A re-examination of an Irish government popularity function

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Abstract

This paper focuses on replication in the sense of Herrnson (1995). It re-examines the only study of an Irish popularity function (Borooah and Borooah, 1990) in the light of recent developments in econometric methodology and in Irish politics. Using error correction models the analysis provides an alternative account of the relationship between economics and government popularity to that provided by Borooah and Borooah. The findings indicate that the short-term impact of the economy is weaker than, and different from, that suggested by them. Economic influences at most set the general level of government approval rather than determine the quarter-by-quarter fluctuations.

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1. Introduction

Following seminal articles by Goodhart and Bhansali (1970) for Britain and Mueller (1970) for the United States, many studies have explored the role of economic performance as a determinant of the fluctuations over time in the popularity of governments.[1] However, there is only one published empirical study of the popularity of Irish governments, namely, that by Borooah and Borooah (1990). Modelling popularity as a function of several economic variables, and certain other variables designed to capture the effects of elections, Borooah and Borooah concluded that the popularity of Irish governments between 1974 and 1987 was explicable to a very significant extent in terms of economic factors. Moreover, they demonstrated that their equation was stable over the period studied. It appears then, on the basis of Borooah and Borooah's econometric work, that Irish governments are judged largely on the way the economy performs. In the absence of subsequent research on the topic, this view has remained highly influential to the way government popularity in Ireland is perceived (Laver and Marsh, 1993; Sinnott, 1995).

While the Borooah and Borooah result is not an unlikely one in as much as many of the attributes that are thought to increase the weight of economic effects on government popularity are present in the Irish context, there are substantive considerations which suggest that the picture of Irish politics as determined by economics should be qualified. Most obviously, the defeat of the incumbent government in the June 1997 election during a period of growth so remarkable as to merit the description of 'Celtic tiger' raises some questions

about the inevitability with which economic success is translated into political popularity. If only because of this consideration, Borooah and Borooah's conclusions are worth re-examination. However, there are other compelling reasons for revisiting their analysis. First, in the light of recent methodological debate about empirical research, there is a strong case to be made for replication of the single Irish study, as well as for its extension to the post-1987 period. Second, advances in econometrics require some reappraisal of any research which utilizes methods that are now questionable. It is therefore the purpose of the present paper to re-examine the Borooah and Borooah analysis and findings and, in particular, the conclusion that there is 'a strong contemporaneous relationship between movements in the economy and movements in political popularity' (p. 77). It is not the intention to develop a wholly new model. Rather the main aim is to replicate and extend the Borooah and Borooah study with due regard for recent developments in econometric techniques. The paper is organized as follows.

Section 2 considers how the original Borooah and Borooah results may relate to the underlying responsibility hypothesis, given the nature and evolution of the political party system in Ireland, especially since 1987. It is suggested that while Borooah and Borooah's results may have been plausible for their sample period, it is inadvisable to assume that they apply without serious qualification to the following period, during which changes took place in the agenda of Irish politics and in the Irish party system alongside reported instability of popularity functions for other countries.

Section 3 focuses on replication of Borooah and Borooah's work in the sense of Herrnson (1995), i.e. replication using different data (see below) and computer software and hardware. However, verification of certain of the Borooah and Borooah findings using their original data set was also attempted.

Although the importance of the role of replication in empirical methodology is now well established and widely accepted in economics (see Dewald et al., 1986) and political science (see King, 1995), published verification and replication studies are still comparatively rare.[2] Here verification and replication are employed as a prelude to the extension of Borooah and Borooah's approach to an enlarged and revised data set and the examination of the stability of their model over the later period 1987 to 1996. Moving beyond replication, Section 3 also draws attention to a conspicuous omission from the Borooah and Borooah analysis, namely an investigation of the time series properties of the individual data series used. Such an investigation is undertaken and a revised model estimated using the techniques associated with cointegration theory (Engle and Granger, 1987).[3] This model proves unstable in the period after 1987.

Section 4 goes on to develop an alternative model broadly in line with that of Borooah and Borooah for the whole of the 1974 to 1996 period. However, although this model is parametrically stable across the pre- and post-1987 sub-periods on the basis of a standard test, its short-term economic components are much less important than those in the models for the period analyzed by Borooah and Borooah. It seems that while economic factors can be said to drive government popularity in the long term, short-term economic changes have little effect. Moreover, the evidence from rolling and recursive regressions indicates that even the importance of long-term economic factors is waning. Section 5 gives a brief summary and some conclusions

2. Responsibility

The Borooah and Borooah (1990) conclusion concerning the strength of the relationship between economic factors and government popularity is

plausible because many of the political features thought to be associated with such strong links are present in the Irish context. In particular, there is clearly someone to blame and people are willing to shift electoral preferences having done so. An important contribution to this situation is made by a set of institutional factors which allow voters to identify responsibility for economic policy; see Powell and Whitten (1993), Anderson (1995). The Irish combination of majority coalition or single-party governments and the lack of institutionalized procedures for opposition parties to exercise real influence on policy-making exemplify such a set of structures. Another factor is an electorate which is willing to shift support between government and opposition in response to short-term cues. The Irish electorate is considered to be de-aligned in as much as a minority thinks of itself as being close to a political party; see Sinnott (1995: 152). In addition to these two factors there is evidence to suggest that issues of economic well-being are almost invariably the only salient issues at election time. With the exception of concern in 1989 over an under-funded health service, either inflation (1969-77) or unemployment (1981-92) topped the agenda at every election between 1969 and 1992 and issues of a non-economic nature have rarely featured significantly; see Sinnott (1995: 178). Polls during the 1997 election confirmed this pattern.

However, this description of Irish politics as driven by economics should be qualified. To begin with, it could be argued that the openness of the Irish economy and the increasing influence of the European Union on economic policy-making might make it more difficult to apportion responsibility for economic performance, whilst the relatively developed welfare state might mitigate the consequences of economic downturns and hence the severity of electoral punishment; see Pacek and Radcliff (1995).

Furthermore, not all Irish governments have overall majorities. In recent years there were minority administrations between 1981 and 1982 and between 1987 and 1989. In the latter case the main opposition party explicitly committed itself to support for the government policy of fiscal rectitude. It might also be suggested that the Irish party system has undergone real change away from a clearly bi-polar system in recent years with Fianna Fáil governments alternating with coalitions of Fine Gael and Labour (Mair, 1993). From 1987 onwards Fianna Fáil was either in coalition with another party or supported by another party. This may have had the effect of obscuring the alternatives for prospective voters, who would have no way of knowing the consequences for a government of giving support to any particular party. Thirdly, other developments in recent years may have obscured the responsibility for economic policy. Since the late 1980s economic policy has been based on neo-corporatist 'partnership' arrangements with employers and unions which have reflected a consensus across all parties. The increasingly strong influence of the EU may also serve the same function, as it both provides huge benefits - most recently in the shape of grants from the structural fund - and constraints on budgetary policy to meet Maastricht criteria for the single currency. Finally, the extent to which non-economic items are absent from electoral calculations can be exaggerated. The 'liberal agenda' - contraception, divorce, abortion and homosexuality reform - has occupied a lot of political attention in Ireland since the late 1970s and there is both survey evidence (Marsh and Sinnott, 1993) and evidence from aggregate data (Sinnott, 1995) that such issues have played a significant role in voting behaviour, not least in 1992. Northern Ireland now dominates the political agenda, and has never been entirely absent from it in the last 27 years. Recent Irish politics has also been characterized by a series of stories about the integrity and honesty of leading politicians from those

which eventually destroyed the 1982 Fianna Fáil government to the inquiry into the beef industry which played a major part in bringing down governments in 1992 and 1994. In the light of such circumstances, it seems somewhat more surprising that government popularity should be so dependent on economic considerations.

3. Replication and revision

Using a theory of discrete voter choice amongst parties, Borooah and Borooah (1990) suggest that a single-equation relationship based on the logistic function may be used to model the impact of the performance of Irish governments on their popularity. Their specification takes as dependent (popularity) variable the government's logarithmic lead over the combined opposition measured as the natural logarithm of the ratio of the respective proportions of support as indicated by quarterly political opinion poll responses, excluding 'don't knows'. The explanatory variables they use fall into three categories. First, several economic variables are used as the essential indicators of 'performance'. These are the annual rate of change in the consumer price index in a given quarter over the corresponding quarter in the previous year, the number of persons registered as unemployed, real hourly earnings obtained by deflating the index for nominal hourly earnings by the consumer price index, the dollar-Irish pound exchange rate, the number of new dwellings constructed, and the real interest rate given by the call money rate of interest less inflation. All the economic data were seasonally unadjusted quarterly series obtained from the OECD *Main Economic Indicators*. The second category contains various electoral dummy variables. Two of these were intended to measure the anticipated cyclical influences on popularity associated with 'fear of change' during the run up to an election and the

'honeymoon' period for a new government following an election. A further five standard 0-1 type dummies were employed to allow for any effects of the changes in government that took place in 1977Q3, 1979Q4, 1981Q3, 1982Q1 and 1982Q4; and a ± 1 type dummy was included to distinguish between Fianna Fáil and non-Fianna Fáil governments. The third group comprises lags of various (unspecified) orders of the dependent variable. The sample period used was 1974Q4 to 1987Q1.

To estimate their model Borooah and Borooah applied ordinary least squares within a 'general-to-specific' framework in the fashion of Davidson et al. (1978). This approach relies on progressive testing of a very general model to arrive at a more parsimonious specification. In addition to the levels of the economic variables, the most general Borooah and Borooah model included both first- and fourth-differences. Full details of their simplification strategy were not provided, but the detailed results relating to their final preferred equation are given by Borooah and Borooah in their Tables 1 and 2. On the basis of standard t tests, R^2, and a range of Lagrange multiplier diagnostic procedures, they claimed that these results appear to be statistically very satisfactory and suggest a prominent explanatory role for economic factors. Thus Borooah and Borooah conclude that 'it was fluctuations in the economy that led to electoral triumphs and disasters for Irish political parties' (p. 75). Finally, using the Chow test, the root mean forecasting error and a Lagrange multiplier test for predictive ability, Borooah and Borooah assess the stability of their model in relation to three possible within sample 'break points' and conclude in favour of parameter constancy.

Our point of departure was the published Borooah and Borooah equation for 'All voters' given in their Table 1. We began by re-estimating this equation using Borooah and Borooah's original data set. We then used the

same specification and source of data for the economic variables, but constructed our government popularity series independently using polls carried out by Irish Marketing Surveys (IMS) and Lansdowne Market Research, two sister companies which employ comparable survey methodology.[4] The reason for this was that the series used by Borooah and Borooah to construct the dependent variable, government lead, were considered unsatisfactory in two ways. Firstly the series combined data from two entirely different sets of polls based on different question wording: IMS polls at the start of the sample period and Market Research Bureau of Ireland polls for the latter part. Secondly, the IMS portion of the series was constructed using only part of the vote intention question; it did not include the additional data which come from prompting otherwise undecided respondents and which are normally incorporated in the published findings. We had available an extended sample covering the period 1974Q4 to 1996Q2. However, we began with the 1974Q4 to 1987Q1 period, with the intention of replicating the Borooah and Borooah findings and then examining the stability of the model over the later period 1987Q2 to 1996Q2. Many economists and political scientists now hold the view that the replication of research is an essential component of scientific methodology, and it is this view that provides the second motivation for our re-examination of Borooah and Borooah's analysis.

We verified the results reported by Borooah and Borooah using their data.[5] However we were unable to replicate the Borooah and Borooah findings using our revised data, and our results using their model and sample period would suggest rather different conclusions. The most important reason for this may be the different series for the dependent variable. Another factor is the presence of minor revisions in the OECD economic data, and small numerical differences in the inflation variable due to the fact that we defined rates of

change of the consumer price index as $(CPI_t - CPI_{t-j})/CPI_{t-j}$, $j = 1$ and 4, whereas Borooah and Borooah used the logarithm of CPI_t/CPI_{t-j}. It is well known that even slight differences in data values may produce markedly different coefficient estimates, especially in the presence of collinearity of data series and high correlations among parameter estimators. Yet there is another fact which we think undermines any attempt at precise replication and extension of the Borooah and Borooah study, namely that of the time-series properties of the variables used in their model. This fact is the basis of the third reason for our wanting to revisit the Borooah and Borooah analysis.

In the light of methodological developments in econometrics from about the mid-1980s, the omission from Borooah and Borooah's analysis of any checks on the time series properties of the individual data series constitutes a potentially serious lacuna. In particular, as their standard use of classical inferential procedures is based implicitly on the assumption that the processes generating the time series observations are stationary, it seemed essential that this matter be examined before embarking on any further analysis of the data set. Thus we carried out a variety of unit root tests on the individual series used by Borooah and Borooah. As the data are quarterly, we began by applying the OCSB test proposed by Osborne et al. (1988).[6] The procedure signals a strong rejection of seasonal non-stationarity but suggests the possibility of non-seasonal unit roots in all of the variables of interest. Consequently these tests were supplemented by standard Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) tests in which the null hypothesis of a non-seasonal unit root is assessed against the alternative of stationarity. In accordance with the earlier results, the conclusion that emerges is of strong evidence for the existence of a non-seasonal unit root in each of the variables considered. It follows that the use of ordinary least squares to estimate, and

test hypotheses about, the parameters of an equation such as Borooah and Borooah's, must be viewed with great suspicion, since in such a situation standard distribution theory does not hold in general, not even asymptotically, and classical statistical inference is invalid. Conclusions reached on the basis of the usual regression testing procedures may be highly misleading.

Given these preliminary findings, our exploration of the impact of economic factors on the Irish government's lead proceeded along the lines of the now well-known Engle-Granger (1987) two-step procedure; see the several papers in Freeman (1992), and Clarke and Stewart (1994, 1995) for explanations and applications in a political science context. Thus tests for cointegration were carried out using the ordinary least squares residuals from a static model involving the levels of the variables. Both Cointegrating Regression Durbin-Watson (CRDW) and DF tests were employed, the former perhaps being preferred because, as Bhargava (1986) has shown, it is less likely to be influenced by the inclusion of a constant in a static model. There were clear indications that government lead and the Borooah and Borooah set of economic variables are cointegrated over the 1974Q4 to 1987Q1 period; see Table 1a.[7] Therefore an error correction model (ECM) was finally constructed, starting with a general model incorporating several lags of the differenced variables, as well as the usual error-correction term and the Borooah and Borooah electoral dummy variables, and employing a progressive simplification strategy to obtain a reasonably parsimonious representation. This ECM can incorporate both short-run dynamics (i.e. the effects of quarterly changes in economic factors on the quarterly change in the government lead) and also long-run information relating to the tendency for the level of government lead and the levels of the economic variables to move together, on average, over long periods, even though these variables are non-stationary. The

error correction term in the ECM indicates the extent of the response of the short-run change in government lead to departures from this long-run tendency. The crucial feature of the ECM is that it allows these various effects to be modelled using ordinary least squares and classical techniques in a manner which avoids the 'spurious regression' problem identified earlier.

Table 1b shows the results of the preferred ECM for the Borooah and Borooah 1974Q4 to 1987Q1 period. All coefficient estimates are significant at the 0.05 probability level and signs are as expected. The adjusted R^2 is 0.72 and the model passes conventional tests for autocorrelation, non-linear functional form, non-normality and heteroscedasticity.

To a degree these results appear to reinforce one of the main conclusions of Borooah and Borooah: that changes in the government's lead over the opposition could be accounted for by the economy. What is added here is the combination of short-term dynamics and longer-term influences and the overall picture is one in which short-term economic dynamics are of very little importance. Only the yearly change in the construction of new dwellings is significant. Deviations from the long-term trend act as much the strongest determinant of changes in government lead, despite a variety of sometimes countervailing pressures. The -0.58 figure associated with the error correction term indicates that a shock to government approval will induce in the next quarter an adjustment towards equilibrium of 58 per cent of the disequilibrium error caused by that shock. In other words, adjustment is quite rapid. Of course if this shock arises as a result of an increase in something like inflation or unemployment, and this increase is sustained, the impact will be felt via the new equilibrium. Only if the shock stems from factors not explicit in the model, such as a policy success on Northern Ireland, will the effect be so short-lived.

When we extend the model beyond the sample period 1974Q4 to 1987Q1, it does not perform as well. When the model is applied to the period 1987Q2 to 1996Q2, although the adjusted R^2 at 0.68 is high, the economic parameters are much less important. The coefficient of the new dwellings variable is not significantly different from zero, even at a very high probability level, and that of the error correction term, though significant at the 0.05 level, is little more than a third the magnitude of the error correction effect in the earlier period. Moreover, when a Chow test is applied to compare the models for the pre- and post-1987 periods, a significant $F_{4,73}$ value of 5.23 is obtained. This confirms a degree of parameter instability across the two periods. It therefore seems that what worked for Borooah and Borooah's original sample period of 1974 to 1987 does not work so well after 1987. This is not of course to say that some other specification might not prove adequate for the post-1987 period. It simply demonstrates that there is instability in this model over time. While parameter instability is a common feature of popularity functions in the international literature (see Lewis-Beck, 1991) and might even be expected in the light of our discussion of responsibility in Section 2, it does merit further consideration.

4. Further revision

Before investigating the difference between the pre- and post-1987 sub-periods an attempt was made to develop a model which applies to the entire period. Using the same methodology as before, we developed the model shown in Tables 2a and 2b. The model is similar to that in Tables 1a and 1b but, while the ECM formulation is adequate in terms of adjusted R^2 (0.69) and the standard diagnostic tests, the substantive message is a little different. The number of new dwellings is again the only statistically significant short-term

economic influence, but it is weaker than in our previous model. The ECM is also significant but again is much weaker: the coefficient is only -0.27. What this appears to indicate is a pattern of fluctuation in the government's lead which owes almost nothing to short-term economic changes. Whilst the lead may shrink or grow quarter by quarter it is the overall performance of the economy which sets the level around which such fluctuations take place, although the constraining influence is much less tight than that initially found for the period 1974 to 1987.

The predictions for the levels of government lead from the error correction model summarized in Tables 2a and 2b are shown in Figure 1 along with the actual values of the dependent variable. This figure demonstrates the reasonably close fit of the series estimated with the ECM model (dotted line) to the series of actual values (unbroken line). It also shows how the actual series wanders around the equilibrium estimated from the cointegrating regression (dashed line) and is 'pulled' back to it when it is 'pushed' away by short-term forces.

Although this model passes a Chow test for parameter stability across the pre- and post-1987 sub-periods, with an $F_{5,75}$ value of 1.02, it fails a Lagrange multiplier one-step ahead prediction test, with a one degree of freedom χ^2 value of 23.01. It also yields smaller absolute values for the economic parameters and associated t-statistics in the latter period compared to the former, just as in our previous analysis. This decline in strength of influence, especially marked in the case of the new dwellings variable and error correction mechanism, is noteworthy; but of more interest is the evolution of the parameter values through time. If the economy is having less effect - which our analysis seems to indicate - can we trace this decline with some precision? Rather than examine the results from the same model in a few

arbitrary sub-periods we ran a series of rolling and recursive regressions using the model in Table 2b.[8] The recursive regressions begin with the smallest possible number of cases on which the model can be estimated and successively add a quarter and re-estimate. The resulting parameter values can be plotted over time and this is done for the error correction coefficient using a solid line in Figure 2. The decline in the absolute value of the parameter over time suggests that the influence of the economy as a determinant of government popularity is declining fairly steadily. There is no sharp break in 1987, or at any other point in time. Of course if significant changes occurred late in the sample period the weight of previous data points might somewhat obscure their impact. Thus we also calculated rolling regressions. These used sub-samples of 24 observations: hence the first regression used data from 1974Q4 to 1980Q3, the next used 1975Q1 to 1980Q4 and so on up to the period 1990Q3 to 1996Q2. The changes in the value of the coefficient for the error correction mechanism are depicted by the dashed line in Figure 2. This reinforces the message of decline conveyed by the results of the recursive regressions but also indicates a break in the pattern at one point. There are marked changes in the values of the coefficient calculated for the six-year periods over the late 1980s and early 1990s, with some indication of a reversion towards a greater impact of the economy on government lead. However, from there the trend is again of the declining impact of the economy on government popularity.

5. Summary and conclusion

This paper set out to review the evidence for Borooah and Borooah's conclusion that the Irish government's lead over the combined opposition in the opinion polls owed much to short-term economic influences. Whilst such a

conclusion fits well with a perception of Irish politics as revolving largely around issues of managerial competence, and structured through a Fianna Fáil versus The Rest party system, changes in the political agenda of Irish politics and changes in the party system make this questionable. More questions arise from an attempt to routinely replicate the Borooah and Borooah study, and from a statistical investigation of the properties of the variables employed in the original model and the subsequent revision and extension of the model.

Using the same variables, but dealing with non-stationarity by means of the Engle-Granger two-step procedure, we developed an error correction version of the Borooah and Borooah equation. While this is satisfactory for the 1974 to 1987 period covered by their study, it did not prove to be so when the sample period was extended. We therefore developed another model using the variables employed by Borooah and Borooah, and again making use of a dynamic specification including an error correction term, but this time for our full sample period 1974 to 1996. Unlike Borooah and Borooah's original model, but like our first revised model, this placed little weight on short-term economic influences, but did highlight the impact of long-term factors, even though these were less strong than in our first model. When the changing impact of the economic parameters was traced through time, the indications of decline were strongly supported, though there was some sign of a reversal in the late 1980s/early 1990s.

What does all this mean? First, our analysis demonstrates a value of replication by providing a somewhat different account of the relationship between economics and government popularity in Ireland from that provided by Borooah and Borooah. Our findings indicate that the short-term impact of the economy is much weaker, but also different from that suggested by them. It is different in as much as economic influences seem to set the general level of

government approval rather than determine the quarter-by-quarter fluctuations. This is arguably a more satisfying story than that which has the government blown hither and thither by fluctuations in the economy and which leaves little room for the influence of issues which often dominate day-to-day news. In the story told here, such factors may well have a short-lived impact on the popularity of governments, but the government's lead will tend to return - though quite slowly -to a level set by underlying economic conditions.

Our re-analysis was also motivated by questions about the continued clarity of responsibility of governments for economic performance, and salience of economic trends for the public. There are grounds for expecting some decline in the impact on approval of economic performance in recent years as a greater consensus on the direction of economic policy has become established. Our results in general seem to bear this out. However, the apparent increase in the impact of the ECM in the period of the Fianna Fáil minority government (1987 to 1989) and the Fianna Fáil - Progressive Democrat coalition (1989 to 1992) would not tie in well with such an explanation. Understanding the changing impact of long-term forces provides research questions for the future. What is clear is that Borooah and Borooah's claim that government popularity is driven by short-term economic changes has little foundation. In the light of our results the defeat of the Irish government in 1997 despite an unprecedented economic boom is unproblematic.

Notes

1. An extensive review of the literature on popularity and vote functions is given by Nannestad and Paldam (1994).
2. A notable unpublished study in political science is that by Green et al. (1996) which contains a replication and critique of the work by MacKuen et al. (1989, 1992).
3. A similar exercise, though in a different context, has recently been carried out by Clarke and Stewart (1994) and shown to lead to different conclusions from those produced by methods that do not take account of non-stationarity. We go further than Clarke and Stewart, in that we highlight the quarterly nature of the time series used and examine the possibility of seasonal non-stationarity.
4. The quarterly series is constructed from polls carried out at somewhat irregular intervals with an average of about six per year. Where there was more than one poll in a quarter these were averaged, although in cases where more than one poll was done in any one month these were averaged and then treated as a single poll. Further details on this data construction are given in Harrison and Marsh (1994).
5. Investigation of the original Borooah and Borooah data revealed that the inflation variable was recorded as a decimal fraction whereas the interest rate variable was a percentage. The implication of this is that their real interest rate variable is in error. For example, say the interest rate is 10 per cent and the inflation rate is 5 per cent, so that the real rate of interest is 10 - 5 = 5 per cent; their calculation sets the real rate of interest to 10 - 0.05 = 9.95. Thus their results do not provide real interest rate effects, as claimed, but only approximate nominal interest rate effects.
6. This procedure tests the null hypothesis that a variable, y_t, is generated by a stochastic process that is I(1,1) against the alternatives I(1,0) and I(0,1), where I(n,s) denotes that the variable is stationary after first differencing n times and seasonal (i.e. fourth) differencing s times. The test is conducted by estimating the regression equation

$$(1-L)(1-L^4)y_t = \alpha_1 Q_{1t} + \alpha_2 Q_{2t} + \alpha_3 Q_{3t} + \alpha_4 Q_{4t} + \beta_1(1-L^4)y_{t-1}$$

$$+ \beta_2(1-L)y_{t-4} + \Sigma^p_{i=1}\Phi_i(1-L)(1-L^4)y_{t-i} + \varepsilon_t,$$

   where L is the lag operator, and then carrying out separate one-sided t-type tests on the non-seasonal unit root ($\beta_1 = 0$) and the seasonal root ($\beta_2 = 0$) and also a joint F test of $\beta_1 = \beta_2 = 0$. The Q_{it}, i = 1,..,4, are seasonal dummy variables used, as suggested by Perron (1988), to allow for the possibility that the test statistics may be influenced by the four starting values of y_t; and the value of p is chosen so as to yield non-autocorrelated residuals. The detailed numerical results of this procedure (and those of standard unit root tests) for our variables are available from the authors on request.
7. Due to the possibility that more than one cointegrating vector may exist when a relationship, like the Borooah and Borooah equation, contains more than one integrated variable, the Johansen (1988, 1989) maximum likelihood procedure was also employed. The results confirm the existence of cointegration.
8. To avoid linear dependence in the required explanatory data sub-sets and so permit estimation of all of the recursive and rolling regressions, the several change of party dummy variables were replaced by a single dummy. The cost of this is to impose the constraint that the change of party effect is constant for all of the relevant time points.

Judging by the final recursive regression result compared with that of the unconstrained case for the entire sample, this is not a serious restriction.

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Table 1a. Cointegrating regression, 1974Q4-1987Q1

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Dependent variable: change in the logarithmic government lead over opposition

50 observations used for estimation

_____

Regressor	Coefficient	t-ratio
CONSTANT	1.316	1.531
INFLATION	-.026	-3.199
UNEMPLOYMENT	-.009	-6.275
REAL EARNINGS	.009	.600
EXCHANGE RATE	-.006	-3.404
NEW DWELLINGS	.352	3.028
REAL INTEREST RATE	-.003	-.468

Diagnostics

Adjusted R^2	.602	
CRDW statistic	1.321	
DF unit root test for residuals	-4.981	

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Table 1b. First revised Borooah and Borooah model, 1974Q4-1987Q1

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Dependent variable: change in the logarithmic government lead over opposition

46 observations used for estimation

———

Regressor	Coefficient	t-ratio
YEARLY CHANGE IN LOGARITHM OF GOVERNMENT LEAD	.364	7.654***
YEARLY CHANGE IN NEW DWELLINGS	.235	5.190***
ERROR CORRECTION MECHANISM	-.578	-7.116***
1983Q1 DUMMY	.263	2.468*

Diagnostics

Adjusted R^2	.720	
F statistic (d.f. 3,42)	39.553***	
Standard error of regression	.106	
Maximum of log-likelihood	40.159	

Lagrange multiplier diagnostic χ^2 tests

Serial correlation (d.f. 4)	4.645	
Non-linear functional form (d.f. 1)	.249	
Non-normality (d.f. 2)	1.015	
Heteroscedasticity (d.f. 1)	.506	

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Note: *** denotes probability $< .001$ ** denotes probability $< .01$ * denotes probability $< .05$

Table 2a. Cointegrating regression, 1974Q4-1996Q2

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Dependent variable: change in the logarithmic government lead over opposition

87 observations used for estimation

_____

Regressor	Coefficient	t-ratio
CONSTANT	-2.166	-3.116
INFLATION	-.004	-.339
UNEMPLOYMENT	-.004	-2.489
REAL EARNINGS	.057	3.257
EXCHANGE RATE	.0002	.115
NEW DWELLINGS	-.131	-1.350
REAL INTEREST RATE	-.0004	-.043

Diagnostics

Adjusted R^2	.	.190
CRDW statistic		.597
DF unit root test for residuals	-3.627	

_____

Table 2b. Second revised Borooah and Borooah model, 1974Q4-1996Q2

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Dependent variable: change in the logarithmic government lead over opposition

78 observations used for estimation

_____

Regressor	Coefficient	t-ratio
YEARLY CHANGE IN LOGARITHM OF GOVERNMENT LEAD	.253	5.514***
YEARLY CHANGE IN NEW DWELLINGS	.114	2.475*
ERROR CORRECTION MECHANISM	-.267	-5.099***
1977Q3 DUMMY	.318	2.246*
1983Q1 DUMMY	.312	2.436*
1987Q1 DUMMY	.487	3.467**
1993Q1 DUMMY	.574	4.464***
1995Q1 DUMMY	-.593	-4.230***

Diagnostics

Adjusted R^2	.694	
F statistic (d.f. 7,75)	27.523***	
Standard error of regression	.127	
Maximum of log-likelihood	57.587	

Lagrange multiplier diagnostic χ^2 tests

Serial correlation (d.f. 4)	5.595	
Non-linear functional form (d.f. 1)	5.510	
Non-normality (d.f. 2)	.165	
Heteroscedasticity (d.f. 1)	1.860	

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Note: *** denotes probability < .001 ** denotes probability < .01 * denotes probability < .05