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Essays in political economy

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ESSAYS IN POLITICAL ECONOMY

by

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ESSAYS IN POLITICAL ECONOMY

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ABSTRACT

In Essay One, the rational partisan business cycle (RPBC) theory is tested in three ways. First, using U.S. real output data for the period 1880-1948. It is found that the theory is not rejected for the period 1914-1948. Second, by exploiting the implications of the theory for the term structure of interest rates. Post-WW2 U.S. data on interest rates is found to be in conformity with the RPBC hypothesis. Third, the theory is extended to encompass the case of nations which have variable inter-election periods, and is successfully tested using output data for Canada and the United Kingdom.

In Essay Two, empirical evidence on a number of political theories of public debt determination is presented. First, it is shown that during the Great Depression, budget deficit persistence was more marked in nations with coalition governments, in accord with the power dispersal theory. Second, Granger-prediction tests are used to test whether large deficits predict future government spending in a sample of industrialized democracies. Finally, a pooled cross-section time series regression analysis reconfirms previous findings that power dispersal is a factor in explaining post-1973 budget deficit persistence in a number of countries but it is also found that the degree of central bank independence is a significant influence.
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I dedicate this work to her and to my Mother and Father.
TABLE OF CONTENTS

Introduction 1

One: Politics, Monetary Policy and the Business Cycle 5
I. Introduction 5

II. Review of the Literature 6
   a. Early contributions 6
   b. Strategic Models of the Business Cycle 8
   c. Partisan Theories 14
   d. The Rational Partisan Business Cycle Model 19

III. The RPBC Theory: New Evidence from the United States 31
   a. Does Congress Influence Monetary Policy? 31
   b. Implications of the RPBC Theory for the Term Structure
      and Some Empirical Evidence 36
   c. Tests of the RPBC Model for 1880-1948 40

IV. The RPBC Model with Variable Inter-Election Periods 47
   a. Introduction 47
   b. The Model 49
   c. Empirical Tests 51
   d. Issues in Implementing the Empirical Tests 55
   e. The Empirical Results 58

V. Discussion and Conclusions 72
Two: Political Determinants of Debt and Deficits:

  * Some New Evidence  79

I. Introduction  79

II. Models of Debt and Deficits: A Survey  82

  1. Optimal Fiscal Policy  82
  2. A Neo-Ricardian Model  88
  3. The Strategic Debt Model  90
  4. The Power Dispersal Model  110
  5. The Political Budget Cycle  120

III. An Integrated Empirical Test  125

IV. Conclusions and Policy Issues  131

Notes  132

Bibliography  133

Appendix  140
LIST OF TABLES

Essay One:
1. Interest Rate Differential, 1949-1988  38
2. Real GNP Growth and Variability  59
3. Growth of Monetary Base: Australia  60
4. Growth of Monetary Base: Canada  63
5. Growth of Monetary Base: New Zealand  66

Essay Two:
1. Net Debt/GDP Ratios, OECD countries  80
2. Income Inequality and Net Debt/GDP  91
3. Results from Parametric Tests  102
4. Results from Rank Regressions  106
5. Summary of Granger-prediction tests  109
6. Deficits and Government Type  115
7. Growth Rates and Fractionalization  119
8. Results from Panel Regression  129
INTRODUCTION

The words "policy" and "politics" have the same Greek root, suggesting they are closely related. But it is only comparatively recently that neoclassical economists have become interested in analyzing any potential links between politics and macroeconomic policymaking. In the wake of the "Keynesian revolution", the first three decades of research into macroeconomic policy were concerned with developing a normative theory of economic policy which ignored the institutional milieu within which policy choices were made. Based on the newly emergent optimal control techniques, this theory purported to show how fiscal and monetary policies - implicitly to be administered by impartial and altruistic technocrats - could be used to maximize some social welfare function. Tinbergen (1952) is a classic example of this literature.

However, in concentrating on the technical minutiae and ignoring the political context of policymaking, this research program was arguably dealing with second-order normative issues. What matters more for public welfare, it now seems clear, is getting the institutional structure 'right'. A first step in that direction is to develop a positive theory of policymaking, and test its predictions with data from nations with different institutional structures.

As a positive theory of policymaking, the traditional
apolitical approach is deficient. (Indeed, in the wake of the time-consistency critique, it also leaves much to be desired as a normative theory). In the 1960s, as economic performance deteriorated in the United States and elsewhere, it became increasingly hard to claim that erratic policy was simply the result of technical errors. Economists belatedly woke up to the fact that there were systematic biases in the policymaking process arising from the responses of rational utility-maximizing politicians to incentives. The work of the Virginia school of public choice provided a framework for building a positive theory of macroeconomic policy.

This 'New Political Economy' is the subject of the two essays which follow. In them, I extend and test some theories of macroeconomic policy determination. They have in common the theme that political institutions such as elections, political parties, and constitutional rules which delineate how power is distributed, affect policy outputs. Moreover, policy makers are not modelled as impartial technocrats seeking to implement policies for the 'common weal'. Instead, they are modelled like any other economic player, as self-interested agents seeking to maximize some objective function subject to constraints. This is not meant to deny that, for some policy makers, some of the time, there is some element of ethical consideration in their actions, a genuine belief that they are 'doing the right thing'. But since models of self-interest have proven so
effective in understanding human behavior in the economic arena, we should see how far such assumptions can help us to understand behavior in the political arena.

The models to be tested are neoclassical in the sense that they do not have any 'history' or 'psychology' in them. By this, I mean that politicians from different times and places are assumed to act in the same predictable way in response to a given set of incentives. We abstract from the particular personality or circumstances of any given policy maker. Now it may be that individual policy episodes can be better explained by knowledge of these factors. For example, May (1990) has claimed that Eisenhower ran a tight fiscal policy in 1959–60 because he did not want to aid the 1960 election campaign of Richard Nixon, for whom Eisenhower had little regard. Similarly, Weatherford (1986) argues that whether or not a President will attempt to manipulate the economy to secure re-election depends upon the strength of his ideological views on economic matters.

Whilst these contentions may well be valid, in the essays that follow the focus is on discerning less fleeting traces of political influences, those that can be picked up by the methods of statistical analysis. I also do not explore - because they are hard to model in a way useful for econometric testing - notions of learning\(^1\) and the influence of changing ideas about economic policy. But these are undoubtedly issues one would want to address if writing a
narrative history of macroeconomic policy making.

Essay One is concerned primarily with models of political influences on monetary policy, and how these can induce output and employment fluctuations. The main model to be discussed and tested is the Rational Partisan Business Cycle (RPBC) theory. Essay Two presents some new empirical evidence to help discern the relative importance of a number of recent political theories of public debt determination. The centrepiece is an integrated test of several recent models.

Notes

1. The technical barriers to modelling learning in rational expectations models are being battered down, however. See, for example, the work of Marcet and Sargent (1989).
ESSAY ONE

POLITICS, MONETARY POLICY AND THE BUSINESS CYCLE

I. **Introduction**

Prior to the contribution of Nordhaus (1975), economic policy research was for the most part normative, following the tradition of Tinbergen (1952). Building on the insights of Downs (1957) and the Virginia school of public choice, Nordhaus and others developed a positive approach to macro policy making, showing how political forces might cause monetary and fiscal policy to deviate from the path that would maximize social welfare. In essence, they attempted to 'endogenize' self-interested office-seeking policy makers in a macroeconomic model. This work spawned a new research program which we might call 'political macroeconomics'.

It is possible to distinguish two waves in the political macroeconomics literature. Within each of these can be discerned a distinction between theories which assume that politicians are vote-motivated and those that assume they are policy-motivated. The first wave, represented by the seminal contributions of Nordhaus, Tufte (1978) and Hibbs (1977), attracted a good deal of attention for a time but weak empirical support and dubious or non-existent theoretical grounding led to dwindling interest, especially in the case of the theories assuming vote-motivation.

The second wave of political models probably traces its
origins to the contribution of Barro and Gordon (1983). Models in the new tradition are, for the most part, explicitly grounded in an optimizing framework with rational economic and political actors.¹

The new wave of political models has to date been little tested, especially with data from outside the United States or before World War II. One of the reasons why tests have concentrated on the U.S. is that some of the models have to be amended in order to take account of other nation's political institutions, particularly the non-fixed nature of inter-election periods. The principal task of this essay is to show how one of the leading new models, the Rational Partisan Business Cycle (RPBC) theory can be made amenable to testing with data from outside the U.S. I also test the model using pre-WW2 data for the U.S. and show how it has implications for interest rate behavior which are not rejected by the U.S. post-WW2 time series data.

II. Review of the Literature
a. Early Contributions

The original idea of a political business cycle appears due to Kalecki (1943). Arguing from an essentially Marxist viewpoint, that the state produces policy in the interests of capital, Kalecki predicted that governments would deliberately engineer recessions in the early part of their elected term in order to instil discipline among workers.
For if governments persistently ran the economy at full employment, union power would no longer be checked by the threat of unemployment. The bargaining power of the industrial capitalists would be eroded and they would lose social position. However, budgetary policy would be eased near election time to assure the workers' vote. But after the election deflation begins again.

This line of enquiry seems to have lain dormant, even among radical economists, until the work of Boddy and Crotty (1975). They presented a more formal model along Kaleckian lines and produced some evidence on the cyclical behavior of profits which they interpreted as consistent with the model. On a more anecdotal level, Marxist commentators have argued that the deep recession which occurred in the early part of Mrs. Thatcher's first Conservative administration in Britain was a classic example of a recession designed to 'break' union power. Since the policy would have been politically unacceptable if presented in these terms, it was cloaked in the technical jargon of 'monetarism' to obscure its true purpose.

Whatever the truth of the Kalecki-Marx political trade cycle model, I shall not pursue it further in this essay. The Marxist paradigm, which takes its basic unit of analysis as class interests, is really incommensurable with the methodological individualism which marks out the neoclassical research program. It is politico-economic
models within this latter paradigm which are the subject of this essay.

b. Strategic Models of the Business Cycle

The political business cycle theory of Nordhaus (1975) is rather different, and could more accurately be described as an electoral business cycle. Macro fluctuations result from the desire of incumbent governments to maximize the probability of re-election [following the model of Downs (1957)]. It is assumed that unemployment and inflation enter into voters’ utility functions and that voters hold the government largely responsible for current and past values. The economy is described by an expectations-augmented Phillips curve, agents form expectations adaptively and the unemployment-inflation trade-off is less favorable in the long-run than in the short-run. The government is thus faced with a constrained optimization problem:

$$\text{Maximize } V(T) = \int_0^T U[u(t), \dot{p}(t)] \exp^{\theta t} \, dt$$  \hspace{1cm} (1)

where $V(\cdot)$ is the government's vote share, $u$ is unemployment, $\dot{p}$ is inflation and $\theta$ the rate of discount subject to:

$$\dot{p} = f(u) + \alpha \dot{p}^*; \quad f' < 0$$  \hspace{1cm} (2)

$$\frac{d\dot{p}^*}{dt} = \beta (\dot{p} - \dot{p}^*); \quad \beta > 0$$  \hspace{1cm} (3)
where (2) is the Phillips curve and (3) indicates that expectations are formed adaptively. $p$ is the expected instantaneous inflation rate.

The optimal policy for the government is to stimulate the economy in the run-up to the election to ensure low unemployment at voting time, then deflate after the election to eradicate inflationary expectations and prepare the stage for the next pre-election boom.

The model has been criticized by McCallum (1978) for its naive representation of the way expectations are formed. Furthermore, voters fail to perceive they are being cheated since the vote-maximization policy lowers social welfare. If workers and firms have rational expectations, prices and wages will already take account of a politically-induced monetary expansion. All that would occur is an increase in the rate of wage and price inflation, with no effect on output or employment. This criticism does not apply to fiscal policy, however. Increases in government purchases would increase output even in a neoclassical model where Ricardian equivalence holds$^2$.

There have been many empirical tests of the Nordhaus hypothesis. These can be conveniently divided into tests of whether the time path of inflation, economic growth and unemployment dance to the rhythm of elections, and tests for electoral cycles in policy instruments. Nordhaus himself produced some evidence of unemployment behavior in West
Germany, New Zealand and the United States being consistent with the model.

Tufte (1978) compared the growth of real disposable income in election and non-election years in 27 democracies for the period 1961-72 and found growth accelerated in 77 percent of election years, compared to 46 percent of non-election years. However, he did not test whether this was a statistically significant difference.

Paldam (1979) tests the Nordhaus hypothesis for 17 OECD countries for the period 1948-75. He looks at the behavior of governments which had a genuine chance of implementing a vote-maximizing strategy, typically requiring that they be in power for at least four years. He finds a significant spurt in growth in the second year of such governments, reflecting, he argues, the fulfilment of campaign promises requiring new government expenditure. He also finds that inflation tends to accelerate in the second half of administrations, which requires a tightening of fiscal and monetary policy - contrary to what is predicted by the strategic model. I note at this stage that Paldam's finding that growth spurts in the second year of administrations would not be inconsistent with the RPBC model of Alesina (1987) to be discussed in a later section.

McCallum (1978) tests for the significance of an electoral dummy variable when U.S. unemployment is regressed on four lags of itself, and finds no dummy specification is
significant in their presence. Keil (1988) performs a similar test with U.K. data and finds an electoral dummy is significant. Dinkel (1981) finds no electoral cycle in economic growth in either West Germany or the U.S. Nor does he find a cycle in the adjusted budget deficit in either nation. Monroe (1980) finds only "weak evidence" of extraordinary monetary and fiscal expansion in the months before presidential or legislature elections in France. Her analysis, however, offers no formal statistical tests of the hypothesis. Thompson and Zuk (1983) use Box-Tsiao intervention models but fail to find a systematic politico-economic growth cycle in the U.S. and they thus reject an auxiliary prediction of Tufte, that of an international electoral cycle caused by the transmission through trade of the U.S. cycle.

Maloney and Smirlock (1981) calculate the theoretically optimal unemployment rate from a Nordhaus-type optimal control model for the U.S. and find that deviations from the optimal rate enter significantly into fiscal and monetary reaction functions. Laney and Willett (1983) find that the cyclically-adjusted deficit is related to the Presidential electoral cycle and monetary policy responded systematically with about fifty percent of the full-employment deficit being monetized. Luckett and Potts (1980) use discriminant analysis to test whether monthly Federal Open Market Committee decisions on whether to tighten or ease monetary
conditions bear a systematically different relationship to inflation, unemployment and economic growth in the two years preceding an election than in the two years after one. They found no difference. Beck (1982) failed to find a shift in an estimated reaction function for the Federal funds rate in the lead-up to the 1972 Presidential election, oft-cited as a classic example of pre-election monetary easing. Golden and Poterba (1980) found weak evidence for a cycle in transfers and money supply (adjusted for the expected rate of inflation) in the U.S. but could not find a cycle in their measures of taxes or government spending. Grier (1987) finds a V-shaped 16-quarter electoral dummy significant in explaining M1 growth even after taking account of the autoregressive path of M1 and a measure of fiscal policy. But Beck (1987) finds there is no such electoral cycle when the ratio of the cyclically-adjusted budget deficit to trend GNP is included in a Grier-type regression for M1. Allen (1986) finds evidence of extra debt monetization in the two to four quarters prior to Congressional and Presidential elections. Richards (1986) shows that when the forecast errors from a Barro-type money growth equation are regressed on an electoral dummy variable, the latter is significant for the period 1960-74 but not after. He speculates that greater awareness of the political business cycle explains this. Haynes and Stone (1988) argue that a good deal of previous econometric work on the PBC theory suffers from
mis-specification. Many findings are based on the use of a step dummy variable when the theory implies a sine-wave path for the dummy. They show that spectral density estimates for inflation and unemployment in the U.S. peak at the four-year cycle. Regression tests indicate the four-year cycle aligns well with elections.

The existence or otherwise of a political business cycle in the U.K. has been re-examined by Keil (1988). He rests his case for its existence on two facts. First, there is a systematic increase in unemployment in the early years of every government from 1957 to 1980 and a corresponding decline towards election dates. Second, there is a systematic fall in real government spending in the early years of every government between 1957 and 1980 and a corresponding rise towards election dates. Additionally, he shows that a government popularity measure is significant in a monetary policy reaction function, albeit with a very small coefficient.

Reviewing the evidence in 1983, Chrystal and Alt conclude "no one could read the political business cycle literature without being struck by the lack of supporting evidence." Since then, the findings of Grier, Beck, Keil and Haynes and Stone have revived the PBC model at the empirical level. Moreover, the political budget cycle model of Rogoff and Sibert (1988) has provided a rigorous rationale for an equilibrium electoral cycle in transfer
c. Partisan Theories

Rather than modelling governments as purely concerned with trying to win the next election (vote-motivated), an alternative hypothesis is that the party in power attempts to maximize the interests of its supporting coalition of interests, subject to the constraint of getting re-elected. In the model of Minford and Peel (1982) there are three groups of voters; Conservatives, Labour and floaters (the uncommitted). It is assumed Conservatives have wealth only in the form of financial assets and Labour voters have only human capital. Floaters have both. Only the inflation rate enters into the utility function of Conservatives; only real income in that of Labour voters but both inflation and real income are arguments of floaters' utility. The economy is described by a Phillips curve with a short-run correlation between inflation and real income growth, but no long-run correlation. Agents have rational expectations. The party in power chooses the size of the budget deficit (or the rate of monetary expansion) that maximizes a weighted sum of the expected utility of its supporters and floating voters subject to the Phillips curve constraint. Since neither Conservatives nor Labourites constitute a plurality, any incumbent must also take account of the utility of floating voters.
The model predicts that Conservatives will have a lower budget deficit than Labour, and that Labour will stabilize real shocks more than the Conservatives, and nominal shocks less. The authors present evidence from the U.K. time series 1959-75 that is consistent with their model. Labour, for example, does tend to increase budget deficits more than Conservatives in response to an increase in expected unemployment.

Minford and Peel's model is a theoretical formalization of some alleged empirical regularities found by Hibbs (1977). He argued that we should expect left- and right-wing governments to institute those macroeconomic policies expected to be most favourable to their respective supporters. Since unemployment tends to be concentrated among blue-collar workers, the left-wing party would be more likely to pursue a more expansionary monetary and fiscal policy to reduce unemployment. The right-wing party would be more inflation-averse since unexpected inflation redistributes wealth from lenders to borrowers. Hibbs offers two pieces of evidence to support his claim. Data for twelve OECD nations for 1960-69 reveal a low unemployment / high inflation configuration for countries where the left-wing party was in power the longest, and a (relatively) high unemployment / low inflation configuration in countries with a predominantly right-wing executive. Second, a Box-Tsiao intervention analysis shows unemployment is lower in the
U.K. when Labour is in power and lower in the U.S. when Democrats are in the White House. Beck (1982a) criticizes both findings. The cross-sectional data, he argues, can as well be explained by the openness of the economy, following Cameron (1978) as by partisanship. The time series evidence for the U.K. and U.S. is also fragile. In the first place, Hibbs can only find unemployment lower under Labour by adding a dummy variable for the introduction of new unemployment benefit legislation in 1966, which one would suppose raised the U.K. natural rate. Second, using data through the end of the Carter administration and OLS regression rather than Box-Tsiao models, Beck concludes that party has less than half the impact on U.S. unemployment claimed by Hibbs. Administration is a better predictor of unemployment than party.

Alt (1986) argues that predictable partisan effects on unemployment in open economies only arise relative to constraints imposed by the level of world activity. Additionally, no effects should be expected where none were promised in the prior election campaign. He calculates a measure of world demand for fourteen OECD countries based on each country’s exports to other nations and estimates a transfer function intervention model for unemployment in each of the fourteen. He finds only weak evidence that change of party affects the unemployment rate once world demand is taken into account. He also finds that what
effects there are most often occur after elections where the economy was the key issue. He interprets this as support for the contention that unemployment reductions should only be expected if they were previously promised.

Given that the relationship between policy initiatives and macroeconomic outcomes is likely to be contaminated by a myriad of other factors, we might expect partisan effects to show up more clearly at the level of policy instruments. However, research along these lines has been sparse. Individual country studies include Minford and Peel (1982) for the U.K. and Beck (1984) for the U.S. Beck shows that adjusted reserves grew 2 percent per annum faster on average under Democrats than under Republicans between 1955 and 1982. But the broad partisan categorization conceals some cases that do not fit the simple partisan story; in particular the Kennedy and Nixon administrations did not perform as expected.

Cross-sectional evidence is provided by Cowart (1978) and Black (1983). Cowart regresses the central bank discount rate on inflation and unemployment for seven European economies. He tests for different slope coefficients on the two macroeconomic variables according to whether left- or right-wing parties were in power. He shows that the discount rate in West Germany and the Netherlands tended to rise more in response to inflation, and fall less in response to unemployment increases when left-wing parties held power. No
partisan effects were evident in other countries. Black estimates reaction functions for a variety of monetary instruments (including discount rates) in ten industrialized democracies. These reaction functions are seen as being derived from an intertemporal policy optimization framework. He does not systematically test for partisan effects in these reaction functions, but instead adds political dummy variables on a selective basis. For example, the reaction functions for the U.K. include a dummy variable for the Heath government for one policy instrument and a dummy for the Thatcher government in another - but they do not appear together. On the basis of his regression estimates, Black concludes that partisan effects do help explain monetary policy: typically, monetary policy is more restrictive under Conservative governments.

Frey and Schneider (1978) blend the political business cycle and partisan models. Governments pursue ideological goals unless there is a danger of losing the next election, at which time a government, irrespective of stripe, will adopt a strategic policy to maximize the probability of re-election. They estimate fiscal reaction functions for the U.K. which include a popularity variable and find they cannot reject their model. Alt and Chrystal (1983) criticize these findings however, claiming that a permanent income model for government expenditure is a superior predictor. They contend that public expenditure plans are too "sticky"
to be changed in response to fluctuations in popularity.

Much of this partisan literature suffers from a weak theoretical basis, making it difficult to interpret empirical results. Again, the rational expectations critique is a powerful argument against models which rely on partisan monetary policy as a cause of different unemployment outcomes. If agents know the objective functions of the parties, how can the left-wing party use monetary policy to stimulate output and employment? Expecting accelerated monetary growth, people would simply incorporate this information in wage and price decisions, resulting in higher inflation and unemployment unchanged at the natural rate. Similarly, the fiscal policy models of Frey and Schneider and Alt and Chrystal are ad hoc formulations.

We now turn to the new generation of models which are derived in an explicit optimizing framework. They spell out the preferences of private agents and government, and the political and economic constraints they each face. The remainder of this essay investigates the new models of monetary policy, while the second essay looks at models of fiscal policy.

d. The Rational Partisan Business Cycle Model

Alesina (1987) presented a model which produces a business cycle at the electoral frequency as a result of uncertainty among wage-setters about the type of monetary
policy likely to prevail after an election when there are two parties with different objectives. Alesina and Sachs (1988) found the model could explain features of the U.S. post-war real GNP pattern. Below I first set out the model in detail and then highlight what are likely to be critical maintained hypotheses in the model.

i. The Model

The economy is characterized by a standard supply function, expressed in rate of growth terms:

\[ y_t = \bar{Y} + \alpha (\pi_t - w_t) \quad ; \quad \alpha > 0 \tag{1} \]

where \( \pi \) is inflation, \( w \) is nominal wage growth and \( \bar{Y} \) is the rate of growth of output compatible with a given natural rate of unemployment. Private agents are viewed as uncoordinated wage-setters who set the nominal wage. They attempt to keep the real wage at a level consistent with maintaining the natural rate. Wage contracts last for one period and are signed at the end of the t-1th period to be in force in time t. Contracts are not state-contingent; full indexation in particular is ruled out.

Wage-setters set the nominal wage according to

\[ w_t = \pi_t^e = E[\pi_t | I_{t-1}] \tag{2} \]

where \( \pi_t^e \) is the expected rate of inflation, conditional on the information set \( I_{t-1} \).
Substituting equation (2) into (1) we obtain:

\[ y_t = \alpha(\pi_t - \pi_t^e) + \bar{y} \] (3)

There are two parties in this economy, denoted without loss of generality D and R. They differ in two respects. First, though both parties view inflation as bad, the D party is more sensitive than the R party to the cost of unemployment. So D has a stronger incentive to generate unexpected inflation to promote growth. Second, apart from unemployment considerations, the two parties disagree about the optimal inflation rate. Party D believes in higher government spending (for example, on transfer payments) and is willing to use seigniorage to finance this. So the D party's optimal inflation rate exceeds that of the R party.

Alesina assumes the following cost functions for D (\(Z^D\)) and R:

\[ Z^D_t = \sum_{t=0}^{\infty} q_t \left[ \frac{1}{2} (\pi_t - c)^2 - b'y_t \right] \] (4)

\[ c > 0; \quad b' > 0; \quad 0 < q < 1 \]

\[ Z^R_t = \sum_{t=0}^{\infty} q_t \left[ (\pi_t^2) \right] \] (5)

c represents the optimal fully anticipated inflation rate for D.

Substitute (3) into (4) to obtain:

\[ Z^D_t = \sum_{t=0}^{\infty} q_t \left[ \frac{1}{2} \pi_t^2 - b(\pi_t - \pi_t^e) - c\pi_t \right] \] (6)
where $b = b'\alpha$ and $z^0 = \frac{-z^0_t - \frac{1}{2} c^2}{1 - q}$

For analytical convenience, the policymaker is assumed to be able to control inflation directly, but this is not crucial. Appending a quantity theory equation complicates the algebra without changing the analytical results. It is further assumed that the government has control over the central bank. This assumption is discussed in more detail later.

Elections take place at discrete intervals of $N$ periods, with $N$ given exogenously. Elections are held at the beginning of the period. The elected party chooses its policy (i.e. rate of seignorage) straight after the election. The probability distribution of electoral outcomes is assumed exogenous and known. The D party is elected with probability $P$ and R with probability $1-P$. For simplicity, $P$ is assumed to be constant at each election. More generally, as the distribution of voter preferences between L and R policies changes, so would $P$ differ from election to election.

In a discretionary regime the policymaker minimizes his cost function, taking as given the current and future actions of the public and his own future moves. The outcome will be the one-shot Nash equilibrium.
The timing of events is seen as follows: polls are taken, from which people derive probability estimates for election outcomes. Contracts are then signed, after which elections are held and policy chosen.

If party D is elected at time $t$, in every period it solves

$$\min_{\pi_t} \left[ \frac{1}{2} \pi_t^2 - b(\pi_t - \pi_t^e) - c\pi_t \right]$$  \hspace{1cm} (7)

The solution is $\hat{\pi}_t^D = b + c$  \hspace{1cm} (8)

Party R solves an analogous problem if elected, and this gives:

$$\hat{\pi}_t^R = 0$$  \hspace{1cm} (9)

If $t$ is an election year then

$$w_t = \pi_t^e = P \mathbb{E}_t[\pi_t^D] + (1-P) \mathbb{E}_t[\pi_t^R]$$  \hspace{1cm} (10)

In non-election years, wage-setters have perfect foresight.

Alesina lists four testable implications of the model.

(i) Output will tend to grow faster than average after the D party is elected and slower than average in the period after the R party is elected. But in the off-election years output grows at the trend rate whoever is in power.

(ii) The more polarized the political parties, the greater will be output variability.
(iii) Inflation will be higher under the D party.

(iv) The greater the expectation of an R victory prior to an election, the smaller the ensuing recession if the R party is indeed elected.

One further implication of the model is that the real wage is counter-cyclical, a feature it shares with other contract models such as Fischer (1977). There has been substantial empirical work on this issue, with little evidence of a negative correlation between real wages and output (e.g. Geary and Kennan, 1982). An important exception to these findings, however, is Card (1990).

Alesina (1988) and Alesina and Sachs (1988) present empirical evidence which suggests we cannot reject the model on the basis of the U.S. data for the period 1948 to 1984. This empirical evidence consists of three forms:

(1) Evidence of partisan differences in monetary growth rates.

(2) Evidence that growth performance is below average in the first half of Republican administrations and above average in the first half of Democrat ones; but there is no significant differences in the second half.

In tests of the model for the U.S. for 1948-84, Alesina (1988) estimated the following regression:

\[ y_t = b_0 + b_1 y_{t-1} + b_2 R1_t + b_3 D1_t + b_4 OIL_t + b_5 D2_t + u_t \]

where \( y \) is a measure of output, \( R1 \) and \( D1 \) are political
dummy variables taking on the value 1 for the first 8 quarters of an administration and zero otherwise, D2 is a dummy taking the value 1 in the second half of Democrat administrations and OIL is a measure of the real price of oil. \( b_2 \) is significantly negative and \( b_3 \) is significantly positive, while \( b_5 \) is insignificant.

(3) Non-rejection of cross-equation restrictions in a nonlinear estimation of the equation system implied by the model.

ii. Discussion of maintained hypotheses

There are a number of maintained hypotheses in the RPBC model which may, if incorrect, lead to model rejection.

(1) It is assumed that parties have different (and constant) preferences over inflation and unemployment. Thus the model assumes that partisan differences in policy objectives show up consistently. If this is not the case, the source of policy uncertainty will be attenuated. Some previous empirical work suggests that the assumption of constant partisan cost functions may not be completely valid. For example, the 'bursty' theory of Alt (1985,1986) suggests we should only expect an incoming administration to make a difference to unemployment (or, presumably, inflation if that is perceived as the "number one" problem) if it has promised before the election to take action to correct the problem. This can be seen as a refinement of the idea of the
fixed party objective function as exists in the RPBC model and which is implicit in the earlier Hibbs model. Woolley (1988) presents evidence which seems to call into question the validity of a constant party objective function in the U.S. and lends support to Alt's theory. He estimates a reaction function for the Federal funds rate for the period 1957-84 using non-overlapping 48 month periods. He finds that coefficients on unemployment and inflation are unstable and there is no easily detectable partisan difference. But his results are consistent with policy bursts at points where there is a change of administration. In transitions from Republican to Democrat administrations the policy response to unemployment usually became stronger, whilst when Democrats gave way to Republicans, the the inflation response rose (the Ford-Carter transition being an exception). He concludes that policy weights change over the course of an administration, reflecting changing popular preferences about policy problems which parties must address because their core support is not sufficient to guarantee re-election.

Cukierman and Meltzer (1986) present a model of a policymaker with changing preferences; policy weights evolve as a random variable so that the public has to form an estimation of the current period objective function. But Blackburn and Christensen (1989) argue that, far from being a random process, policy objectives are likely to change in
response to policymakers learning about the effects of policy. This can potentially explain why, since the late seventies, governments in many countries have abandoned their previous commitment to full employment as they realized the limits to their ability to force unemployment below its natural rate. Within the context of the model above, this would be revealed as a change in the parameters of the left-wing party's cost function. As a result we might expect to see a smaller inflation differential between left- and right-wing governments and less output variability. This could also be interpreted in terms of Alesina's (1987) reputational equilibrium argument. As parties interact in the policy arena, he shows that they may learn that both can be made better off by reducing the inflationary bias to policy.

At a more fundamental level, one might ask what is a political party and why does it adopt the policies it does? All the partisan models reviewed earlier, including the RPBC model, ignore this question although it is an important one. Political parties are not monolithic; they are made up of different factions, each with a different viewpoint on the policy that the 'party' should put before the electorate. Compare, for example, the policy platforms of Kennedy and Carter in the 1980 Presidential election. As different factions within the party gain power, the latter's objective function is very likely to change.
(2) It is assumed that the government controls the central bank. This is an important assumption since, if the central bank is independent, then it is less likely we would observe partisan differences in monetary growth rates. Research on central bank independence by Bade and Parkin (1985), Fair (1980) and Masciandaro and Tabellini (1988) is summarized by Alesina (1988). The degree of independence is classified according to factors such as institutional and formal relationships between the bank and the executive (for example, whether there are government representatives on the board of directors); the extent of informal contacts between central bankers and members of the executive; budgetary and financial relationships between the bank and the government; and macroeconomic relationships such as rules forcing the central bank to monetize debt. Based on assessments along these lines, each bank is assigned to one of four groups, with group 1 being the least independent and group 4 the most. These assignments are shown below:

Group 1: Italy (pre-1981); Spain; New Zealand; Australia

Group 2: Italy (1981-); France; Sweden; Denmark; United Kingdom; Norway; Netherlands; Canada; Belgium

Group 3: United States; Japan

Group 4: Switzerland; Germany

Source: Alesina, Table 9.
This line of research would suggest that partisan differences in monetary policy may be weaker in countries in groups three and four. However, as the extensive literature on Federal Reserve behavior reviewed earlier indicates, the nominal independence of the U.S. central bank has not prevented political manipulation of monetary policy. Moreover, the clash between the Bundesbank and the executive over the appropriate currency unification policy for East and West Germany in 1990, where the central bank had to back down, shows that even the most independent bank is not wholly immune from political forces.

(3) It is assumed that fluctuations in real output arise from unanticipated monetary growth. This issue lies at the heart of current business cycle research. Pre-rational expectations monetarist models predicted that monetary policy could affect output in the short-term, whether or not that policy was anticipated. Early macro models that incorporated rational expectations suggested that only unanticipated shifts in monetary policy could affect real output. Empirical work by Barro (1977) supported this view. However, Mishkin (1982) and others showed that anticipated money also affects output. Disillusion with this line of research led proponents of modelling business cycles as an equilibrium phenomenon to abandon monetary explanations for output fluctuations. Instead, business cycles were seen as resulting from real factors, especially technological shocks
to the production function.

Hoover (1988) reviews the evidence for business cycles as a supply-side phenomenon. There have been four main types of evidence. First, claims that real business cycle models closely mimic the variances and covariances of several real macro variables. However, it has not been shown that other models could not equally achieve this. Second, failure of Granger-causality and vector autoregressions to show money influencing output in the United States. But, as Hoover points out, in fact the Federal Reserve targeted interest rates for most of the post-war era, so that they would contain information about monetary policy and would cause money to be statistically insignificant in these tests. Third, the finding by Barro and Hercowitz (1980) that there was no relationship between revisions in money supply data and changes in output. Whilst this is consistent with the real business cycle model, it is equally consistent with non-market clearing monetary models. Fourth, evidence that real GNP has a unit root. Since this implies that output innovations are highly persistent, this was taken to be highly damaging to monetary interpretations which imply that innovations die out relatively quickly. However, it has become clear that these tests do not have much power to discriminate between a random walk and a first-order autocorrelation process with a coefficient close to unity. West (1988) has shown that the Taylor contracting model in
which money causes fluctuations in real GNP implies just such a first-order autocorrelation process.

Moreover, a class of real business cycle models incorporating endogenous technological shocks model investment in R & D by firms as a function of the state of demand. An increase in demand resulting from, for example, a rise in monetary growth, could stimulate R & D and give rise to technological innovations which would have a long-lasting effect on output. Thus, unit root tests would tell us nothing about the source of impulse for output innovations. In conclusion, the case against the monetary interpretation of the business cycle is far from proven.

III. The RPBC Theory: New Evidence from the United States

1. Does Congress Influence Monetary Policy?

Shepsle (1988) has questioned the one-dimensional nature of political influence on monetary policy that underlies the RPBC model and others. There are other political agents such as Congress which could also affect policy and should be modelled explicitly. In defence of Alesina's approach, it should be pointed out that there is a sizeable literature examining the influence of Congress on monetary policy and the bulk of it finds little evidence of any significant Congressional imprint. Woolley (1984) argues that the House and Senate Banking Committees, which have
nominal jurisdiction over monetary policy, have exerted no consistent pressure on the Federal Reserve one way or another. The conventional view of Congressmen held by political scientists is that they are primarily interested in getting re-elected (Mayhew, 1974). According to Woolley, most Congressmen do not see involvement in monetary policy as providing a good payoff in this regard. The issues are difficult to understand and do not offer easily identifiable benefits to constituents. Serving on the Banking committees carries low prestige and these consequently have a relatively high turnover. Congressional initiatives on monetary policy tend to be strongest at times of high interest rates: Kettl (1986) regressed the number of bills related to reforming the Federal Reserve introduced in Congress each year on the level of the interest rate and found a significantly positive correlation.

An apparent watershed in Congressional oversight was House Concurrent Resolution 133, passed in 1975 in the aftermath of a deep recession. It directed the Fed to expand the money supply to facilitate early recovery, and to ensure the long-run growth of monetary aggregates was commensurate with achieving long-run potential output. However, according to Woolley, Congress failed to follow up on HCR 133 by demonstrating persistent concern. This is documented by Davis (1978) who shows there was desultory attendance at the new Congressional oversight hearings on monetary policy set
up as part of HCR 133. Weintraub (1978) offers further
evidence that monetary policy is far more subject to
influence from the executive than from the legislature. I
present some more formal tests for Congressional influence
below.

To test for Congressional influence, I re-estimated the
equation for money growth that Alesina (1988) fit to the
post-war data, but now add a variable which is designed to
capture the partisanship of the House and Senate Banking
Committees and test for its significance. The test focuses
on these committees rather than Congress as a whole because
committees are the centrepiece of legislative policymaking.
If Congress has any influence at all on monetary policy, it
should be observed here.

The partisanship measure - or perhaps ideological
measure would be a more accurate description - is obtained
as the average value of the "liberal quotient" of the
members on the Senate and House Banking Committees. The
"liberal quotient" was obtained from the annual rankings
issued by Americans for Democratic Action. For each year
from 1951-1984, I obtained the ADA rating for every member
of the two Congressional banking committees, and divided the
total by the number of members for each committee. The
committee "liberalness" should enter the equation with a
positive coefficient if it is assumed that the more liberal
are the banking committees, the more likely they are to push
for an expansionary monetary policy.

The estimated equation for the growth rate of M1 for the period 1951-1984 was (standard errors in parentheses):

\[
D\text{M}_1_t = 0.0596 + 0.3065 \; D\text{M}_{1, t-1} + 0.0087 \; G\text{N}_t + 0.0193 \; \text{PRES}_t \\
(0.0241) \quad (0.1089) \quad (0.0016) \quad (0.005) \\
- 0.0016 \; H\text{SE}_t - 0.00001 \; \text{SEN}_t \\
(0.0004) \quad (0.0004) \quad R^2 = 0.769 \quad D.W. = 1.9
\]

\( \text{UN} \) = unemployment rate; \( \text{PRES} = 1 \) for Democrat; \( \text{HSE} \) and \( \text{SEN} \) are the liberality measures for the House and Senate banking committees. Economic data was taken from the Economic Report of the President, 1988.

The above results are in line with those previously reported by Alesina (1988) and Alesina and Sachs (1988). However, the measure of House liberality is perversely negative and significantly different from zero. A possible explanation for this unexpected result is that the House variable is picking up some of the effect of the President dummy; the House composition tends to move in the opposite direction to the White House incumbent in mid-term elections. This was particularly true in the period 1950-60 and I found that when re-estimating the above equation for the sample period 1961-1984, the House variable stays negative but we cannot reject its being equal to zero at conventional confidence levels. In both cases, the Senate variable is insignificantly different from zero.
I also ran regressions including the rate of inflation, and I find that for 1965-1984, money growth responds negatively to inflation but the Presidential dummy is still significant. But including the inflation rate did not change the results for Congressional influence.

My results provide econometric backing for the view generally argued in the literature: the executive branch seems to have much more influence on Federal Reserve policy than Congress. Havrilesky (1988) has provided another piece of confirmatory evidence. He constructs an index of views on monetary policy (desirability of easing, tightening or just staying put) uttered by Administration officials and Congressmen reported in the Wall Street Journal for the period September 1979 to December 1984. The cumulative value of the index for each month was then used in a regression of the change in the monetary base for that month. The views of the Administration turned out to be a significant predictor of monetary base changes; Congressional views were not found to be statistically significant.

The above results, whilst not the last word on the matter, do not suggest that previous studies were especially negligent in ignoring the potential influence of Congress on monetary policy. I now turn to some further implications of the model and present some new results.
2. Implications of the RPBC Theory for the Term Structure and some Empirical Evidence

The RPBC theory has some testable implications for the term structure of interest rates. As is well-known, under the pure expectations theory, the rate of return on a long-period bond is simply an average of future short-term rates. Approximately, the return on an n-period bond can be written

\[
R^N_t = \frac{1}{n} (r_t + r_{t+1} + \ldots + r_{t+n-1})
\]  

(1)

where \(R^N_t\) is the long-period nominal rate of return and \(r_t\) is the short-term expected return in time \(t\).

By the Fisher equation, the nominal return in any period equals the expected real rate of interest plus the inflation rate expected to prevail over the period until maturity. Letting the expected real rate be constant over all periods and equal to \(\mu\), the above equation can be rewritten as:

\[
R^N_t = \mu + \frac{1}{n} (\pi^e_t + \pi^e_{t+1} + \ldots + \pi^e_{t+n-1})
\]  

(2)

where \(\pi^e_t\) is the inflation rate expected for period \(t\).

Consider now a case where elections are held every other period and suppose we are in a non-election year. In that year the inflation rate is known with certainty. But in the context of the RPBC model, expected inflation for the subsequent period will be:
\[ \pi_{t+1}^e = P (b + c) \]  

Consequently, we can derive a prediction of the RPBC model for the term structure of interest rates. If the R party is in power, then, for given probabilities about election outcomes, the long-term interest rate should rise relative to the short-term rate in the run-up to the election. After the election, this differential will decline if the R party wins. Similarly, if the D party is in power, the long-term interest rate should decline relative to the short-term rate in the run-up to the election. After the election, this differential will rise if the D party wins.

Table One shows the long-term interest rate minus the short-term interest rate broken down by administration for each year for the period 1948 through 1988. The short-term rate is the three-month Treasury Bill rate expressed at an annual rate and the long-term rate is the average yield on 3-5 year government bonds, also expressed as an annual rate. All data were taken from various issues of the Federal Reserve Bulletin. The differential in Table 1 is the average of the monthly differentials for each year.
<table>
<thead>
<tr>
<th>Year/Party</th>
<th>Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>0.323</td>
</tr>
<tr>
<td>1950</td>
<td>0.261</td>
</tr>
<tr>
<td>1951</td>
<td>0.371</td>
</tr>
<tr>
<td>1952</td>
<td>0.412</td>
</tr>
<tr>
<td>1953</td>
<td>0.672</td>
</tr>
<tr>
<td>1954</td>
<td>0.887</td>
</tr>
<tr>
<td>1955</td>
<td>0.765</td>
</tr>
<tr>
<td>1956</td>
<td>0.492</td>
</tr>
<tr>
<td>1957</td>
<td>0.389</td>
</tr>
<tr>
<td>1958</td>
<td>1.134</td>
</tr>
<tr>
<td>1959</td>
<td>0.957</td>
</tr>
<tr>
<td>1960</td>
<td>1.116</td>
</tr>
<tr>
<td>1961</td>
<td>1.252</td>
</tr>
<tr>
<td>1962</td>
<td>0.801</td>
</tr>
<tr>
<td>1963</td>
<td>0.562</td>
</tr>
<tr>
<td>1964</td>
<td>0.509</td>
</tr>
<tr>
<td>1965</td>
<td>0.277</td>
</tr>
<tr>
<td>1966</td>
<td>0.310</td>
</tr>
<tr>
<td>1967</td>
<td>0.772</td>
</tr>
<tr>
<td>1968</td>
<td>0.266</td>
</tr>
<tr>
<td>1969</td>
<td>0.204</td>
</tr>
<tr>
<td>1970</td>
<td>0.956</td>
</tr>
<tr>
<td>1971</td>
<td>1.446</td>
</tr>
<tr>
<td>1972</td>
<td>1.777</td>
</tr>
<tr>
<td>1973</td>
<td>-0.115</td>
</tr>
<tr>
<td>1974</td>
<td>-0.024</td>
</tr>
<tr>
<td>1975</td>
<td>1.768</td>
</tr>
<tr>
<td>1976</td>
<td>1.966</td>
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<tr>
<td>1977</td>
<td>1.583</td>
</tr>
<tr>
<td>1978</td>
<td>1.097</td>
</tr>
<tr>
<td>1979</td>
<td>-0.487</td>
</tr>
<tr>
<td>1980</td>
<td>0.077</td>
</tr>
<tr>
<td>1981</td>
<td>0.414</td>
</tr>
<tr>
<td>1982</td>
<td>2.307</td>
</tr>
<tr>
<td>1983</td>
<td>1.833</td>
</tr>
<tr>
<td>1984</td>
<td>2.311</td>
</tr>
<tr>
<td>1985</td>
<td>2.157</td>
</tr>
<tr>
<td>1986</td>
<td>1.091</td>
</tr>
<tr>
<td>1987</td>
<td>2.009</td>
</tr>
<tr>
<td>1988</td>
<td>1.564</td>
</tr>
</tbody>
</table>
Interestingly, every administration from 1957 to 1984 is broadly in conformity with the theory. This represents 7 out of the ten administrations in this period.

As a more formal test of the term structure implications of the RPBC model, I calculated, for each month from 1949.1 through 1988.12, the theoretical interest differential that would be generated if the model was the true one, and regressed the actual differential on the theoretical one. The latter was calculated under the following assumptions:

(i) constant expected real interest rate
(ii) agents expect zero inflation under Republicans and a 10 percent rate under Democrats (the numbers are chosen arbitrarily: what matters is that there be a constantly higher rate of inflation under Democrats).

Using monthly data, the theoretical long-term rate was found from the formula

\[ \frac{1}{47} \sum_{i=0}^{48} \pi^e_{t+i} \]

The expected short-term interest rate for any time horizon outside of the current office span would be given as a probability-weighted average of the expected rates under the two parties, the weights being the probabilities agents attach to the parties winning the next election. For simplicity, I assume these probabilities are fixed at 0.5 for each party.

The result of the regression for the period 1949.1 -
1988.12 is shown below (standard errors in parentheses):

\[
\text{DIFF}_t = 0.100 + 1.021 \text{DIFF}_{t-1} - 0.245 \text{DIFF}_{t-2} \\
\quad \quad (0.024) \quad (0.046) \quad (0.065) \\
+ 0.199 \text{DIFF}_{t-3} - 0.094 \text{DIFF}_{t-4} + 1.844 \text{ALEDIFF}_t \\
\quad \quad (0.065) \quad (0.045) \quad (0.612)
\]

R-square: 0.852

where DIFF = monthly differential, derived as per Table 1
ALEDIFF = theoretical differential.

The number of lags of the dependent variable was chosen to minimize the Akaike Final Prediction Error. ALEDIFF enters with the expected sign and is significant at the 1 percent confidence level. We can conclude that interest rate behavior in the U.S. over the post-WW2 period is not at variance with the RPBC theory.

3. Tests of the RPBC Model for 1880-1948

Rogoff (1988) suggests that the RPBC model should be tested for robustness using pre-1948 U.S. data. In this section I follow up this suggestion, using data for the period 1880-1948.

In the RPBC model, higher rates of monetary growth are expected during Democrat governments than during Republican ones either because of different weights attached to unemployment and inflation in their cost functions, or because of different fiscal objectives. There is plenty of
evidence that partisan differences about optimal inflation rates were alive and well even in the nineteenth century. Indeed, the Presidential election of 1896 was fought on just this issue. William Jennings Bryan was the Democrat nominee and he led the argument in favor of silver monetization against the Republicans who wanted to maintain the gold standard. As Friedman and Schwartz (1963) confirm, this election was the culmination of three decades of silver politics and general inflation advocacy by a growing coalition of interest groups.

It is sensible to divide the period into two sections, before and after 1914. This date represents an important division in two ways. First, the United States was on the "classical" Gold Standard until 1914, when the system broke down internationally because of the Great War. Whilst a type of gold standard was re-instituted after the war, it did not operate as automatically as before. Second, the Federal Reserve Act of 1913 created an American central bank, distancing the second period still more from the earlier era.

I begin the analysis by testing for political effects on monetary policy in the two periods, using monetary base as the policy instrument to be investigated. For the Gold Standard sample, 1880-1913, we would not a priori expect any partisan difference in monetary growth rates to be apparent since the monetary base should be endogenously determined by
gold flows, themselves responding to growth rates and international interest rates. But the OLS regression yields the following results (standard errors in parentheses):

\[
\begin{align*}
\text{DMB}_t &= 0.002 + 0.443 \text{DMB}_{t-1} - 0.319 \text{DMB}_{t-2} \\
&\quad + 0.235 \text{DGNP}_{t-1} + 0.036 \text{PARTY}_t \\
&\quad (0.01) \quad (0.153) \quad (0.140) \\
&\quad (0.086) \quad (0.013) \quad \text{R-square: 0.568}
\end{align*}
\]

\begin{itemize}
  \item \text{DMB} = \text{change in monetary base}
  \item \text{DGNP} = \text{change in log of real output}
  \item \text{PARTY} = 1 \text{ if Republican President, 0 if Democrat.}
\end{itemize}

The political dummy variable shows up positive and strongly significant. Apparently, under Republican presidents, the monetary base grew 3.6 percentage points faster than under Democrats, which is contrary to prior beliefs about money growth under the automatic gold standard. However, it is not at all clear that one can infer from this result that Republicans had a preference for inflation - indeed it is clearly at odds with what we know about the politics of money at this time. My surmise is that this result can be explained by 'political risk'. When Republicans were in office, international investors felt the gold standard was secure, resulting in gold flowing into the United States and boosting the money stock. When Democrats were in office, however, investors may have been concerned that the gold standard would be abandoned, causing gold to
be exported from the U.S. and lowering the monetary base. There were, in fact, significant gold outflows between 1889 and 1896, when Bryan was defeated by McKinley.

For the period 1914-1948, it is fair to say that U.S. monetary policy was much more the creature of domestic considerations - that is, exogenous rather than endogenous. The reasons for this are the growing importance of the American economy as a proportion of the world economy (thus the "small economy" assumption was less and less valid) and the fracturing of the automatic gold standard. The famous Tenth Annual Report of the Federal Reserve of 1923 makes it very clear that even by that time the central bank was aware that it had the power to alter monetary conditions to ensure 'internal balance'.

The estimated money growth equation for this sample was

\[
\begin{align*}
DMB_t &= 0.100 + 0.507 \ DMB_{t-1} - 0.450 \ DMB_{t-2} \\
&(0.02) \quad (0.164) \quad (0.151) \\
&+ 0.105 \ DGNP_{t-1} - 0.095 \ PARTY_t \\
&(0.099) \quad (0.024) \quad \text{R-square: 0.662}
\end{align*}
\]

Once again we find the political variable is strongly significant, but this time negatively signed. Monetary base growth was on average 9.5 percentage points lower under Republicans over this time period.

I turn now to the results for output, again presenting separate estimates for the two sub-periods. For the period
1880-1913 I estimated a regression model including lagged values of the dependent variable, a measure of real government spending (to account for any effects from wars) and a variable to capture any effects from disruptions of financial intermediation. After deleting insignificant variables, the results were:

\[
DGNP_t = 0.229 \text{ DMULT}_t + 0.024 \text{ PARTY}_t
\]

(0.045) \quad (0.009) \quad R\text{-square: 0.496}

\text{DGNP} = \text{ change in log of real GNP}

\text{DMULT} = \text{ change in numerical value of money multiplier; computed as ratio of commercial bank deposits to monetary base.}

The multiplier term was included as an attempt to capture the possible magnifying effects on real output of disruptions in the degree of financial intermediation. It is analogous to the oil dummy Alesina used in his post-WW2 empirical tests. Rush (1985) also found the multiplier to be a significant additional explanatory variable for real output in a Barro-type regression equation of output on unanticipated money growth in this period.

From our perspective, however, what is most interesting is the strong, positive showing in the output equation of the party dummy. As we found in the money growth equation, the party variable is perverse according to a late twentieth century expectation, but the output and money growth results
are internally consistent within the RPBC theory framework. That is to say, if money growth were higher under Republican governments, we would expect higher output under them too.

I am skeptical of this interpretation. Suppose that there is some factor causing output to be higher under a Republican president. Under a pure gold standard regime, increased output in the United States will lead to a higher demand for real money balances there. This would cause gold to flow into the U.S. and thus raise the monetary base. This would explain the joint appearance of a significant and positive Republican dummy variable in the output and money growth equations. This argument does not exclude the potential validity of the political risk argument mentioned before. We are, of course, still left without any explanation for why output might be higher under Republican presidents. This would be an interesting topic for future research.

A slightly different specification was found to be appropriate for the period 1914-1948:

\[ \text{DGNP}_t = 0.043 + 0.0003 \text{DGX}_t + 0.1087 \text{DMULT}_t - 0.0435 \text{PARTY}_t \]

\[ (0.015) \quad (0.0001) \quad (0.0328) \]

where \( \text{DGX} \) = change in real government spending, and other variables are as before.
The money multiplier is again significant. Real government spending also proved to be positive and significant. The theoretical justification for including real government spending could be provided along Keynesian lines (a rightward shift of the IS curve) or in the framework of the new classical fiscal theory (intertemporal substitution as a result of temporarily high real interest rates or output expansion from the provision of public goods, particularly infrastructure). For this time period, output tended to be lower under Republican presidents, and the coefficient on the party dummy is significant at the 10 per cent level. We cannot refute the RPBC model at this marginal significance.

The results are not as strong as for the post-1948 sample. But the reason for this is not hard to find. In the RPBC model, it is long-term nominal wage contracts that cause output to deviate from its natural rate. Since 1948 there has been a substantial increase in the duration and coverage of collective bargaining agreements in the United States. In 1948, three-quarters of wage agreements were of one year's duration and just 15 percent were three-year agreements. By 1972, three-year contracts made up 57 percent of the total. Additionally, the proportion of the civilian labor force belonging to unions rose from 5.8 percent in 1910 to 23.4 percent in 1970. The greater coverage and duration of contracts in the post-WW2 era goes a long way.
towards explaining the relatively greater success of the partisan model in the later time period.

To sum up, there is evidence of partisan effects on output in the U.S. in the period 1880-1948. For the Gold Standard era before World War I these effects show up differently than under a fiat money regime. I find that output is higher under Republican governments, on average, attracting gold flows into the U.S. and so raising the monetary base. Added to this, fears that Democrats might take the U.S. off the Gold Standard caused gold outflows at various times. It remains an open question as to why output exhibited partisan effects. For the period 1914-1948 the RPBC model cannot be rejected at the 10 percent significance level. It is likely that the stronger results achieved for the post-WW2 era can be explained by changing features of the labor market.

IV. The RPBC Model with Variable Inter-Election Periods

1. Introduction

The original RPBC model was developed for the case of countries with fixed inter-election periods, so is not immediately applicable to countries where elections are endogenous. Election dates may either be chosen by the government, subject to some constitutional upper bound on the length of time between elections; or forced upon it by, for example, the breakdown of a coalition.
To take account of this added uncertainty, I assume that the probability of an election in any given period is a random variable as far as wage-setters are concerned. The actual forces governing the timing of an election are likely to be manifold. As a convenient framework for discussing them, we can take the political scientist's viewpoint that politicians can be modelled as office-motivated, vote-motivated or policy-motivated. An office-motivated actor derives utility simply from being in office; he derives "ego-rents" to use the terminology of Rogoff (1990). Absent other considerations, the office-motivated politician maximizes utility by governing to term. But to the extent that he is concerned about winning the next election - i.e. is vote-motivated - he may not want to wait it out until the last moment for fear of having to face the electorate when he is unpopular due to, for instance, a foreign policy crisis. In addition, there may be reputational constraints at work: voters may punish a government which is perceived to be calling a frivolous early election, since after all the expected utility from voting to an atomistic voter is negative. Finally, the policy-motivated politician would presumably also prefer to stay in office as long as possible to keep in place her preferred policies. Consequently, in a fully-specified model - which the model outlined in II.d is not - the election timing would be found as the solution to the maximization problem of the leader, whose utility
function would contain the elements discussed here.

2. The Model

As before, there are two parties denoted D and R, with objective functions as defined earlier. The time-consistent rates of seignorage or inflation are unchanged.

Suppose that, if an election is held in time \( t \), the next election must be held in time \( t+N \) at the latest. Let the probability of an election in time \( t+i \), conditional on there being no election since \( t \), be \( q(i) \), which satisfies the following conditions:

\[
q(i+1) > q(i) \text{ for all } i \in [1, N] \\
q(N) = 1
\]  

(1) (2)

This captures the idea that the probability of an election increases the closer is the constitutional limit. A rationalization of this may be that the government is trading off the perks of being in office against the possibility of a bad shock to its popularity.

Assume that we are now in time \( t+N \), the latest date at which an election could be held, so that there is no uncertainty about timing. If the R party was elected, output would continue to be given as

\[
y_t = \overline{Y} - \alpha P(b+c)
\]

(3)

Similarly, if the D party won, output would be
\[ y_t = \bar{y} + \alpha(1-P)(b+c) \]  

(4)

This is no different from the case with exogenous elections. Now consider the situation in time \( t+i \), where \( i < N \). Let wage contracts be signed at the beginning of a time period, before the decision whether or not to call an election has been made. The assumed sequence of events is then: (i) polls are taken; (ii) wage contracts are signed; (iii) election is called either by choice or loss of vote of confidence.

If the R party is in power, the expected rate of inflation will be

\[ \pi_{t+i} = q(i) \cdot P(b+c) \]  

(5)

If there is no election in \( t+i \), or if there is an election and the R party retains power, output will be

\[ y_{t+i} = \bar{y} - \alpha q(i) \cdot P(b+c) \]  

(6)

The higher the probability of an election, the lower is real output when the R party is in power or if it retains power after an election. Notice that if an election was held in \( t+i \) and the D party took office, output would be given as

\[ y_{t+i} = \bar{y} + \alpha(1-[q(i) \cdot P])(b+c) \]  

(7)

A switch from an R government to a D government will have a more stimulative effect on output the more unexpected is the election.
If the D party is in power in \( t+i \), the expected rate of inflation will be:

\[
\pi_{t+i} = q(i)*P(b+c) + (1-q(i))(b+c)
\]  
(8)

If there is no election in \( t+i \), or if there is an election and the D party retains power, output will be

\[
Y_{t+i} = \bar{Y} + \alpha\{q(i)*(1-P)(b+c)\}
\]  
(9)

The higher the probability of an election, the higher is output when the D party is in power or if the D party retains power. If an election was held in \( t+i \) and the R party took office, output would be given as

\[
Y_{t+i} = \bar{Y} - \alpha\{(1-q(i))(b+c) + q(i)*P(b+c)\}
\]  
(10)

A switch from a D government to an R government will have a more contractionary effect on output the more unexpected is the election.

3. Empirical Tests

The theory developed above suggests that there are three sources of political influence on expectations, and hence output, which need to be considered:

1. The partisan effect
2. The expectation of an election effect
3. The unexpectedness of the last election effect

We need to construct an index variable that embodies
these three effects. The most efficient way to achieve this is to construct an index variable time series of unexpected inflation. This is done as follows. First, I assume that there are four cohorts of unco-ordinated workers who sign one-year contracts. Cohort 1 signs in quarter t, t+4 and so forth. Cohort 2 signs in t+1, t+5, .... and so forth. The third and fourth cohorts sign contracts in an analogous way. Each cohort is assumed to form expectations about the inflation rate over the course of their contract rationally, conditional on their information about election timing probabilities, time-consistent monetary growth rates for the two parties, and election win probabilities for the two parties.

Without loss of generality, the monetary growth rates are assumed to be zero for the right-wing party and 2% per quarter for the left-wing party. Also, we assume constant win probabilities of 0.5.

The probability of an election in any given quarter is derived from a logit regression:

$$\log \frac{\text{Prob (Elec)}}{1 - \text{Prob (Elec)}} = b_0 + b_1 \text{Time}_t + b_2 \text{Min}_t$$  \hspace{1cm} (1)

where Time is the number of quarters elapsed since the last election and Min is a dummy variable taking the value 1 if there is a minority government, zero otherwise. The election probabilities derived from this equation are assumed to be
known to workers.

Given this information set, one can then construct the rate of inflation that each cohort would expect over the course of its contract. The average expected inflation rate in any given quarter will be the mean of the rates expected by each cohort. We would then compute the index variable of unanticipated inflation, which we call DMRPOLI, for each quarter as:

Hypothesized actual rate - average expected rate

where the hypothesized actual rates are as indicated earlier. The reason for modelling four overlapping cohorts can now be seen: it allows us to capture inertia in inflation expectations. After an election, some contracts will still embody expectations formed before the election took place.

Finally, the model is tested by estimating the regression equation

\[ y_t = \beta_1 + \beta_2 y_{t-1} + \beta_3 \text{DMRPOLI}_t + \beta_4 z_t \]  

where \( y \) is the quarterly growth rate of real GNP, DMRPOLI is as described above and \( z \) is a measure of world demand: real output effects should be measured relative to international conditions for small open economies. We expect \( \beta_3 \) to be positive - the higher is unexpected inflation, the higher should be output.
One issue in the empirical set-up needs further discussion, and that is the non-appearance of current and/or past economic variables in the election probability equation above. An assumption of the model is that the probability of an election is not affected by the current state of the economy, a very different conclusion than flows from the traditional PBC model. Here voters vote prospectively rather than retrospectively. Crucially, current and past inflation and output performance do not affect the probability of the incumbent winning the election in any time period. As a result, they will not affect the timing of an election in a system with time-varying elections under the assumptions of the model. However, a finding that current and/or past economic variables did influence election timing would not be fatal to the model's principal prediction, that output fluctuations arise from uncertainty about the future policy regime. For while it might cast doubt on voter rationality, it does not vitiate the assumption of rational expectations for wage-setters. Even voter rationality could be rescued along the lines of the signalling model of elections (Terrones, 1989). According to this, voters choose among parties according to their expected competence in economic performance. Competence is a random variable and only the government knows its own current competence "shock". Voters have to infer its value from past and current economic performance. In the model, governments will tend to call
elections in good economic times to attempt to convince voters that their current competence shock is high.

4. Issues in Implementing the Empirical Tests

For which countries, and what time periods is the model likely to be appropriate? The partisan model derives its dynamic from two parties with different preferences over inflation and unemployment. Moreover, these parties must alternate in power reasonably frequently; or, at the very least the opposition must be a credible alternative government. In the context of the model, the lower is the credibility of the opposition as a potential government, the less uncertainty there is about future monetary policy and so the less output will fluctuate from this source. Perhaps Australia in the 1950s and 1960s represents a possible case where people attached low probability to an incumbent electoral loss.

Sartori (1976) classifies democracies according to their party system. He identifies four classes which he calls predominant, two-party, moderate multipartism and extreme pluralism. A predominant system is one where one party has been observed to dominate; two-party systems are self-explanatory. Those democracies where several parties have shared power he splits into two groups. Those where the parties are segmented but not polarized he calls examples of moderate multipartism. Those where the parties are segmented
and polarized are examples of extreme pluralism. The classification for a group of industrialized countries is shown below:

1. Predominant: Norway, Sweden, Japan

2. Two-party: Canada, Australia, United Kingdom, New Zealand, United States, Austria

3. Moderate
   Multipartism: Netherlands, Denmark, Belgium, France V, West Germany

4. Extreme
   Pluralism: Finland, France IV, Italy

It is the group in the two-party category whose political systems most closely coincide with the model assumptions. However, we drop the U.S. from consideration since it has a fixed election system. I also do not test the model for the case of Austria since it had coalition governments for much of the post-war period. The remaining four countries are also appropriate for testing in that none of them have independent central banks.

One further complicating factor is the nature of the exchange rate regime. Under a fixed exchange rate system, a government has limited control over its monetary policy beyond the short-run. Thus partisan differences in monetary policy would be muted, which suggests that the model would
therefore perform better after the abandonment of the fixed exchange rate regime in 1972-73.

However, even under such a system there could be partisan effects on real output resulting from currency realignments, which would have temporary real effects. The pattern of short-run output dynamics would probably differ from the model in IV.1 above, depending upon how much time elapses between accession to office and realignment.

To take account of devaluation considerations under a fixed exchange rate regime, the model could be slightly amended as follows. Suppose wage-setters expect a right-wing government to revalue the currency at some date while they expect a left-wing government to devalue at some date. The nominal wage is set to maintain a constant expected real wage at the level which maintains the natural unemployment rate. Suppose that, in setting nominal wages, workers look at the consumption bundle of domestic goods and importables. A revaluation decreases the cost of living by improving the terms of trade, and so lowers wage demands, whilst devaluation does the opposite. Expectations about the future cost of living would depend on (i) which party is expected to be in power; (ii) when the currency re-alignment is expected to occur; (iii) the size of the re-alignment.

If it is assumed that a right-wing party, on coming to office, revalues by x percent whilst a left-wing party devalues by x percent, then election timing has no effect if
both parties have a 50% win probability. The expected value of the currency re-alignment would be zero. Immediately after a right-wing party won and re-valued there would be a negative demand shock, and a positive shock if the left-wing party won and immediately devalued.

Thus, under fixed exchange rates with potential currency re-alignments, we in fact recover the original predictions of the RPBC model, provided one assumes (a) one re-alignment per administration and (b) re-alignments take place immediately after the election.

5. The Empirical Results

(i) A Cross-Country Test

In addition to time series tests for individual countries, it is possible to test the model using a cross-sectional approach. In those countries with a predominant party, the theory would predict a lower level of output volatility (after adjustment for foreign shocks) than in countries which experience governments with alternating policy preferences. In Table 2 below I show the mean growth rate of real GDP, standard deviation and coefficient of variation for nine countries, based on data for the period 1955-87. We should use the coefficient of variation as the comparison statistic to adjust for differences in average growth rates.
Table 2

<table>
<thead>
<tr>
<th>Country</th>
<th>Mean Growth</th>
<th>Std Dev.</th>
<th>C.V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>3.99 %</td>
<td>2.21</td>
<td>0.55</td>
</tr>
<tr>
<td>Canada</td>
<td>4.28 %</td>
<td>2.19</td>
<td>0.51</td>
</tr>
<tr>
<td>France</td>
<td>3.96 %</td>
<td>2.01</td>
<td>0.51</td>
</tr>
<tr>
<td>Italy</td>
<td>3.92 %</td>
<td>3.08</td>
<td>0.79</td>
</tr>
<tr>
<td>Japan</td>
<td>6.64 %</td>
<td>3.50</td>
<td>0.53</td>
</tr>
<tr>
<td>Sweden</td>
<td>2.98 %</td>
<td>1.78</td>
<td>0.60</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2.37 %</td>
<td>2.09</td>
<td>0.88</td>
</tr>
<tr>
<td>United States</td>
<td>2.99 %</td>
<td>2.28</td>
<td>0.76</td>
</tr>
<tr>
<td>West Germany</td>
<td>3.77 %</td>
<td>3.29</td>
<td>0.87</td>
</tr>
</tbody>
</table>

There are no clear-cut conclusions about the effects of political polarization, though the countries which were expected a priori to have lower output variance, Japan and Sweden, in fact do so. Similarly, two-party system nations like the U.K. and U.S. have higher variance. But the picture is blurred by the performance of Canada and Australia. These results seem to warrant further research.

(ii) Individual Country Tests

AUSTRALIA

a. Monetary Policy

The table below shows the average rate of monetary base growth under Australian governments for the period 1959-1988. Data is taken from International Financial
Statistics.

Table 3

<table>
<thead>
<tr>
<th>Government &amp; Party</th>
<th>Mean Annual Base Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959.1 - 1966.4 Lib/Country</td>
<td>2.50 %</td>
</tr>
<tr>
<td>1967.1 - 1972.4 Lib/Country</td>
<td>10.42 %</td>
</tr>
<tr>
<td>1973.1 - 1975.4 Labour</td>
<td>12.42 %</td>
</tr>
<tr>
<td>1976.1 - 1983.1 Lib/Country</td>
<td>7.02 %</td>
</tr>
<tr>
<td>1983.2 - 1988.4 Labour</td>
<td>12.29 %</td>
</tr>
</tbody>
</table>

The above gives some reason to believe that there is a higher rate of base expansion under Labour governments in Australia. As a further check, I regressed quarterly base growth on a constant, an autoregressive term, seasonals and a dummy variable taking the value 1 when Labour was in power. The result was:

\[
DMB_t = 0.061 + 0.182 DMB_{t-1} + 0.013 LABDUM_t + \text{seasonals}
\]

\[
(0.007) \quad (0.089) \quad (0.007)
\]

R-square: 0.452 D.W. 1.958

The sign on the dummy was as expected, indicating that the base grows 1.3 percentage points faster each quarter under Labour. It is significant at alpha= 0.075.

b. The election probability equation

A logit regression did not give satisfactory results in the case of Australia, so a different approach
was taken. I estimated the hazard function for Australian elections. The hazard \( H(t_j) \) is the probability of an election in quarter \( j \), conditional on there being no election before then. An estimator for \( H(t_j) \) is

\[
H(t_j) = \frac{h_j}{n_j}
\]  

(1)

i.e. the number of 'failures' at duration \( t_j \) divided by the number 'at risk' at duration \( t_j \).

Below I show the time between elections in Australia 1951-90 and the computed hazard:

<table>
<thead>
<tr>
<th>Election After</th>
<th>Number</th>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 quarters</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6 quarters</td>
<td>3</td>
<td>.19</td>
</tr>
<tr>
<td>7 quarters</td>
<td>1</td>
<td>.08</td>
</tr>
<tr>
<td>8 quarters</td>
<td>2</td>
<td>.17</td>
</tr>
<tr>
<td>9 quarters</td>
<td>1</td>
<td>.10</td>
</tr>
<tr>
<td>10 quarters</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11 quarters</td>
<td>2</td>
<td>.22</td>
</tr>
<tr>
<td>12 quarters</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

Smoothing the gaps in the calculated hazard function, we can say that from six quarters until 11 quarters there is a conditional probability of approximately 1 in 5 that there will be an election in that quarter. After this the hazard jumps to 1 as the constitutional inter-election period is reached. In constructing the DMRPOLI variable I assumed a zero conditional probability of an election for the first
year, and then a constant 0.2 probability up to and including the eleventh quarter.

c. The Output equation

Quarterly real GDP growth for the period 1960.1 - 1988.4 was regressed on itself lagged one and two periods, US GNP growth lagged one period, seasonal dummies and the DMRPoli index variable. The result was

\[
y_t = 0.135 - 0.243 y_{t-1} - 0.286 y_{t-2} + 0.271 \text{USY}_{t-1} - 0.005 \text{DMRPOLI}_t + \text{Seasonals} \\
(0.006) (0.093) (0.092) (0.092)
\]

R-square: 0.956 D.W. 2.05

In the case of Australia, the RPBC model receives no support. Nor does it offer any support for the traditional PBC model. I tried two dummy variable specifications in the above equation to capture election effects: a step-function pattern and an inverted-V pattern, but neither proved to be significant. I also estimated the original equation for the sample 1972.1 - 1988.4, on the grounds that the Liberal/NCP coalition was the only credible government party in the earlier period, but this was no more successful.

The disappointing results for Australia may arise from the fact that partisan differences take a different form here compared to other countries. In particular, the Liberal/NCP governments reflect the interests of rural
groups and Labour governments those of the blue-collar workers. Liberal/NCP governments favor their core coalition by maintaining an undervalued exchange rate to promote exports whilst Labour governments favor large-scale public spending programs. Both result in monetary base expansion though the source of the expansion is different.

CANADA

a. Monetary Policy

The average annual rate of growth of the monetary base for the period 1958.1 through 1988.4 is shown in the table below (data from IFS):

<table>
<thead>
<tr>
<th>Government &amp; Party</th>
<th>Mean annual base growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958.1 - 1963.1</td>
<td>3.7 %</td>
</tr>
<tr>
<td>1963.2 - 1968.2</td>
<td>6.06 %</td>
</tr>
<tr>
<td>1968.3 - 1974.2</td>
<td>11.14 %</td>
</tr>
<tr>
<td>1974.3 - 1979.2</td>
<td>11.96 %</td>
</tr>
<tr>
<td>1979.3 - 1984.3</td>
<td>3.85 %</td>
</tr>
<tr>
<td>1984.4 - 1988.4</td>
<td>7.52 %</td>
</tr>
</tbody>
</table>

There is clear evidence that base growth is more rapid under Liberal governments. This is confirmed by a regression equation for base growth estimated using the same sample period:
DMB_t = -0.007 - 0.108 DMB_{t-1} + 0.112 DMB_{t-2} - 0.202 DMB_{t-3} + 0.532 DMB_{t-4} + 0.009 LIBDUM_t + seasonals

\( R^2: 0.808 \quad \text{D.W. 1.821} \)

On average, the base expands annually about 3.6 percentage points more under Liberal governments.

b. The election probability equation

The equation for estimating election probability was estimated by a logit regression for the period 1953.1 to 1988.4. This sample period includes 13 elections.

\[
\frac{\text{Prob}}{1 - \text{Prob}} = -10.186 + 0.552 \text{TIME}_t + 5.642 \text{MIN}_t
\]

\( (2.408) \quad (0.150) \quad (1.542) \)

Current and past values of real output growth were also tried in the equation to test whether the state of the economy influenced election timing. The only evidence for this, feeble as it is, is that growth lagged three quarters was statistically significant at the 10 percent level.

c. The output equation

The estimates for election probability from the above logit model were used to derive the DMRPOLI index variable. This was then included in the output regression
equation, for which the estimates for the sample period 1956.1 through 1988.4 are given as

\[ Y_t = 0.005 - 0.239 Y_{t-1} + 0.139 Y_{t-2} + 0.173 Y_{t-3} \]
\[ + 0.397 USY_t + 0.006 DMRPOLI_t \]
\[ R-sqr: 0.252 \]

As the RPBC model predicts, DMRPOLI helps to explain real output behavior in Canada over the sample period.

Canada represents an unusual case because the Canadian dollar floated against other currencies from 1950 till 1962 and then from May 1970 onwards. The above equation was estimated for the period 1962.1 through 1970.1 to test if it was sensitive to the exchange rate regime. Although the autoregressive terms became insignificant, the coefficient on DMRPOLI was 0.007 and significant at alpha = 0.052.

NEW ZEALAND

a. Monetary Policy

Below in Table 5 I show the average annual rates of money base growth for the period 1961 - 1987.

No consistent partisan differences show up in the base data, unless one is prepared to throw out the 1970-72 and 1976-78 National governments. The monetary picture is clouded by the frequently changing exchange rate regimes New Zealand has operated under in this time period. The currency
was pegged to sterling prior to 1970, followed by pegging to the dollar until 1973 and then crawling peg schemes up until the decision to float in 1985.

<table>
<thead>
<tr>
<th>Government &amp; Party</th>
<th>Mean annual base growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961 - 1963 National</td>
<td>- 3.75 %</td>
</tr>
<tr>
<td>1964 - 1966 National</td>
<td>- 4.35 %</td>
</tr>
<tr>
<td>1967 - 1969 National</td>
<td>- 4.53 %</td>
</tr>
<tr>
<td>1970 - 1972 National</td>
<td>22.76 %</td>
</tr>
<tr>
<td>1973 - 1975 Labour</td>
<td>8.03 %</td>
</tr>
<tr>
<td>1976 - 1978 National</td>
<td>11.20 %</td>
</tr>
<tr>
<td>1979 - 1981 National</td>
<td>3.30 %</td>
</tr>
<tr>
<td>1982 - 1984 Labour</td>
<td>9.00 %</td>
</tr>
<tr>
<td>1985 - 1987 Labour</td>
<td>10.10 %</td>
</tr>
</tbody>
</table>

Data source: International Financial Statistics

b. The election probability equation

Between 1954 and 1987 New Zealand elections were called every 36 months, so to all intents and purposes, New Zealand can be treated as a fixed period election case.

c. The output equation

Annual output growth was regressed on itself lagged once, the contemporaneous US GNP growth rate and two dummy variables, one taking the value 1 in the first year of a
National government and zero otherwise, and one taking the value 1 in the first year of a Labour government. The estimated equation was:

\[ y_t = -0.005 + 0.622 y_{t-1} + 0.290 \text{USY}_t - 0.0145 \text{NAT1} \]
\[ (0.009) \quad (0.172) \quad (0.171) \quad (0.0115) \]
\[ - 0.012 \text{LAB1} \]
\[ (0.009) \quad \text{R-square: 0.367} \quad \text{D.W. 1.71} \]

Output growth is one and a half points lower in the first half of National governments, which is as expected. But it is also 1.2 points lower in the first years of Labour governments. The lack of support for the RPBC model seems consistent with the monetary base results reported in part a. The finding of below average growth in the first years of office under both parties leads us to suspect the political business cycle model may have more relevance here. Below are the results from estimating the model with a dummy variable that takes the value 1 in election years:

\[ y_t = -0.006 + 0.613 y_{t-1} + 0.303 \text{USY}_t + 0.018 \text{EVDUM}_t \]
\[ (0.009) \quad (0.159) \quad (0.158) \quad (0.008) \]
\[ \text{R-square: 0.422} \quad \text{D.W. 1.519} \]

The dummy is significant, indicating output grows 1.8 percentage points faster in election years compared with non-election years. This represents one of the strongest findings in favor of the PBC model that I found in any of my
tests in the four countries. I also tested for evidence of an electoral cycle in monetary base growth rates but was unable to detect such a cycle. However, there is weak evidence of an electoral cycle in the budget deficit. A regression of the deficit / nominal GDP ratio on itself lagged once, real GDP growth and an electoral dummy variable yielded the result that the deficit ratio was 1.3 percentage points higher in election years, though it was significant only at alpha = 0.15. In fact, the entire equation had low explanatory power.

In general, the results from New Zealand need to be treated with caution as the data are probably some of the poorest quality among OECD countries, at least in the 1960s and 1970s, as the 1977 OECD survey of New Zealand warns. This gives rise to the problem of measurement error in the regression estimates, leading to potentially biased and inconsistent estimates.

UNITED KINGDOM

a. Monetary Policy

Below in Table 6 I set out the average annual rate of monetary base growth in the United Kingdom for the period 1956-1958 broken down according to party in power.

There is little difference between the parties prior to 1970. This is to be expected since the U.K. was on a fixed exchange rate system until the summer of 1973 and so there
was little scope for persistent partisan differences in the
growth of the money supply.

Table 6

<table>
<thead>
<tr>
<th>Government &amp; Party</th>
<th>Mean annual base growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956-1959</td>
<td>Cons</td>
</tr>
<tr>
<td>1960-1964</td>
<td>Cons</td>
</tr>
<tr>
<td>1964-1970</td>
<td>Labour</td>
</tr>
<tr>
<td>1970-1974</td>
<td>Cons</td>
</tr>
<tr>
<td>1974-1979</td>
<td>Labour</td>
</tr>
<tr>
<td>1979-1983</td>
<td>Cons</td>
</tr>
<tr>
<td>1983-1987</td>
<td>Cons</td>
</tr>
</tbody>
</table>

The advent of floating exchange rates allowed U.K.
governments to pursue an independent monetary policy and it
is clear that the Labour government of 1974-79 had a much
greater base expansion than the two Conservative governments
which bracketed its term of office.

b. The election probability equation

Using quarterly data for the period 1955.1 through
1988.4, I estimated a logit model of election probability in
any given quarter. This sample period includes 10 elections.
The resulting equation was:

\[
\log \frac{\text{Prob}}{1 - \text{Prob}} = -12.968 + 0.746 \text{ TIME}_t + 9.112 \text{ MIN}_t
\]

(3.527) (0.223) (2.822)
To check whether economic conditions also influenced timing, I included inflation and economic growth variables in the logit regression. The sign on 4-quarter growth was positive as expected, but not significant.

c. The output equation

The quarterly growth rate of real GDP was regressed on one autoregressive term, the U.S. growth rate, DMRPOLI and seasonals using data from 1956.1 - 1988.4. Results were:

\[
y_t = 0.047 - 0.431 y_{t-1} + 0.349 \, \text{USY}_t - 0.001 \, \text{DMRPOLI}_t + \text{Seasonals} \quad \text{R-square: 0.79} \quad \text{D.W. 2.109}
\]

For the sample period as a whole, the political variable has no explanatory power. But as already observed, independent monetary policy in the U.K. only became possible with floating exchange rates. The model estimates for the sample period 1973.1 - 1988.4, the floating regime, were:

\[
y_t = 0.048 - 0.269 y_{t-1} + 0.411 \, \text{USY}_t + 0.012 \, \text{DMRPOLI}_t + \text{Seasonals} \quad \text{R-square: 0.84} \quad \text{D.W. 1.929}
\]

DMRPOLI has the expected sign and is significant. We cannot reject the RPBC model during this period.

When the equation was estimated for the period of fixed exchange rates, the results were:
\[ y_t = 0.042 - 0.566 y_{t-1} - 0.503 y_{t-2} - 0.334 y_{t-3} \]
\[ + 0.087 USY_t - 0.013 DMRPOLI_t + \text{Seasonals} \]
\[ R^2 = 0.916 \quad \text{D.W.} \quad 1.998 \]

For this period, DMRPOLI is highly significant but this time negatively signed. This implies output growth is below trend in the first few quarters of a Conservative government and increasingly above trend as the election approaches, whilst the reverse is true for a Labour government. The original PBC model would fit the first case but not the second. Why would a Conservative government follow a strategic policy while a Labour government unexpectedly tightens monetary policy prior to an election? There is some evidence for the PBC hypothesis in this period (1953-1971). Regressing annual money base growth on a variety of possible explanatory variables such as inflation, balance of payments (measured as the negative of official financing divided by nominal GNP), real output and a dummy variable for election years, I found that only real output and the dummy were significant:

\[ DMB_t = 0.0263 + 0.4068 y_t + 0.014 EV_t \]
\[ R^2 = 0.446 \quad \text{D.W.} \quad 1.568 \]

As for the tightening of monetary policy at the end of the 1964-70 Labour government, we could explain this as
resulting from the conditions attached to loans to the U.K. by the International Monetary Fund. Effectively the IMF was acting like the "conservative central banker" that Rogoff (1985) suggests a left-wing government can use to achieve anti-inflation credibility.

I also tested the political business cycle hypothesis using both the full sample and the floating regime sample. A dummy variable was constructed from the election probability data derived from the previously estimated logit regression. When the conditional probability of an election reached 0.02 (i.e. after government had been in office for 10 quarters), the dummy variable switches 'on'. This is meant to capture any effects of election proximity on output growth as the PBC model predicts. The PBC dummy was nested within the output equation estimated above, both with and without the DMRPOLI variable. In all cases the dummy is insignificant.

V. Discussion and Conclusions

Three out of the four countries showed evidence of political influence on the timing of the business cycle. Given the different institutional structures, such as wage bargaining processes and union organization, and the restrictive maintained hypotheses (e.g. constant election win probabilities, rational expectations) this is a significant finding.

Previous researchers have provided evidence for both
the political business cycle model and the partisan model, whether with rational expectations or not. The new evidence I present also finds evidence that supports the RPBC model (Canada, the United Kingdom and the U.S. pre-WW2) and the PBC model (New Zealand).

The message, it seems, is that both models have a role in explaining business cycle behavior. The next stage of research in this area will presumably have to integrate them in a coherent and empirically refutable way. Some steps in this direction have already been taken. In the models of Havrilesky (1987, 1988a, 1988b) governments make fiscal redistributions in the early part of their terms to fulfil pre-election pledges. But the tax and spending plans have supply-side disincentives that are eventually borne by some groups in society, although the exact incidence of these burdens is not usually known beforehand. The groups that are adversely affected press for relief, which is granted in the form of an easier monetary policy and an abandonment of previous pledges of sound money and anti-inflation rhetoric that is common to both liberal and conservative governments in their early days. Havrilesky's model predicts that both types of government eventually have to resort to easier monetary policy to alleviate the consequences of earlier fiscal redistributions or disequilibrium exchange rates. The exact timing of the change is unpredictable.

The model has the virtue of being more flexible than
other models in that it allows a variety of time paths for monetary growth that would be consistent with political manipulation. The rationale for manipulation is different from other models. Here the administration is not so much concerned with the state of the economy per se as with the state of individual sectors which have political influence. This might show up in estimated monetary reaction functions as concern with unemployment when in fact monetary policy is being influenced by other factors. This would explain why some empirical studies have found that, at various times, conservative administrations exhibit responsiveness to unemployment equal to or even greater than that of liberal administrations. Havrilesky argues that conservatives and liberals really do not have sufficiently different preferences over unemployment and inflation that they would show up consistently in reaction functions. We should realize that, to win elections, parties have to form coalitions of disparate groups and policy may have to take twists and turns that do not fit into traditional conceptions of partisan policy patterns.

The vice of flexible models is that they are so rich in their implications that they are difficult to reject empirically: anything goes. Havrilesky (1988b) tests two predictions of his model: monetary growth will increase when there is a change from a Republican to Democrat President and decrease when the office switches the other way. This is
because, he assumes, the conservative government is ideologically constrained to redistribute less than a liberal government. Second, monetary growth is positively related to the extent of fiscal redistribution. Regression estimates for the U.S. for 1952-84 do not reject these model predictions. But it is not clear that his empirical work really enables discrimination between his model and other partisan models.

Alesina and Cukierman (1990) also present a model which implies intra- as well as inter-administration policy changes. Here, each party is assumed to want to pursue policies favourable to its core supporters, but has also to take into account the fact that the average voter is more "moderate" than its typical core supporter. Thus, to win an election, it must appear to voters to be moderate. Voters have to infer the incumbent's true policy preferences - which are assumed to be stochastic but autoregressive - from past outcomes. The voters' inference problem is complicated by the fact that (i) past outcomes are imperfectly correlated with prior policy actions and (ii) the government may choose an imprecise technique of policy control. As an example, suppose the government uses monetary policy to affect unemployment via a short-run Phillips curve. Since many factors will be affecting labor markets, unemployment and monetary policy are only imperfectly correlated. The unemployment rate is a noisy signal of policy intent.
Furthermore, the government may choose a control technique such as an interest-rate target that makes it even more difficult to form correct inferences about true policy intent. Typically, then, a government may switch from an ideological policy to one closer to the one that the median voter would choose as an election approaches. Voters do not know for sure whether this is simply an "election-winning" ploy or a true preference change, for the reasons outlined above. This theory, incidentally, gives a microfoundation for retrospective voting.

This theory represents an interesting move towards reality but still lacks sufficient identifying parameters to make it empirically testable. One possible route for this is the embryonic work on political party structure such as Strom (1990). In future research I hope to pursue this line.

Yet another potential extension is to endogenize the probability of the incumbent winning the election by making it a function of the state of the economy. This could be done, for example, by assuming that people vote for the party they perceive to be most competent. If the state of the economy acts as a noisy signal of incumbent competence, election win probabilities would be a function of the state of the economy.
Notes

1. The microfoundations of fiscal policy models are more secure than those of monetary policy models. This is a reflection of the fact that the existence of money continues to be anomalous within the standard general equilibrium model that constitutes the chosen framework for the New Political Economy. It is also hard to rationalize real effects from monetary policy in Walrasian models.

2. The precise impact on output would depend on (i) whether the purchases were temporary or permanent; (ii) the nature of the purchases, particularly how closely they substitute for private purchases. For more on this, and a full survey of the New Classical fiscal policy, see Aschauer (1988).

3. Note that the empirical work of McCallum (1978), Grier (1987) and Beck (1987) are not subject to this critique.


5. See Sachs (1980) and the references therein for more detail.

6. Four lags were initially included in the output regressions for all countries, and insignificant lags dropped from the reported estimates.

7. Some support for this contention can be gleaned from the balance sheet of the Reserve Bank. The table overleaf shows the average monthly change in the monetary base for each government from July 1974 to May 1989, as well as the average monthly contributions to the base change arising from the central government budget deficit and changes in the foreign exchange reserves.
<table>
<thead>
<tr>
<th>Date &amp; Party</th>
<th>Base Change</th>
<th>Central Govt Deficit</th>
<th>For. Ex Reserves</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/74 - 12/75 (Labor)</td>
<td>+52</td>
<td>+364</td>
<td>-81</td>
<td>-231</td>
</tr>
<tr>
<td>1/76 - 12/77 (Lib/NCP)</td>
<td>+42</td>
<td>+325</td>
<td>-36</td>
<td>-247</td>
</tr>
<tr>
<td>1/78 - 10/80 (Lib/NCP)</td>
<td>+22</td>
<td>+231</td>
<td>-5</td>
<td>-204</td>
</tr>
<tr>
<td>11/80 - 3/83 (Lib/NCP)</td>
<td>+107</td>
<td>+277</td>
<td>+255</td>
<td>-425</td>
</tr>
<tr>
<td>4/83 - 12/84 (Labor)</td>
<td>+122</td>
<td>+657</td>
<td>+104</td>
<td>-639</td>
</tr>
<tr>
<td>1/85 - 7/87 (Labor)</td>
<td>+143</td>
<td>+495</td>
<td>+16</td>
<td>-368</td>
</tr>
<tr>
<td>8/87 - 5/89 * (Labor)</td>
<td>+108</td>
<td>-345</td>
<td>+184</td>
<td>+269</td>
</tr>
</tbody>
</table>

* incomplete administration

Source: Reserve Bank Bulletin
ESSAY TWO

POLITICAL DETERMINANTS OF DEBT AND DEFICITS:

SOME NEW EVIDENCE

I. Introduction

Is the time path of public debt, spending, taxes and deficits completely characterized as the outcome of the fiscal decisions of a social welfare maximizing government? Or is it influenced by political institutions such as elections, partisan policy and the constitutional rules allocating political power? In this essay I attempt to answer this question by empirically testing some of the recent models that purport to explain fiscal policy.

Interest in the causes of budget deficits and public debt build-up has gathered pace in recent years, largely as a result of the unbroken string of deficits run up by the U.S. federal government over the past twenty years. There is a widespread perception that this debt accumulation, particularly in the past decade, represents something unusual in U.S. fiscal history. On an international scale, it is clearly not the case that the U.S. experience is exceptional: debt accumulation has been faster elsewhere, as the data in Table 1 (overleaf) makes clear.

This evidence suggests that explanations for deficits in the U.S. which focus exclusively on U.S. institutions are rather missing the point; there has been a general trend in
OECD countries towards larger budget deficits since the end

Table 1

<table>
<thead>
<tr>
<th>Country</th>
<th>Change in net debt/GDP ratio (annual average, 1975-85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>6.16 %</td>
</tr>
<tr>
<td>Ireland</td>
<td>5.80 %</td>
</tr>
<tr>
<td>Denmark</td>
<td>4.53 %</td>
</tr>
<tr>
<td>Sweden</td>
<td>4.41 %</td>
</tr>
<tr>
<td>Italy</td>
<td>3.65 %</td>
</tr>
<tr>
<td>Japan</td>
<td>2.86 %</td>
</tr>
<tr>
<td>Germany</td>
<td>2.12 %</td>
</tr>
<tr>
<td>France</td>
<td>0.57 %</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>0.25 %</td>
</tr>
<tr>
<td>Britain</td>
<td>-0.97 %</td>
</tr>
</tbody>
</table>


of World War II, a trend which became more pronounced in the
wake of the oil shock of 1973. Some authors, for example, have pointed to Congressional reforms in the 1970s which
strengthened subcommittees at the expense of committees, as
resulting in greater fiscal irresponsibility (Shepsle and
Weingast (1985)). This may be true, but does not explain the
debt explosion elsewhere. It is a partial explanation, one
which could perhaps be encompassed by a more general theory.

According to the New Classical approach to fiscal
policy, there should be nothing to explain. This theory
argues that public debt issue can be modelled as if it were
produced by a welfare maximizing social planner. Barro
(1979, 1986) argues that public debt issue in the United
States and the U.K. (up until 1917) does not reject this
model. In this approach, deficits arise only in response to
temporary fluctuations in government spending (typically due to war) or tax revenue (due to recessions). The implication is that there is no need to explicitly take account of political factors.

But many find this view implausible and a number of models have appeared that explicitly model institutional factors and make them central to explaining public debt behavior. In this essay I present some empirical evidence on three such models: the political budget cycle hypothesis, the power dispersal hypothesis and the strategic debt hypothesis. I test the first two theories nested within the empirical framework for testing the optimal debt theory used by Barro. This represents the first time these theories have been empirically compared. I use a pooled cross-section time series regression approach. This allows me to additionally test whether central bank independence has an impact on fiscal behavior, as suggested by the model of Sargent and Wallace (1981).

The strategic debt theory is not easily tested in this framework, but Granger-prediction tests can be used to test one of the model's implications. Both standard and nonparametric Granger tests are used. Section II presents the essential theoretical issues; Section III presents the empirical evidence and Section IV concludes.
II. Models of Debt and Deficits: A Survey

1. Optimal Fiscal Policy

The optimal fiscal policy theory provides an appropriate point of departure in discussing public debt determination. Its principal architect, Robert Barro, claims that it is more than a normative model: the British pre-1917 and U.S. time series do not reject it as a positive theory of debt evolution. Any successful political theory, then, must show it has additional power to explain the time series (and cross-sectional) data.

The model makes three key assumptions: (i) a given known time path of government spending $G_t$; (ii) the present value of tax revenue equals the present value of $G$ plus the inherited debt; (iii) the excess burden of taxation is a convex function of the tax rate $\tau$, where $\tau$ is the ratio of tax revenue to real GNP.

Theorem: A social-welfare maximizing government will set $\tau$ at a fixed rate that minimizes the intertemporal deadweight losses.

Proof: Let $g_t$ be the time path of the ratio of government spending to real GNP and $\tau_t$ the time path of the tax rate. With a given and, for simplicity, fixed real rate of interest, the public debt evolves as:

$$B_{t+1} = (1 + R) B_t + G_t - T_t \quad (1)$$

Taxes are assumed to be distorting with deadweight
losses per unit of GNP given as \( D_{t(t)} \), \( D' > 0 \), \( D'' > 0 \).

The government's intertemporal loss function as of time \( t \) is

\[
L_t = \sum_{i=0}^{\infty} (1+R)^{-i} D_{t+i} Y_{t+i}
\]  \hspace{1cm} (2)

The government's goal is to find \( \tau_t \) to minimize (2) subject to

\[
\sum_{i=0}^{\infty} (1+R)^{-i} \tau_{t+i} = (1+R)B_t + \sum_{i=0}^{\infty} (1+R)^{-(i-1)} G_{t+i}
\]  \hspace{1cm} (3)

The first-order condition is:

\[ D'_{t+i} = \mu_i \]  \hspace{1cm} (4)

So \( \tau \) should be constant. The above is derived for a world of certainty. In a stochastic environment, Barro interprets the F-0-C as implying the tax rate should follow a random walk. This is also known as the 'tax-smoothing' hypothesis. What does it mean for the evolution of the public debt? First we have to find the tax rate which solves the government's problem above. Define the 'permanent' level of government spending, denoted \( g^p_t \), as the constant level of government spending starting at time \( t \) such that the present value of \( g^p_t \) equals the present value of actual spending \( g_t \). For a constant growth rate of real GNP, this is given as

\[
g^p_t = \left[ \frac{(R-n)/(1+R)}{1+R} \right] \frac{1+R}{1+n} g_{t+i}
\]  \hspace{1cm} (5)
where \( n \) is the growth rate of GNP.

So the tax rate that solves the problem is given by

\[
\tau = (R-n) b_t + g^p_t
\]  

(6)

The implied evolution of the debt/GNP ratio \( b \) is:

\[
b_{t+1} - b_t = \frac{1}{1+n} [g_t - g^p_t]
\]  

(7)

Barro (1987) finds that this model can explain the evolution of the British debt/GNP ratio for the period 1701–1918 and, using a different regression specification, the U.S. time series (1986).

The theory can also be tested by reference to its implication that tax rates should follow a random walk. There have been numerous attempts to test the model in this form, but most of them are forced to make substantial data compromises. This is because the theory in its correct form refers to the average of marginal tax rates; it is marginal tax rates that affect labor supply and determine the extent of deadweight losses. But remarkably little work has been done on constructing average marginal tax rates for nations other than the United States (for these, see Barro and Sahasakul, 1983). As a result, tests of tax-smoothing for other countries usually use the ratio of tax revenues to GNP as a proxy for average marginal tax rates.

Another implication of optimal fiscal policy which has
received increasing attention recently, particularly because of its implications for the success of European monetary unification, is the optimal seigniorage argument. Efficient fiscal policy requires that each tax should be set such that the marginal deadweight cost per dollar of marginal revenue is equated across taxes. Since inflation is a tax on real money balances, a government faced with an increase in permanent government spending should increase seigniorage along with marginal income tax rates to preserve the MC per dollar revenue equality. So if, historically, governments have acted optimally we should find a positive correlation between tax rates and inflation. Mankiw (1987) does indeed find this for the U.S. but Poterba and Rotemberg (1989) reject it for Germany, France and the U.K. but accept it in the case of Japan. They speculate that political factors may account for the theory being rejected in three of the four countries they studied.

The optimal debt theory described above is essentially a formalization of the approach to debt advocated by the pre-Keynesian writers on the subject. To support this claim, let us consider the following extract from Bastable (1903):

We have seen that, under normal conditions, there ought to be a balance between [public expenditure and revenue]. Outlay should not exceed income, or... tax revenue should be kept up to defray expenses. This general principle must, however, admit of modifications. Temporary deficits and surpluses cannot be avoided. The... varying productiveness of.... the tax revenue forbid(s) minute agreement.
The foregoing consideration would apply to any system of finance in its ordinary or usual state, but the difficulty of adjustment is much increased by the operation of what has been described as extraordinary outlay. ... War and the execution of public works are the great causes of this sudden increase of expenditure ... In any case it may fairly be said that exceptional charges of the kind should not be altogether met out of current income.

Bastable, Book V, pages 611-612.

Thus, temporary government spending should be financed by debt issue, and the "varying productiveness" of the tax revenue may cause deviations from balance. Note there is a subtle difference from the modern version: debt issue arising from recessions is seen as accidental rather than as a conscious policy choice to avoid intertemporally inefficient labor allocations.

Buchanan has argued in several places (e.g. 1987) that Keynes's "General Theory" marks a watershed in attitudes towards debt issue. Before Keynes, politicians were constrained from fiscal profligacy by an implicit moral contract between generations. It was thought immoral to burden future generations with debt repayment unless they would benefit from the expenditures so financed. But according to Buchanan and Wagner, Keynes sanctioned deficit spending as "respectable" economic policy. In so doing, he opened wide the door to political competition to transfer income from one group to another. Voters like income redistributions that benefit themselves and reward through re-election the politicians who deliver them and finance
them by debt issue. The costs are passed on to future
generations who will be unable to hold today's politicians
to account. There is a missing political market.

This represents the standard "Virginia school" public
choice explanation for the emergence of persistent deficits
in the post-WW2 period. It has not been without its critics
however. The nub of this criticism is the assumption of
apparent voter irrationality that underlies the model. The
model derives its dynamic from "fiscal illusion" among
voters who elect politicians who implement suboptimal fiscal
policy. Tax burdens are maldistributed over time, lowering
social welfare. This criticism stands or falls on just how
sophisticated voters really are. In particular, do they
understand the fundamental budget constraint that any
government faces? The present value of government spending
must equal the present value of future tax receipts, so
today's debt must eventually be repaid, principal and
interest.

Ultimately, Buchanan's argument revolves around the
assumption that voters do not internalize the budget
constraint. Whether this assumption is justified brings us
to the heart of the controversy over the Ricardian
proposition that debt and (lump-sum) taxes are equivalent.
Barro (1974) shows that if people care about the welfare of
their children and their grandchildren and all subsequent
generations, people will act as if they had an infinite
planning horizon. Consequently, they would care about future tax burdens and would be irrational if put in office politicians who distort the optimal tax rate time profile.

But they would not be irrational if they did not care about future generations. This could be true if they are childless, plan to emigrate to another political jurisdiction or if they wished to leave a negative bequest to their children. Indeed, it is precisely this latter assumption that underlies the model of Cukierman and Meltzer (1989), to be discussed in the next section. Furthermore, Tabellini and Alesina (1990) show that the budget constraint may also fail to be internalized if people are uncertain which group will have to pay the future taxes. If future taxes fall on a given individual (or his children) with probability less than one, but he gets the benefit of current spending with certainty, they show that majority rule voting by expected utility maximizing voters will produce deficits.

2. A Neo-Ricardian Model

Cukierman and Meltzer (1989) construct an overlapping generations model with three classes of agents who are assumed to have perfect foresight. Rentiers earn their income from interest payments on government bonds and the middle and lower classes from wages. The real wage depends on the stock of capital and individual abilities. The middle
class (high ability) real wage is above the average and the lower class (low ability) real wage is below it. The political decisions - about current tax rates, future social security benefits and current debt issues - are made by majority rule. Since individuals differ in ability and thus wage earnings, they may not wish to leave positive bequests if they know that their descendants will be richer than they are. Instead, bequest-constrained agents wish to borrow from future generations, which increases their feasible consumption set. But given that negative debts are not legally dischargeable by their descendants, the only way in which they can borrow from future generations is through government deficits. Bequest-constrained agents favor forward tax-shifting financed by present issue of government debt. Under majority rule, if the decisive voter is bequest-constrained he will choose suboptimally low (from a social welfare standpoint) current taxes and/or high social security benefits.

Those with low real wages will form a coalition in favor of deficits with the rentier class, who benefit from the higher real interest payments arising from an increase in the debt issue. The model predicts that the debt will be larger:

(a) The faster is expected economic growth. Higher future growth implies higher living standards for future generations and so an increase in desired borrowing by
bequest-constrained individuals.

(b) The larger the fraction of the population below a given level of wealth, and so likely to wish to leave a negative bequest.

(c) The larger the rentier class.

(d) The higher expected longevity. The longer the expected duration of the second period of life in this OLG model, the more likely an individual is to become bequest-constrained.

(e) The larger the dispersion of income and wealth. Since the coalition for debt is made up of the very poor and the very rich, the larger the dispersion, presumably the greater the political demand for debt-financing.

This theory could offer an alternative explanation to Buchanan's contractarian theory for the rise of deficit financing in twentieth century democracies. A feature of such democracies has been the extension of the franchise to the poorer classes. As this happens, it is obviously more likely that the decisive voter will be bequest-constrained and will favor debt-financed tax-shifting.

No formal tests of this model have yet been conducted, although the authors do contend that the size and functional distributions of income in the United States over the post-war period are consistent with the model. It is clear, for example, that the 1980s saw both a widening degree of income inequality and an increase in the rate of debt accumulation.

As further shreds of evidence on the matter, I show in
Table 2 below two measures of income inequality, and net debt/GNP ratios for a sample of fourteen OECD countries. Other things being equal, those countries with the greatest degree of inequality should have the highest debt ratios, and those countries where the bottom quintile earns a larger fraction of total household income should have lower debt ratios.

<table>
<thead>
<tr>
<th>Country</th>
<th>Inequality Ratio</th>
<th>Lowest 20%</th>
<th>Net Debt/GNP Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>2.72</td>
<td>7.9</td>
<td>61.7</td>
</tr>
<tr>
<td>Canada</td>
<td>4.49</td>
<td>5.3</td>
<td>10.8</td>
</tr>
<tr>
<td>Denmark</td>
<td>4.13</td>
<td>5.4</td>
<td>16.5</td>
</tr>
<tr>
<td>France</td>
<td>5.75</td>
<td>5.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Finland</td>
<td>3.44</td>
<td>6.3</td>
<td>-4.6</td>
</tr>
<tr>
<td>Ireland</td>
<td>3.48</td>
<td>7.2</td>
<td>32.0</td>
</tr>
<tr>
<td>Italy</td>
<td>4.53</td>
<td>6.2</td>
<td>60.7</td>
</tr>
<tr>
<td>Japan</td>
<td>2.57</td>
<td>8.7</td>
<td>14.9</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.59</td>
<td>8.3</td>
<td>27.3</td>
</tr>
<tr>
<td>Norway</td>
<td>3.80</td>
<td>6.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Sweden</td>
<td>3.79</td>
<td>7.4</td>
<td>- 5.2</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.34</td>
<td>7.0</td>
<td>48.7</td>
</tr>
<tr>
<td>United States</td>
<td>4.40</td>
<td>5.3</td>
<td>19.8</td>
</tr>
<tr>
<td>West Germany</td>
<td>3.04</td>
<td>7.9</td>
<td>10.2</td>
</tr>
</tbody>
</table>
Sources: Data on income were taken from Table 28 of the "World Bank Development Report 1985". Data on debt are OECD compiled, taken from Roubini and Sachs (1989).

In the table, the inequality ratio is calculated as:

\[
\frac{\text{% share of household income held by highest decile}}{\text{% share of household income held by lowest quintile}}
\]

The column entitled "Lowest 20%" shows the percentage of total household income earned by the bottom quintile of households.

As a test of proposition (b), I calculated the correlation coefficient between columns (2) and (3). It was + 0.20.

As a test of proposition (e), I calculated the correlation coefficient between income inequality and debt. It was - 0.16.

In both cases, the correlation was of the wrong sign. However, these findings certainly do not constitute a strong rejection of the theory. First, the degree of variability in the data sets is low; and second, income distribution data is notoriously unreliable so that measurement error is likely to be large. Finally, other things are far from equal in such a heterogeneous sample. Tests based on comparisons of wealth across nations are also ruled out at this stage by lack of good quality data.
3. The Strategic Debt Model

Whereas the above model locates debt bias in the desire of some members of the current generation to enrich themselves at the expense of future generations, the strategic debt model of Persson and Svensson (1989) models debt issue as arising from the different preferences among social groups for public goods expenditure. They show that a government can use debt policy to constrain the government spending policy of its successor. Suppose a conservative government knows it is going to be replaced by a liberal government which prefers a larger amount of government spending than the conservative government. By bequeathing a larger debt to the liberal government than the latter would have itself chosen had it been in power in the previous period, the conservative government ensures that government spending in the second period lies between the preferred spending levels of the two parties.¹

A representative consumer has a utility function defined over the single good produced and leisure. There are two periods. He can borrow or lend at the world rate of interest, taken to be zero for simplicity. The utility function is deliberately structured to rule out time-inconsistent tax policy by the government. By maximizing this subject to the budget constraint, an indirect utility function in terms of after-tax real wages is found, as well as labor supply functions for the two periods.
The government's preferences are given by

\[ U(w_1, w_2) + v'(g) \quad (1) \]

where the first term is the representative consumer's indirect utility function which is to be maximized by the social welfare maximizing government. But the government also has preferences about period 2 government spending, given by the concave utility function \( v'(g) \). (For analytical convenience, there is no government spending in period 1. This is not crucial). The period 1 government chooses the after-tax wages, debt issue and spending to maximize (1) subject to the intertemporal budget constraints

\[ (1-w_1) \cdot L(w_1) = -b \quad (2) \]

\[ (1-w_2) \cdot L(w_2) = b + g \quad (3) \]

The left-hand-side of both constraints is tax revenues; and \( b \) is net borrowing, which is negative in period 1 by dint of the assumption of no period 1 government spending.

The authors show that an indirect utility function that expresses private utility as a function of \( g \) alone can be derived. Call this \( V(g) \). Then the government's problem is to choose the level of \( g \) which maximizes

\[ V(g) + v'(g) \quad (4) \]
The F-O-C give the familiar result that the period 1 government chooses \( g \) so that the marginal cost (in terms of tax distortions) of the chosen level of \( g \) is just equal to the marginal utility derived from it.

The diagram below is a heuristic representation of one possible configuration of government spending, taxes and borrowing.

On the horizontal axis is measured government spending; the vertical axis shows the marginal utility of government spending to conservative and liberal governments. At any level of spending, the liberal government derives higher marginal utility from an extra dollar spent.
The $MC_1$ curve can be thought of as the present value of tax distortion for the level of government borrowing that the period 1 conservative would undertake if he knew he would be returned to power in period 2. Similarly, $MC_2$ shows the (higher) distortions resulting from the level of debt he would bequeath if he knew he would be replaced by a liberal in period 2. As a result, the liberal only undertakes $G_2$ instead of the $G_1$ he could have spent if the conservative had not acted strategically. The result is sensitive to the conservative's preferences between accepting tax distortions and preventing future spending.

Alesina and Tabellini (1990) present a model with similar implications; in their model potential governments disagree about the composition of government spending rather than the level. The incumbent tries to influence his successor by running a deficit. The principal difference between this and the Swedish model is that both parties have an incentive to bequeath deficits. The deficits will be larger

(i) the more polarized the political system;
(ii) the greater the probability the incumbent will not be re-elected;
(iii) the more rigidities there are in the budget mechanism.

A potential shortcoming of these strategic debt models is their reliance on a particular political structure, namely two-party systems with alternating governments. The
model would need substantial adaptation to be applicable to coalition parliamentary governments where two or more parties will be in power at any time. The attitude of coalition partners towards using debt to constrain future governments will likely depend on their ideological proximity, tempered by manoeuvres to further the electoral aims of the individual parties.

Testing the strategic debt model of Svensson and Persson requires surmounting some formidable obstacles. The major testable implication is that conservative governments with particular preferences between the costs of intertemporally inefficient taxation and the optimal size of the public sector will run larger deficits than other types of conservative governments, in the presence of potential liberal successors with very different preferences. Identifying such preferences would be no mean feat.

The authors suggest two episodes represent casual confirmation of the model, the Swedish conservative rule from 1976-80 and the Reagan governments of 1981-88. Using annual data for the sample 1951-1987, I tested the Reagan hypothesis by regressing the deficit/GNP ratio on itself lagged once and the real GNP growth rate plus a "Reagan dummy" taking the value 1 for 1981-87. The result was:

\[
\text{DEF}_t = -0.0129 + 0.5424 \text{DEF}_{t-1} + 0.2634 \text{DY}_t - 0.0143 \text{REAGAN}_t
\]

\[
(0.003) \quad (0.144) \quad (0.0829) \quad (0.0066)
\]

R-square: 0.697
The Reagan dummy was significant: the deficit ratio was almost 1.5 percentage points higher under Reagan. I further tested whether the relationship would hold up for all Republican administrations by running the regression with a dummy taking the value 1 for all years when there was a Republican administration. This yielded:

$$\text{DEF}_t = -0.0177 + 0.823 \text{DEF}_{t-1} + 0.3605 \text{DY}_t + 0.0046 \text{REPDUM}_t$$

$$\begin{align*}
(0.0045) & \quad (0.113) & \quad (0.0899) & \quad (0.0045) \\
\text{R-square: 0.664}
\end{align*}$$

As evidenced by the insignificant dummy variable, the relationship does not hold for all Republican presidents, which raises the question: Why Not? Presumably, one could argue that it is because Reagan was unusually concerned about the size of government. But in Britain, Mrs. Thatcher was equally keen to "roll back the frontiers of the state" and made this as much a plank of her election platform as Reagan. Yet by the time of her third election victory, the U.K. budget deficit had become a surplus, which is obviously counter to the model strictly interpreted.²

One possible explanation for this apparent anomaly is that Svensson and Persson do not consider the possibility of debt monetization. A conservative leader in a country with an independent central bank might be more willing to bequeath a large debt than would a conservative in a country with a weak central bank. A strong bank would not be likely
to monetize the debt and so would force the incoming liberal to raise taxes. By contrast, a weak central bank would monetize and so eliminate the constraint on the liberal - and at the same time impose a levy on bondholders who are presumably part of the core constituency of the conservative government.

This is just one instance of how varying institutions make international tests tricky. One should also take into consideration other differences in the balance of power between the legislature and the executive: this would seem to be essential in comparing the Reagan and Thatcher cases.

As stated earlier, there is a serious identification problem at the heart of testing the model. Empirical tests of its key prediction require knowledge of individual administration's preferences over government spending and tax distortions. Rather than go this route, I propose to test one of the maintained hypotheses, that public debt levels influence the level of government spending. This would establish a minimum plausibility level for the theory. A negative finding here would lead us to question the real world relevance of the theory.

I use the technique pioneered by Granger (1969). A variable \(X\) is said to help predict another variable \(Y\) if inclusion of \(X\) in a regression equation of \(Y\) on lags of itself finds \(X\) statistically significant. In the context of the above models, we would expect to find the level of real
public debt helps predict the level of real government expenditure. To test this, I adopt the strategy of Hsiao (1981) and McMillin and Fackler (1984).

a. Ensure that both series are stationary. This I do by testing for a unit root using the Augmented Dickey-Fuller regression method. The ADF test consists of running a regression of the first difference of the series \( Z(t) \) against the series lagged once, i.e. \( Z(t-1) \), lagged difference terms, a constant and a time trend. If the coefficient on \( Z(t-1) \) is significantly different from zero we reject the null hypothesis of a unit root. The critical values used for testing the null hypothesis are those computed by MacKinnon (1990) incorporated in the MicroTSP econometric program.

b. Determine the own lag length for \( Y \) (here, the ratio of government spending to nominal GNP) using Akaike's Final Prediction Error method. The lag length selected is that which minimizes the FPE.

c. Determine the lag length for the \( X_i \) variables which are thought a priori likely to predict \( Y \). In the results below, I first test for the influence of real GNP on \( Y \), finding the optimal number of lags using the FPE criterion. Then we test for the influence of the debt/GNP (or deficit/GNP ratio) in what is therefore a trivariate regression. The reason I test for debt effects in the presence of real GNP is the probability that real GNP will affect both government
consumption spending and the state of the deficit.

There are several hypotheses that would lead us to anticipate real output affecting government spending. For example, Wagner's Law states that the ratio of government spending to income tends to rise with the increase in per capita real income. Also, if a country pursued a Keynesian counter-cyclical fiscal policy, this would show up as output Granger-predicting government spending.

To be more specific about the approach taken: First, it was decided to take a maximum of five lags of all variables. In cases where a group of five lagged variables was significant, I tested for six and seven lags. I began by finding the number of lags of the dependent variable which minimized the FPE. Then real output was added and again I tested for the optimal number of lags. If output was significant, I retested for the optimal number of lags of the dependent variable in a regression including the optimal number of lags of output found from the previous stage. Then I added the fiscal variable and tested for the optimal number of lags of this. If the fiscal variable was significant, I again retested for the optimal number of lags of the dependent variable (in a regression with the previously found FPE minimizing lags of output and the fiscal variable) and the optimal number of lags of output (in a regression with the previously found FPE-minimizing lags of the dependent variable and the fiscal variable).
Empirical Results

I conducted Granger-prediction tests for ten OECD countries using data from the International Monetary Fund Yearbook. The sample period was 1950-1988 for all countries except Australia and France (1950-87), Denmark (1950-1986) and West Germany (1953-1988).

Define the following variables:

\[ GXRT = \text{Final government purchases} \div \text{Nominal GNP} \]

\[ DGXRT = \text{First-difference of } GXRT \]

\[ DGNP = \text{Change in log of real GNP} \]

\[ DFRT = \text{Central government deficit} \div \text{Nominal GNP} \]

\[ DDEF = \text{First difference of } DFRT \]

Table 3

Results from Parametric Tests

Australia

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Vars</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>3.393 E-5</td>
<td>3.393 E-5</td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>1.642 E-4</td>
<td>1.118 E-4</td>
</tr>
<tr>
<td></td>
<td>DGNP(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F (1,29) \] \[ DGXRT \rightarrow DDEF = 7.22 ** \]

Canada

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Vars</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>4.733 E-5</td>
<td>4.431 E-5</td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDEF(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>1.871 E-5</td>
<td>1.871 E-5</td>
</tr>
<tr>
<td></td>
<td>DDEF(2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F (2,29) \] \[ DDEF \rightarrow DGXRT = 3.65 ** \]
### Denmark

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>6.369 E-5</td>
<td>5.390 E-5</td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGDP(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>2.347 E-4</td>
<td>2.183 E-4</td>
</tr>
<tr>
<td></td>
<td>DGXRT(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F(4,26) \text{ DGXRT} \rightarrow \text{DDEF} = 2.57 \]

### France

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>2.714 E-5</td>
<td>2.714 E-5</td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>1.447 E-4</td>
<td>1.397 E-4</td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGXRT(2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F(2,28) \text{ DGXRT} \rightarrow \text{DDEF} = 2.45 (\#) \]

### Ireland

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>3.636 E-5</td>
<td>2.739 E-5</td>
</tr>
<tr>
<td></td>
<td>DGXRT(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGDP(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>4.291 E-4</td>
<td>3.807 E-4</td>
</tr>
<tr>
<td></td>
<td>DGDP(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Italy

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>2.498 E-5</td>
<td>2.498 E-5</td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>2.863 E-4</td>
<td>2.863 E-4</td>
</tr>
<tr>
<td></td>
<td>DGDEF(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sweden

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var</th>
<th>Initial FPE</th>
<th>Final Min FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>3.644 E-5</td>
<td>3.382 E-5</td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGDP(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>2.492 E-4</td>
<td>1.563 E-4</td>
</tr>
<tr>
<td></td>
<td>DGDEF(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGXRT(3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ F(3,28) \text{ DGXRT} \rightarrow \text{DDEF} = 8.418 \]**
United Kingdom

\[
\begin{align*}
\text{DGXRT} & \quad \text{Constant} \\
& \quad \text{DGXRT(2)} \quad 4.913 \ E-5 \quad 4.913 \ E-5 \\
\text{DDEF} & \quad \text{Constant} \\
& \quad \text{DGXRT(3)} \quad 2.794 \ E-4 \quad 2.517 \ E-4 \\
F (3,29) \quad \text{DGXRT} \rightarrow \text{DDEF} & = 3.217 *
\end{align*}
\]

United States

\[
\begin{align*}
\text{Dep. Var.} & \quad \text{Indep. Var} & \quad \text{Initial FPE} & \quad \text{Final Min FPE} \\
\text{GXRT} & \quad \text{Constant} \\
& \quad \text{GXRT(2)} \quad 4.175 \ E-5 \quad 3.769 \ E-5 \\
& \quad \text{DDEF(1)} \\
\text{DDEF} & \quad \text{Constant} \\
& \quad \text{DDEF(3)} \quad 1.638 \ E-4 \quad 1.511 \ E-4 \\
& \quad \text{DGNP(1)} \\
F (1,29) \quad \text{DDEF} \rightarrow \text{GXRT} & = 5.15 **
\end{align*}
\]

West Germany

\[
\begin{align*}
\text{DGXRT} & \quad \text{Constant} \\
& \quad \text{DGNP(4)} \quad 3.176 \ E-5 \quad 1.891 \ E-5 \\
& \quad \text{DFRT(1)} \\
\text{DFRT} & \quad \text{Constant} \\
& \quad \text{DFRT(1)} \quad 8.589 \ E-5 \quad 7.094 \ E-5 \\
& \quad \text{DGNP(1)} \\
F (1,25) \quad \text{DFRT} \rightarrow \text{DGXRT} & = 9.64 **
\end{align*}
\]

Notes to Table 3:

* Significant at 10 percent.
** Significant at 5 percent.
# 10.45 % chance of this value of test statistic under the null hypothesis.

Numbers in parentheses refer to number of lags used to minimize the Akaike FPE in the regressions. A maximum of 5 lags was tested in all cases.

The initial FPE is the prediction error when the regression includes only the minimizing number of past values of the dependent variable. (N.B. that the
optimal number could be zero lags, that is, just an intercept term).

The final minimum FPE shows the lowest value attained when additional regressors were included.

The F Statistics test the null hypothesis that the deficit does not help to predict government spending, or vice-versa. I only report the value of the F statistics when they are significant at the 10 percent confidence level.

The above results indicate that deficits Granger-predict government spending in Canada, the United States and West Germany, but not in any of the other countries in the sample. However, government spending predicts the deficit in five of the ten countries. A possible interpretation of the latter result is that spending increases bring forth future tax increases, so reducing the deficit. There is an extensive empirical literature analyzing the temporal relationship between spending and taxes (see, for example, McMillin and Fackler, 1984).

Recent research (Holmes and Hutton, 1990, for example) has indicated that parametric Granger-prediction tests such as the above may lead to incorrect inferences. In particular they show that if the error terms have a non-normal distribution or are heteroskedastic, or if the relationship is non-linear, linear Granger-prediction tests are misspecified. Holmes and Hutton advocate a methodology that minimizes assumptions about the potential relationship between X and Y. Specifically, they recommend using the
multiple rank F test. This involves estimating the relationship between variables measured in ranks by OLS and calculating the standard ANCOVA F statistic based upon the residual variances from the rank regressions. To ensure our inferences from standard parametric tests are not spurious, I present in Table 4 evidence from the multiple rank F tests for comparison.

The results in Table 4 were derived using identical procedures to those used in the parametric tests, except that now the data is estimated in rank form. Thus, the stationary data was ranked and then the Akaike FPE criterion was used on the transformed data to find the optimal lags.

Table 4

Results from Rank Regressions

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var.</th>
<th>Initial FPE</th>
<th>Final FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>111.81</td>
<td>111.81</td>
</tr>
</tbody>
</table>

| DDEF      | Constant    | 114.63      | 104.69    |
|           | DGNP(1)     |             |           |
|           | DGXRT(1)    |             |           |

F(1,29) DGXRT --&gt; DDEF = 4.82 **

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Indep. Var.</th>
<th>Initial FPE</th>
<th>Final FPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>111.45</td>
<td>103.83</td>
</tr>
<tr>
<td></td>
<td>DGXRT(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDEF(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| DDEF      | Constant    | 120.65      | 120.65    |
|           | DDEF(2)     |             |           |

F(1,29) DDEF --&gt; DGXRT = 4.09 *
<table>
<thead>
<tr>
<th>Country</th>
<th>Variable</th>
<th>Coefficient 1</th>
<th>Coefficient 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>94.67</td>
<td>86.61</td>
</tr>
<tr>
<td></td>
<td>DGXRT(3)</td>
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</tr>
<tr>
<td></td>
<td>DGDP(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>121.74</td>
<td>121.74</td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDEF(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGNP(5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>109.35</td>
<td>71.27</td>
</tr>
<tr>
<td></td>
<td>DGNP(5)</td>
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<tr>
<td>DDEF</td>
<td>Constant</td>
<td>124.4</td>
<td>103.03</td>
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<tr>
<td></td>
<td>DDEF(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGNP(5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F(1,23) DGXRT --&gt; DDEF = 2.91 (#)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
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</tr>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>91.68</td>
<td>78.72</td>
</tr>
<tr>
<td></td>
<td>DGXRT(2)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>DGDP(2)</td>
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<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>119.91</td>
<td>90.21</td>
</tr>
<tr>
<td></td>
<td>DGDP(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>116.4</td>
<td>115.3</td>
</tr>
<tr>
<td></td>
<td>DGNP(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDEF(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>120.91</td>
<td>120.91</td>
</tr>
<tr>
<td></td>
<td>DDEF(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGXRT</td>
<td>Constant</td>
<td>89.64</td>
<td>75.88</td>
</tr>
<tr>
<td></td>
<td>DGXRT(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DGDP(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDEF</td>
<td>Constant</td>
<td>127.5</td>
<td>97.51</td>
</tr>
<tr>
<td></td>
<td>DGXRT(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F(3,29) DGXRT --&gt; DDEF = 5.51 **</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
United Kingdom

\[
\begin{array}{ccc}
\text{DGXRT} & \text{Constant} & 98.91 \\
& \text{DGNP}(2) & 85.91 \\
& \text{DDEF}(1) & \\
\text{DDEF} & \text{Constant} & 112.59 \\
& & 112.59 \\
F(1,29) \text{ DDEF } \rightarrow \text{ DGXRT } = 5.76 \ast
d\end{array}
\]

United States

\[
\begin{array}{ccc}
\text{DGXRT} & \text{Constant} & 71.33 \\
& \text{DGXRT}(1) & 63.5 \\
& \text{DGNP}(3) & \\
\text{DDEF} & \text{Constant} & 108.29 \\
& \text{DDEF}(2) & 107.53 \\
& \text{DGXRT}(1) & \\
F(1,29) \text{ DGXRT } \rightarrow \text{ DDEF } = 2.05
d\end{array}
\]

West Germany

\[
\begin{array}{ccccc}
\text{Dep. Var} & \text{Indep. Var.} & \text{Initial FPE} & \text{Final FPE} \\
\text{DGXRT} & \text{Constant} & 98.33 & 60.18 \\
& \text{DGNP}(2) & \\
& \text{DFRT}(1) & \\
\text{DFRT} & \text{Constant} & 60.72 & 45.38 \\
& \text{DFRT}(1) & \\
& \text{DGNP}(1) & \\
F(1,27) \text{ DFRT } \rightarrow \text{ DGXRT } = 3.64 \ast
d\end{array}
\]

(#) Probability of this value under null is 10.15 %

The non-parametric Granger-prediction tests are broadly in accord with the previous tests, with two notable exceptions. The conclusions for the United Kingdom and the United States are completely reversed, suggesting that there
was some mis-specification in the original tests for these two countries.

Table 5 summarizes the results of the parametric and nonparametric tests.

Table 5
Summary of Granger-prediction tests

<table>
<thead>
<tr>
<th>Country</th>
<th>DEF --&gt; GX</th>
<th>GX --&gt; DEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Parametric</td>
<td>Yes</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Denmark</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>France</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>Yes(*)</td>
</tr>
<tr>
<td>Ireland</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Italy</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sweden</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Parametric</td>
<td>No</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>United States</td>
<td>Parametric</td>
<td>Yes</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>West Germany</td>
<td>Parametric</td>
<td>Yes</td>
</tr>
<tr>
<td>Nonparametric</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Conclusions

I have presented the first empirical tests of the strategic debt model, using techniques of Granger-prediction. There is some support for the hypothesis in the cases of Canada, United Kingdom, United States and West Germany. However, these are not the countries in my sample which experienced the largest debt accumulation in the post WW2 era. In many countries, the evidence above suggests, significant increases in debt have not led to cutbacks in government spending in real terms. A possible explanation for this is provided by the power dispersal or coalition model, to which we now turn.

4. The Power Dispersal Model

Roubini and Sachs (1989) present a model which makes coalition governments, or power dispersal, central to the analysis of budget deficit persistence. Unlike the models reviewed in earlier sections, the coalition government hypothesis of Roubini and Sachs is not grounded in an explicit optimizing framework. Instead, they present what they call a "semi-reduced-form equation" to describe the basic dynamic response of deficits to major macroeconomic shocks.

They claim that the optimal fiscal policy model cannot fully explain the different patterns of public debt that have been observed in OECD countries over the period 1960-
85. Institutional features matter: in particular, when power is dispersed, either across branches of government as in the United States, or between the partners in a coalition government, the likelihood of intertemporally inefficient budget policy increases. Whilst the optimal fiscal policy can explain the emergence of budget deficits in all countries after the growth slowdown following the 1973 oil price shock, it cannot explain why some countries managed to stem the increase in their debt/GNP ratios in the 1980s whilst in others the debt/GNP ratio continued to rise. If the tax-smoothing hypothesis were universally true, we should have seen all countries raising taxes or cutting spending and so reining in their deficits.

Roubini and Sachs note that the countries unable to keep the rise in debt/GNP below 10% between 1981-85 (1981 marks, in their estimation, the point at which it became clear to governments that the rise in government spending induced by the 1973 slowdown was not just cyclical but instead permanent) were mostly countries with a proportional representation form of voting and multi-party coalition governments. Coalition governments may find it particularly hard to reduce deficits for two reasons. First, individual coalition partners have distinctive interests and constituencies. A prisoner's dilemma arises in that all coalition partners may prefer comprehensive cuts but each partner wants to protect its own part of the budget. Second,
individual partners may have the power to prevent a change but not the power to implement one.

R & S estimate a pooled cross-section time series model using annual data where the regression equation is given by

$$DB_{i,t} = a_0 + a_1 DB_{i,t-1} + a_2 DU_{i,t} + a_3 D^2 GDP_{i,t}$$
$$+ a_4 [DR_{i,t} - DGDP_{i,t}] B_{i,t} + a_5 POL_{i,t} + v_{i,t}$$

The dependent variable is the change in the debt/GDP ratio. The right-hand-side variables are a lagged dependent variable, the change in the unemployment rate, the change in the growth rate of GDP, the change in the real interest rate minus the GDP growth rate times the lagged value of the debt/GNP ratio and a political variable which represents an index of political cohesion for each country in each year. The political index variable takes the following values$^3$:

0 if country has one-party majority government; or presidential government with same party in the majority in the executive and the legislature.

1 if country has a coalition parliamentary government with two coalition partners; or a presidential government with different parties in control of the executive and legislature.

2 if country has coalition parliamentary government with three or more parties.

3 if country has a minority parliamentary government.
In their reported results, Roubini and Sachs find that the coefficients on the economic variables have the expected sign and the political variable enters significantly with the correct sign. That is, the less cohesive the government, the larger the deficit. When an interaction variable is added, this proves significant and the pure political variable loses its explanatory power. The interaction consists of the political variable times a zero-one dummy which takes the value 1 after 1975. This is supposed to represent the advent of the economic slowdown and resultant rise in real government spending. The interpretation R&S place on this finding is that coalitions do not of themselves have a tendency to produce overly-large deficits. Rather, coalitions make it more difficult to retrench after some exogenous shock initiates a rise in debt/GNP and so perpetuate large deficits. (Below I offer an alternative explanation for the lack of a coalition effect prior to 1975).

A Historical Test of the Power Dispersal Theory

Gordon (1989) questions the robustness of the power dispersal theory and suggests it be tested with other data sets. An interesting historical episode for testing the theory is provided by the inter-war years, specifically the period 1926-1938. The reason for restricting analysis to this period is that the years immediately following the end
of World War One were characterized by a degree of political and economic upheaval greater than can be usefully analyzed by this model. It is true that there was a large debt problem for many countries after 1918 but the political forces shaping the debt resolution differed dramatically from country to country and cannot be captured solely by power dispersal. Alesina (1988) offers an interesting comparative analysis of these forces in France, Germany, Italy and the United Kingdom.

By 1927 the economic and political picture had stabilized in most European countries. The period 1927-1938 therefore represents a suitable framework for testing the coalition hypothesis. What we are interested in testing is whether deficits arising from the Great Depression were more persistent in those countries where power was dispersed. Table 6 overleaf shows how the deficit/GNP ratio changed in ten industrial democracies during the decade of the Great Depression.

What do we learn from these numbers? They are certainly in reasonable accord with the power dispersal theory. All countries with single party governments ended the period with deficits under control whereas four out of seven countries with coalition governments failed to restore pre-Depression budgetary equilibrium. However, it could be argued that different budget performance in the 'thirties might be accounted for by variability in the severity of the
downturn. It is well-known, for example, that the Scandinavian countries were relatively unscathed by the Great Depression.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>Deficit/GNP Ratio (%)</th>
<th>Type of Government</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1929-30</td>
<td>1937-38</td>
</tr>
<tr>
<td>Australia</td>
<td>-1.29</td>
<td>-0.15</td>
</tr>
<tr>
<td>Belgium</td>
<td>-0.15</td>
<td>-4.94</td>
</tr>
<tr>
<td>Canada</td>
<td>-0.34</td>
<td>-0.66</td>
</tr>
<tr>
<td>Denmark</td>
<td>+0.29</td>
<td>+0.89</td>
</tr>
<tr>
<td>Finland</td>
<td>-1.64</td>
<td>-3.57</td>
</tr>
<tr>
<td>France</td>
<td>+2.09</td>
<td>-7.88</td>
</tr>
<tr>
<td>Netherlands</td>
<td>-2.18</td>
<td>-7.47</td>
</tr>
<tr>
<td>Norway</td>
<td>-0.64</td>
<td>-0.07</td>
</tr>
<tr>
<td>Sweden</td>
<td>-0.46</td>
<td>-0.68</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>+0.78</td>
<td>+0.36</td>
</tr>
</tbody>
</table>

Source: Deficits calculated from Tables H4 and H5 of Mitchell (1975), except for Australia and Canada. GNP from table K1 of Mitchell, except for Australia and Canada.

As further evidence, I now present a formal test of the importance of power dispersal in the context of a pooled cross-section time series regression model that also takes account of the relative severity of output shocks in
different nations.

The regression equation to be estimated is:

\[ \text{DEF}_{i,t} = b_0 + b_1 \text{DEF}_{i,t-1} + b_2 \text{DGNP}_{i,t} + b_3 \text{POLI}_t + u_{i,t} \]

where \( \text{DEF}_{i,t} \) is the deficit/GNP ratio for country \( i \) in period \( t \).

The lagged deficit ratio is included to allow for any slowness in budget adjustment extra to the hypothesized effect that is captured by the variable POLI. DGNP is the rate of GNP growth. POLI is coded as zero if the country had a majority government; otherwise it takes the value \([K(i,t)-1]\), where \( K(i,t) \) is the value of the Kesselman-Wildgen index. This is an index designed to capture legislature fractionalization. It is constructed using the formula:

\[ K(i,t) = \exp \left[ - \sum_{i=1}^{m} P(I) \times \ln P(I) \right] \]

where \( P(I) \) is the proportion of seats in parliament \( t \) held by party \( i \) and \( m \) is the total number of parties with seats. The index has a lower bound of 1, which would be the value if one party won all the seats in the legislature. It thus captures power dispersal through the fact that the higher the fractionalization of the legislature, the more likely there is to be a coalition government.

OLS was performed on data from the countries in Table
Six above for the time period 1927-1938. Results are shown below. A preliminary inspection of the residuals did not reveal any evidence of heteroskedasticity.

\[
\text{DEF}_{i,t} = -0.1836 + 0.8225 \text{DEF}_{i,t-1} + 0.1156 \text{DGNP}_{i,t} \\
(0.2496) \quad (0.0530) \quad (0.0298) \\
- 0.1872 \text{POLI}_{i,t} \\
(0.0773) \\
\text{R}^2 = 0.768
\]

As expected, economic performance significantly affects the budget deficit: the lower GNP growth, the higher the deficit ratio. But of greater interest is the significance of the variable capturing power dispersal. It is of the expected sign and highly significant. Thus the Great Depression era provides further evidence in favor of the theory. Even allowing for different economic performance, those countries with single-party majority governments were much more likely to restore budgetary balance.

Some Comments on the Model

First, we should note that one feature common to the episodes of fiscal difficulty experienced in the Great Depression and 1973-85 was the absence of a working fixed exchange rate system. A fixed exchange rate system prevents member countries fiscal policies from diverging "too far" from each other in anything longer than the short-term. If agents have rational expectations, a sequence of large
deficits will cause them to expect monetization in the future, leading to an exchange rate crisis today. This will force the fiscal authority to either address its deficit problem or devalue its currency. One could argue, then, that the effects of political cohesion on deficits are less likely to be observed under fixed exchange rate regimes. This offers a possible explanation for the lack of evidence of effects of power dispersal on deficits in the post-World War II era pre-1973.

Second, because Roubini and Sachs do not explicitly model the political equilibrium, their regression results are open to the charge that they may be biased because they do not take into consideration the possible feedback from the economy to the polity. There is plenty of evidence that voters are sensitive to the state of the economy. It is plausible that a weak economy causes both budget deficits to emerge and changes in the partisan make-up of the government. Depending presumably on the voting system, this could manifest itself either as a new party in power or increased fractionalization of the legislature.

As a check on possible feedback from the economy to legislature composition, Table 7 below shows the growth rates in twelve countries for two periods, 1960-73 and 1974-87. This partition reflects the belief that the two oil shocks reduced the trend growth rate. Juxtaposed with these are the average values of the Kesselman-Wildgen Index for
each country over the relevant time period. (See the previous section for the definition of the index).

Table 7
Growth Rates & Fractionalization

<table>
<thead>
<tr>
<th>Country</th>
<th>DGNP60-73</th>
<th>KWI60-73</th>
<th>DGNP74-87</th>
<th>KWI74-87</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>5.05 %</td>
<td>2.325</td>
<td>2.13 %</td>
<td>2.544</td>
</tr>
<tr>
<td>Belgium</td>
<td>4.87 %</td>
<td>4.041</td>
<td>1.71 %</td>
<td>7.854</td>
</tr>
<tr>
<td>Canada</td>
<td>5.14 %</td>
<td>3.101</td>
<td>3.47 %</td>
<td>2.575</td>
</tr>
<tr>
<td>Denmark</td>
<td>4.36 %</td>
<td>4.501</td>
<td>1.92 %</td>
<td>7.007</td>
</tr>
<tr>
<td>Finland</td>
<td>5.43 %</td>
<td>5.958</td>
<td>2.84 %</td>
<td>6.044</td>
</tr>
<tr>
<td>France</td>
<td>5.43 %</td>
<td>4.293</td>
<td>2.14 %</td>
<td>4.555</td>
</tr>
<tr>
<td>Italy</td>
<td>5.55 %</td>
<td>4.713</td>
<td>2.81 %</td>
<td>5.016</td>
</tr>
<tr>
<td>Japan</td>
<td>9.45 %</td>
<td>3.014</td>
<td>3.71 %</td>
<td>4.071</td>
</tr>
<tr>
<td>Neth'lnds</td>
<td>5.31 %</td>
<td>7.091</td>
<td>1.71 %</td>
<td>4.879</td>
</tr>
<tr>
<td>Norway</td>
<td>4.34 %</td>
<td>4.119</td>
<td>3.94 %</td>
<td>4.137</td>
</tr>
<tr>
<td>U.K.</td>
<td>3.31 %</td>
<td>2.161</td>
<td>1.64 %</td>
<td>2.516</td>
</tr>
<tr>
<td>W.Germany</td>
<td>5.15 %</td>
<td>2.543</td>
<td>1.81 %</td>
<td>2.780</td>
</tr>
</tbody>
</table>

Key to acronyms:
DGNP60-73: average rate of GNP growth, 1960-73
DGNP74-87: average rate of GNP growth, 1974-87
KWI60-73: average value of K-W index of legislature, 1960-73
KWI74-87: average value of K-W index of legislature, 1974-87
In all twelve countries, the average GNP growth rate was significantly lower for the later period. In ten of the twelve cases, the average degree of fractionalization was also higher in the second period, with Belgium and Denmark being spectacular examples. So there is some evidence that poorer growth performance is associated with greater fractionalization, but the evidence is too weak to refute the Roubini and Sachs claim that we can safely ignore potential feedback from the economy to the polity, at least in this sample. Future research in this area should consider jointly estimating an equation for deficits and an equation linking fractionalization to the state of the economy.

5. The Political Budget Cycle Model

The models reviewed so far can be regarded as an explanation for the gradual increase in budget deficits traced in the introduction. By contrast, the political budget cycle model of Rogoff and Sibert (1988) postulates that a deficit arises at election time as a consequence of attempts by governments to signal their competence to voters by cutting taxes and/or increasing government spending. The size of the deficit is not observable to voters until after the election, however.

There are two parties, denoted L and R, who compete for office every other period. The main factor in the voter's decision is assumed to be the perceived competence of the
two parties in providing a fixed quantity of government services, $G$. The more competent the government, the less revenue it requires to deliver $G$, i.e.

$$G = e + t + D$$  

(1)

where $e$ is the government's competency, $t$ is a lump-sum poll tax and $D$ is a distortionary seignorage tax.

Identical voters have a welfare function:

$$= y - t - D - W(D)$$  

(2)

where $y$ is some constant level of exogenous nonstoreable output and $W$ represents distortions arising from the seignorage tax. It would clearly be socially optimal to always use the poll tax to finance $G$, irrespective of the level of $e$. Equally, utility-maximizing voters will prefer the more competent party, other things being equal.

Competency is assumed to be stochastic and, for analytical convenience is assumed to follow an MA(1) process here, thus allowing elections to be treated as independent. (That a party suboptimally set taxes too low at a previous election conveys no information about its present policy). The competency shocks of the two parties are independent.

The crucial assumption in the model which delivers a potential political budget cycle is a postulated temporary information asymmetry. The incumbent party is assumed to observe its current competency shock whereas voters can only
observe it with a lag and must infer the competence of the incumbent from the poll tax bill. It follows that the government has an incentive to cheat by setting taxes "too low" from a social welfare point of view, thus giving the voter a false signal of the government's competence. When the citizen votes, he knows G and t but not e and D. He must therefore infer competence, recognizing the government's incentive to cheat. The expected competence of the opposition party is given by the mean of the probability distribution describing e. No statement by the opposition that it is more competent than the mean will be credible\(^5\).

Each party is assumed to choose the rate of seignorage which maximizes its objective function. This depends on (a) their probability of being in office (from which the government gets "ego-rents" and (b) the social welfare losses due to suboptimal use of seignorage. Voters know the form of the objective function.

Rogoff and Sibert show that, except for cases where the competency shock is extremely low or extremely high, all governments will use the seignorage tax (or run a deficit in a model with bonds) in an election year. Notice that there is no incentive to resort to seignorage in non-election years since this simply lowers welfare without increasing the party's chances of winning the election.

The idea that incumbents will cut taxes and run a deficit in election years predates the Rogoff & Sibert
model. Earlier models such as Frey and Schneider (1978) also predicted election year deficits. However, these models were not based on rational voters. An early empirical contribution was Tufte (1978). He claimed transfer payments were unusually high in the fourth quarter of presidential election years. However, Winters et al (1981) dispute much of his evidence. In particular, fourth-quarter peaking occurs only in the case of Nixon in 1972. But in a more formal econometric analysis, Alesina (1988) again confirms Tufte's findings for the sample period 1960-88. Schneider and Frey (1988) provide a summary of some empirical tests of non-rational political budget cycle models in countries other than the U.S.

Some General Comments

Summarizing, the models presented above are all linked by the theme that political factors matter in explaining why deficits arise and vary internationally but differ in (i) the specific institutional variables that are hypothesized as driving the debt process and (ii) the modelling of political equilibrium - i.e. in some cases it is exogenous, others endogenously determined. There is no reason why we should expect one model to adequately explain deficits for all times and places but it would be difficult to model the political equilibrium in a theory encompassing all the above.
One criticism that can be made of the recent vintage of political debt models is their failure to take account of the monetary authorities. In fact, there is a close link between the fiscal and monetary arms of policymaking, made explicit by the government's budget constraint at a point in time:

$$G(t) - T(t) = \frac{M(t) - M(t-1)}{p(t)} + B(t) - (1 + r) B(t-1)$$

where $G(t)$ is real government spending, $T(t)$ is real tax revenue net of non-interest transfers, $B(t)$ is the real value of one-period bonds due to mature in $t+1$ and $M(t)$ is the nominal stock of high-powered money. The constraint says that any excess of spending over tax revenues must be financed by an increase in either the public debt or the monetary base or some combination of the two.

Sargent and Wallace (1981) show that if a central bank follows a consistent low monetary base growth rate while at the same time the fiscal authority is running large deficits, the situation cannot continue indefinitely. For ultimately the long-run constraint that current deficits be backed by future taxes means that either the monetary or fiscal authority must capitulate. In Sargent and Wallace it is the monetary authority that is assumed to be subordinate to the fiscal authority. The deficit will ultimately be monetized, leading to their famous claim that tight money
today is incredible and causes higher inflation today if a stream of future deficits is anticipated.

However, as Parkin (1987) points out, it is possible to envisage that the monetary authority is dominant, in which case it will be the fiscal authority that has to rein in its debt issue in the face of tight monetary policy. He presents some evidence that supports the claim that the independence of the central bank constrains the tendency of governments to run deficits. He estimates time series models of deficit processes for individual countries and uses the asymptotic means and variances of his estimates to draw conclusions about the influence of central bank independence on fiscal policy.

III. An Integrated Empirical Test

In previous sections, I have presented some empirical tests of individual theories. In this section, I report some results from an integrated test using pooled cross-section time series data, one which also incorporates the potential influence of central bank powers. This represents the first such attempt to statistically identify the explanatory power of different models. It also constitutes a more powerful test of the fiscal effects of independent banks than Parkin (1987) who only estimated models for individual countries.

The integrated test nests testable implications of the optimal fiscal policy model, the political budget cycle
model and the power dispersal model. It additionally tests whether central bank independence plays a role in determining deficits. The model of Sargent and Wallace (1981) implies that any test not controlling for this variable would be mis-specified.

The OLS regression model to be estimated is

\[
\text{DEFRT}_{t,i} = a_0 + a_1 \text{DEFRT}_{t-1,i} + a_2 \text{GTEMP}_{t,i} + a_3 \text{DGNP}_{t,i} \\
+ a_4 \text{CBIND}_{t,i} + a_5 \text{POLI}_{t,i} + a_6 \text{ELYR}_{t,i} + u_{t,i}
\]

The variables are defined as follows:

- DEFRT = Central government deficit/GNP ratio
- GTEMP = temporary government spending
- DGNP = change in real GNP
- CBIND = measure of central bank independence
- POLI = measure of political cohesion
- ELYR = dummy variable for election year.

I now describe how these variables are constructed.

DEFRT is the ratio of the deficit to nominal GNP. The use of this variable affords a much larger sample size than R&S reported on, since debt data is available for a shorter time period than deficit data for most of the countries in their tests.

GTEMP is calculated as follows. I begin by finding the level of "permanent" real government spending. Define the variable G*, where G* is defined as the ratio of real
government expenditure to trend GNP. Real government spending is obtained by deflating nominal spending by the GNP deflator and trend real GNP is obtained by running a seven-year moving regression of the log of real GNP on a constant and time and using the fitted value of the middle observation as the trend for that year. Next, I estimate an ARIMA model for G* and use the fitted and forecast values to form my measure of permanent spending:

$$GPERM(t) = \frac{1}{n} [G^*(t+1) + G(t+2) + \ldots \ldots G(t+n)]$$

n was taken to be 30 in the computations of GPERM. Finally, the GTEMP series is found as the difference between G* and GPERM. This method is essentially that advocated by Beveridge and Nelson (1981). The estimated ARIMA processes for G* used to calculate GXTEMP are shown in Appendix A.

DGNP is the change in the log of GNP. The expected sign in the regression is negative according to the optimal fiscal policy theory but positive according to the debt theory of Cukierman and Meltzer.

CBIND is measured as in Alesina (1988), except for Ireland which I assign a value of 1 based on information in Brennan and Walsh (1990). CBIND is measured on a scale of 1 to 4 with the least independent central banks assigned a value of 1 and the most independent assigned a value of 4. We would expect the long-run deficit to be lowest in countries with the most independent central banks; hence
CBIND should enter with a negative coefficient.

POLI is the measure of political cohesion used in Roubini and Sachs. It should enter with a negative sign but is expected to lose its significance when an interactive term, DGNP*POLI is included in the regression. Two countries (Australia and Switzerland) are included in my sample which were not in the original R&S sample. The construction of the variable for these countries was as follows:

**Australia:** In years when the same party controls both Houses, a value of zero is assigned. When power is split, a value of 1 is assigned.

**Switzerland:** The cabinet in Switzerland has always consisted of members from four parties. Thus a value of 2 was assigned for all years.

ELYR is a dummy variable which takes the value 1 in an election year, zero otherwise and should be positive.
Table 8

Results of the Pooled Cross-Section Time Series

Regression for sample period 1960-1988

Dependent Variable: Deficit/Nominal GNP ratio.

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFRT(-1)</td>
<td>0.932</td>
<td>0.932</td>
<td>0.935</td>
<td>0.918</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.023)</td>
<td>(0.022)</td>
<td>(0.023)</td>
</tr>
<tr>
<td>DGNP</td>
<td>0.100</td>
<td>0.010</td>
<td>0.073</td>
<td>0.076</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.026)</td>
<td>(0.027)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>GXTEMP</td>
<td>-0.775</td>
<td>-0.777</td>
<td>-0.767</td>
<td>-0.745</td>
</tr>
<tr>
<td></td>
<td>(0.155)</td>
<td>(0.154)</td>
<td>(0.155)</td>
<td>(0.154)</td>
</tr>
<tr>
<td>POLI</td>
<td>-0.0001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.0007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGNP*POLI</td>
<td></td>
<td>0.031</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.013)</td>
<td>(0.013)</td>
<td></td>
</tr>
<tr>
<td>CBIND</td>
<td></td>
<td>0.0016</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0006)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-Square</td>
<td>0.858</td>
<td>0.858</td>
<td>0.860</td>
<td>0.861</td>
</tr>
</tbody>
</table>

Note: In none of the regressions was the election year dummy variable significant and was therefore dropped.

The standard errors reported in parentheses are derived from the White heteroskedasticity-consistent covariance matrix.

Interpretation:

The above results confirm the importance of growth fluctuations and temporary government spending as determinants of the evolution of deficits, in line with the predictions of the optimal fiscal policy theory. However,
they also indicate that institutional features can explain the different pattern of deficit behavior across time and countries. In particular, my results confirm the importance of political fragmentation as a factor in failure to restore budget equilibrium after an initial macroeconomic shock.

Supporters of the political budget cycle hypothesis, however, can find no comfort from these results. There is no indication that deficits are higher in election years.

The Sargent-Wallace-Parkin theory, that the independence of the central bank matters, receives some substantial support. The coefficient is of the correct sign and significant at 5 percent. Typically, the more independent the central bank, the greater its constraining effect on the fiscal authority and so the lower is the average deficit ratio, other things being equal. Of course, this finding is open to other interpretations. It is always possible that the average voter in those countries with strong central banks is inflation and debt averse and so votes into office a fiscal conservative who appoints a conservative central banker a la Rogoff (1985). It is always difficult to extricate the separate influences of tastes and institutions. Potentially the earlier-referenced model of Cukierman and Meltzer could be used to help disentangle them: for instance, one could compare the relative strengths of the constituencies for debt policies in different countries and test whether they align with the degree of
central bank autonomy. Thus, if one found that a country with a strong central bank had a winning coalition for debt policies, this would constitute evidence in favor of the institutional constraint interpretation.

IV. Conclusion and Policy Issues

My results confirm the importance of institutional factors in explaining the cross-section and time series behavior of public debt in the post-WW2 era. Does it also shed any light on framing institutions to improve social welfare? If it is believed that deficits have been "excessive" in many countries, it ought to be possible to organize institutions to restrain this public profligacy. Buchanan has long advocated a constitutional amendment forbidding deficits, but the optimal fiscal literature seems to indicate this would be suboptimal. A more flexible approach would be to have an independent central bank, which seems to allow temporary deficits but provides a long-run constraint. An alternative constraint might be provided by a fixed exchange rate regime, provided the countries were committed to it. One can be relatively sanguine about the prospects of European countries getting their deficits under control through the discipline of the European Monetary System, but no such prospect is on the horizon for the United States.
Notes

1. It is interesting to note the recent comment of Conservative M.P. Rhodes Boyson: "There's no point in a Conservative government building up reserves instead of debt, so that an incoming Labour government can spend it." Quoted in 'The Economist', 9 Feb 1991.
This seems to indicate that some politicians at least are thinking in strategic terms.

2. In a broader sense, Mrs. Thatcher did conform to the model: by privatizing many nationalized industries, she provided a "fait accompli" for future Labor governments.

3. This index makes a strong cardinality assumption.

4. The authors claim that the model can be generalized to include bond-financed deficits.

5. This feature of the model conforms to the popular notion that governments lose elections, oppositions don't win them.
Bibliography


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Appendix

ARIMA Models of G* for Sample Countries

Australia  \[ G_t - G_{t-1} = 0.002 + e_t \]
\[ (0.001) \]

Canada  \[ G_t - G_{t-1} = 0.0015 - 0.417 [G_{t-1} - G_{t-2}] + e_t \]
\[ (0.0006) (0.165) \]
\[ + e_t + 0.948 e_{t-1} \]
\[ (0.056) \]
\[ \text{R-square: 0.21} \]

Denmark  \[ G_t - G_{t-1} = 0.0034 + 0.438 [G_{t-1} - G_{t-2}] + e_t \]
\[ (0.0019) (0.180) \]
\[ \text{R-square: 0.163} \]

France  \[ G_t - G_{t-1} = 0.0018 + e_t \]
\[ (0.0009) \]

Ireland  \[ G_t - G_{t-1} = e_t + 0.469 e_{t-1} \]
\[ (0.160) \]
\[ \text{R-square: 0.13} \]

Italy  \[ G_t - G_{t-1} = -0.357 [G_{t-1} - G_{t-2}] + e_t \]
\[ (0.177) \]
\[ + 0.883 e_{t-1} + 0.409 e_{t-2} - 0.438 e_{t-5} \]
\[ (0.151) (0.079) (0.093) \]
\[ \text{R-square: 0.233} \]

Japan  \[ G_t - G_{t-1} = 0.221 [G_{t-2} - G_{t-3}] + e_t \]
\[ (0.131) \]
\[ + 0.638 e_{t-1} + 0.662 e_{t-4} \]
\[ (0.079) (0.041) \]
\[ \text{R-square: 0.357} \]

Netherlands  \[ G_t - G_{t-1} = e_t + 0.286 e_{t-1} - 0.422 e_{t-3} \]
\[ (0.150) (0.149) \]
\[ \text{R-square: 0.228} \]
Norway \( G_t - G_{t-1} = e_t \)

---

Sweden \( G_t - G_{t-1} = 0.711 \left[ G_{t-1} - G_{t-2} \right] + e_t \)
\( (0.125) \)
R-square: 0.326

---

Switzerland \( G_t - G_{t-1} = 0.0012 + 0.262 \left[ G_{t-1} - G_{t-2} \right] \)
\( (0.0005) \) \( (0.173) \)
\( - 0.370 \left[ G_{t-2} - G_{t-3} \right] + e_t \)
\( (0.175) \)
R-square: 0.164

---

United Kingdom \( G_t - G_{t-1} = e_t + 0.650 e_{t-1} \)
\( (0.132) \)
R-square: 0.222

---

United States \( G_t = 0.202 + 0.497 G_{t-1} + e_t + 0.844 e_{t-1} \)
\( (0.207) \) \( (0.323) \)
\( + 0.282 e_{t-2} \)
\( (0.115) \) R-Square: 0.763

---

W. Germany \( G_t - G_{t-1} = 0.0021 + e_t \)
\( (0.0011) \)