpreted as implying an elasticity of real per capita income (RYPC) with respect to size that is positive.

Wagner's Law is then enhanced by a set of hypotheses that suggest that the fraction of the population in agriculture (AGRIC) and the fraction of younger people (YOUNG) proxy changes in the structure of the economy and/or the strength of interest groups: as AGRIC declines and urbanization increases and as YOUNG declines and the percentage of older citizens grows, we should expect greater demands for government services.[13]. To capture other structural features that may promote more (or less) government involvement, we shall use immigration rates (IMRATIO) and the openness of the economy through its reliance on foreign trade (OPEN).[14]

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10. See Legrenzi (2004) for cross country evidence on the displacement effect and a recent test for Italy.

11. Any remaining heteroscedasticity in the error term (of LNGSIZE equations) is accounted for by using White standard errors.

12. See, for example, Kau and Rubin (1981), Borcherding (1985), Mueller (1989), Ferris and West (1996) and Borcherding, Ferris and Garzoni (2004).

13.The use of these variables and not their complement - the degree of urbanization and the percent of population that is older than 65 years, is dictated by the availability of data for the entire time period we study.

14. Immigration plays a major role in Canadian history, especially before WWI and in the decade or so after WWII. The use of OPEN follows Cameron (1978), Rodrik (1998) and others. One hypothesis is that more openness leads to more government as a form of insurance against external shocks. A competing view is that openness restrains government growth by imposing balance of payments and other external constraints. We shall see that this later view is more likely to apply in the Canadian case. One should also note that population is often used to test for scale economies in government size. Often scale economies are not found (see, Borcherding, Ferris and Garzoni, 2004) and, in Canada, the population time series is of a different order of integration than the other variables, i.e., I(2). For this reason, population size was not used as part of the convergence model. Finally, we note that in preliminary work we used the share of transfers in total federal spending (LNGRANT_SHARE) as an additional explanatory variable. Although consistently negative in its effect on federal government size (and significantly so), its presence was never

Then because GSIZE and some of the explanatory variables (IMRATIO, AGRIC, YOUNG, and OPEN) are all confined to lie between zero and one, we transform these variables into logarithms (adopting the prefix LN), in order to avoid restrictions on the domain of the error terms in our estimating equations.

Descriptive statistics for these logged variables are presented in Table 1a where it is noted that LNGSIZE and the entire set of explanatory variables for the long run economic model of public sector size are nonstationary in levels but stationary in first differences or I(1).[15] Political factors used to test the nonconvergence hypothesis are introduced in the next section.

3. Are there Political Cycles in Annual Canadian Macroeconomic Data?

In this section we outline testable hypotheses that arise from the opportunistic and partisan theories of political cycles for the growth rates of aggregate real output and inflation.[16] This is followed by the results of our test of these hypotheses for Canada.

Traditional opportunistic political theories argue that incumbent political parties use their control over government to gain votes opportunistically by increasing aggregate demand in the periods immediately prior to each election (Nordhaus,1975). This is independent of the ideology of the party in power and is observable through faster rates of real growth and/or higher inflation rates in the period leading into each election. Rational opportunistic theories, on the other hand, rely on the Lucas critique to argue that government spending would need to be unanticipated to affect aggregate demand.[17] Hence rational opportunistic theories suggest that there will not be a pre-election boom. To test whether the data are consistent with traditional (or rational) opportunism, we look for a positive (zero) effect of ELECTIONYEAR lagged on either GROWTH or INFLATION.[18] Descriptive statistics for this opportunistic variable and for the other political factors discussed below are found in Table 1b. All of these variables are stationary in levels.

Partisan political theories, following Hibbs (1977) and others, suggest that the major political party on the left - in Canada, the Liberal Party (indicated by the one-zero dummy variable LIBERAL) - spends

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consistent with cointegration.

15. All unit root tests used four lags.

16. See Alesina, Roubini, and Cohen (particularly pages 36 and 62) for a convenient summary. Haynes and Stone (1990) suggest that the two sets of hypotheses may be nonseparable, where interdependence can be tested for with interaction terms. However, our experimentation produced no instances where such interaction was significant in our data. The second issue pointed to by Haynes and Stone - that political cycles may persist over time - is allowed for here and below via the error-correction methodology as we have pointed out above.

17. Such arguments abstract from any effects that might arise from government redistribution from lower spending to higher spending groups.

18. Because the data is annual and most elections take place mid-year, it is not clear that the hypothesized boost to aggregate demand will arise in the previous rather than the current year (i.e., in the January - August period for a September election). Hence all equations were rerun with ELECTIONYEAR. This typically resulted in only small differences. See, however, footnote seventeen below.

more when in power than their more Conservative alternative (1- LIBERAL). Hence the test for traditional partisanship is a positive sign on the coefficient for LIBERAL. Once again, however, any predictable policy will be anticipated by rational individuals and hence incorporated into their behavior, so that rational partisan political theories refine the hypothesis by arguing that only as long as the electoral outcome is uncertain can the realization of a more liberal political party victory generate (unexpected) boosts to aggregate output or inflation (Alesina, 1987). The size of that effect will then depend upon (a) the degree of surprise in the election result; and (b) the passage of time since the last election, as the electoral outcome is incorporated into individual's expectations.

To test the rational partisanship hypothesis we must account for both the degree of surprise in the election result and the ideology of the party winning political power. We assume that the degree of surprise in an election will be inversely related to the ex-post size of the winning majority, on the grounds that large ex-post majorities are likely to have been foreshadowed during the pre-election period, and we measure surprise as one minus the fraction of seats won by the governing party, (1-SEATS). The direction of the surprise may be incorporated by a dummy variable distinguishing party type in power using the indicator LIBERAL.[19] Finally, we shall modify our measure of surprise to account for times when parliament was controlled by a minority government and hence for those periods when political behavior might be anomalous.[20] Using the dummy variable MINORITY to control for these time periods, the result of these considerations is the composite variable SURPRISE, defined as:

$$\text{SURPRISE} = (1\text{-MINORITY})\{(1\text{-SEATS})*\text{LIBERAL} - (1\text{-SEATS})*(1\text{- LIBERAL}). \qquad (1)$$

The prediction of rational partisan theory is that the coefficient on SURPRISE will be positive.[21]

The duration hypothesis of rational partisan political theory is tested through the sign of the coefficient of the composite variable

$$\text{DURATION} = \{(\text{LIBERAL}*\text{ELAPSE}) - (1\text{- LIBERAL})*\text{ELAPSE}\}, \qquad (2)$$

where ELAPSE is the time (in years) since the last election. Since the size of the stimulative (contractive) effect generated by the election of a Liberal (not Liberal) government is expected to dissipate as time in power elapses, the coefficient of DURATION should have a negative sign.

Lastly, before we attribute explanatory power to the political variables, it is necessary to control for more

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19. We do not test whether the size of the surprise is viewed as biased against the incumbent governing party. See Heckelman (2002) who argues that the Canadian data (1965-1996) is more consistent with symmetry across parties.

20. Kontopolous and Perotti (1999) and Persson, Roland and Tabellini (2004), for example, use a common-pooling argument to motivate higher than normal spending for coalition governments. Subsequent results confirm the wisdom of treaty minority governments as a distinct case. Using Beck and Campbell to define minority government, minority governments existed in Canada in the following periods: 1872-73, 1921-25, 1957, 1962-67, 1972-73, and 1979. Using the Canadian Parliamentary Guide, minorities existed in 1872-73, 1921-29, 1957, 1962-67, 1972-73, and 1979,

21. The composite variable SURPRISE is I(0) with and an ADF statistic of - 3.43. This is almost significant at 1% (the one percent MacKinnon critical value is -3.48).

traditional reasons for variation in GROWTH and INFLATION in Canada. As noted earlier, we are fortunate in being able to use the small open economy nature of the Canadian economy and its close integration with the US economy to adopt USGROWTH and USINFLATION as controls.

The resulting evidence for political cycles in Canada's annual macroeconomic data is presented in the OLS regression equations reported in Tables 2 and 3. Here all equations were run using two alternative measures of the political data described above (the results are labeled as columns A and B). Different interpretations of the size of the winning majority arise in Canada, especially for the first half of the 20th century, because closely associated, nominally independent candidates often run unopposed by the candidates of the winning political party and, once elected, these members tend to vote with the winning party. Hence judging whether or not they form part of the winning coalition is problematic.[22] In both Tables 2 and 3 the first set of columns follow one convention (Beck and Campbell) based on judgements about which coalitions were durable, while the second set of columns follow the Canadian Parliamentary Guide in using official party titles to measure the number of seats won by any officially designated political party. Within each, the first column represents our findings for the entire 1870-2000 time period, while the second represents the 1921-2000 subperiod over which the data are somewhat easier to collect.

[Tables 2 and 3 here]

One should note here that the equations were also run over the 1945 to 2000 time period with no appreciable change in results (not shown), indicating that there is no suggestion in either Table 2 or 3 that political cycles are more prevalent now than they were before the Second World War. Other variations (also not shown), including adding a second lag on US growth in Table 2, a first lag on US inflation in Table 3 and also using Newey-West HAC errors to deal with autocorrelation instead of the White correction for heteroscedasticity reported in the tables leave all conclusions unaffected. Moreover, use of a dummy variable for the periods of fixed exchange rates in Canada - 1870-1914, 1926-1931, 1939-1951, 1960-1972 – did not improve the fit nor was itself significant.

The results in Table 2 illustrate that despite the importance of economic factors in explaining the growth rate of Canadian output, as reflected in the significance of USGROWTH and its lag, the set of political variables do assist in explaining real growth. A Wald test rejects the hypothesis that the political variables as a group are jointly insignificant (at five percent or better) in three of the four cases, and SURPRISE is clearly significant in all formulations. By inspection it can also be seen that the different definitions of the size of the winning majority and minority status result in little difference in practice, with the two equations generating virtually identical regression coefficients and t statistics. On the other hand, Table 3 indicates that the political variables reflecting opportunism and partisanship have much less success in explaining the rate of inflation. The control variable for U.S. economic influence, USINFLATION, is highly significant, and is responsible for virtually all of the equation's overall explanatory power, and none of the designated political variables matter.[23] Even though each coefficient on the political variables

22. For example, in the election of 1872 where the Conservative party was elected with a minority of 99 Conservatives out of 200 seats as determined by the Canadian Parliamentary guide, Beck considers the outcome as a Conservative majority of 99 plus three Independent Conservatives plus one independent for 103 out of 200 seats.

23. For further evidence confirming this aspect of the results, see Winer (1986b).

has its expected sign, none of the coefficients, individually or as a group, are significant.[24]

Overall, then, Canada's macroeconomic data is consistent with the hypothesis of a political cycle in annual real growth over the 1870 to 2000 time period, but gives only very limited support to the hypothesis that the inflation rate exhibits a political cycle.[25]

We turn next to the question of which political cycle hypotheses are consistent with real growth in output. First, the hypothesis that opportunistic pre-election spending results in a significantly positive effect on output growth is not supported by the data. Even though all four ELECTIONYEAR(-1) coefficients have their expected positive sign, all are insignificantly different from zero. In this sense, the data is more consistent with the non-significance implied by rational opportunistic theory, according to which any predictable pre-election behavior would be anticipated by individuals and the market so that its effect on behavior and output would be negligible.

The surprise hypothesis predicted by rational partisan theory is broadly consistent with the data. The coefficient on the composite variable, SURPRISE, is positive in all equations and is significantly different from zero at five percent in two of the four equations (and at ten percent in the remaining two). Narrow LIBERAL victories are associated with larger increases in the output growth, while narrow Conservative victories correspond to periods with larger fall offs in the rate of output growth. Lastly, the political tenure hypothesis - that the effect of a partisan victory wears off through time - is suggested but not confirmed by the data. In three of the equations the predicted negative sign appears, but in all cases the coefficients are insignificantly different from zero. In summary, whether or not the data reject the hypothesis that political variables produce cycles in the inflation rate, our results are clearly consistent with the hypothesis that there is a political cycle in annual real output growth rates.

To assess the importance as opposed to the significance of the surprise effect, we ask what would be the predicted effect on the growth rate of a relative surprising Liberal (Conservative) election victory? Using as an example the narrow Liberal victory of 1926 (registering a surprise value of 0.480), we take the difference between that surprise and mean SURPRISE and then multiply the result by the coefficient estimate in Table 2 (either column (1) or (2)). The calculation indicates that real growth would have been 1.14 percentage points higher than its mean of 3.69% over the entire period.[26] That is, our results suggest that the surprise Liberal victory in 1926 added roughly a third to average annual growth rate over the period studied, a large number. On the same basis, the relatively surprising conservative victory in 1980 (a -0.479 surprise) produced a growth rate that was 1.43 percentage points lower than average. In either direction, the results indicate that a close election could affect the expected growth rate by as much as a third.

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24. Use of the election year, rather than the year prior to an election, did produce a significantly positive coefficient in the inflation equation (for 1921-2000) and hence did give some support to traditional opportunism. Such improvement, however, did not spill over into producing similarly better results for the other two hypotheses.

25. Use of a dummy variable for the periods of fixed exchange rates in Canada - 1870-1914, 1926-1931, 1939-1951, 1960-1972 – did not improve the fit nor was itself significant. This is consistent with Winer (1986a) who found weak evidence for political cycles only in the higher frequency (quarterly) monetary data of the post 1972 period of exchange rate flexibility.

26. Other elections with similar sized 'surprises', as defined here, were the 1976 and 1981 Liberal victories.

The relative strength of the relationship between political events and real output growth suggests that the search for a transmission mechanism in public choices might well begin with fiscal rather than monetary policy. For this reason we proceed to examine in detail whether opportunism or partisanship play a role in explaining non-interest spending by Canada's central government. If we find at least some of these variables to be significant, we can then ask whether observed changes in these factors are consistent with the observed cyclical effects on real growth. Both the presence of a transmission mechanism and the consistent use of that mechanism are needed to support the joint hypothesis of a political cause for observed political cycles in macroeconomic aggregates.

4. Methodology for the Study of the Role of Politics in Explaining Government Size

The transmission of partisan and political opportunism through government size requires that overtly political factors help to explain the evolution of public expenditure. We begin our investigation of this issue by implementing the convergence hypothesis - that government size depends only on variables that reflect underlying endowments, tastes and technology.

It is important to note that under the convergence hypothesis politics do matter, though not as implied by the usual partisan or opportunistic theories. Under convergence, political competition is assumed to force governing parties to provide, in the long run, the level of spending demanded by the community, regardless of the particular state or timing of the political system concerning who is in power or the point in the electoral cycle. For this reason, it is necessary to control for the degree of political competition when implementing the convergence model.

We use the size of the wining majority in each election, SEATS, to measure the degree of political competition, as is often done in the literature (see for example Remmer and Wibbels 2000, and Levitt and Poterba 1999), assuming that the ex post outcome is correlated with the ex ante degree of party competition.[27] The coefficient on SEATS, which is inversely related to the degree of competition, provides a test of the hypothesis that more competition drives government size to converge on the size indicated by the tastes and preferences of the community. Since the absence of competition, or of political balance (using Remmer and Wibbel's view, p.423), will provide more scope for rent dissipation and the satisfaction of special interests through unwanted increases in real government size, we expect that the coefficient on SEATS to be positive if the degree of political competition matters in the convergence process. In general, greater competition among parties can be expected to lead government size to conform more closely to the wishes of the community (see for example Stigler 1972 and Becker, 1983) and from this more general viewpoint, any significantly non-zero coefficient on SEATS indicates the importance of competition in the evolution of the public policy process.

To implement the convergence hypothesis, we first investigate whether or not the set of variables introduced earlier that represent the economic determinants of government size in the long run, as well as SEATS, are in fact the basis for a stable long run explanation of relative government size. As we have

27. It should be noted that SEATS is also used in the construction of SURPRISE, so that the issue of correlation between these variables arises. It proves not to be a problem: the two variables are almost orthogonal. The simple correlation is -0.07 over the entire sample period 1870-2000 and -.06 over the period 1921-2000.

seen, these structural variables are nonstationary in their levels, with the exception of SEATS which is I(0), so that any regression using these variables to explain GSIZE could be spurious. Nevertheless, if the residuals of the estimated equation in levels are stationary, we can interpret the result as evidence of a long run equilibrium relationship linking these variables with government size (Engle and Granger, 1987).

Given that a stationary long run relationship can be found, the residuals from this estimated relationship can be used as the error term in an error correction model of short run adjustment about the long run equilibrium. The cointegrating equation and this error correction model together implement the convergence hypothesis, in which tastes and technology alone along with the degree of competition explain both the longer run and shorter run adjustments of government size.[28]

It follows that if the addition of a set of overtly political variables in this framework results in an expanded relationship that is cointegrated, we can conclude that political variables associated with opportunism and/or partisanship do indeed form part of the explanation of government size. This would be convincing evidence of "nonconvergence".

5. Cointegration and the Long Run Model of Government Size

The convergence or base case model of long run economic convergence and government size is presented in the first two columns of Table 4. The estimated relationship allows for several shifts in the intercept of the cointegrating equation: first, during both world wars; second, in the time period following the end of WWII; and, finally, for periods when the exchange rate was fixed versus flexible. We introduce the exchange regime to allow for different propensities to use fiscal policy because of the fact that (in the well known Mundell-Fleming class of open economy models), fiscal policy is a more potent policy instrument in a fixed than in a flexible rate regime.

[Table 4 here]

The first column in the table presents the cointegrating equation over the entire 1870-2000 time period and the second column repeats the same OLS estimation over the shorter period from 1921 for which, in some cases, the data are better. In both cases, the ADF test statistic on the equation residuals falls well inside the modified MacKinnon (1996) critical value for a cointegrating equation with six explanatory I(1) variables.[29] Moreover, a quick glance across the rows indicates a remarkable degree of consistency in the sign and size of the coefficient estimates.[30] As expected, government size is significantly larger in the two world wars and, consistent with the Peacock Wiseman displacement hypothesis, appears to be

28. We recall here footnote 5 concerning our reliance on the Engel-Granger approach. Results using the Johansen approach to cointegration are also provided below.

29. As far as we are aware, there are no tables of critical values for cointegration relationships with structural breaks occurring at known break points. Gregory and Hanson (1996), for example, give approximate critical values for the ADF test of a Engle-Granger type cointegration equation with a single structural break arising at an *unknown* points. Hence despite the relative high (absolute) values on the ADF statistics of our cointegration residuals, the implied significance may well be overstated.

30. The exception is the coefficient of LNYOUNG whose large standard error implies that all are insignificantly different from zero. See the Saikkonen results in Table 5.

significantly larger in WWII's aftermath. Perhaps somewhat surprisingly, our results suggest that government size was consistently larger in periods when the exchange rate was flexible rather than fixed.[31]

Caution is required in judging significance of the estimates. While the base case equations in columns (1) and (2) are consistent with the hypothesis of a long-run equilibrium relationship among the variables (with known structural shifts in the intercept), it is likely that the innovations among the I(1) variables in the equation are correlated. This implies that the standard errors of the coefficients will be inconsistent. To discuss the significance of the individual coefficients, we follow Saikkonen (1991) and adjust the equations and their standard errors. [This is done in Table 5 below]. Nevertheless, because the OLS coefficient estimates are themselves super consistent, we can still utilize the equation as a whole as a reliable indicator of whether cointegration exists. And on this basis, equations (1) and (2) do indicate that a cointegrating relationship can be found among the key economic variables suggested by the large literature on growth of government.

The next step is to determine whether any of the overt political variables form part of this cointegrating relationship, including of course the degree of political competition. Because the political variables used to test for cycles in growth rates are all I(0), it seems unlikely that any of them would contribute to an explanation of long run government size modelled, as above, through a collection of mainly I(1) economic variables.[32] Hence we expect that if political variables are significant in explaining government size, evidence of this relationship will more likely be revealed by the error correction equation than by the long run cointegrating equation.

Nonetheless, we consider how the political factors in Table 1b would be expected to affect size in the long run. To do so, we must recognize that by changing from a test of the effect of politics on output to a test of the effect of politics on government size, there a change in perspective is required. In particular, unlike the test of the rational partisanship hypothesis, where surprise spending is important, *surprise is not needed for a partisanship effect on government size*. For government size to be a mechanism by which output is affected through political surprise, the change in size must simply be present in order for the additional effect of size on output to have been possible. In this sense, the test for the effect of political factors on government size is more straightforward than is the test for politics on growth, a point that to our knowledge has not been recognized in the literature.

Similarly, it follows that all fiscal opportunism theories, whether traditional or rational, require only that government size increase in the period leading into an election.[33] Thus the coefficient of

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31. This seems surprising only in the sense that Mundell-Fleming reasoning suggests that fiscal policy should be more effective in altering aggregate demand under fixed exchange rates. However if variations in size are more effective, then larger changes in size are not needed to counter effective demand failures. Moreover, a flexible rate may to some extent free the government from the balance of payments constraint on policy choices generally.

32. Note that the I(0) political variables can be incorporated into the regression equation because of the I(0) property of the cointegrating vector.

33. The theories of asymmetric information that suggest that opportunism cannot be effective in the long run also imply that such "unnecessary" spending will be embodied in the equilibrium. That is, if incumbent parties do not spend (as expected) before an election, then aggregate demand will be affected adversely with resulting party losses. Asymmetric information then traps both political parties and the electorate into an equilibrium that is second best (compared to a world where such inefficiencies could be eliminated costlessly).

ELECTIONYEAR(-1) should be positive in relation to government size.[34] Similarly, partisan theories require LIBERAL victories to result in greater spending hence produce larger government size (compared to the alternative). Moreover, should partisan effects arise, any diminution (or expansion) of that form of partisan effect over the tenure of governments would depend on the type of party elected. This we test for through the composite DURATION variable introduced previously.

Our earlier test for surprise was based on reasoning that government behavior might be anomalous during periods of minority government, and this we now test for explicitly. Minority governments are expected to resolve potential defections by spending more due to common pool problems (Kontopolous and Perotti 1999; Persson, Roland and Tabellini 2004), resulting in a coefficient on MINORITY that is expected to be positive with respect to government size. Finally, we include SEATS, the measure of political competition, as part of the convergence model. A positive coefficient here will indicate that a reduction in the degree of competition results in the party with more "market power" spending more, independently of partisan affiliation.

Columns (3) and (4) in Table 4 present the final stage of our iterative search for cointegration among the enhanced set of economic and political variables.[35] This search procedure started by adding all political variables used in the test for a political business cycle to the base case equations of columns (1) and (2), as well as our measure of the degree of political competition SEATS. The inability to find evidence of cointegration among this set then led us to eliminate the least significant variable and retest. We continued in this manner until all the political variables but SEATS were eliminated and the models in columns (3) and (4) were isolated.

Perhaps the most interesting aspect of the results is what is missing from the table. The results indicate that the political variables representing the timing of electoral events and/or the binary switching of power between partisan opposites do not enter the cointegrating equation. Only SEATS, the measure of political competition, remains significant. In part, such results might have been expected on the basis of the differences in the order of integration in the two sets of variables. One might expect that if political variables are significant in explaining government size, evidence of this relationship will more likely be revealed by the error correction equation than by the long run cointegrating equation. Nevertheless, our measure of political competition does explain at least part of the variance in the cointegrating equation in the longer run suggesting that political competition plays a role in convergence to economic 'fundamentals'.

5.1 Further results concerning SEATS and the degree of political competition

Since the role of political competition is not usually investigated in empirical studies of government size,

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34. Note that because the instrument must be affected ahead of the expected policy result, changes in government spending must precede the desired change in output. This implies ELECTIONYEAR(-1) and perhaps even ELECTIONYEAR(-2) would be more appropriate that ELECTIONYEAR itself. Experimentation with all these forms produced no appreciable difference.

35. In the tests we follow the Beck/Campbell/Parliamentary Guide (definition A) measure of the of winning majorities and whether there was a minority government. The tests were rerun for competing definition B, based on the Canadian Parliamentary Guide exclusively throughout, with no appreciable change in results.

it seems wise to investigate the robustness of our results in this respect. In the first place, it might be argued that the alternative indicator of the degree of competition - (0.5-SEATS) - more directly reflects the idea that any departure from a 'balanced' situation indicates a lessening of competition. But this reformulation does not appreciably alter the results in Table 4.

Second, since SEATS is based on the *results* of elections it seems wise to consider the possibility that it is endogenous in the present context. One should note that SEATS is the size of the winning majority independent of party type. Hence while we might hypothesize that a larger sized government would increase the size of the incumbent's majority or the winning majority of the more liberal party, we have no particular reason to believe that causality would run from government size to larger electoral majorities independent of incumbency and/or party type. Moreover, from a cointegration perspective, even if SEATS is endogenous the estimation in Table 4 remains valid, although it is then no longer clear that causality runs only *from* the degree of competition *to* government size.

Nonetheless, we proceed with a Hausman test for the endogeneity of SEATS, using U.S. growth and U.S. inflation and lagged SEATS as instruments. This test indicates that SEATS is exogenous, although the hypothesis of endogeneity just fails at the 10 percent level.[36] Continuing to allow for the possible endogeneity of SEATS, we consider hat happens when one replaces it with its lag, that is, with the share of seats in the legislature won by the governing party in the *previous* election, which is predetermined. In that case, it turns out that the results in Table 4 again remain essentially unaffected, with the coefficient on SEATS lagged in column (3) of the table then being equal to 0.72 with a t- statistic of 1.93.[37]

A cointegration analysis using the Johansen methodology in which the potential endogeneity of SEATS is allowed for by including it in the cointegrating relation along with economic fundamentals is provided in section 6 below.

5.2 Saikkonen's adjustment and the long run convergence model

From the broader perspective of analyzing cyclical policy, the primary role of this section has been to find the long run cointegrating relationship on which we can base our error correction model of dynamic short run adjustment. In moving forward, we take the residuals from equations (1) and (3) as the basis for the error correction terms to be used in the convergent and nonconvergent versions of our model of short run adjustment.

Before we turn to this error-correction formulation, to complete our long run analysis we present in Table 5 the Saikkonen (1991) adjustment for serial correlation among the error terms of the set of I(1) variables in the cointegrating equation. Such correlations make the coefficient standard errors inconsistent and overstate the size of the t-statistics that arise under OLS estimation. As shown in Table 5, even though

36. The complete set of exogenous variables used in the first stage of the test includes all of the variable sin Table 4 except for LNRYPC, and includes USGROWTH and its lag and USINFLATION and its lag, as well as SEATS lagged. Adding another lag of the last three variables clearly leads to rejection of the endogeneity of SEATS at 10 percent

37. This result is based on the use of Newey-West HAC standard errors.

this proved to be the case, all of the individual hypotheses generally retain their degree of significance and algebraic sign after Saikkonen's adjustments are performed. Hence our results suggest that Wagner's Law holds for Canada in the long run, that structural variables such as the share of agriculture in final output, demographics, immigration rates and the degree of openness do assist in explaining government size over the longer run.[38]

[Table 5 here]

In addition, while openness continues to matters, it does so in a way that is opposite to that suggested by Rodrik (1998) and Cameron (1978). In Canada, greater trade openness is associated with a smaller rather than larger sized government, perhaps because openness erodes the power of special interests and this effect dominates any increased need for social assistance to deal with greater insecurity. This result is consistent with the negative effect of fixed exchange rates on GSIZE in Table 5 if we interpret the latter result as stemming from the tighter balance of payments constraints of a fixed rate regime.[39] Finally, and of particular interest, SEATS retains its significance after the Saikkonen adjustment, indicating the importance of political competition for convergence.

6. Error Correction Models of Government Size

While one might be surprised if the timing and/or partisan nature of political events mattered for the long run size of government, it would be much less surprising to find that political factors do matter in relation to short run cyclical variation about that long run size. Indeed, the power of partisan and opportunistic political theories is their implicit reliance on the strategic use of transitory spending to influence individual behavior and aggregate output over shorter horizons.

To test for the presence of political factors in the adjustment process we use the error correction models presented in Tables 6a, 6b and 6c.[40] Table 6a presents equations that make use of current value of first differences in formulating the error correction model in the Engle-Granger tradition, Table 6b uses the Engle-Granger approach with lagged values of first differences, and Table 6c reports the results of an error correction analysis of the Johansen type when SEATS is included in the cointegrating or long run equations. All of these variations lead to the same general conclusion - that only political competition matters in addition to economic ' fundamentals', and that the overt political factors used in Tables 2 and 3 do not play a significant role.

In columns (1) and (2) of Table 6a are found the two error correction models that correspond to our base case, economic convergence hypothesis presented in Table 4. To explain the choice of variables appearing in the table, we follow the methodology of incorporating the current value first differences of all the

38. LNYOUNG was consistently the weakest within our set of potential explanatory variables,.

39. We also note that as in Table 4, the size of Canada's central government is significantly larger during the world wars, and does appear to have been displaced upwards in the time period following WWII. Our work also provides little evidence for the existence of an upward shift in government size following WWI, as argued by Dudley and Witt (2004).

40. Once again the rerunning of the equations using only the Canadian Parliamentary guide definitions of MINORITY and SEATS led to no significant change in our findings.

potential economic and public choice variables (as described in Section 2 and used in Section 5) together with dummy variables allowing for potential breaks at the time intervals associated with breaks in the long run. In addition, we included a dummy variable for periods when the exchange rate was fixed (the exchange regime may influence the choice of fiscal policy instrument in the shorter run), and we also include changes in the scale of federal transfer payments to other levels of government a share of non-interest federal spending net of grants, D(LNGRANT_SHARE). The latter variable allows for the possibility that in the short run, changes in the size of federal transfers to provincial and local governments could speed up or hold back competing federal programs, and so influence the ability of the federal government to exercise spending discretion in relation to the cycle.

[Table 6a here]

With this enhanced set of variables, the error correction equation was run and variables that were insignificant were dropped successively until the variables remaining were significantly different from zero in at least one version in one time period. The result is the base case error correction model in columns (1) and (2), where these relationships explain between fifty and sixty percent of the short run variation in government size over the 1870-2000 and 1921- 2000 time periods respectively.[41] The coefficient estimates are broadly similar across the two equations, and in each of the equations the error correction term was negative as expected (for convergence to the long run to occur) and significantly different from zero. The estimated size of the error correction coefficient implies that deviations from long run size are corrected over a time period of about five years.

In our error correction models in Table 6a, the only time period dummy previously employed that remains significant is the one for WWII. This is consistent with the displacement effect found in the long run cointegration model presented earlier. In addition, although changes in government size show no significant response to periods of fixed exchange rates, the change in the estimated coefficient sign from negative (in the long run model) to positive does hint at the possibility that government size was adjusted more often in response to transitory economic events in periods of fixed (rather than flexible) exchange rates. Finally, anticipating our later results (as presented in columns (3) and (4)) of Table 6a, greater reliance on fiscal policy is indicated somewhat more strongly in the political version of the error correction model.

In terms of its economic meaning, one of the most interesting features of the error correction model is that the coefficient estimate on the contemporaneous change in income is significantly negative in all equations and hence opposite in sign to the long run coefficient estimates found in Tables 4 and 5. This provides strong evidence of a counter cyclical role for government size in the short run. Hence while the data is consistent both with Keynesian counter cyclical fiscal policy in the short run and Wagner's Law over the long run, the two hypotheses do imply opposing relationships over different horizons that might easily become co-mingled in different tests that do not distinguish longer and shorter run effects. As might be expected with respect to our other hypotheses, structural features of the economy which matter in the longer run show up here in varying degrees of importance.

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41. When the equations were rerun over the 1945 to 2000 time period, the error correction term became insignificant, suggesting that short run adjustment was distinctly different in the later time period. For an interpretation of what was happening in the post WWII time period, see Ferris and Winer, 2003.

Another notable feature of all our error correction equations in Table 6a is that increases in the share of intergovernmental transfers (out of federal spending) are associated with declines in federal government size. Our guess is that these changes reflect the political strength of the federal government versus the provinces, and so capture the negative effect of greater intergovernmental competition on federal government size. While our explanation for this effect is somewhat ad hoc, the results consistently suggest an effect that is both substantive and pervasive. It is significantly negative in every form of the test run, and in subsequent estimation using different approaches.

The final step is to test for the significance of politics on short run variations in size by adding the set of political variables to the model, using the same general to specific methodology as before to test down to reveal significant political variables. The remaining two columns of Table 6a present these nonconvergence hypothesis results for the 1870 - 2000 and 1921 - 2000 time periods. As columns (3) and (4) indicate, most of the political variables have no effect on short run variations in government size. Neither the time period leading into an election (ELECTIONYEAR(-1)), rational partisanship (SURPRISE), nor the duration of partisan type in power (DURATION) have any consistent effect on short run variations in government size. None of the partisan or opportunistic political variables are significantly different from zero.

However, the data does support the hypothesis that at least two characteristics of the political process - the size of the winning electoral majority, SEATS, and the time period when a minority government is in power, MINORITY - do matter for explaining short run variations in government size. In both cases, their significance is independent of electoral timing and the partisan affiliation of the political party in power. It follows that while we do find evidence that some dimensions of politics matters for short run variations in government size, the variations that do arise are not consistent with either political business theory of the cycle. Rather, evidence that large majorities of either partisan type result in a temporarily larger government is consistent with the hypothesis that it is the lack of competition among political parties that results in the temporary "overexpansion" of government size relative to that desired by the community.

Thus the significance of SEATS in the error correction model is consistent with political competition driving convergence in the short as well as the long run. The fact that MINORITY is also significant suggests that time periods when minority governments are in power are indeed anomalous. Minority governments spend more, it appears, independently of the type of party leading the governing coalition. Somewhat ironically, then, election outcomes that are the closest, and hence the most competitive, end up with parties resolving coalition differences by spending more rather than less.[42] (Subsequent results suggest the effect of minority government may not be a strong one however, as the significance of the coefficient is not supported in all forms of the error correction model.)

For the periods of majority government, a feeling for the magnitude of the SEATS effect can be gained by estimating the predicted consequence for the growth in government size of having an electoral victory of the size of John Diefenbaker's Progressive Conservative landslide victory in 1958. This is an outlier

42. This also validates our decision to remove periods of minority government from our measure of surprise in our first stage tests.

representing the most lopsided election victory in Canadian federal political history, with the Conservative party capturing of 78.5% of the seats in the House of Commons. Using our long period estimates, a victory of this scale would have been expected to lead to approximately a 9.7 percentage point higher rate of growth of (relative) government size.[43] Given that the mean growth rate of federal government size over the entire period was slightly below one per cent per year, such a result would temporarily increase the annual growth rate of government size ten times. A one standard deviation increase in SEATS (of 9.3 percent) leads to an increase in the growth of GSIZE of about 4.6 percent. At the very least, these results indicate that the consequences of a lack of political competition can be substantive.

6.1 Other formulations of the error correction model.

Table 6b presents an alternative formulation that makes use of lagged first differences of the economic variables; in this case, three lags are used, though results concerning political factors are robust for lags between one and four. The representation of the wars is also different, allowing explicitly here for both rapid increases in spending during a war, and also for a rapid decrease after the war using the dummy variables WWIAfter and WW2After.

For the lag structure shown, and for lags from one up to four, the only political factor that is significant in the short run is SEATS, the degree of political competition, with the size of a MINORITY now playing a positive but insignificant role . The same calculations as immediately above indicate now that a victory on the scale of the 1958 Conservative landslide would result in an increase in real growth of about 5.3%, and that a one standard deviation increase in SEATS leads to an increase in the growth of GSIZE of about 2.5%. Again this indicates that the role of competition is substantial.

[Table 6b here]

Other results remain essentially the same as in Table 6a, with some exceptions. OPENness of the economy in terms of both significance and magnitude is much more important in the results. Also, MINORITY is no longer significant.

6.1 Using the Johansen approach

Finally, we consider the number of cointegrating relations using the Johansen methodology (Johansen 1991) and then present the corresponding error correction model. This formulation also allows in a different manner than before for the possible endogeneity of SEATS in the longer run by including it as part of the cointegrating relation.

Placing SEATS third after LNGSIZE and LNRYPC in the group of economic determinants that also includes LNAGRIC, LNIMRATIO, LNYOUNG and LNOPEN, and without using any exogenous determinants except for a linear trend in the data and intercepts and a linear trend in the cointegrating relation, the Trace statistic suggests there are 3 cointegrating relations at 5%, while the Maximum

43. The calculation is (78.5 - 59.2)*.49 = 9.2%, where 59.2% is the percentage of seats held on average by the winning political party. The mean growth rate of GSIZE, federal non-interest spending net of grants, over the entire period from 1870 is 0.823%.

Eigenvalue test suggests 2 cointegrating vectors. (Omission of SEATS from the list of potential members of the cointegrating relation leads to the conclusion that there are two cointegrating vectors using either tests.)

Including SEATS in the cointegrating group and assuming that there are three cointegrating relations results in the vector error correction models shown in Table 6c. Here the AIC criterion is used to decide that 5 lags should be used for the longer period, and 4 lags for the shorter period. For convenience, most of these lagged first differences are omitted from the table, and only equations fro LNGSIZE, LNRYPC and SEATS are recorded. Conclusions about the political variables remain unaffected by other lag choices from one to six: once again, given the economic factors, of the political factors considered only SEATS matters in the short run adjustment process.

[Table 6c and Figure 3 here]

The error correction terms in the table clearly indicate the consequences of the degree of competition for increases in government size in the short run adjustment process. The effects of government spending on SEATS, on the other hand, is more muted, judging again by the error correction terms as well as by impulse responses to a standard deviation shock. These impulse responses in Figure 3 show that the positive effect of SEATS on GSIZE is larger and continues for 5 to 7 periods or years before declining, while the opposite effect falls off quickly after about 3 years.

7. Conclusions

We have investigated the effect of election timing and the partisan nature of Canadian federal electoral politics on rates of economic growth, inflation and the relative size of government over the post-Confederation time period from 1870 to 2000. The general idea we implement empirically is that politics can clearly be said to influence the evolution of public choices if it can be shown to lead to departures from a dynamic path defined by the evolution of the usual economic factors alone.

While a persistent political cycle does appear to be present in the data for real output growth in Canada, the mechanism by which politics influences output is not readily apparent. Here we have investigated federal government expenditure as the mechanism by which political influences could be transmitted into variations in real output. To do so, we first recognize that by changing from a test of the effect of politics on output to a test of the effect of politics on government size, a change in perspective required. In particular, unlike the test of the rational partisanship hypothesis, where surprise spending is important, surprise is not needed for a partisanship effect on government size.

There are, of course, other methods besides government spending by which political control could have been exercised – changes in taxes, the size of the deficit, the composition of spending, and monetary policy – to name only a few. However, since the cycles observed are real as opposed to nominal in nature, it is reasonable to suppose that such overtly political influences on output would require sympathetic movements in government size in the short run. Yet the data does not support any of the established theories that would explain that interconnection.

In particular, the timing of political events and the partisan nature of party politics do not appear to have prevented the convergence of government size to its 'fundamental' long run value, nor does there seem to be any evidence that the timing or partisan nature of party politics matter in relation to cyclical variations about long run size. Of all of the overtly political factors, it is only the degree of political competition in both the short and the long run that underlies convergence of public choices to fundamentals, and possibly the existence of minority government in the short run, that matter for the explanation of government size.

In addition to the importance of using the general approach to investigating the role of politics and economics in the evolution of public choices, our results suggest several additional points that bear on the direction of future research. First, until clear evidence of a transmission mechanism is provided, it seems wise to view evidence of the existence of partisan and opportunistic political cycles, in Canadian output as well as elsewhere, with some caution. Perhaps the political cycle for real growth apparent in the Canadian data reflects reverse causality, from the economy to what appears to be opportunism or partisanship, an issue that deserves attention. Or perhaps the missing mechanism (other than public expenditure) is there waiting to be found. Second, the persistent significance of SEATS suggests that more attention should be given in empirical studies to the degree of political competition, a topic that has not been studied extensively in Canada or elsewhere.

One final aspect of our work also merits emphasis. The analysis here is based not only on the premise that political factors cannot be isolated independently of complementary economic factors, but also on the premise that long and short run changes in government size are intertwined. Hence the paper distinguishes changes in size that arise over the cycle from those that arise over the longer run as part of one model that jointly determines the two types of public expenditure under political competition. An analysis of the short run involves more than simply subtracting out a trend, and the results as a whole suggest that an encompassing theory is needed to interpret and disentangle the web of connections that link political decision-making in the short and the long runs[44].

44. In Ferris and Winer (2003) we use an explicit spatial voting model to derive estimating equations for public expenditure, taxation, and public debt in both the long and the short run, and to disentangle the connections between long run and short run developments in the fiscal system as a whole over long periods of time.

Data Appendix

A. The Data

The data used in this study come from four basic sources: *Canadian Historical Statistics,* for the structural variables in the earliest time period (1870 through 1921); *Cansim*, the statistical database maintained by Statistics Canada, for these variables in the later time period (1921-2001); Gillespie's (1991) reworking of the Federal public accounts from 1870 to 1990, updated by Ferris and Winer (2003); and Beck (1968), Campbell (1977), and the *Canadian Parliamentary Guide* (1997, 2002) for the political variables. Because the pre-1921 annual variables are often interpolations between census dates, 1921 becomes a natural point in time across which we test for the robustness of our findings. In addition, we use the 1945 to 2000 time period to see if political variables have come to matter more (or less) in contemporary times. More precise definitions and the specific sources are given below.

1. List of Economic Variable Names and Data Sources:

AGRIC = proportion of the labor force in agriculture. 1871-1926: Urquhart, (1993)**,** 24-55; 1926-1995 Cansim series D31251 divided by D31252; 1996-2001: Cansim II series V2710106 divided by V2710104.

D = first difference operator

EXPORTS and IMPORTS = exports and imports. 1870-1926, Urquhart, (1993) Table 1.4; 1927-1960, Leacy, et al, 1983, Series G383, 384; 1961-2001: CANSIM series D14833 & D14836.

OPEN = openness. Calculated as: (**EXPORTS** + **IMPORTS**) / **GNP.**

GNP = gross national product in current dollars. 1870-1926: Urquhart (1993), pp. 24-25 (in millions); 1927-1938: Leacy et al (1983), Series E12, p.130; 1939–1960 *Canadian Economic Observer, Historical Statistical Supplement 1986*, Statistics Canada Catalogue 11-210 Table 1.4. CANSIM D11073 = GNP at market prices. 1961-2001 Cansim I D16466 = Cansim II V499724 (aggregated from quarterly data).

GOV = total government expenditure net of interest payments.1870-1989: Gillespie (1991), pp.284-286; 1990-1996: Public Accounts of Canada 1996-97: 1997-2000: Federal Government Public Accounts, Table 3 Budgetary Revenues Department of Finance web site, September 2001. To this we add the return on government investment (**ROI**) originally subtracted by Gillespie for his own purposes. Expenditure is net of interest paid to the private sector. Data on **ROI**: 1870 to 1915: Public Accounts 1917 p.64; 1915-1967: Dominion Government Revenue and Expenditure: Details of Adjustments 1915-1967 Table W-1; 1916-17 to 1966-67: Securing Economic Renewal - The Fiscal Plan, Feb 10, 1988, Table XI; 1987-88 to 1996-97: Public Accounts 1996, Table 2.2. Interest on the Debt (ID) was subtracted out (with adjustment for interest paid to the Bank of Canada (**BCI**) ultimately returned to the government). Data on **ID**: 1870-1926: Historical Statistics of Canada, Series H19-34: Federal Government budgetary expenditures, classified by function, 1867-1975; 1926-1995: Cansim D11166. 1996-2000: Cansim D18445. Finally, data for **BCI:** copied by hand from the Annual Reports of The Bank of Canada, Statement of Income and Expense, Annually, 1935-2000. Net Income paid to the Receiver General (for the Consolidated Revenue Acct). Note: all government data had to be converted from fiscal to calendar years.

GSIZE = the relative size of non-interest central government public expenditure, calculated as: (**GOV** - **GRANTS) /(GNP)**

GRANTS = Transfers to Provinces and Local Governments; 1870 - 1912: From Rowell-Sirois Commission, "Subsidies and Grants Paid to Provinces Since Confederation", Table II; 1913-1935: From Rowell-Sirois Commission, "Dominion-Provincial Subsidies and Grants", Statistical Appendix, p. 186; 1926 - 2001: Cansim label D11164 and D11165.

GRANT_SHARE = GRANTS / GSIZE

IMMIG = immigration numbers. 1868 – 1953: Firestone (1958), Table 83, Population, Families, Births, Deaths; Updated by Cansim D27 (1955 to 1996). Cansim Sum of X100615 (Females) plus X100614 (Men) for 1954;1997-2001, Cansim D27 (sum of quarters).

IMMRATIO = IMMIG/POP.

IPIUS = Index of Industrial Production for the United States. 1870-1929: Table A15. NBER, Nutter; 1930-1970, Table A16. (BEA) Bureau of Economic Analysis;1971-1995: Cansim D360048 (1987=100);1996-2000, U.S. Department of Commerce, Business Cycle Indicators, Index of Industrial Production 1992=100.

LN = the log operator.

PRCNTYNG = percentage of the population below 17. 1870-1920 Leacey et al (1983). Interpolated from Census figures Table A28- 45 sum of columns 29, 30, 31, and 32 all divided by 28 (adjusted to make 1921 the same); 1921-2001 Cansim C892547.

P = GNP deflator before 1927 and GDP deflator after (1986 = 100). 1870-1926: Urquhart, (1993), 24-25;1927-1995 (1986=100): Cansim data label D14476; 1996-2001 Cansim D140668. All indexes converted to 1986 = 100 basis.

POP = Canadian population. 1870-1926: Urquhart, (1993), 24-25; 1927 - 1995: CANSIM data label D31248; 1995 - 2001: Cansim D1 (average of four quarters).

RGNP = real GNP = GNP/P

RYPC = real income per capita = GNP/(P*POP).

WWI = 1 for 1914 - 1918; = 0 otherwise. **WW1after** = 1 for 1919-1921; = 0 otherwise.

WWII = 1 for 1939 - 1945; = 0 otherwise. **WW2after** = 1 for 1946-1949; = 0 otherwise.

WWIIAftermath = 1 from 1946 onward; = 0 otherwise.

2. List of Political Variable Names and Data Sources:

ELECTIONYEAR = 1 if election year; = 0 otherwise.

LIBERAL = 1 if governing party was the Liberal Party; = 0 if any other (more conservative) party.

MINORITY = 1 if the governing party was part of a minority government; = 0 otherwise.

SEATS = percentage of the seats won by the governing party.

ELAPSE = the number of years since the last election.

Data Sources for political variables:

Beck, Murray, J. (1968). *Pendulum of Power*. Scarborough: Prentice Hall of Canada.
Campbell, Colin (1977). *Canadian Political Facts 1945-1976.* Toronto: Methuen.
Canadian Parliamentary Guide. Various years (1997, 2002).
Elections Canada (2001). *Thirty Seventh General Election.* Ottawa.
Scarrow, Howard A.(1962). *Canada Votes: A Handbook of Federal and Provincial Election Data*. New Orleans: Hauser Printing Company.

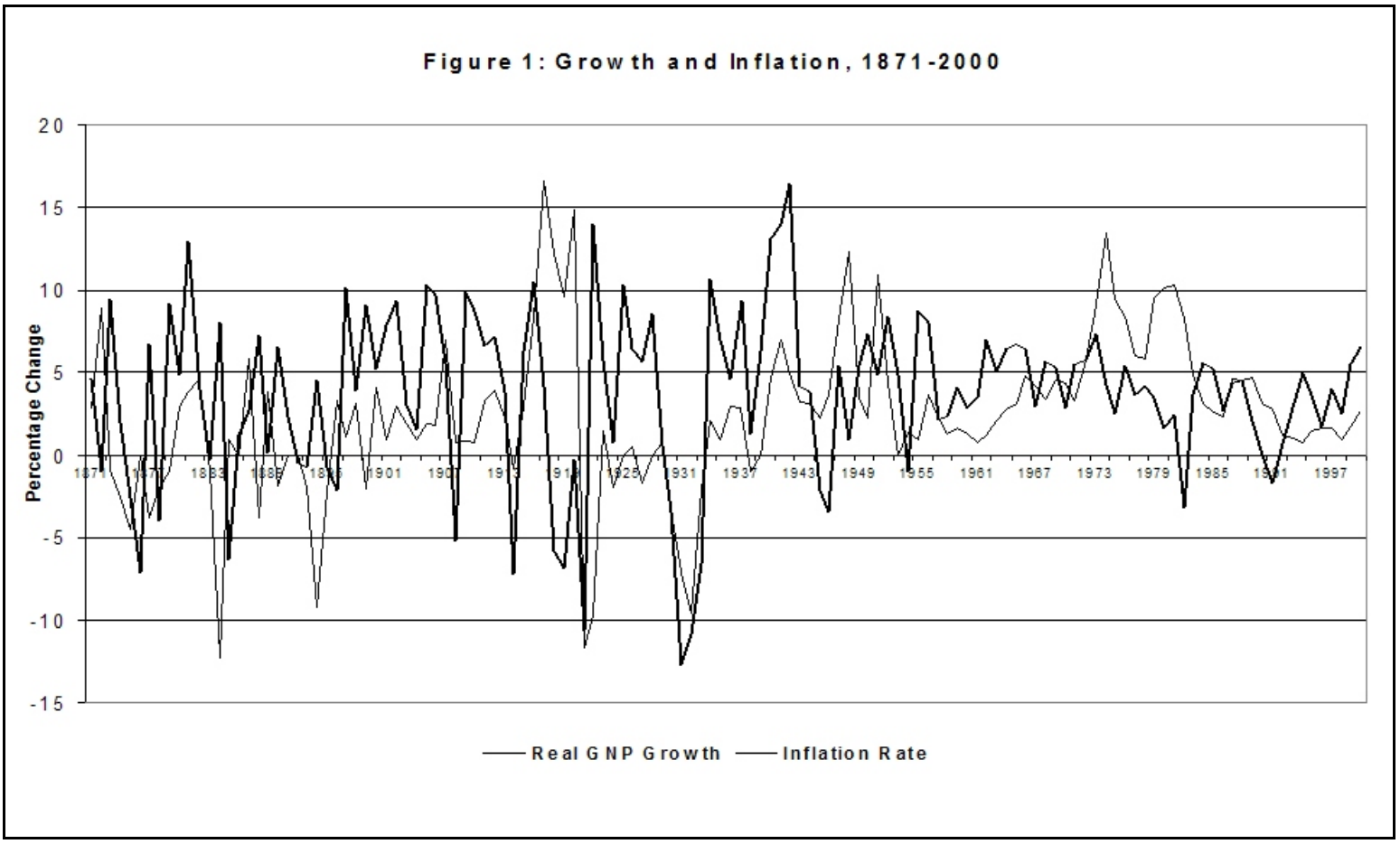


Figure 1: Growth and Inflation, 1871-2000
Percentage Change
20
15
10
5
0
-5
-10
-15
1871
1877
1883
1889
1895
1901
1907
1913
1919
1925
1931
1937
1943
1949
1955
1961
1967
1973
1979
1985
1991
1997
Real GNP Growth
Inflation Rate

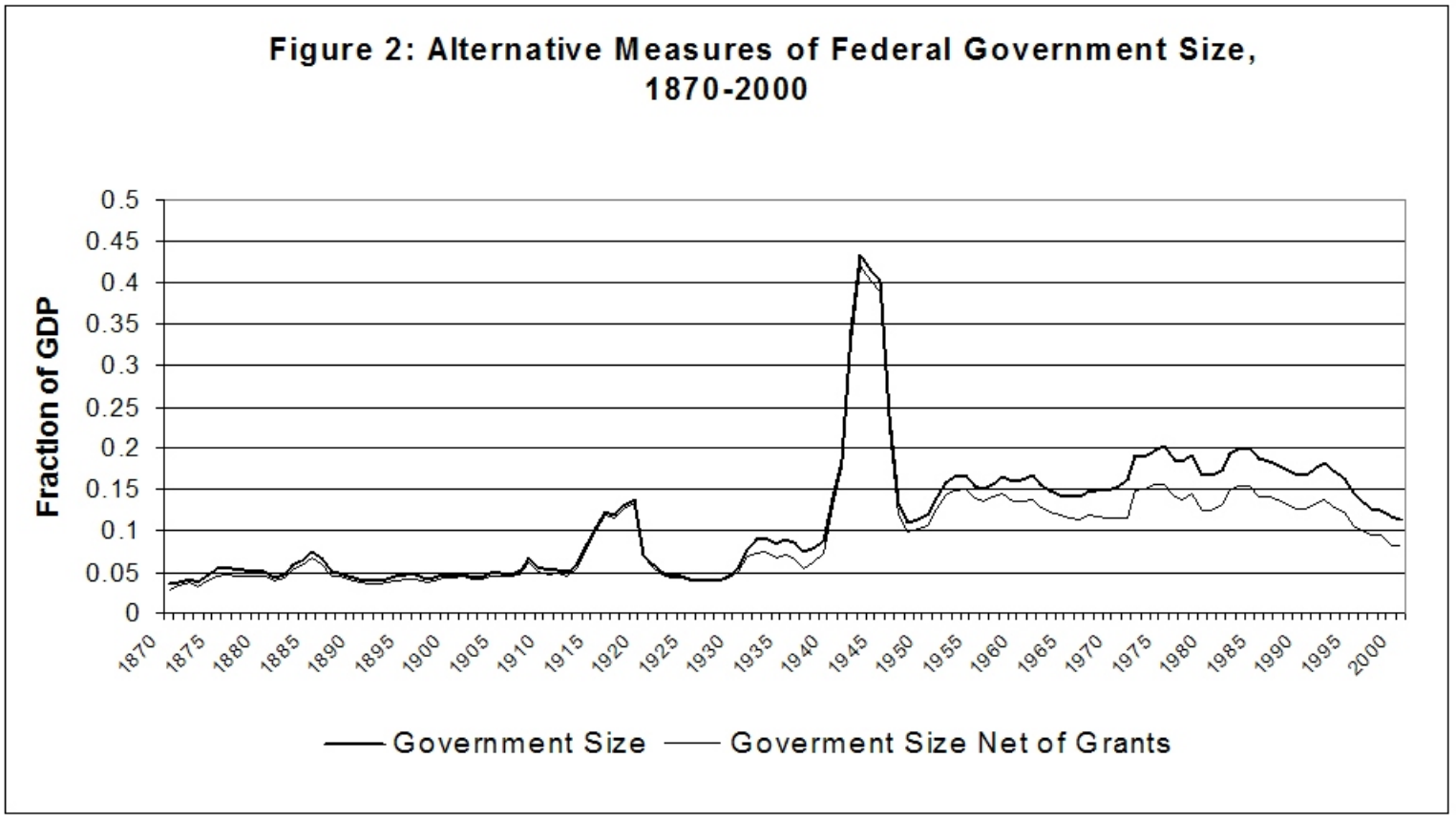


Figure 2: Alternative Measures of Federal Government Size, 1870-2000
Fraction of GDP
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1870
1875
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
Government Size
Goverment Size Net of Grants

Table 1a
Descriptive Statistics for Macroeconomic Aggregates and for Government Size Variables, 1870 - 2000

	GROWTH	INFLATION	USGROWTH	USINFLAT	GSIZE	LNGSIZE	LNRYPC	LNAGRIC	LNIMRATIO	LNYOUNG	LNOPEN
Mean	3.69	2.39	4.06	1.95	0.097	-2.52	8.67	-1.64	-4.9	3.59	-0.83
Median	4.23	2.23	5.23	1.73	0.082	-2.5	8.47	-1.09	-4.96	3.65	-0.87
Maximum	16.5	16.7	22.9	17.98	0.419	-0.87	10.1	-0.54	-2.94	3.88	-0.13
Minimum	-12.7	-12.3	-24.8	-13.89	0.028	-3.57	7.39	-3.61	-6.91	3.14	-1.18
Std. Dev.	5.1	4.68	9.64	4.71	0.068	0.61	0.81	1.02	0.88	0.19	0.22
Skewness						0.29	0.16	-0.68	-0.42	-0.84	0.99
ADF (4 lags) Levels	-5.68*	-3.68*	-7.05*	-3.40**	1.18	-2.82	0.14	1.65	-2.88	-0.186	-0.74
ADF (4 lags) 1st Differences					-4.44*	-6.97*	-5.95*	-3.11**	-5.90*	-2.55***	-5.13*

Notes: * (**)(***) = significant at one (five)(ten) percent. ADF critical value at 5% = - 2.88 (MacKinnon 1996).
GSIZE = central government spending after netting out interest payment to the private sector and grants to lower levels of government.

Table 1b
Descriptive Statistics for Political Variables, 1870 - 2000

	ELECTIONYEAR	ELAPSE	LIBERAL	MINORITY	SEATS	SURPRISE[A]	DURATION
Mean	0.273	1.561	0.553	0.1288	0.592	0.051	0.153
Median	0	1	1	0	0.588	0	0
Maximum	1	5	1	1	0.79	0.49	4
Minimum	0	0	0	0	0.41	-0.479	-5
Std. Dev.	0.447	1.297	0.499	0.336	0.093	0.359	2.044
ADF (4 lags) Levels	-5.94*	-4.84*	-3.34**	-4.03*	-3.67*	-3.48**	-3.65*

Notes: *(**) = significant at one (five) percent. ADF critical value at 5% = - 2.88 (MacKinnon 1996).
SURPRISE[A] = (1-MINORITY){(1-SEATS)*LIBERAL- (1- SEATS)*(1- LIBERAL), using definition A of SEATS. See notes to Table 2.
DURATION = {(LIBERAL*ELAPSE) - (1- LIBERAL)*ELAPSE}.

Table 2

The Effect of Political Variables on the Growth Rate in Canada: 1870 - 2000
(Absolute values of White heteroskedasticity-consistent t-statistics in brackets).

Dependent Variable	**GROWTH of RGNP 1872 - 2000**	**GROWTH of RGNP 1921 - 2000**	**GROWTH of RGNP 1872-2000**	**GROWTH of RGNP 1921 - 2000**
Constant	1.38* (2.88)	1.78* (3.28)	1.40* (3.04)	1.82* (3.82)
ELECTION YEAR(-1)	0.992 (1.23)	0.071 (0.097)	1.04 (1.37)	0.146 (0.190)
SURPRISE (Definition A)	2.68** (2.21)	2.68** (2.30)		
SURPRISE (Definition B)			2.46*** (1.73)	2.45*** (1.62)
DURATION	-0.025 (0.103)	-0.115 (0.457)	0.009 (0.034)	-0.075 (0.283)
USGROWTH	0.309* (6.43)	0.347* (6.35)	0.309* (8.77)	0.349* (9.57)
USGROWTH(-1)	0.148* (3.32)	0.132** (2.36)	0.148* (4.12)	0.132* (3.62)
Statistics:				
No. of Observations	129	80	129	80
R^2	0.460	0.462	0.436	0.600
D.W.	2.31	2.21	2.29	2.25
Akaike info criterion	5.57	5.18	5.58	5.19
Wald Prob [c(2) = c(3) = c(4) = 0	0.02**	0.13	0.04**	0.005*

Notes: * (**)(***) significantly different from zero at 1% (5%) (10%).

SURPRISE = (1-MINORITY){(1-SEATS)*LIBERAL - (1-SEATS)*(1- LIBERAL).
DURATION = {(LIBERAL*ELAPSE) - (1- LIBERAL)*ELAPSE}.

Definition A - Fraction of Seats won by the governing party and minority status as determined by Beck (1968): 1870-1944; Campbell (1977): 1945 - 1978; Canadian Parliamentary Guide (2002): 1979-2000.
Definition B - Fraction of Seats won by the governing party and minority status as determined by the *Canadian Parliamentary Guide (2002)*: 1870-2000.

Table 3

The Effect of Political Variables on the Inflation Rate in Canada: 1870 - 2000
(Absolute values of White heteroskedasticity-consistent t-statistics in brackets)

Dependent Variable	**Inflation Rate 1871 - 2000**	**Inflation Rate 1921-2000**	**Inflation Rate 1871 - 2000**	**Inflation Rate 1921-2000**
Constant	0.721** (2.29)	0.433*** (1.84)	0.723** (2.63)	0.451 (1.44)
ELECTION YEAR(-1)	0.005 (0.012)	0.381 (0.803)	0.012 (0.023)	0.391 (0.775)
SURPRISE (Definition A)	0.592 (0.706)	0.846 (0.863)		
SURPRISE (Definition B)			0.722 (0.773)	1.167 (1.071)
DURATION	-0.017 (0.117)	-0.007 (0.042)	-0.033 (0.203)	-0.035 (0.200)
USINFLATION	0.836* (16.52)	0.850* (12.70)	0.834* (17.56)	0.840* (14.55)
Statistics:				
No. of Obs	130	80	130	80
R^2	0.723	0.786	0.723	0.788
D.W.	1.78	1.04	1.79	1.05
Akaike Info criterion	4.71	4.35	4.71	4.34
WALD Prob (c(2) = c(3) = c(4) = 0)	0.833	0.387	0.768	0.330

Notes: * (**)(***) significantly different from zero at 1% (5%) (10%).
For definitions, see Table 3.

Table 4
Long Run Model of Government Size
Canadian Federal Government Expenditures as a Fraction of GDP: 1870 - 2000
(Absolute values of t-statistics in brackets) #

Dependent Variable	(1) LNGSIZE: Base Case 1870 - 2000	(2) LNGSIZE Base Case 1921 - 2000	(3) LNGSIZE: Political 1870 - 2000	(4) LNGSIZE: Political 1921 - 2000
Constant	-5.25 (3.59)	-5.06 (1.59)	-6.62 (4.42)	-5.13 (1.57)
LNRYPC	0.254 (2.51)	0.290 (0.873)	0.299 (3.00)	0.302 (0.870)
LNAGRIC	0.121 (1.66)	0.147 (0.811)	0.093 (1.30)	0.156 (0.800)
LNYOUNG	-0.103 (0.402)	-0.435 (1.50)	0.086 (0.338)	-0.441 (1.50)
LNIMRATIO	-0.060 (2.78)	-0.148 (5.05)	-0.057 (2.71)	-0.150 (4.64)
LNOPEN	-0.544 (4.04)	-0.810 (4.84)	-0.514 (3.92)	-0.813 (4.78)
WWI	0.809 (9.08)		0.774 (9.00)	
WWII	1.85 (16.34)	1.70 (12.50)	1.79 (16.00)	1.70 (12.29)
WWII Aftermath	0.809 (9.74)	0.845 (8.94)	0.750 (9.01)	0.846 (8.86)
FIXED EXCHANGE RATE[t]	-0.214 (4.66)	-0.147 (3.19)	-0.200 (4.47)	-0.148 (3.12)
SEATS			0.529 (2.89)	-0.025 (0.132)
Equation Statistics: No. of Observations Adj. R^2 D.W. Akaike info criterion A.D.F. statistic on residuals MacKinnon critical values: (at 1 % for 6 vars = -5.12) (at 1 % for 7 vars = -5.44)	 131 0.920 0.888 -0.627 -6.30	 80 0.920 1.38 -0.943 -6.90	 131 0.925 0.966 -0.605 -6.57	 80 0.919 1.38 -0.918 -6.92

Notes:
The t-statistics in these regressions are inconsistent because of correlations arising among the random components of the I(1) variables and hence are unreliable for use as significance tests. See accompanying Table 5 for Saikkonen's adjustment method.
[t] The periods when exchange rates were fixed in Canada are: 1870-1914, 1926-1931, 1939-1951, and 1960-1972.

Table 5
Saikkonen Supplement to Table 4
Canadian Federal Government Expenditures as a Fraction of GDP: 1870 - 2000
(Absolute values of Saikkonen adjusted t-statistics in brackets) #

Dependent Variable	(1) **LNGSIZE: Base Case** from Table 4, Col. (1) 1872 - 1999	(2) **LNGSIZE: Politics Case** from Table 4, Col. (3) 1872 - 1999
Constant	-7.72* (3.31)	-9.91* (5.65)
LNRYPC	0.394* (2.81)	0.511* (4.90)
LNAGRIC	0.187 (1.39)	0.222** (2.31)
LNYOUNG	0.309 (0.695)	0.546*** (1.69)
LNIMRATIO	-0.081** (2.40)	-0.067* (2.76)
LNOPEN	-0.350*** (1.63)	-0.328** (2.13)
WWI	0.634* (4.73)	0.620* (6.50)
WWII	1.642* (9.66)	1.646* (13.61)
WWIIAftermath	0.821* (4.90)	0.782* (6.54)
FIXED EXCHANGE RATES	-0.192* (3.21)	-0.174* (4.07)
SEATS		0.775* (3.99)
Equation Statistics: No. of Observations Adj. R^2 D.W. Akaike info criterion Saikkonen adjustment factor	 128 0.940 0.860 -0.802 0.728	 128 0.948 1.100 -0.951 0.947

Notes: *(**) [***] significantly different from zero at 1 (5) [10] %.
Saikkonen's (1991) estimator adjusts for inconsistency in the standard errors of the I(1) variables in the cointegrating equation by including the contemporaneous, lagged and led values of the first differences of both left and right hand side variables (with the exception of the dummy variables WWI, WWII, WWIIAftermath, and the fixed exchange rate dummy). Only the coefficients of the level terms are relevant and so presented. In addition, the standard errors and t-statistics had to be adjusted for the presence of correlation among the innovations of the I(1) variables by a factor formed by the ratio of two standard errors a) the standard error of the augmented equation divided by b) the "long run standard error". The latter is calculated as the square root of the variance plus two times the weighted sum of the significant autocovariances among the residuals (Saikkonen, 1991). This adjustment led to the estimated t-statistics in column (1) being multiplied by the factor .728 while the t-statistics in (2) were adjusted by the factor .947.

Table 6a
Error Correction Model of Government Size
The Change in Canadian Federal Government Expenditures as a Fraction of GDP: 1870 - 2000
(Absolute value of t-statistics in brackets)

	(1) Base Case 1872 - 2000	(2) Equations 1921 - 2000	(3) Political 1872 - 2000	(4) Variables 1921 - 2000
Dependent Variable	**D(LNGSIZE)**	**D(LNGSIZE)**	**D(LNGSIZE)**	**D(LNGSIZE)**
Error Correction term	-0.188* (3.09)	-0.233* (2.63)	-0.269* (4.45)	-0.294* (3.58)
D(LNRYPC)	-0.625* (2.92)	-0.633*** (1.80)	-0.785* (3.82)	-0.936* (2.76)
D(LNAGRIC)	-0.211 (0.681)	-0.276 (0.717)	-0.785 (0.490)	-0.233 (0.649)
D(LNYOUNG)	-1.57 (1.49)	-1.60 (1.31)	-3.31* (3.03)	-3.89* (2.93)
D(LNIMRATIO)	-0.134* (5.21)	-0.185* (4.95)	-0.124* (5.04	-0.157* (4.33)
D(LNOPEN)	-0.083 (0.467)	-0.176 (0.720)	-0.051 (0.308)	-0.219 (0.961)
Constant	-0.010 (0.533)	-0.007 (0.319)	-0.322* (3.55)	-0.344* (3.07)
WWII	0.156* (3.16)	0.189* (3.24)	0.125* (2.63)	0.143* (2.55)
FIXED EXCHANGE RATES	0.02 (1.05)	0.005 (0.174)	0.030 (1.55)	0.027 (0.912)
D(LNGRANT_SHARE)	-0.517* (9.77)	-0.460* (6.59)	-0.490* (9.52)	-0.432* (6.61)
MINORITY			0.069** (2.06)	0.079** (1.97)
SEATS			0.490* (3.51)	0.525* (3.06)
Equation Statistics: No. of Observations Adj. R^2 D.W. Serial Corr. LM test NR^2 (3 lags) Akaike info criterion	 130 0.570 1.57 10.54** -1.56	 80 0.526 1.55 6.5** -1.39	 130 0.619 1.67 7.22** -1.66	 80 0.591 1.66 4.23 -1.52

Notes: * (**) [***] significant at 1% (5%) (10%)
The error correction term used was the lagged residuals of column (1) of Table 4 for columns (1) and (2)above and column (3) of Table 4 for (3) and (4) above.

Table 6b
Error Correction Model of Government Size Using 3 Lags
The Change in Canadian Federal Government Expenditures as a Fraction of GDP: 1870 - 2000
(Absolute values of t-statistics in brackets)

	(1) Base Case 1874 - 2000	(2) Equations 1922 - 2000	(3) Political 1874 - 2000	(4) Variables 1922 - 2000
Dependent Variable	**D(LNGSIZE)**	**D(LNGSIZE)**	**D(LNGSIZE)**	**D(LNGSIZE)**
Error Correction term	-0.101 (1.464)	-0.134 (1.163)	-0.148 (1.967)***	-0.14 (1.406)
D(LNRYPC) lags 1 - 3	-0.15 (0.588) 0.091 (0.336) -0.36(1.487)	-0.494(1.225) -0.036(0.088) -0.211(0.54)	-0.256(0.954) 0.019(0.069) -0.388(1.583)	-0.607(1.544) -0.189(0.47) -0.232(0.626)
D(LNAGRIC) lags 1 - 3	-0.878(2.452)** -0.288(0.779) 0.184(0.527)	-1.001(2.477)** -0.444(1.071) 0.39(0.934)	-0.918(2.593)** -0.263(0.721) 0.069(0.199)	-1.083(2.785)* 0.381(0.94) 0.331(0.825)
D(LNYOUNG) lags 1-3	3.48(1.017) -3.378(0.721) -2.357(0.639)	5.425(1.269) -3.565(0.672) -3.752(0.876)	1.105(0.286) -3.001(0.648) -1.047(0.286)	1.935(0.441) -3.279(0.643) -2.017(0.477)
D(LNIMRATIO) lags 1-3	-.0.014(0.408) 0.001(0.045) 0.022(0.707)	-0.0134(0.271) -0.068(1.407) 0.008(0.189)	0.007(0.214) 0.010(0.322) 0.020(0.646)	0.001(0.033) -0.056(1.328) 1.92E-05(0.0004)
D(LNOPEN) lags 1-3	-0.905(4.034)* 0.188(0.854) -.0259(1.278)	-.065(2.173)** -0.034(0.125) -0.100(0.37)**	-0.889(4.011)* 0.191(0.878) -0.30(1.494)	-0.723(2.542)** -0.053(0.202) -0.151(0.584)
Constant	-0.029 (1.165)	-0.029 (1.032)	-0.18 (2.134)**	-0.229 (2.503)**
WWI	0.175 (2.657)*		0.192 (2.924)*	
WWIAfter	-0.195 (2.439)**		-0.193** (2.459)	
WWII	0.152 (2.455)**	0.124 (1.709)***	0.140 (2.284)**	0.104 (1.533)
WWIIAfter	-0.335 (4.251)*	-0.347 (3.589)*	-0.304 (3.915)*	-0.330 (3.742)*
FIXED EXCHANGE RATES	0.0333 (1.337)	0.07 (1.976)***	0.037 (1.554)	0.087 (2.57)**
D(LNGRANT_SHARE)	-0.395 (5.934)*	-0.367 (4.491)*	-0.383 (5.802)*	-0.357 (4.704)*
SEATS			0.236 (1.861)***	0.318 (2.235)**
Equation Statistics:				
No. of Observations	127	79	127	79
Adj. R^2	0.565	0.537	0.576	0.575
D.W.	1.694	1.817	1.701	1.919
Serial Corr. LM test NR^2 (3 lags)	19.032*	3.193	13.941*	1.121
Akaike info criterion	-1.451	-1.314	-1.472	-1.388

Notes: * (**) [***] significant at 1% (5%) (10%).
Lag lengths from 1 to 4 do not alter conclusions about role of political factors MINORITY, SURPRISE, DURATION and ELECTIONYEAR(-1). The error correction term used was the lagged residuals of column (j) of Table 4 for the corresponding column in this table.

Table 6c
Error Correction Model of Government Size Using the Johansen Approach
The Change in Canadian Federal Government Expenditures as a Fraction of GDP: 1870 - 2000
(Absolute values of t-statistics in brackets)

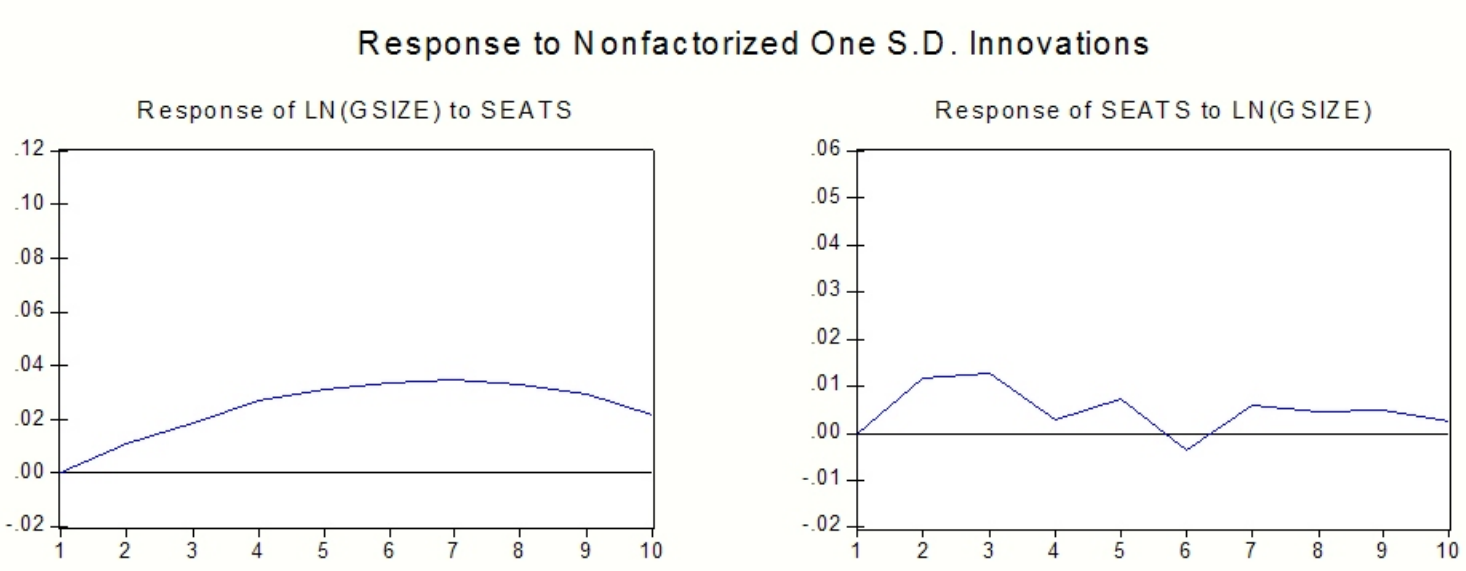
	(1) 1876-2000 Using 5 lags			**(2) 1921 - 2000 Using 4 lags**		
Dependent Variable	**D(LNGSIZE)**	**D(LNRYPC)**	**D(SEATS)**	**D(LNGSIZE)**	**D(LNRYPC)**	**D(SEATS)**
Error Correction terms						
LNGSIZE	**-0.249(2.992)***	-0.016(0.400)	**0.064(1.477)**	**-0.249(2.67)****	**-0.005(-0.143)**	**0.014(0.215)**
LNRYPC	-0.118(0.630)	0.012(0.135)	-0.088(0.902)	0.542(1.56)	-0.096(0.636)	-0.337(1.312)
SEATS	**0.481(1.66)*****	-0.029(0.206)	**-0.433(2.889)***	**0.713(2.48)****	**-0.382(3.03)***	**-0.865(4.061)***
D(LNGSIZE) lags 1 - 2 only	0.106(1.026) 0.222(2.17)**	-0.015(0.299) 0.026(0.537)	0.052(0.966) 0.032(0.608)	0.116(0.92) 0.205(1.546)	0.004(0.075) 0.020(0.348)	0.121(1.296) 0.113(1.154)
D(LNRYPC) lags 1 - 2 only	-0.164(0.496) -0.07(0.218)	-0.056(0.352) -0.08(0.523)	0.251(1.461) 0.047(0.27)	-0.754(1.611) -1.076(2.46)**	0.114(0.556) 0.461(2.40)**	0.333(0.963) 0.375(1.157)
D(SEATS) lags 1 - 2 only	-0.265(0.881) -0.19(0.794)	0.027(0.19) -0.04(0.335)	-0.169(1.086) -0.032(0.253)	-0.483(1.97)** -0.27(1.297)	0.319(2.963) 0.173(1.888)	0.177(0.977) 0.27(1.74)***
D(LNAGRIC) lags 1 - 2 only	-0.551(1.345) -0.53(1.326)	-0.100(0.505) 0.213(1.102)	0.112(0.528) -0.042(0.204)	-1.097(2.731)* -1.133(2.995)*	0.132(0.750) 0.639(3.851)*	0.225(0.758) 0.015(0.053)
D(LNYOUNG) lag 1-2 only	1.77(0.40) 1.28(0.229)	0.185(0.087) -1.692(0.622)	1.96(0.859) -0.80(0.275)	2.929(0.663) -0.033(0.006)	1.123(0.579) -2.309(1.06)	4.243(1.298) 1.091(0.297)
D(LNIMRATIO) lag 1-2 only	0.007 (0.211) -0.016(0.466)	0.004(0.233) 0.016(0.944)	0.027(1.437) 0.020(1.096)	0.033(0.591) -0.029(0.577)	0.023(0.93) 0.02(0.948)	0.07(1.68)*** 0.06(1.168)
D(LNOPEN) lag 1-2 only	-0.600(2.41)** 0.206(0.782)	0.23(1.87)*** -0.022(0.174)	0.017(0.134) -0.197(1.448)	-0.223(0.688) -0.061(0.23)	-0.26(1.82)*** -0.20(1.74)***	-0.269(1.124) -0.528(2.692)*
Constant	-.0141(2.36)**	0.024(0.824)	0.084(2.718)*	0.033(0.792)	0.04(1.95)***	0.089(2.86)*
WWI	0.234(2.62)**	-0.047(1.094)	0.002(0.052)			
WWIAfter	0.056(0.556)	-0.074(1.151)	0.017(0.333)			
WWII	0.465(4.06)*	0.087(1.577)	-0.039(0.663)	0.381(3.412)*	0.08(1.634)	-0.078(0.947)
WWIIAfter	-0.169(1.412)	-0.05(0.872)	-0.0003(0.004)	-0.161(1.648)	-0.0202(0.469)	-0.0036(0.05)
WWIIAfterMath	0.227(2.01)**	0.007(0.131)	-0.052(-0.902)	-0.15(1.73)***	0.059(1.532)	0.016(0.246)
FIXED EXCHANGE RATES	-0.02(0.668)	0.004(0.297)	-0.0076(0.474)	-.034(0.835)	-0.003(0.202)	0.004(0.144)
D(LNGRANT_SHARE)	-0.321(3.918)*	-0.053(1.345)	-0.0005(0.012)	-0.248(2.841)*	-0.128(-3.36)*	-0.013(-0.205)
MINORITY	-0.038(0.893)	0.013(0.654)	-0.177(7.901)*	-0.007(0.196)	-0.025(1.429)	-0.185(6.186)*
Equation Statistics:						
No. of Observations	125	125	125	80	80	80
Adj. R^2	0.62	0.119	0.474	0.728	0.43	0.489
Akaike info criterion	-1.472	-2.91	-2.782	-1.756	-3.404	-2.359

Notes: * (**) [***] significant at 1% (5%) (10%).
Only the first two lags of the lagged first difference terms are shown in the table.

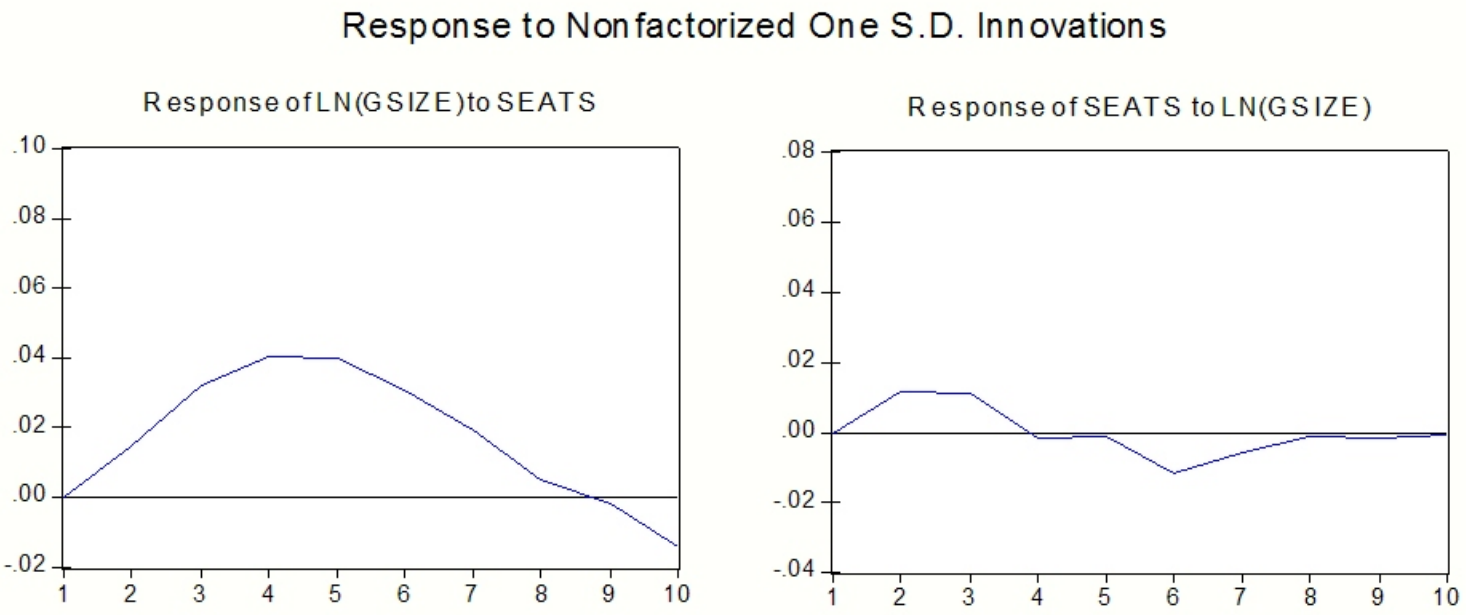
Figure 3

Impulse Responses to One Standard Deviation Shocks
Based on the Error Correction Model in Table 6c

1876-2000



1921-2000



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