Studying the Role of Political Competition in the Evolution of Government Size Over Long Horizons

J. Stephen Ferris*
stephen_ferris@carleton.ca

Soo-Bin Park*
soo-bin_park@carleton.ca

and

Stanley L. Winer**
stan_winer@carleton.ca

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* Department of Economics, Carleton University
** School of Public Policy and Department of Economics, Carleton University
All authors: 1125 Colonel By Drive, Ottawa Ontario, Canada, K1S 5B6

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Abstract

We argue for the use of cointegration and error correction analysis as a method to combine economic factors that are nonstationary with political factors that are stationary into a dynamic, empirical model of the evolution of public policy over long periods. The approach we develop is applied to disentangle the contributions of economics and politics to the evolution of public expenditure by the Government of Canada over 130 years, from the origin of the modern state to the end of the 20th century. Political competition emerges robustly as the primary political factor affecting government size in the long run as well as over shorter horizons.

Key Words: political competition, conditional convergence, cointegration, public expenditure, size of government, politics versus economics
JEL Categories: D7, H1, H3, H5

1. Introduction

The purpose of this paper is to develop a method to combine consistently economic variables that trend with political variables that are stationary in a dynamic empirical model of the evolution of the relative size of the public sector over a long period in a stable democracy. The role of variation in the intensity of political competition is the substantive focus of our analysis.

Electoral competition is a fundamental mechanism that tends to force the policy choices of governments in a democracy to conform to the wishes of the electorate (Wittman 1995, Breton 1996). It is relied upon heavily in spatial voting models, including Coughlin (1992), Hettich and Winer (1999), Adams, Merrill and Grofman (2005) and Schofield and Sened (2006) among others, where competition induces political parties to propose efficient platforms that balance the interests of various groups of voters. Following in this tradition we implement empirically two related views about how the public sector evolves towards a long-run equilibrium, while allowing for the possibility that even in a mature democracy, the intensity of political competition may vary.

We begin by defining *political convergence* as a long-run outcome in which political competition induces the governing party to provide the level of spending demanded by the community, independent of the particular state of the political system.[1] This view is implemented by modelling the long run as a cointegrating relationship among underlying 'economic fundamentals'. While a uniformly high degree of competition is necessary to induce convergence in this sense, some variation in the degree of competition about that norm can be expected to arise even in mature democracies.

Since less competition enhances the ability of special interests and political agents to extract rent and so increase government size, allowing for transitory changes in the level of political

1. Convergence of party platforms to the same set of policies is another matter. Competition may or may not lead to convergence in this sense. See Adams, Merrill and Grofman (2005) and Schofield and Sened (2006).

competition should allow for a more precise and detailed description of the evolution of long-run government size. The hypothesis that in the long-run, government size will also reflect transitory changes in the degree of political competition we shall then call *conditional political convergence*. In this second view of the longer run, which encompasses the first, government size evolves in relation to a revised list of fundamentals, one which now includes at least one political dimension - the degree of political competition associated with each specific election. Once either model is established as the better description of the long - run process governing government size, we can assess whether additional political factors play a distinctive role in the longer run evolution of public choices by determining the extent to which they generate departures from this long-run path.

Corresponding to any successful model of the long-run policy is an implied model of the short-run embodied in its error correction form. This stationary process reflects policy responses that are specifically shorter run in nature; in our case, expenditure changes associated with economic and political factors that are relevant to the business and electoral cycles. Whether factors of these types contribute to an explanation of the evolution of policy over the shorter run can be assessed through their significance in the error-correction model implied by long run cointegration.

Our approach - first choosing an appropriate long-run model of political convergence using cointegration analysis, and then fitting an appropriate short-run model of fiscal policy in the associated error-correction form - is applied to study the roles of economic and political factors in the evolution of the relative size of non-interest, direct spending by the Government of Canada from its origin as a modern state to the end of the 20th century. This application is novel in itself. The data have not previously been assembled nor has such a long time period been investigated. In addition, we investigate how our approach differs from other current approaches that use Hodrick-Prescott filters to effect a separation between longer and shorter run policy processes.

This investigation is different from, but complementary to, the work of researchers who use international panel data of relatively short duration to study the contributions of economics and politics to the course of public policy (Drazen 2001). Here we extend research on the political economy of fiscal systems by considering a very long horizon within a single stable regime, a task for which cointegration and error correction modelling is particularly appropriate. The period from 1870 to 2000 provides the long span of data (131 years) required for this kind of statistical work.[2]

While our approach could be applied to any democratic system, Canada provides a particularly interesting case study. First, there are good data for an entire history in which the majoritarian parliamentary system has remained essentially unaltered. Second, Canada's unique experience with exchange rate regimes and openness to trade provides a data set that has embedded in it substantial variation in the power of fiscal policy, the importance of external shocks to domestic interests, and the role of balance of payments constraints (whose influence on policy choices is of independent interest). We also can make use of Canada's relationship with its much larger U. S. neighbour to define instrumental variables, since U. S. history is not influenced by Canadian events.

The Canadian case has been studied before, though not with the approach we develop nor with the same length of time-series data. Moreover, this literature lacks consensus on the role of politics in the evolution of the fiscal instruments of the Government of Canada. For example, over the 1961-1996 post-war period, Kneebone and McKenzie (1999) use Hodrick-Prescott filters to control for long-run factors and find evidence of opportunism and partisanship in fiscal structure over the short run at all levels of government. This stands in contrast to Serletis and Afxentiou (1998) who find, using annual data for 1926

2. Shiller and Perron (1985) and Zhou (2001) suggest that span, without gaps, in a time series is more important than frequency for cointegration analysis.

to 1994, no evidence of any regularity arising between a set of Hodrick-Prescott filtered policy target variables (such as output and unemployment) and a set of similarly filtered government policy instruments (such as government consumption and investment).[3]

The analysis proceeds as follows. In section two we test the political convergence and conditional hypotheses in relation to the evolution of public expenditure of the Government of Canada. Measurement of the degree of political competition is discussed. After arguing for acceptance of the long run model of conditional convergence relative to one that assumes a constant degree of political competition over the entire time period, we assess the quantitative importance of variation in political competition as a source of transitory deviations from a long run defined by economic factors alone.

Section three considers whether other political factors besides the degree of competition play a role in either the long or shorter runs. In section four, we compare our cointegration-error correction results with those using a Hodrick-Prescott trend to represent the long run. A concluding section summarizes and draws implications for future research. Data sources, an extreme bound analysis of the robustness of key results and ancillary estimation results introduced later are presented in an Appendix.

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3. See also Heckelman (2002) who looks at unemployment. Winer (1986) finds evidence of weak feedback at electoral cycle frequencies from the Gallup poll measure of party popularity to monetary growth under flexible but not under fixed exchange rates since 1945. Kneebone and McKenzie (1999) also consider policy in relation to provincial governments. Other work on the provinces suggests the existence of political influences: Reid (1998) finds evidence of opportunism, Kneebone and McKenzie (2001) find opportunism and partisanship in fiscal policy, and Tellier (2006) shows that political popularity affects the extent to which provincial governments can satisfy ideological preferences. Good data on the provinces are available only after the second war so that we do not pursue that application here.

2. Long Run Models of Government Size

We begin the empirical analysis by illustrating the evolution of the logarithm of the relative size of the Government of Canada from 1870 in Figure 1. Here government size is measured by total non-interest expenditure relative to GNP (GSIZE).[4] In measuring size, we have removed interest payments which depend on macroeconomic fluctuations as well as grants to the provinces that lead to changes in size as a result of federal-provincial bargaining.[5] The difference removing grants makes to our measure of Canadian federal government expenditure is shown as the smaller of the two lines in the figure. In some of our estimating equations we include the share of grants in total federal spending on the right side to reflect the state of federal-provincial competition, but neither this nor the use of government size measured gross of grants alters our conclusions.

[Figure 1 here]

Figure 1 shows that (the logarithm of) Canadian central government expenditures have grown relative to GNP more or less continually over the decades from 1870 to 2000. Only since 1992 is there some sign that this upward trend may be ending, but even here 1990s retrenchment was largely a response to the build up of debt incurred during and after the recession of the early 1980's.[6] The dramatic effect of the two world wars is also striking, requiring us to control for the effects of the wars with shift variables in a manner discussed below.

The history of public expenditure also reflects an increase in variance after the Second World War (WWII) as well as an upward shift in mean. To allow for that rise in variance, as well as to

4. Exact sources and definitions of all data are given in the Appendix.

5. Further decomposition of spending from 1870 onward is not possible. Data on interest payments from 1867 exists because of the importance attached to the public debt, and early data on federal grants is available as a result of the the Rowell-Sirois Royal Commission on Dominion-Provincial Relations in 1940.

6. For a more extensive documentation of this pattern in Canadian public expenditure, see Ferris and Winer (2007).

avoid restrictions on the erorr terms, we model the logarithm of relative government size (denoted LnGSIZE in the figures and tables), which has a standard deviation that is roughly constant before and after WWII.[7] Because government size and many of the other explanatory variables (introduced later) are confined to lie between zero and one, variation in these variables is ultimately bounded and even with the use of logarithms (denoted by the prefix 'Ln'), the variables are bounded above by zero. The implications this has for our stationarity tests are considered in the course of the discussion.

2.1 *Political convergence*

In constructing a long-run model of government size to reflect either convergence hypothesis, we need a set of variables that spans the very long time period and reflects the evolving economic interests of the electorate. The variables we use are for the most part standard in the empirical literature on the growth of government.[8] We identify these variables in the following paragraphs, illustrate their characteristics in Tables 1a and 1b, and then summarize the specification of the long-run model in Table 2 along with estimation results. For reading convenience, we temporarily drop the repeated use of the prefix 'Ln', even though all variables are used in log form whenever possible. Precise definitions of all variables are provided in the Appendix.

The starting point is Wagner's Law, the hypothesis that the size of government increases more than in proportion to society's growth in scale and complexity. Since we model public expenditure relative to GNP, this is interpreted as implying an elasticity of government size with respect to real per capita income (RYPC) that is positive. Wagner's Law is then enhanced by including the fraction of the

7. The standard deviation of LnGSIZE is 0.336 over 1870 - 1939 and 0.328 for the period from 1939 to 2001.

8. See Bird (1970), Kau and Rubin (1981), Borcherding (1985), Mueller (2003), Ferris and West (1996), and Borcherding, Ferris and Garzoni (2004).

population in agriculture (AGRIC) and the fraction of young people (YOUNG) in order to represent changes in the structure of the economy and in the strength of interest groups. The use of (the log of) these variables and not their apparent complement - urbanization and the percent of the population that is old - is dictated by the availability of data for the entire time period. As AGRIC declines and urbanization increases, we might expect a greater demand for government services if education and health are mainly public responsibilities. On the other hand, however, if higher education and health care are largely private, we would expect the opposite.[9]

To capture other structural features that may promote more (or less) government involvement, we use the immigration rate (IMMRATIO) and the openness of the economy to foreign trade (OPEN). Immigration has played a major role in Canadian economic and political history, especially before WWI and in the decade following WWII. The use of openness follows Myrdal (1960, 135), Cameron (1978) and Rodrik (1998) and is appropriate considering the relative importance of trade to Canada.[10] Their hypothesis is that more openness leads to bigger government as voters seek insurance against external shocks. A competing view is that openness restrains government size by imposing balance of payments constraints on governing instruments, and by creating competition for, and so reducing the power of domestic special interests. We shall see that the later view is the one consistent with Canadian data.

For several reasons we do not include population as a separate variable in the model of political convergence even though it is often used to test for scale economies. First, scale economies are not often found in studies of government growth, as noted by Borcherding et al (2004). Moreover, population in Canada is not clearly integrated of order one like the other economic factors. Finally, the log of population is highly correlated (at 0.99 for 1870 -2000) with the log of real per capita income, which

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9. We are indebted to Keith Acheson for pointing this out.

10. Exports plus imports as a fraction of GNP vary from 0.30 to about 0.88 in the sample.

is already included.[11]

In addition to acknowledging Canada's particular openness to trade, it is important to control for Canada's unique experience with fixed and flexible exchange rate regimes. The well-known Mundell-Fleming class of open economy models suggests that fiscal policy is relatively more potent in fixed rather than in flexible exchange rate regimes, and for this reason fiscal instruments may be employed differently in these two situations. We allow for this possibility by including an indicator equalling 1 when the exchange rate is fixed and zero otherwise (FIXED EXCHANGE RATES).[12]

To complete the long-run model we allow for the possibility of a displacement effect after WWII (Peacock and Wiseman 1961) – i.e., that the economy adjusted permanently to the large temporary increase in spending that occurred during World War Two. Figure 1 suggests that this was so, leading us to include a dummy variable for the post-WWII period (WWIIAftermath) in the cointegrating relationship describing the long run, in addition to dummies that control for the large temporary shifts in the expenditure process associated with the wars.[13]

The descriptive statistics for the logarithms of the economic factors introduced above are presented in Table 1a. Table 1b presents the descriptive statistics for the political variables to be defined and discussed later. The important feature of these tables is that while government size and (almost) the entire set of economic explanatory variables in Table 1a are found to be nonstationary in their levels for our sample period (becoming stationary only in first differences), the political variables in Table 1b are already stationary in their levels.[14] Two potential time series concerns did not materialize. That is, both

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11. Including LnPOP, or alternatively omitting LnPOP and LnAGRIC (which is also highly correlated with real income LnRYPC) results in a similar pattern of results as are presented in Table 2 below.

12. Exchange rates were fixed in the following periods: 1870-1914, 1926-1931, 1939-1951, 1960-1972.

13. See Dudley and Witt (2004) and Legrenzi (2004) for recent evidence on the displacement effect.

14.We present three tests for the stationarity of our economic variables in Table 1a: the ADF, Phillips-Perron, and the DF-GLS tests (the latter controls for heteroskedasticity). The exceptions to the general finding of I(1) series are LnPOP (which appears to be I(2)) and LnIMMRATIO (which appears weakly I(0)). All unit root tests are based on the DF-GLS unit root test that allows for heteroscedasticity did not generate findings inconsistent with the unadjusted unit root results and the implications of boundedness in the logs of the ratios in *infinite* samples could be dealt with by adjusting appropriately the critical values needed to reject the hypothesis of a unit root and ended up reinforcing the more traditional test findings.[15]

[Tables 1a and 1b here]

Given that the economic variables in our test are nonstationary, it is well known that a regression using such variables to explain government size could be spurious. Nevertheless, if the residuals of the equations we estimate are stationary, as they turn out to be, we can interpret the results as evidence of an equilibrium relationship linking them to government size (Engle and Granger, 1987).

The resulting estimate of the long run model of political convergence based on the economic factors summarized in Table 1a is presented in column (1) of Table 2. Columns (2) and (3) present models of conditional political convergence and are discussed later. All estimation is conducted appropriately using least squares.

[Table 2 here]

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the AIC criterion and employ the automatic lag length selection in Eviews 6. All estimation is conducted using Eviews.

15. The substantive issue, as raised by one of our referees, is that while most of the economic variables in our analysis are found to be I(1) by conventional unit root tests, they share the common feature that their log values are bounded by construction (and theory) to lie between minus infinity and 0 (in log form). Boundedness, even as in our case one-sided boundedness, can create a problem for regular asymptotic unit root tests since the stochastic process cannot be I(1) in the usual sense. Most importantly, this implies that an I(1) series may appear to be stationary only because the boundaries impose mean reversion on the series (or prevent continuous departures from the mean). Recent work by Cavaliere (2005) modifies the Phillips-Perron unit root test to incorporate the consideration that the sample statistical process may be limited either by explicit control or its close approach to (or collision with) one or more of the model's boundaries. Intuitively, the adjustment recognizes that usual test will not be misleading if the variable's variation is far from the boundary throughout the sample period but become more misleading to the extent that closeness to the model's boundaries distort the distribution of variable outcomes. For almost all economic variables, the range of sample variation was far enough from the relevant boundary to allow us to conclude that the boundedness issue did not distort unduly our findings of nonstationarity within the sample period. On the other hand, LnIMMRATIO does present weak evidence of stationarity by standard measures and so is susceptible to the boundedness concern. Conceptually, political controls have imposed effective limits on the variation in immigration rates (since the government used immigration targets for at least part of our time period). Because the traditional evidence for stationarity was weak and may be biased by boundedness bias, we continued to use the immigration rate in our cointegrating equation.

Column (1) then presents the cointegrating equation for political convergence for the entire 1870-2000 time period. The same equation was also estimated for the shorter 1921-2000 period (for which the data are somewhat better) with broadly similar results.[16] As the adjusted Dickey-Fuller and Phillips-Perron test statistics both indicate, the equation residuals fall well inside the modified MacKinnon (1996) critical value for a cointegrating equation with six explanatory variables.[17] Thus the results indicate a cointegrating relationship among key economic variables consistent with that suggested by the literature on the government size, as amended to fit the Canadian case.

A look across the table coefficients indicates a strong degree of consistency in the sign and size of the coefficient estimates so that discussion of the findings in column (1) need not be repeated elsewhere.[18] Of particular interest is the finding that the trade openness coefficient (LnOPEN) is always negative and often highly significant. This stands in contrast to the results found by Rodrik (1998), Cameron (1978) and others based on international panel data. In Canada, greater openness is associated with a smaller rather than a larger government, perhaps because openness erodes the power of special interests and makes more difficult the collection of differentially higher taxes compared to the U.S. These effects appear to dominate any increased demand for social assistance arising from the greater insecurity associated with a more open economy.

The results in the first column of Table 2 also indicate that government size was consistently larger in periods when the exchange rate was flexible rather than fixed. Mundell-Fleming reasoning

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16. The interested reader is referred to our longer working paper for details. See Ferris, Park and Winer (2006).

17. As far as we are aware, there are no critical values for cointegration relationships with breaks occurring at known points. Gregory and Hanson (1996), for example, give approximate critical values for the ADF test of a cointegration equation with a single break arising at an *unknown* point. Hence despite the high values of the ADF statistics on equation residuals in Table 2, the implied significance may well be overstated. Because of the weakness of the ADF statistic in the presence of structural breaks, however, we also report the Phillips-Perron test coefficients. They allow a robustness test of the ADF conclusions and show results that are broadly consistent.

18. The exception is the coefficient of LnYOUNG for which all coefficient estimates are insignificantly different from zero. See the dynamic OLS results in Table 3.

suggests that fiscal policy should be more effective in altering aggregate demand under fixed rates and this may lead one to expect greater use of the more powerful instrument. However, if size variations are more effective under fixed rates, then larger changes in size may not be needed to counter effective demand failures. Moreover, flexible rates free governments from the balance of payments constraint on policy choices generally, an interpretation of the negative sign on the fixed exchange rate indicator that is consistent with the negative effect of openness on government size. Finally we note that, as expected, government size appears to be described by a process that shifted permanently upwards in the aftermath of the Second World War.

While the results in column one indicate the presence of a long-run equilibrium with known structural shifts in the intercept, it is possible that innovations in the right hand side variables are correlated. If so, the standard errors of the least squares coefficients in these equations will be inconsistent and may be overstated.[19] To assess the significance of the *individual* coefficients properly, we follow Saikkonen (1991) and Hamilton (1994) and adjust the equations and their standard errors. This requires re-estimation of the models in the first two columns of Table 2 by adding leads and lags of the first differences of all the included right side variables, and then adjusting the standard errors accordingly.[20] The results of this are presented in columns (4) and (5) respectively, and indicate that although the statistical significance is reduced somewhat, earlier conclusions about the size of individual coefficients continue to apply.[21] It proves useful to postpone further discussion of these results until the

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19. When LnGSIZE is cointegrated with the I(1) regressors (as argued above) and the I(1) regressors are not themselves cointegrated (the ADF for that equation is $|-3.21| < |-4.77|$ for the 1% MacKinnon critical value for 5 variables), then we need not worry about simultaneity bias as, at least in large samples, the ordinary least squares estimates in Table 2 will be 'super-consistent' (Hamilton, 1994, p. 588).

20. See Saikkonen (1991) and Hamilton (1994, 608-618). This involves estimating the model in Table 2 with leads and lags of first differences of all I(1) right hand side variables added, with lag and lead length determined by the AIC criterion, and then adjusting the standard errors accordingly. One lead and lag proves to be appropriate.

21. The exception is LnYOUNG, whose coefficient changes sign. LnYOUNG was consistently the weakest of our set of potential explanatory variables, never reaching significance at 10%.

model of conditional political competition is considered.

2.2 The role of political competition

We now turn to consider the encompassing hypothesis of conditional political convergence. As discussed earlier, political competition is central to the prediction that equilibria exhibit policy choices that are tuned to the interests of voters. The fact that we can establish cointegration among a set of economic factors in Table 2 is consistent with political competition as an important force. However, a simple extension of such reasoning also suggests that variations in the degree of competition should matter, a possibility that is encapsulated in the conditional political convergence hypothesis. A reduction in the degree of political competition, for example, may enable political and/or bureaucratic agents to divert public resources to private or party-specific uses by increasing public expenditure above the level predicted on the basis of the economic fundamentals alone.

In testing for conditional convergence, we thus add to the variables used a measure of the degree of competition. To construct such a measure, we follow the literature on political competition and voter turnout where, generally speaking, a less competitive situation is defined as one where, ex ante, competing political parties have a less than equal chance of winning, judged ex-post by electoral outcomes.[22] Hence a large, unbalanced win for the governing party, measured by its positive deviation either from ½ or from some fixed norm in the proportion of votes or seats won, signals that the election process was not competitive.[23] Our measure of the degree of political competition is the proportion of seats in the House of Commons won by the governing party in each election (SEATS), with a higher

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22. The work on closeness and turnout includes Filer and Kenny (1980), Cox and Munger (1989), Endersby, Galatas and Rackaway (2002), and Franklin (2004) among many others.

23. In addition to their use in the literature on voter turnout, such measures are beginning to appear in the empirical literature on policy choices (Levitt and Poterba 1999, Remmer and Wibbels 2000, Besley, Persson and Sturm 2005, and Solé-Ollé 2006).

value of SEATS reflecting a less competitive environment.[24] In the Westminister style parliamentary government of Canada, it is the share of the seats in the House of Parliament, rather than the share of the vote, that matters for legislative power.[25] As an additional indicator of the degree of competition, we sometimes add a zero-one indicator of minority government (MINORITY). In a parliamentary system, minority government lead to periods of particularly intense competition.

The construction of a measure of seats won by the governing party is an interesting conceptual problem in its own right because of the lack of clarity, from time to time, in the nature of political coalitions in Canada. For the period before 1945 we follow Beck (1968) who classified independent politicians and small parties that always voted with one of the two major parties (either Conservative or Liberal) as members of the major party.[26] For the period after the war, the official Parliamentary website alone was used to define the number of seats of the governing party, and whether or not there was a minority party in power. All results were rerun for a definition of SEATS based exclusively on the parliamentary website, with no appreciable change in conclusions.

It is important to note that since SEATS is stationary and government size exhibits a strong upward trend, we should not expect that variations in the degree of competition will lead to permanent

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24. Defining competition as a deviation from any fixed norm affects only the size of the coefficient estimated. We note that there is a second quite different competitive interpretation that one can give to SEATS. The interpretation above reflects a concern with competition *in* the current election. But the nature of the legislature after the election can also be judged by its degree of competitiveness. Because competition is needed in the legislature on an ongoing basis, a Parliament that consisted almost entirely of one political party would result in less ongoing political competition *between* elections than one in which the elected parties were of more or less equal size. In this sense the electoral threat to the governing party between elections declines with the size of the governing party's majority. Thus SEATS can serve as a measure of competition both *in* elections as well as *between* elections.

25. Thus the number of seats is the preoccupation of party strategists. We reran our estimation using the vote share of the winning party (not presented but available on request) and found, as might be expected, broadly similar (but less significant) findings. Although there are a few exceptions in Canadian history, parties that win a majority of SEATS also win a plurality of votes.

26. For example, in the election of September 1926, the Parliamentary website has the Liberal party elected with a minority of 116 of 245 seats. Beck considers the electoral outcome as a Liberal majority of 128, 116 Liberal plus 12 independently affiliated members. Using our combination of Beck and the Parliamentary website, minorities arise in 1922-26, 1957, 1962-67, 1973-74, and 1979 (15 of 131 years or 11.5% of the years). The Parliamentary website alone has minorities in 1922-30, 1957, 1962-67, 1973-74, and 1979 (19 or 14.5% of the years).

changes in the size of government. Hence by testing for conditional convergence, we are considering whether or not changes in the degree of competition produce transitory deviations from a long run determined by economic factors alone, and in this sense form part of the stochastic process explaining the evolution of long-run government size.[27]

The results of adding the stationary or I(0) variables SEATS and MINORITY to the set of I(1) variables (in columns one and two of Table 2) that has been already been shown to be cointegrated are presented in columns two and three of the table, and also in column five where the Saikkonen adjustment is made for the equation that includes SEATS alone. Because the ADF and Phillips-Perron statistics on the equation residuals in Table 2 both increase (over that in column one) and exceed the modified MacKinnon critical value (now for seven variables), these results suggest that the measure of competition does indeed form part of an enhanced cointegrating relationship. Moreover, the coefficient on SEATS remains positive and significant after the Saikkonen adjustment is applied, as shown in column five.[28] Thus it appears that a less competitive environment leads to a transitory increase (over one or two electoral periods) in the size of the public sector.[29] [30]

Column three of Table 2 also provides information on the role of MINORITY governments over

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27. Hansen and Juselius (1995, 1) point out that it is permissible to add a stationary variable (SEATS) to a set of variables that are all I(1), provided cointegration is maintained in the enhanced set of variables.

28. In the longer working paper (Ferris, Park, and Winer, hereafter FPW 2006) we show that SEATS is significant also in the sub-periods 1921-2000 and 1945-2000, with the coefficient on SEATS falling in size as the sample period is shortened.

29. We also considered the possibility that the effect of competition is nonlinear. If SEATS squared is included in addition to SEATS, the re-estimate of column three in Table 2 finds that the terms in SEATS are: 2.26*SEATS - 1.46*$(\text{SEATS})^2$, with both coefficients insignificant at 10%. Ignoring significance, this result implies that the effect of a lessening of competition on government size is concave in SEATS, peaking at SEATS = 0.77 which is slightly less than its historical maximum of 0.785. We do not carry this specification forward since the coefficient is insignificant and doing so adds little to the ability to predict over the longer term.

30. In the working paper version we also test for partisan bias in such spending changes. Those results show that *both* Conservative and Liberal governments spend more when the degree of competition declines. Although Conservative governments appear to increase their spending somewhat less than do Liberals, the difference proves to be insignificant. Hence the ideological stance of the governing party doesn't appear to matter; all parties spend more when competition is reduced and do so to more or less the same extent. See FPW (2006).

the long run. In our sample, there were 10 periods of minority government, most only a few years in duration. One possibility, noted earlier, is that these periods involve particularly intense competition and thus lead to reductions in government size. On the other hand, writers such as Weingast, Shepsle and Johnsen (1981), Kontopolous and Perotti (1999) and Persson, Roland and Tabellini (2004) suggest that representative governments suffer from a common pool problem in budgeting - a tendency to over-exploit the general taxpayer in order to deliver specific benefits to particular constituencies. Since the opposition is in a good position to extract concessions from a minority government wishing to remain in power, a positive coefficient on MINORITY would then be expected in an equation for government size. There is no indication of such a common pool problem in Table 2, however, where the coefficient on MINORITY is negative though not significant. We return later to the role of minorities in the analysis of the short run.

2.3 Economic significance and robustness in relation to the degree of political competition

Since the role of political competition is not usually investigated in empirical studies of government size, it is useful to question the importance and the robustness of our results. We begin by asking if the degree of competition is economically meaningful as well as statistically significant. One useful exercise is to simulate what would have happened to government size if political competition had remained uniformly intense, e.g., if SEATS remained equal to 0.5. To make this counterfactual comparison, we first generate for 1950 onwards the predicted value of long-run government size arising from equation (2) in Table 2. This is the dashed line in Figure 2. We then simulate long-run government size under the hypothesis that SEATS equalled ½ over the entire period. This results in the solid line. The difference between the two shows clearly that even normal levels of political competition would have eliminated a number of the most dramatic episodes of rapid government growth in the post WWII period, especially those arising during the periods of popular Conservative governments -John

Diefenbaker (1957 - 63) and Brian Mulroney (1984 - 93). For specific electoral episodes, then, it does appear that the consequences of imperfect competition have been substantial.

[Figure 2 here]

The robustness question arises with respect to our results in the first instance because large political victories could be the result of promises of larger spending, a reversal of the causality implied in the discussion so far. Hence we need to inquire into whether SEATS is statistically endogenous. To do so we use a Hausman test, where the instruments are U.S. growth and U.S. inflation rates and selected lags, and a lagged value of SEATS representing the state of competition in the *previous* electoral period.[31] That test indicates that SEATS is endogenous at 1% over the period from 1876, and exogenous even at 10% for the period from 1921. One should note that even if SEATS is endogenous, the cointegration estimations in Table 2 would remain consistent, although in that case it is no longer clear that causality runs only from competition to government size. We shall return to the endogeneity issue in relation to the short run below.

3. Politics in the Long and (Especially) in the Shorter Run

The last step in modelling the long run is to determine whether political factors other than the degree of competition and the minority status of a government play a role in creating transitory deviations from the long run trend. We then turn to the analysis of the short run.

To define a set of overtly political factors, we draw on the extensive political business cycle literature concerning the roles of political partisanship and opportunism. Following Hibbs (1977), virtually all partisan theories of the political business cycle start from the presumption that the major

31. We use the current and first two (as well as the fifth) lag of U.S. real growth and U.S. inflation, and the fifth lag of SEATS.

party on the left, in Canada the Liberal party, will spend more when in power than will their Conservative rival. Hence the inclusion of LIBERAL tests whether partisanship alone matters for a given degree of competition.[32] In addition, should such an effect be present, any diminution (or expansion) of partisan effect over the tenure of the government in power would depend on the type of party elected. This we test for using the composite variable DURATION = {(LIBERAL*ELAPSE) - (1-LIBERAL)*ELAPSE}, where ELAPSE is the time (in years) since the last election.

It should be noted that to verify a role for a political factor, such as partisanship, in relation to policy, the partisan variable simply needs to be present with the right sign in the spending equation to be consistent with the widely held view that parties ideologically on the left tend to spend more. In contrast, theories of the political business cycle (reviewed, for example, by Alesina et al 1997 and Drazen 2001) often require an element of surprise or informational asymmetry between voters and parties for changes in partisanship to produce real macroeconomic consequences. Here we are interested only in the effects of elements of the political system on policy choices, whether or not they have macroeconomic consequences. A test for an effect of political factors on government size is therefore more straightforward than is a test for their effect on macroeconomic aggregates.[33]

Opportunistic or strategic political business cycle theories (following Nordhaus 1975) often argue that incumbents use their control over policy to gain votes by manipulating aggregate demand. Other work suggests that increases in spending occur either to signal private competency (Rogoff and

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32. The test, reported in footnote 29, also examines the possible interaction between the degree of competition and partisanship and finds that interaction does not add explanatory power.

33. Haynes and Stone (1990) in their review of the political business cycle literature suggest that partisan and opportunistic effects may not be separable and test for interdependence. Our experimentation produced no instances where the interaction was significant. The second issue pointed to by Haynes and Stone - that political cycles may persist over time - is incorporated in our error-correction methodology.

Sibert 1988)[34] or to undertake actions in the hope that voters will attribute these actions to greater competency (e.g., Shi and Svensson 2006, Mink and de Haan 2005). All such theories require government size to increase in the period leading into an election and therefore predict that the coefficient of ELECTIONYEAR(-1) will be positive.[35] Moreover, given the intent either to take advantage of (or

inform) voters, the effect should wear off over time, suggesting that ELAPSE itself, independently of DURATION, ought to be included in the equation.

What is the empirical effect of these political factors, summarized in Table 1b, when they are added to the long-run convergence model? It turns out that the answer is already given by columns two and three in Table 2. That is, the absence of any other political factors in those columns represents the final stage of an iterative search for cointegration among the full set of economic and enhanced political variables.[36] This search procedure began by adding all political variables discussed above (SEATS, LIBERAL, DURATION, ELECTIONYEAR(-1), ELAPSE) to the conditional convergent equation of columns (1). The inability to find evidence of cointegration among this set, as judged by either the ADF or Phillips-Perron statistic, then led to the elimination of the least significant variable and retesting. Testing continued in this manner until cointegration was again re-established, and the model in columns two and three emerged. Such a finding implies that political variables representing the timing of elections and the switching of power between partisan opposites do not enter the cointegrating relation.

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34. In this case it is the competent politician that increases spending more (or at all), suggesting the effect may be weak. (See Mink and de Haan 2005).

35. Note that because the instrument must be used ahead of the expected effect, changes in government spending must precede the desired consequences, implying that ELECTIONYEAR(-1) or perhaps its second or third lag will be more appropriate than its current value. Experimentation with all these forms produced similar results.

36. These tests use the Beck/Parliamentary website measure of winning majorities and whether there was a minority. The tests were rerun for the competing definition, based exclusively on the official Canadian parliamentary website data, with no appreciable change in results.

We conclude that the conditional convergence model provides a reasonable long-run relationship on which we can base an error correction model of short-run adjustment.

3.1 The roles of economics and politics in the shorter run

Because economic and political variables generally have different degrees of integration, it was perhaps not surprising to find that the variables representing partisanship and political opportunism did not matter in relation to the evolution of government size in the long run. Indeed, the power of partisan and opportunistic theories of the political business cycle is their reliance on the strategic use of short-run spending (and other short run instruments) to influence voting behaviour. For this reason we look for evidence of the presence of these factors in the shorter run error-correction model.

The results of our tests for the presence of political factors in the shorter run adjustment process implied by the two models of long-run convergence in columns one and two of Table 2 are presented in the error correction equations of Table 3.[37] To reinforce these findings, the Appendix presents an extreme bounds test of the interpretation placed on these tables. Columns one and two of Table 3 present the results when only contemporaneous first differences are used in formulating the error correction model in the Engle-Granger tradition, using residuals from the appropriate cointegrating equations in Table 2 (An analysis of the short run using the Johansen technique is provided later). Columns three and four expand upon these simple models to capture more of the intertemporal adjustment process through the use of three lagged first differences.

[Table 3 here]

Column one in the table uses the residuals of the political convergence model based only on 'economic fundamentals', while column two corresponds to the conditional convergence model in Table 2 that incorporates transitory changes in political competition. Both equations (and their expanded three

37. The reader is again referred to FPW (2006) for results over the shorter 1922-2000 and 1945-2000 time period.

lagged versions in Table 4) include dummy variables to allow for breaks at the time intervals associated with the breaks found in the long run. In addition, effective representation of the wars must allow for both the rapid increase in spending during the war and its rapid subsequent decline. This requires the additional dummy variables WWIAfter and WW2After. We also include a dummy variable for those periods when the exchange rate was fixed (since the exchange regime should influence the choice of fiscal policy instrument), and a variable to represent *the change* in the scale of federal transfer payments to other levels of government as a share of non-interest federal spending net of grants, D(LnGRANT_SHARE). The latter variable expands the role of political competition in relation to the level of intergovernmental competition: D(LnGRANT_SHARE) is a measure of the success provincial governments have in the competition for federally collected funds. From the federal government's perspective, however, short-run increases in the size of federal grants remove funds from federal discretion both holding back competing federal programs and reducing the ability of the federal government to exercise short-run discretionary changes in fiscal policy.

Finally, all regressions in Table 3 also include our measure of political competition, SEATS. Hausman tests were performed on both D(LnGRANT_SHARE) and SEATS to confirm that both variables are exogenous in the present context.[38]

The resulting relationships work well, explaining between 60% and 70 % of the short-run

38. The Hausman tests for the endogeneity of D(LnGRANT_SHARE) and SEATS in the error correction model used the equation in columns 3 and 4 of Table 3. The instruments were the current and lagged values of U.S. GDP growth and inflation, as well as the fourth and fifth lag of D(LnGRANT_SHARE), to represent the previous electoral period (and the fifth lag of SEATS when that variable was considered). When we first considered the exogeneity of D(LnGRANT_SHARE) in equation (3), the Hausman test indicates that it was exogenous over the period 1876-1999. When we then considered whether SEATS and D(LnGRANT_SHARE) are jointly exogenous in the SEATS version of the error correction model in equation (4), both were again found to be exogenous. We also considered the joint endogeneity of LnRYPC and SEATS, using the same instruments (except for GRANTS). Again, joint endogeneity is rejected. In FPW (2006) we consider various sub-periods.

variation in government size over the various time periods considered.[39] In each version of the short run, the error correction term is negative as expected (for convergence to the long run to occur) and significant, and the coefficient estimates are broadly similar across equations. The size of the error correction coefficients implies that deviations from long-run size are corrected in about three to five years.

One of the interesting features of the error correction models 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 in Table 2. This provides strong evidence of a counter cyclical role for government spending. Hence the data are consistent both with Keynesian counter cyclical fiscal expenditure policy in the short run *and* with Wagner's Law in the long run. Such a result illustrates nicely how the co-presence of these two aspects of policy, implying opposing relationships of public expenditure to real income over different time horizons, can easily be lost in tests that do not distinguish appropriately the long from short run.[40]

Another feature of the estimated error correction equations is the finding that increases in the share of intergovernmental transfers (out of federal spending) are associated with significant short run declines in federal expenditure government relative to GNP. Our best guess is that these changes reflect the relative political strength of the federal government versus the provinces and so capture the negative effect of greater intergovernmental competition on federal government size.

The results in columns one and two present the outcome of the same general to specific

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39.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 Winer and Ferris (2008).

40. In addition, note that although changes in government size show no significant response to periods of fixed exchange rates, the estimated coefficient changes from negative (in the long-run model of Table 2) to positive in Table 3, suggesting as well that fiscal expenditure was used more often over the short run in periods of fixed (rather than flexible) exchange rates. As might be expected with respect to our other hypotheses, structural features of the economy which matter most for the long run show up in varying degrees of importance in the short run.

methodology as used before to reveal significant political variables. As indicated by their absence from the table, in no case was a political variable other than SEATS found to be significant. Note that rather than presenting all of the insignificant coefficients here, we again show only the equations with SEATS included, and append an Extreme Bounds Analysis (EBA) based on adding all of the political variables into the error correction version of the conditional convergence model in column three of Table 2. This EBA is presented in the Appendix to verify the significance of SEATS and the insignificance of all other political variables. The continued significance of SEATS in the fuller version of the error-correction model (when all political factors are included, which is not recorded in the table) further increases our confidence that the significant role of political competition indicated in Table 3 is robust.

Thus for Canada over this entire 1870-2000 period, neither the time period leading into an election (ELECTIONYEAR(-1)), nor the time since an election (ELAPSE), nor the partisan nature of government by itself (LIBERAL), nor the duration of partisan power (DURATION), nor periods of minority government (MINORITY) have had 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 indicate that variation in the degree of political competition does matter for explaining short-run variations in government size. Together, the cointegration and error correction results indicate that political competition plays an important role in explaining variations in government size in both the short as well as in the long run.[41]

3.2 Using the Johansen method

As a final test of the robustness of our conclusions on the importance of political competition,

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41. We also tested whether a lessening of competition allowed the governing party to satisfy its ideological preferences in the short run. As was the case in the long run, the results show that both parties increase spending when competition declines. Although Conservatives appear to increase their spending to a lesser extent than do the Liberals, there is no statistical difference between the two. See Table 4(I) in FPW (2006).

we employ the full information maximum likelihood method of Johansen (Johansen 1991, 1995) to construct a cointegration-error correction representation of the process describing the evolution of government size. This formulation allows for the possible endogeneity of SEATS in the long run by including it as part of the cointegrating relation. Placing SEATS third after LnGSIZE and LnRYPC in an ordered group of determinants that also includes LnAGRIC, LnIMRATIO, LnYOUNG and LnOPEN, and with an intercept in the cointegrating relation, the Trace statistic suggests there are 4 cointegrating relations at 5%, while the Maximum Eigenvalue test suggests that there are 3 vectors. (Omission of SEATS from the list of potential members of the cointegrating relations leads to the conclusion that there is one less cointegrating vector, as is to be expected since SEATS is I(0). See Hansen and Juselius 1995, p1)). We proceed assuming there are three vectors.[42]

Including SEATS in the cointegrating relation, with other political factors included as exogenous determinants, results in the vector error correction model partly recorded (to conserve space) in Table 4. [43] Here the AIC criterion is used to determine that 5 lags should be used, although just two of the lagged first differences terms are recorded in the table and only the error correction equation for LnGSIZE is shown.[44]

[Table 4 here]

Given the economic factors, of all the political factors considered, only SEATS matters significantly in the short run adjustment process. The error correction terms indicate that variation in the degree of political competition has important implications for government size. This is confirmed by the generalized accumulated impulse responses (to a standard deviation shock in LnGSIZE and SEATS) that

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42.Including a trend in the cointegrating relation reinforces the conclusion that there are three cointegrating relations.

43. Results for the shorter period from 1921 leads to the same general conclusions.

44. Conclusions about the political variables remain unaffected by the choice of other lag structures (from 1 to 6).

are shown in Figure 3. There we can see that the positive accumulated effect of government spending on SEATS is modest, compared to the positive effect of SEATS on LnGSIZE which appears quickly, is about twice as large as the effect in the opposite direction after five periods, and continues to increase steadily over the ten periods shown.

[Figure 3 here]

For completeness, we also include in the Appendix a Johansen analysis based on the supposition that the cointegration rank is equal to one, with the coefficient on LnGSIZE normalized to one (see Table A1). This allows comparison of the long run with the earlier results in Tables 2 and 3. We simply report here that the analysis supports the conclusion that political competition plays a significant and important role in the evolution of government size.

4. Alternative Dynamic Models and Deterministic Detrending

The error correction models in Table 3 are based on the premise that the determinants of long and short public policy are intertwined and that the long run must be modelled explicitly in order to expose appropriate short-run behaviour. In contrast, other dynamic political economy models tend not to model the long run explicitly, using instead either lagged dependent variables or Hodrick-Prescott filtering to deal with the dynamic nature of the short-run process under investigation. In this section we compare the cointegration - error correction approach with these formulations.

In Table 5 aspects of the estimated error-correction, cointegration model (in column one) are compared with five alternative dynamic formulations (in columns two to six). Only the definition of the dependent variable and the associated economic factors, as well as estimation results for the lagged dependent variable or the Hodrick-Prescott (HP) trend and their political factors, are recorded.[45] All equations use the same basic set of variables and enter the common set of political variables in the same way.[46]

[Table 5 here]

The alternatives to the error correction model are as follows: *in column two,* LnGSIZE is modelled with its lag and with economic factors in log-level form; *in column three*, first differences are used: D(LnGSIZE) is modelled using its lag and the first difference in logs of the economic factors so that this equation differs from the error correction model in column one only by the replacement of the error-correction term with $D(LnGSIZE)_{t-1}$. *In column four*, the Hodrick-Prescott cyclical component of LnGSIZE is modelled using its lag and the economic factors in first difference form; *in column five*, the same specification is employed as in column 4 except that the economic variables are also in HPcycle form; and finally, *in column six*, LnGSIZE itself is modelled using its HP trend to represent the long run, and by the first differences of logs of the economic factors and the common set of political factors to represent the short run.

In discussing these results, we focus only on the role of the political variables. In the error-correction model and in the estimated models of columns two and three, only SEATS matters. In columns four and six, none of the political factors are significant, while in column five, only MINORITY is significant. It is important to note that in the equations using HP detrending (columns four through six), the coefficient on SEATS is *negative* in contrast to the error correction results in column one and the models in columns two and three. This holds for the shorter time period as well. (For the shorter time

45. The equations that use HP detrending are estimated over periods that remove the beginning and end of the sample as these are affected by the mechanics of the detrending procedure. Estimating the other equations over the shorter period indicates that comparisons across alternative formulations are not affected by the shorter time period. We also note that use of two lags of the dependent variable as regressors does not alter the substantive results.

46. To improve comparability across equations, all t-statistics are of the Newey-West (HAC) type.

period in column six, the negative coefficient on SEATS is also significant.)

That the results using the Hodrick-Prescott filter are so different is not surprising. A key reason for the difference is evident in Figure 4, where the HP trend for LnGSIZE is compared to the prediction that arises from our preferred cointegration model (column three of Table 2). By inspection of that figure and from the table of descriptive statistics presented below, it can be seen that the long run based on the cointegration model has higher frequency elements in it and that these are skewed differently as well.[47] This difference carries over into the models of Table 5 through the various methods used to control for the long-run evolution of government size.

[Figure 4 here]

The lesson that emerges from this comparative analysis is that it does matter how the data are detrended and, more generally, how the interaction between long and shorter runs is modelled. While deterministic detrending or the use of lags to get at short-run behaviour may be convenient, our experiments suggest that explicit modelling of the long run is to be preferred.

5. Conclusions

In this paper we use cointegration and error correction analysis to study the evolution of public policy over a long period within a stable democracy. The approach is consistent with the logic of spatial voting models and tests two models of convergence: convergence to a long run defined by economic factors alone, and political convergence conditioned on the degree of political competition. The latter encompasses the first, unconditional model. The approach also allows economic factors with strong trends to be combined with measures of political competition and other political variables that are

47. The corresponding table shows that what is evident in the figure is not simply a product of including the war years in the sample.

stationary. Implementation of the convergence hypotheses requires the careful choice of a set of cointegrated economic factors that serve, along with a measure of the degree of political competition, as controlling variables in the subsequent investigation of the role of other political factors over both longer and shorter horizons.

The cointegration/error-correction approach is chosen not only to deal with the different orders of integration in economic and political variables but also because potentially distinct long and short-run aspects of public policy are intertwined in the same time series. Hence the models we have estimated formally distinguish those changes in policy that reflect desired changes in long-run government size from shorter run fiscal policy actions that arise over, or in relation to, the business and electoral cycles. This reflects our position that the study of short-run policy requires more than simply subtracting out a long-run trend; an encompassing, theoretically driven empirical approach is required to disentangle and interpret the connections that link political decision-making over different horizons.

We have applied this approach to model the relative size of non-interest, direct spending by the Government of Canada over a period that extends almost from the founding of the modern state to the beginning of the 20th century, a span of 131 years. This long time series is ideal for the present investigation and, to the best of our knowledge, has not previously been studied. Our results indicate that neither the timing of political events, the partisan nature of the governing party, nor the duration of partisan power prevent the convergence of government spending on its long-run size as defined by economic interests, conditional on the degree of political competition. Nor does there seem to be any evidence that the timing or partisan nature of party politics matter in relation to cyclical variations about that long run. Of the political factors we have considered, only the degree of political competition in both the short and the long run clearly affects the convergence of public expenditure to its long-run path defined by economic 'fundamentals'.[48] In general, it appears that less competition leads temporarily to a larger sized government (relative to its long-run path).

Comparing our results with current alternatives illustrates that how the dynamic character of a policy process is modelled does matter. Deterministic detrending and/or the application of smoothing procedures to remove the long run and expose the political factors important for the evolution of policy over the resulting short run often leads to different conclusions. In our view, the explicit modelling of the long run leads to residuals that better reflect the variation due to short-run policy choices. We think that this message will apply to many aspects of the study of public policy.

Finally, the persistent significance and quantitative importance of variations in the degree of political competition in Canada suggest that greater attention should be given in empirical research to the measurement and role of competition in forcing the matching of policy choices with underlying characteristics of the electorate.[49]

While other political environments will differ and the form of competition may change, the general nature of our findings suggests that the role of variation in the degree of political competition has received insufficient attention, and that there is a potential payoff to its more extensive study both within Canada and elsewhere.

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48. There is also some weak evidence that periods of minority government are more intensely competitive in this respect.

49. With respect to measurement, future work might consider a definition of competition based on the number of marginal political constituencies or votes, following Mayhew (1974) and others. The considerable task is to define explicitly what 'marginal' means and is a subject for another paper. With respect to policy outputs, one might also model the composition of spending, though a long time series such as used in this paper is not available.

Appendix: Data Sources, Extreme Bounds Analysis and Additional Results Based on the Johansen Approach

A. The Data

The data come from several sources: Urquhart, M.C., *Canadian Historical Statistics* and *Gross National Product, 1870-1926*, McGill-Queen's University Press 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), and the *official web site of Parliament* www.parl.gc.ca for election data. More precise definitions and sources are given below.

1. Economic Variables and Data Sources:

AGRIC = proportion of the labour 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 of the economy. 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 federal 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 are converted from fiscal to calendar years, and allows for a change in the definition of the fiscal year in 1906/07, as described in Gillespie (1991, Appendix C).

GSIZE = non-interest federal government, direct 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 / GOV**.

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.

YOUNG = 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 - 1919; = 0 otherwise. **WW1after** = 1 for 1919-1921; = 0 otherwise.
WWII = ½ in 1940, 1 for 1941 - 1945, ½ in 1946 ; = 0 otherwise. **WW2after** = 1 for 1946-1949; = 0 otherwise.
WWIIAftermath = 1 from 1946 onward; = 0 otherwise.
The WW1 and WW2 dummies apply to spending *relative to* GNP, and take into account the actual result of mobilization and demobilization as revealed by LnGSIZE in each of the world wars.

2. Political Variables and Data Sources:

The effective dating by year of each election was chosen to reflect the first year that each governing party was in power, allowing for a period of about one quarter for the new government to settle in office and begin to alter previously established spending patterns (if it so chooses). If an election was held between January and June 30, the election was assigned to the actual calender year in which the election occurred. If the election was held between July and December, it was attributed to the following year. There are only two elections in July in the sample period, little is accomplished in the summer, and elections in the fall or early winter do not leave enough time for a new government to alter spending programs before years end - the effective date of these late in the year elections is assigned to the following calendar year.

We note that data concerning SEATS, MINORITY and VOTES differs from that on the official parliamentary web site for the period before 1945. We follow Beck (1968) who makes a sensible decisions about which small parties always supported the government, and hence which effectively should be counted as part of it. On this basis:

ELAPSE = the number of years since the last election.
ELECTIONYEAR = 1 if an 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 (or effectively controlled) by the governing party.
VOTES = percentage of the popular vote won by the governing party.

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*. Hauser Printing.
Official web site of the Parliament of Canada: www.parl.gc.ca ((recording data provided by the Chief Electoral Officer)

B. Extreme Bounds Analysis

Extreme Bound Analysis Concerning Political Factors Based on Table 3, column 2
(Absolute value of Newey-West HAC t-statistics in brackets)

	Seats	Minority	Electionyear(-1)	Duration	Liberal
Eq0	0.296*				
Eq1	0.378**	0.033			
Eq2	0.296**		0.003		
Eq3	0.297**			0.001	
Eq4	0.305**				0.014
Eq5	0.377**	0.033	0.002		
Eq6	0.379**	0.033		0.0008	
Eq7	0.389**	0.034			0.015
Eq8	0.297**		0.003	0.0008	
Eq9	0.305**		0.002		0.014
Eq10	0.308**			-0.003	0.024
Eq11	0.378**	0.033	0.002	0.0008	
Eq12	0.308**		0.001	-0.003	0.024
Eq13	0.394**	0.035		-0.003	0.026
Eq14	0.389**	0.034	0.0006		0.015
Eq15	0.395**	0.035	-0.0004	-0.003	0.026
Average	0.343	0.034	0.002	-0.002	0.02
Std. Dev.	0.043	0.001	0.001	0.003	0.006

Extreme Bounds Analysis Table

Variable Name	Lower Bound	Upper Bound	% Sign. at 1%	% Sign at 5%	Standard Deviation
Seats	0.296	0.395	6.25%	100%	0.043
Minority	0.033	0.035	0	0	0.001
Electionyear(-1)	0.001	0.003	0	0	0.001
Duration	-0.004	0.001	0	0	0.003
Liberal	0.014	0.026	0	0	0.006

Notes: * (**) [***] significant at 1% (5%) (10%).

C. Cointegrating Equation and Error Correction Model of Government Size Using the Johansen Approach, 1873 - 2000, When the Number of Cointegrating Relations is Constrained to Equal One

The equation presented in column one of Table A1 corresponds to the Saikkonen version of the political convergence equation appearing as column five of Table 2. The corresponding error correction model in columns two and three then correspond to the earlier results given in Table 3, columns one and three. In this case SEATS is not included in the cointegrating relation. By inspection, it can be seen that the broad features of the Engel-Granger analysis reappear. In particular, government size is again shown to vary with income over the long run (consistent with Wagner's Law) while varying inversely over the business cycle, consistent with counter-cyclical fiscal policy.(The Johansen approach generates a higher long-run income elasticity and a smaller short-run income elasticity than does the Engel-Granger. Nevertheless, both methods concur with the opposite signed policy prediction.) Moreover, SEATS again has a positive and significant effect on government size in the error correction representation, with a coefficient that is about 2/3 of the size of the same coefficient in Table 3.

Table A1

(Absolute value of t-statistics in brackets)

Cointegrating Eqtn. With the Coeff. of LnGSIZE Normalized to 1	**-1**	**Error Correction Equation for D(LnGSIZE)**	**Contemporaneous first difference (2)**	**Lagged first difference (3)**
		Error Correction Term	**-0.098* (3.82)**	
LnRYPC	**1.03** (2.08)**	**D(LnRYPC)**	**-0.165 (0.616)**	**0.020 (0.070)**
LnAGRIC	**0.238 (0.743)**	**D(LnAgric)**	**-0.541 (1.51)**	**-0.291 (0.838)**
LnYOUNG	**-2.67*** (1.71)**	**D(LnYOUNG)**	**1.52 (0.384)**	**-1.49 (0.284)**
LnIMMRATIO	**-0.023 (0.179)**	**D(LnIMMRATIO)**	**0.019 (0.542)**	**0.002 (0.066)**
LnOPEN	**-3.45* (4.72)**	**D(LnOPEN)**	**-0.737* (3.31)**	**0.239 (1.03)**
Constant	**-5.73 (0.690)**	**Constant**	**-0.217** (2.80)**	
		D(LNGSIZE)(-1)	**0.063 (0.650)**	
		D(LNGSIZE)(-2)	**0.199** (2.10)**	
		D(LnGRANT_SHARE)	**-0.390* (5.49)**	
		SEATS	**0.199* (2.97)**	
		WWI	**0.204* (2.84)**	
		WWIAfter	**-0.084 (0.891)**	
		WWII	**0.290* (3.35)**	
		WWIIAfter	**-0.094 (1.05)**	
		FIXED EXCHANGE RATES	**-0.004 (0.140)**	
		Statistics: **No. of Observations** **Adj. R^2** **Akaike info criterion**	**128** **0.633** **-1.53**	

Notes: * (**) [***] significant at 1% (5%) (10%). Error correction process used five lagged first differences; only the contemporaneous and first lagged value are presented.

Figure 1
The Logarithm of Federal Government Expenditures relative to GNP
Canada: 1870 - 2000

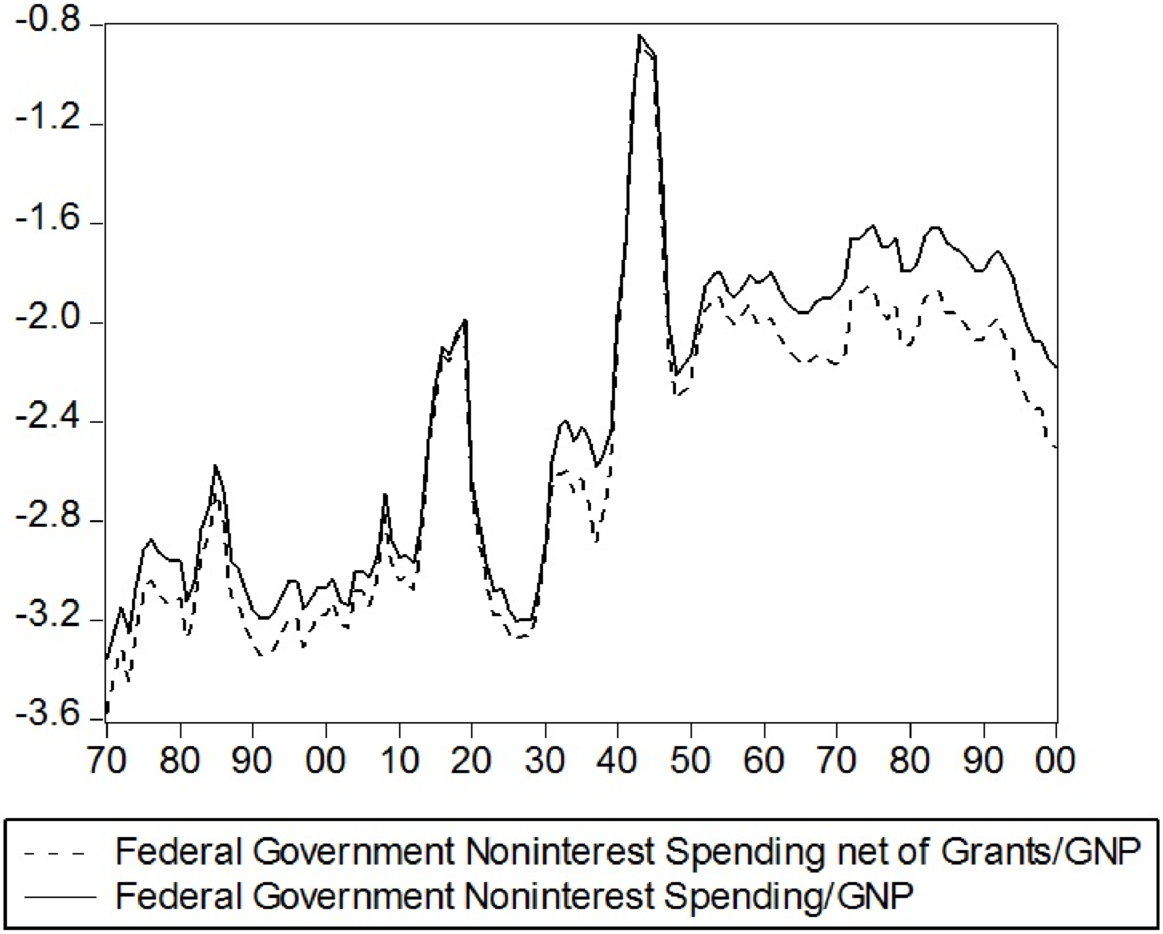


Table 1a
Descriptive Statistics for Government Size and Various Economic Factors, 1870 - 2000

	GSIZE	LnGSIZE	LnRYPC	LnAGRIC	LnIMMRATIO	LnYOUNG	LnOPEN	LnPOP
Mean	0.097	-2.52	8.67	-1.64	-4.9	3.59	-0.83	9.29
Median	0.082	-2.5	8.47	-1.09	-4.9	3.65	-0.87	9.29
Maximum	0.419	-0.87	10.1	-0.54	-2.95	3.88	-0.13	10.33
Minimum	0.028	-3.57	7.39	-3.61	-7.28	3.14	-1.18	8.2
Std. Dev.	0.068	0.61	0.81	1.02	0.89	0.19	0.22	0.67
Skewness	2.382	0.29	0.16	-0.68	-0.47	-0.84	0.99	-0.01
ADF Levels	-2.31	-2.04	-0.08	2.37	-3.25**	1.41	-0.48	-0.64
Phillips-Perron Levels	-2.41	-1.84	0.05	2.44	-2.71***	0.3	-0.36	-0.58
Elliott-Rothenberg-Stock DF-GLS	-1.6	-0.896	2.17	1.99	-3.26*	-0.66	-0.56	0.50
Phillips-Perron 1st Differences	-8.66*	-6.03*	-5.47*	-8.06*	-5.56*	-3.78*	-5.89*	-3.01**

Notes: * (**)[***] = significant at 1% (5%)[10%].
Phillips Peron critical values at 1% = -3.48; at 5% = - 2.88; at 10% = - 2.58 (MacKinnon, 1996).
Elliott-Rothenberg-Stock DF-GLS critical values at 1% = -2.58; at 5% = -1.94; at 10 %= -1.62 (MacKinnon, 1996)
Ln = denotes the natural log of the indicated variable. See the Appendix for exact definitions of variables.
GSIZE = (gross expenditure of the Government of Canada less net interest paid to the private sector and less grants to lower levels of government) / GNP.

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

	ELECTIONYEAR	ELAPSE	LIBERAL	MINORITY	SEATS	DURATION
Mean	0.267	1.649	0.588	0.115	0.601	0.168
Median	0	2	1	0	0.586	0
Maximum	1	5	1	1	0.785	4
Minimum	0	0	0	0	0.413	-5
Std. Dev.	0.444	1.37	0.494	0.32	0.087	2.142
ADF Levels	-2.99** (-5.92* with 4 lags)	-10.25*	-4.21*	-5.45*	-3.84*	-5.53*
Phillips-Perron	-17.38*	-10.60*	-4.29*	-5.44*	-4.93*	-5.54*

Notes: *(**) = significant at 1% (5%).
DURATION = {(LIBERAL*ELAPSE) - (1- LIBERAL)*ELAPSE}.
See also notes to Table 1a.

Table 2
Long Run Models of Government Size: 1870 - 2000 and 1921 - 2000
(Absolute values of t-statistics in brackets)[a]

Dependent Variable: LnGSIZE = *log (federal noninterest direct spending /GNP)*	(1) Political Convergence 1870 - 2000	(2) Conditional Convergence 1870 - 2000	(3) Conditional Convergence 1870 - 2000	(4) Political Convergence Saikkonen Eq.[#] 1872 - 1999	(5) Conditional Convergence Saikkonen Eq.[#] 1872 - 1999
Constant	-5.22 (3.57)	-6.39 (4.25)	-6.74 (4.08)	-7.19** (2.10)	-11.01* (5.86)
LnRYPC	0.25 (2.50)	0.30 (2.97)	0.32 (2..96)	0.33 (1.61)	0.60* (5.18)
LnAGRIC	0.12 (1.68)	0.10 (1.45)	0.11 (1.48)	0.11 (0.55)	0.29* (2.75)
LnYOUNG	-0.11 (0.42)	0.03 (0.12)	0.10 (0.34)	0.25 (0.38)	0.53 (1.58)
LnIMMRATIO	-0.06 (2.78)	-0.06 (2.80)	-0.06 (2.81)	-0.09*** (1.74)	-0.06** (2.34)
LnOPEN	-0.54 (4.04)	-0.51 (3.85)	-0.51 (3.80)	-0.49 (1.55)	-0.35** (2.16)
WWI	0.80 (9.07)	0.78 (8.99)	0.77 (8.69)	0.76* (4.02)	0.66* (6.79)
WWII	1.84 (15.97)	1.77 (15.23)	1.77 (15.19)	1.80* (7.93)	1.64* (13.07)
WWII Aftermath	0.81 (9.77)	0.76 (8.97)	0.75 (8.84)	0.76* (3.11)	0.82* (6.47)
FIXED EXCHANGE RATE [(b)]	-0.22 (4.71)	-0.20 (4.32)	-0.20 (4.33)	-0.19** (2.26)	-0.15* (3.42)
SEATS		0.47 (2.50)	0.41 (1.85)		1.62* (5.55)
MINORITY			-0.03 (0.51)		
Statistics:					
No. of Observations	131	131	131	128	128
Adj. R2	0.92	0.92	0.92	0.93	0.95
D.W.	0.88	0.92	0.92	0.87	1.17
AIC criterion	-0.63	-0.66	-0.65	-0.71	-0.99
ADF for residuals [©]	-4.67 AIC*** -6.28 SIC*	-6.50*	-6.54*		
Phillips-Perron	-6.42*	-6.59*	-6.26*		
Saikkonen Adj. Factor				0.523	0.876

Notes: *(**) [***] significantly different from zero at 1 (5) [10] %.
a: The t-statistics in the first three column 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. Columns (4) and (5) present Saikkonen's adjustment.
b: Periods when exchange rates were fixed (or 'heavily' managed) in Canada are: 1870-1914, 1926-1931, 1939-1951, and 1960-1972.
c: MacKinnon (1996) critical values: at 1% for 6 varbs = -5.45 using N= 131; with 7 varbs = -5.74. AIC (Akaike) and SIC (Schwartz) information criterion based on automatic lag selection in EViews 5.1. In columns (2) to (4), AIC and SIC criteria produce almost the same values.
#: 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 right side variables (with the exception of the dummy variables WWI, WWII, WWIIAftermath, and the fixed exchange rate dummy). See also Hamilton (1994, 608-618). One lead and lag of each explanatory variable is used here, but only the coefficients of the level terms are relevant and so presented. Using two leads and lags gives similar results. The standard errors and t-statistics are 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".

Figure 2
The Effect of Imperfect Political Competition on the Relative Size of Government
1950 - 2000

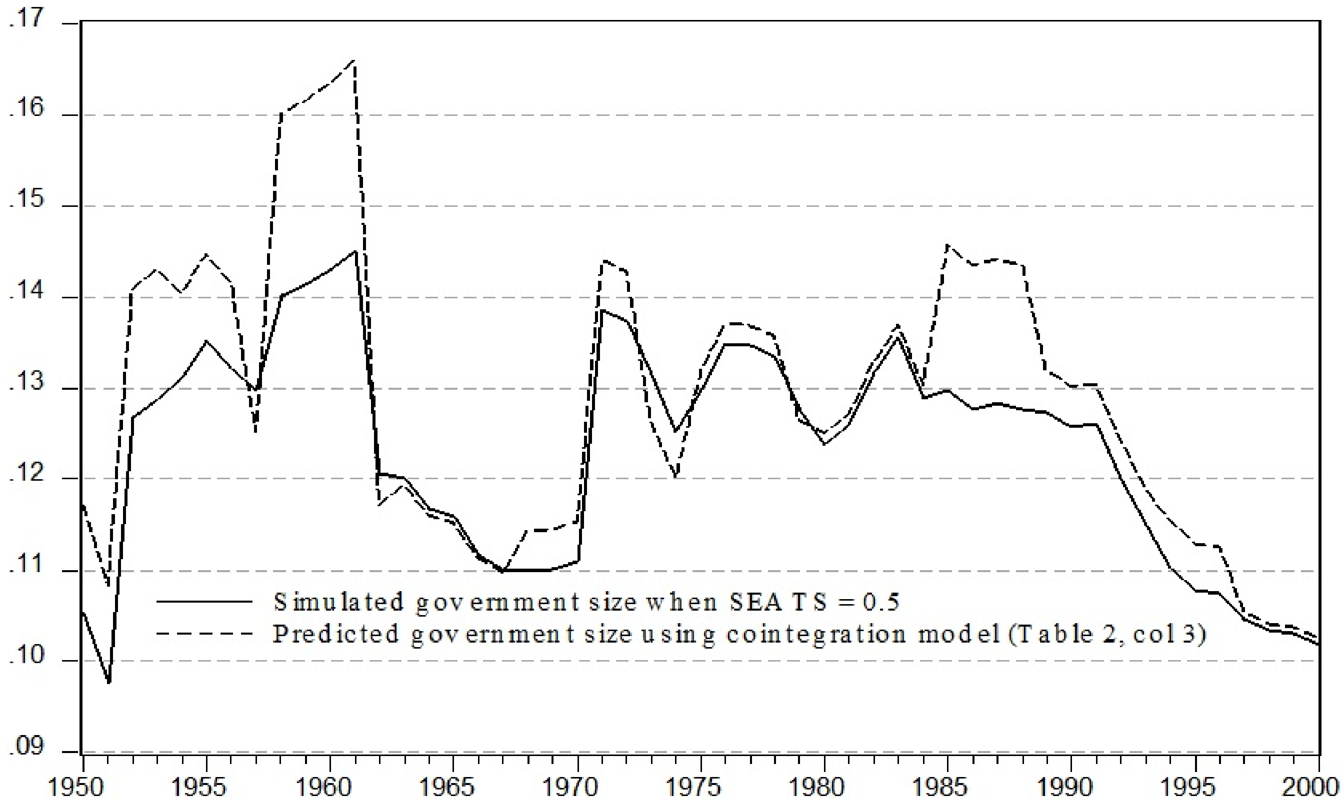


Table 3
Shorter Run (Error Correction) Models of Government Size: 1871 - 2000, 1921 - 2000 and 1946 - 2000
(Absolute value of HAC t-statistics in brackets)

Dependent Variable: D(LnGSIZE)	**(1) Political Convergence 1871 - 2000**	**(2) Conditional Convergence 1871 - 2000**	**(3) Political Convergence 1874 - 2000**	**(4) Conditional Convergence 1874 - 2000**
Error Correction term	-0.21** (2.21)	-0.21** (2.14)	-0.16 ** (2.52)	-0.15 (1.53)
D(LnRYPC)	-0.85* (3.40)	-0.84* (3.30)	-0.87* (4.00) 0.12 (0.45) 0.07 (0.30) -0.37*** (1.71)	-0.84* (3.17) 0.15 (0.69) -0.06 (0.28) -0.36*** (1.90)
D(LnAGRIC)	-0.44 (1.63)	-0.41 (1.54)	-0.22 (0.73) -0.79** (2.43) -0.24 (0.75) 0.23 (0.73)	-0.21 (0.75) -0.76* (2.65) -0.24 (0.87) 0.24 (0.93)
D(LnYOUNG)	-1.99*** (1.72)	-2.03*** (1.70)	-4.27 (1.17) 4.65 (1.08) -3.16 (0.76) -0.01 (0.002)	-3.95 (1.26) 4.19 (1.12) -3.15 (1.04) 0.18 (0.08)
D(LnIMMRATIO)	-0.09* (3.02)	-0.09* (3.04)	-0.09* (3.07) -0.01 (0.24) -0.003 (0.11) 0.04 (1.50)	-0.09** (2.58) -0.009 (0.21) 0.0006 (0.02) 0.04 (1.57)
D(LnOPEN)	-0.17 (0.98)	-0.15 (0.89)	-0.03 (0.14) -0.53** (2.58) 0.03 (0.14) -0.11 (0.64)	-0.01 (0.07) -0.54* (2.78) 0.04 (0.16) -0.11 (0.65)
Constant	-0.21** (2.17)	-0.19** (2.01)	-0.20** (2.55)	-0.18** (2.11)
WWI	0.07 (1.60)	0.07 (1.61)	0.13** (2.25)	0.13** (2.29)
WWIAfter	-0.19* (2.79)	-0.19* (2.76)	-0.21* (2.80)	-0.21* (3.10)
WWII	0.15** (2.54)	0.15** (2.48)	0.18* (3.23)	0.17* (3.21)
WWIIAfter	-0.23* (2.79)	-2.10* (3.76)	-0.27* (3.66)	-0.26* (3.84)
FIXED EXCHANGE RATES	0.03 (1.65)	0.03 (1.66)	0.03 (1.58)	0.03** (2.00)
D(LnGRANT_SHARE)	-0.40* (4.10)	-0.39* (3.77)	-0.41* (7.07)	-0.41* (4.25)
SEATS	0.34** (2.35)	0.30** (2.16)	0.29** (2.39)	0.25** (2.03)
No. of Observations Adj. R^2 D.W. Serial Corr. LM test $N*R^2$ (2lags) AIC criterion	130 0.66 1.84 4.04 -1.76	130 0.65 1.83 3.98 -1.75	127 0.68 1.98 7.12** -1.74	127 0.68 1.99 6.75** -1.72

Notes: * (**) [***] significant at 1% (5%) (10%). The error correction term used in each column is based on the corresponding column in Table 2. Lag lengths from 1 to 3 do not alter conclusions about role of political factors LIBERAL, MINORITY, DURATION and ELECTIONYEAR(-1).

Table 4
Error Correction Model of Government Size Using the Johansen Approach, 1876 - 2000[#]
Coefficients of LnGSIZE, LnRYPC and SEATS normalized to 1

(Absolute value of t-statistics in brackets)

Error correction equation for D(LnGSIZE)	**Coefficients (First two of five lags only are shown)**
Error Correction Terms **LnGSIZE** **LnRYPC** **SEATS**	 **-0.283*(4.33)** **0.306*(3.65)** **0.275*(4.23)**
D(LnGSIZE) **lags 1 - 2 only**	**0.168***(1.65)** **0.301* (3.05)**
D(LnRYPC) **lags 1 - 2 only**	**-0.310 (1.12)** **-0.103 (0.36)**
D(SEATS) **lags 1 - 2 only**	**-0.359 ***(1.88)** **-0.063 (0.38)**
D(LnAGRIC) **lags 1 - 2 only**	**-0.519 (1.31)** **-0.436 (1.12)**
D(LnYOUNG) **lags 1-2 only**	**4.904 (1.17)** **1.002 (0.18)**
D(LnIMMRATIO) **lags 1-2 only**	**0.042 (1.11)** **0.047 (1.32)**
D(LnOPEN) **lags 1-2 only**	**-0.492** (2.01)** **0.402***(1.65)**
Constant	**0.009 (0.24)**
WWI	**0.149*** (1.90)**
WWIAfter	**-0.031 (0.32)**
WWII	**0.348* (3.72)**
WWIIAfter	**-0.030 (0.32)**
FIXED EXCHANGE RATES	**-0.060** (1.95)**
D(LnGRANT_SHARE)	**-0.357* (4.90)**
Statistics: **No. of Observations** **Adj. R^2** **Akaike info criterion**	 **125** **0.642** **-1.537**

Notes: * (**) [***] significant at 1% (5%) [10%].

#. The equations for LnRYPC and SEATS are not shown here. Also, only the first two lags of the five lagged first difference terms used are shown in the table.

Figure 3

Generalized Impulse Responses Based on the Error Correction Model (Partly) Recorded in Table 4

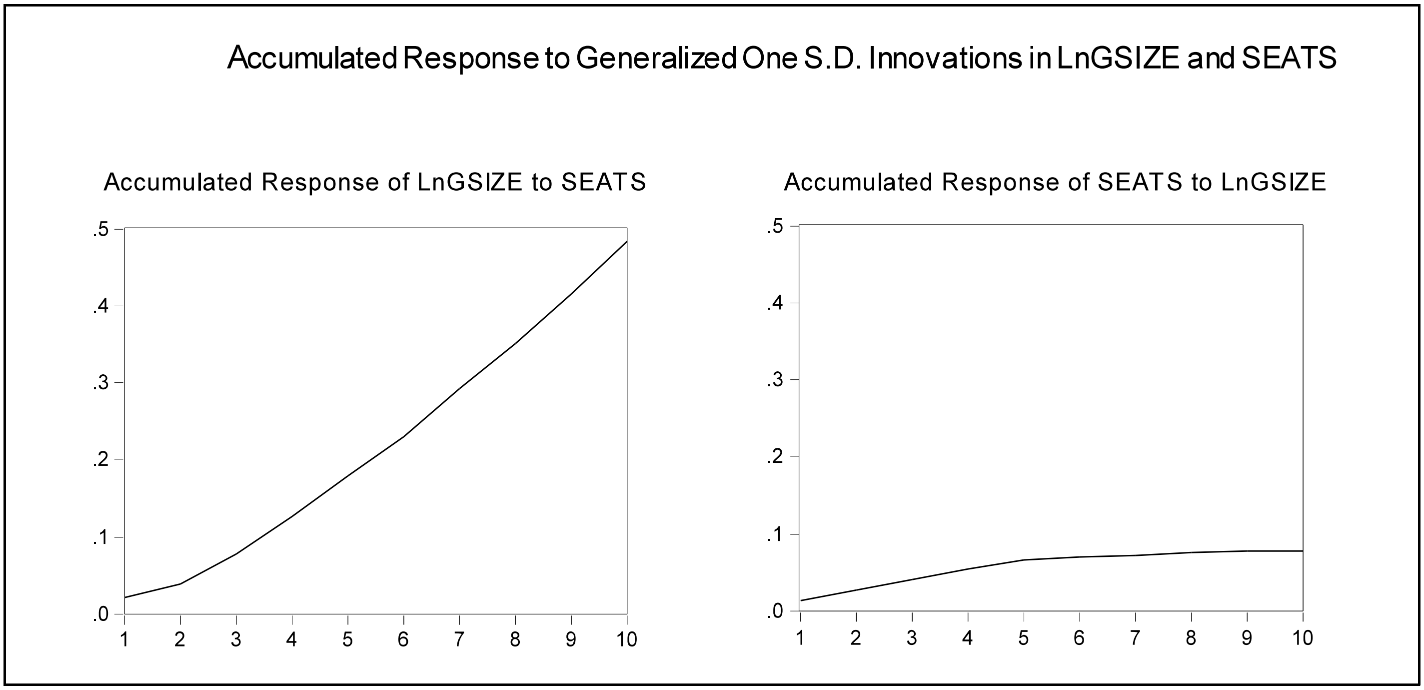


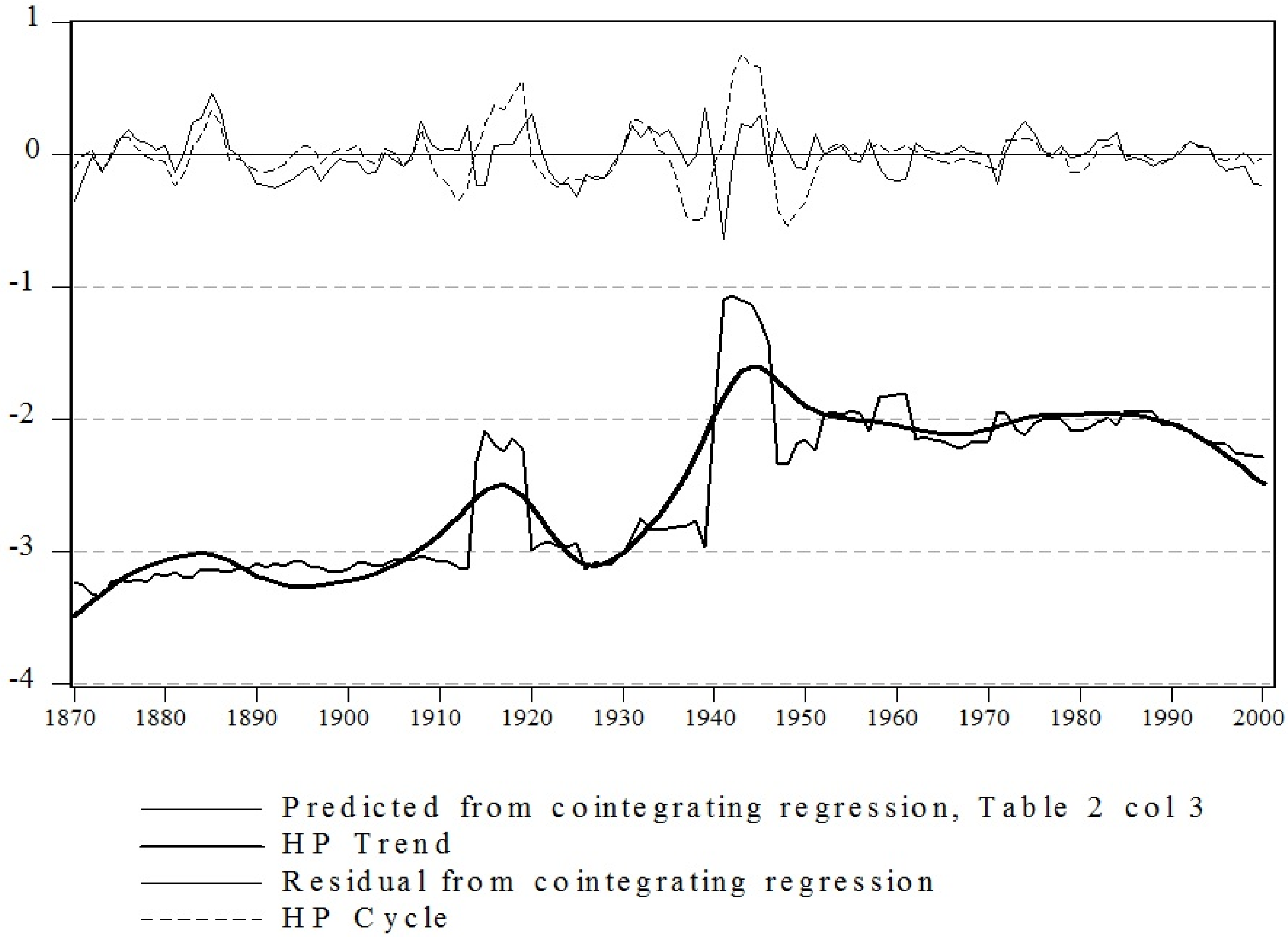
Table 5
Detrending and Alternative Models of the Short Run, Various Sample Periods

(Absolute value of Newey-West HAC t-statistics in brackets)

1871-2000

Dependent variable *(form of economic factors)*	**(1)** **D(LnGSIZE)** ***(Dlog form)***	**(2)** **LnGSIZE** ***(Log form)***	**(3)** **D(LnGSIZE)** ***(Dlog form)***	**(4) 1875-1995** **HPcycle (LnGSIZE)** ***(Dlog form)***	**(5) 1875-1995** **HPcycle (LnGSIZE)** ***(HPcycle form)***	**(6)** **LnGSIZE** ***(Dlog form)***
Error correction term	-0.223** (2.17)	-	-	-	-	-
LnGSIZE - 1	-	0.677* (12.14)	-	-	-	-
D(LnGSIZE) -1	-	-	0.096 (0.90)	-	-	-
HPcycle(LnGSIZE) - 1	-	-	-	0.694* (7.07)	-	-
HPcycle(LnGSIZE) - 1	-	-	-	-	-0.027 (0.82)	-
HPtrend(LnGSIZE)		-	-	-	-	0.966* (18.60)
SEATS	**0.395** (2.25)**	**0.523** (2.35)**	**0.274*** (1.72)**	0.004 (0.02)	-0.049 (1.26)	-0.192 (0.58)
MINORITY	0.035 (1.09)	-0.019 (0.43)	0.025 (0.90)	0.002 (0.07)	-0.036 (1.50)	-0.052 (0.76)
ELECTIONYEAR - 1	-0.0004 (0.02)	-0.022 (0.96)	0.003 (0.13)	-0.011 (0.54)	-0.002 (0.24)	-0.028 (1.26)
DURATION	-0.003 (0.65)	-0.003 (0.52)	0.0009 (0.20)	-0.0008 (0.15)	-0.002 (0.78)	-0.004 (0.40)
LIBERAL	0.026 (0.92)	0.013 (0.36)	0.013 (0.49)	0.0009 (0.04)	0.006 (0.55)	-0.007 (0.15)
Statistics:						
No. of Observations N	130	130	129	121	121	130
Adj.R^2	0.648	0.968	0.614	0.827	0.974	0.950
Ser. Corr. LM test N* R^2 (2lags) - P value	0.136	0.003	0.624	0.214	0.000	0.000
1922-2000						
	-7	**-8**	**-9**	**(10) 1922-1995**	**(11) 1922-1995**	**-12**
Error correction term	-0.343** (2.04)	-	-	-	-	-
LnGSIZE - 1	-	0.693* (8.78)	-	-	-	-
D(LnGSIZE) -1	-	-	0.240** (2.41)	-	-	-
HPcycle(LnGSIZE) - 1	-	-	-	0.562* (4.80)	-	-
HPcycle(LnGSIZE) - 1	-	-	-	-	-0.046 (0.96)	-
UPTREND(LnGSIZE)	-	**-**	-	-	-	1.113* (23.72)
SEATS	**0.348** (2.02)**	0.301 (1.36)	0.229 (1.54)	-0.173 (0.81)	-0.067 (1.51)	**-0.687*** (1.99)**
MINORITY	0.029 (0.73)	-0.015 (0.33)	0.009 (0.29)	-0.009 (0.23)	-0.042 (1.54)	-0.053 (0.99)
ELECTIONYEAR - 1	0.030 (1.22)	**-0.059** (2.34)**	-0.035 (1.24)	-0.038 (1.37)	-0.003 (0.39)	-0.042 (1.54)
DURATION	-0.009 (1.02)	-0.003 (0.37)	-0.001 (0.24)	0.0008 (0.12)	-0.003 (0.68)	0.0003 (0.03)
LIBERAL	0.056 (1.62)	**0.082*** (1.75)**	0.018 (0.53)	-0.010 (0.30)	-0.003 (0.13)	-0.061 (1.26)
Statistics:						
No. of Observations N	79	79	79	74	74	79
Adj.R^2	0.664	0.963	0.612	0.858	0.970	0.954
Ser. Corr. LM test N* R^2 (2lags) - P value	0.631	0.039	0.083	0.315	0.000	0.019

Figure 4: Explicit Modelling of the Long Run versus Using a Hodrick-Prescott Trend or Lags



1871 - 2000

For LnGSIZE	Predicted value from cointegration regression, Table 3, col 3	Residual from cointegrating regression	HP Trend (100+)	HP Cycle
Mean	-2.52	0.00	-2.52	0.00
Std. Dev.	**0.58**	0.16	**0.54**	0.21
Skewness	**0.37**	-0.17	**-0.06**	0.78
Sum Sq. Dev.	**44.26**	3.35	**38.31**	5.70
Observations	131.00	131.00	131.00	131.00

1946 - 2000

For LnGSIZE	Predicted value from cointegration regression, Table 3, col 3	Residual from cointegrating regression	HP Trend (100)	HP Cycle
Mean	-2.06	0.00	-2.06	0.00
Std. Dev.	**0.13**	0.11	**0.12**	0.11
Skewness	**-0.77**	1.51	**-2.02**	1.07
Sum Sq. Dev.	**0.88**	0.69	**0.75**	0.65
Observations	55	55	55	55

Notes: + '100' refers to the parameter of the Hodrick - Prescott filter usually employed with annual data.

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