# THE PARTISAN MODEL OF MACROECONOMIC CYCLES: MORE THEORY AND EVIDENCE FOR THE UNITED STATES*

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The "Partisan Theory" of macroeconomic policy is based on the idea that political parties typically weight nominal and real economic performance differently, with left-party governments being more inclined than right-party ones to pursue expansive policies designed to yield lower unemployment and higher growth, but running the risk of extra inflation. Given suitable assumptions about the structure of the macroeconomy, partisan models imply a political signal in demand management, output and inflation movements originating with shifts in party control of the government. In this paper I develop and test with postwar US data a revised Partisan model that allows for (i) uncertainty among policy authorities about the sustainable output growth rate and therefore about how aggregate demand expansions will be partitioned between extra output and extra inflation, and (ii) ex-post and projective learning and preference adjustment under such uncertainty. Dynamic numerical analysis of a small, stylized political-economic model based on these extensions of Partisan Theory generates within-sample forecasts that correspond remarkably well to the observed pattern of price, output and nominal spending fluctuations under the parties.

RESEARCH ON politics and business cycles has developed along two mutually consistent tracks. (See Alesina, 1988 and Nordhaus, 1989 for reviews of the voluminous literature.) One line of inquiry, known as the electoral or "political business cycle" (PBC), was launched in its modern form by Nordhaus (1975). The PBC is based on the idea that vote maximization is the paramount goal of governing parties, and so policies are pursued solely to win elections. Consequently, incumbents maneuver economic policy to create unusually favorable economic conditions at election dates, which yields a political signal in economic policy and outcome fluctuations driven by the electoral calendar.

Nordhaus' seminal contribution, and other early papers in this genre (for example, Lindbeck 1976 and MacRae 1977) relied on voter myopia and an exploitable Phillips curve of 1960s to early 1970s vintage to generate cycles of economic expansion prior to elections and contraction afterward. Subsequent work in this tradition (for example, Cukierman and Meltzer, 1986, and Rogoff and Sibert, 1988), deferred to rational expectations, and addressed similar themes

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using asymmetric information between the electorate and policy officials in place of earlier assumptions of economic and political "irrationality".

The second major line of inquiry, developed by Hibbs (1975, 1977, 1987), and modified to incorporate rational expectations by Alesina (1987), Alesina and Sachs (1988) and Chappell and Keech (1986, 1988), is known as the party cleavage or "partisan theory" (PT) of macro policy.[1] Under the PT the principal objective of governing parties is implementation of policies favoring their core constituencies. Partisan models therefore imply a political signal in economic policy and outcome fluctuations driven by shifts in party control of the government, with (other things equal) policy being more expansionary, output growth and inflation higher, and unemployment lower under Left parties than Right ones.[2]

In this paper I develop and test with postwar US data a revised PT model that departs from both pre- and post-rational expectations PT set-ups by allowing for (i) uncertainty among policy authorities about the sustainable output growth rate and therefore about how aggregate demand expansions will be partitioned between extra output and extra inflation, and (ii) ex-post and projective learning and preference adjustment under such uncertainty. The main body of the paper is organized as follows.

In Part 1 the record of cyclical fluctuations in prices, output, income distribution and financial returns under Democratic and Republican Presidential Administrations is documented. The macroeconomic data comprise the stylized facts confronted by the political-economic model devised and tested in the remaining sections. Part 2 establishes the economic constraints faced by policymakers: a time-varying parameters equation of motion for real output of the general form proposed by Lucas (1973) to study output-inflation trade-offs. The change in nominal spending (aggregate demand) is taken to be the principal policy variable available to political authorities, who are assumed to update recursively their best guesses of the economy's parameters, especially how notional expansions of aggregate demand are likely to be partitioned between higher output and inflation.

Section 3 introduces objective functions for the parties in which, *ceteris paribus*, Democratic Administrations fundamentally entertain more ambitious (and more inflation prone) growth rate targets than Republican ones. Partisan preferences, however, are not immutable: movements in observed and expected inflation, and changes in best guesses about the economy's parameters, prompt revisions of the growth rate goals driving aggregate demand policy. Moreover, uncertainty about the prevailing nominal spending policy multiplier also tempers demand

[1] Hibbs, 1992, reviews the evolution of the Partisan Theory of business cycles, contrasting pre- and post-rational expectations set-ups.
[2] It is worth emphasizing that the PBC and the PT are in principle compatible. In fact, a number of papers in the late 1970s by Bruno Frey and Friedrich Schneider combined explicitly core features of the PBC and the PT. Frey and Schneider, 1978 is the main report of their US work. Nordhaus' (1989) retrospective on the two traditions also integrates the PBC and the PT in a common framework.

management activism. These learning-based policy and preference adjustment mechanisms distinguish the model in this paper from earlier PT set-ups in which the parties' output (or unemployment) goals are fixed and constrained only implicitly, if at all, by stable Phillips-curves (as in Hibbs, 1975; 1977), or are fixed and constrained exclusively by the assumed transitory duration of output effects generated by partisan policy surprises following unanticipated electoral changes of the governing party (as in Chappell and Keech, 1988 and Alesina and Sachs, 1988).

In Sections 4 and 5 the solution for optimal demand policy, obtained by maximizing party objective functions, is fit to postwar data on changes in nominal spending, and the complete political-economic system for output, price and nominal GNP fluctuations is analyzed numerically by within-sample, dynamic, deterministic simulation. The paper concludes with observations about the implications of the results for theories of policy induced macroeconomic fluctuations and politically motivated macroeconomic policies.

## 1. SOME STYLIZED FACTS

Table 1 shows data for some important macroeconomic, distributional and financial variables, averaged over the first to fourth year of presidential administrations. These data are the stylized facts that partisan theory, or any other politically motivated theory of the economy, must confront. The partisan patterns in the data are quite obvious,[3] though it must be remembered that there were administration-specific deviations from the average records, that the data were affected by large exogenous shocks (notably the OPEC energy price increases), and that lags between changes in party administrations and the full effects of associated policy changes on the macroeconomy likely existed (and so first year outcomes may to some degree reflect the policies of the previous administration).

Cumulative inflation during each four year presidential term (measured here by changes in the GNP deflator) has typically been about the same under Democrats and Republicans, but the time trajectories are noticeably different. Under the Democrats, who in the two runs that postwar history thus far gives us inherited low or falling inflation from the Republicans, the inflation rate generally rose over most of each presidential term, often more rapidly at the beginning than the end. The opposite was true under the Republicans, who usually inherited high and rising inflation from the Democrats. The inflation rate tended to fall during Republican presidencies, more noticeably during first than second terms.

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[3] Alesina (1988) and Alesina and Sachs (1988) focus attention on the early-term, late-term pattern in US output and inflation data and show its consistency with a "rational partisan model" based on rationality of price expectations and institutionalized sluggishness of wage adjustments.

TABLE 1   SOME MACROECONOMIC, DISTRIBUTIONAL AND FINANCIAL FACTS,
BY FIRST TO FOURTH YEARS OF DEMOCRATIC AND
REPUBLICAN PRESIDENTIAL ADMINISTRATIONS, 1953–1990

|  | GNP Deflator Inflation (% rate) | Real Output Growth (% rate) | Income Share Top 20/ Bottom 40 (Yr to Yr % Change) | Real Equity Returns (% rate) | Real Bond Returns (% rate) |
|---|---|---|---|---|---|
| DEMOCRATIC ADMINISTRATIONS | | | | | |
| YEAR | | | | | |
| First | 3.32 | 4.26 | 2.42 | 7.67 | 3.99 |
| Second | 4.24 | 5.32 | − 2.53 | − 3.58 | − 5.16 |
| Third | 4.22 | 3.09 | − 1.84 | 7.54 | − 4.09 |
| Fourth | 5.07 | 3.03 | 0.48 | 9.95 | − 11.37 |
| Cumulative Four Year Change | 16.9 | 15.7 | − 1.47 | 21.6 | − 16.6 |
| REPUBLICAN ADMINISTRATIONS | | | | | |
| YEAR | | | | | |
| First | 4.69 | 2.97 | − 0.14 | 2.15 | − 4.90 |
| Second | 4.35 | − 0.27 | 2.64 | − 2.52 | 4.64 |
| Third | 4.59 | 3.24 | 0.49 | 22.4 | 3.15 |
| Fourth | 3.80 | 4.15 | 0.27 | 5.50 | 1.92 |
| Cumulative Four Year Change | 17.4 | 10.1 | 3.26 | 27.5 | 4.81 |

*Sources*: Economic and financial data, *Economic Report of the President*, 1990, 1991. Income distribution data, Haslag et al., 1989, updated by author.
*Notes*: First and second term patterns are quite symmetrical. Equity and bond yields were computed under the assumption of annual reinvestment of dividends and coupon payments, respectively, and are deflated by the CPI. 1989 is last year for financial data.


Real output growth has been substantially higher under the Democrats than the Republicans. And, as in the case of inflation, the time paths are distinctive. Output growth rates typically rose during Democratic Administrations until the second part of the term; then slow-downs tended to occur. The reverse pattern has been typical of Republican Administrations. Output growth declines from inherited rates early in the term, and rises afterward.

In the model devised ahead the large cumulative growth premium associated with Democratic Administrations is generated by the Democratic propensity to aggressively fill-in Okun gaps, perhaps magnified by hysteresis and endogenous growth properties of the macroeconomy. Given initial biases in the goals of the parties, partisan differences in the time paths of inflation and output growth follow from the inclination of all governments to de-escalate (escalate) their growth rate goals as inflation rises (falls).

Income distribution, measured in Table 1 by the income share of the top quintile relative to the bottom two quintiles,[4] tracks the partisan pattern in the real economy.[5] Inequality falls sharply as a consequence of the Democratic early term booms and rises sharply during Republican early term busts. The cumulative effects over a presidential term reveal large partisan differences which are consistent with a distributional interpretation of the political foundations of the PT featured in my previous work.

The time patterns for financial returns, shown in the right-side columns of Table 1 are a bit more complicated, no doubt because they depended in complicated ways on the implications of inflation and output growth trends for contemporaneous and anticipated future corporate earnings and interest rate movements. The clearest message from the data is that rising inflation rates and favorable movements in real output (and employment) growth have historically been associated with very poor bond market performance. Consequently, bond investors have fared terribly during Democratic Administrations.

## 2. THE MACROECONOMY

The first step in devising a political-economic model of macroeconomic policy is to establish the economic constraints. Consider a time-varying parameters, trend-reverting equation of motion for real output of the general form proposed by Lucas (1973) and frequently used since then to investigate output-inflation trade-offs. Letting q denote log real output, y denote log nominal GNP (log aggregate demand), T a time trend, S "major" supply shocks,[6] $\epsilon$ "normal" shocks, and $\Delta$ the first backward difference, we have (for equations tailored to annual observations)

$$q_t = \alpha(t) + \beta(t)\,T + \pi(t)\,\Delta y_t + \delta(t)q_{t-1} + k_0(t)\,S_t + k_1(t)\,S_{t-1} + \epsilon_t, \qquad (1.1)$$

where normal shocks are propagated autoregressively,

$$\epsilon_t = \phi_1(t)\,\epsilon_{t-1} + \phi_2(t)\,\epsilon_{t-2} + v_t, \qquad (1.2)$$

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[4] Alternative measures, for example, the variance of log income shares and the Gini index, exhibit the same behavior as the "Top 20 to Bottom 40" ratio in Table 1.

[5] The connection of income distribution to macroeconomic fluctuations in the US is well established. See Hibbs 1987, chapters 2, 3 and 7 for a review of the evidence. Hibbs and Dennis, 1988 model some important channels through which partisan policy actions affect distribution, but I think this topic deserves more attention.

[6] Specifically, the proportional change in the import price of crude petroleum less the change in the GNP deflator (the change in the relative price of energy imports), weighted by the net share (imports less exports) of imported oil in GNP. Such shocks were negligible in magnitude prior to 1973.

and v is the white noise component in output disturbances.[7]

Shocks aside, output exhibits first-order dynamic oscillations about trend[8] (which, for lack of a satisfactory alternative, might be viewed as a proxy for a time dependent natural rate) and is driven by changes in aggregate demand.[9] The demand policy multiplier term is intentionally not constrained a priori as deviation from expectation, in other words is not written in the form $\pi(t) \cdot [\Delta y_t - \Delta y^e t]$ as in Chappell and Keech (1988) and Alesina and Sachs (1988), because of the overwhelming evidence, first supplied by Mishkin (1982) and Gordon (1982) and more recently by Bohra and Sauer (1992), that US real output responds to both anticipated and unanticipated expansions of nominal spending (or the money supply) in about equal proportion. The multiplier parameter $\pi$ is time varying, however, and so in principle the economic constraint accommodates the possibility that demand policy becomes futile (with $\pi(t)$ going to zero) when authorities attempt to operate on (1.1)–(1.2) in order to achieve their macroeconomic objectives (as Lucas, 1973 first argued).

In the model introduced in the next section I assume that all governments took (1.1)–(1.2) to be the benchmark equation of motion for real output and that estimates obtained each period of the output-demand expansion relation and other parameters of the macroeconomy were in fact used systematically by Administrations in pursuing their growth rate goals. In a dynamic economy, however, political authorities, along with everyone else, presumably were uncertain about the sustainable rate of output growth, $\beta/(1-\delta)$, about the prevailing policy parameter, $\pi$, and, consequently, about how a given notional policy for nominal demand expansion, $\Delta y$, would be partitioned at any period in time between higher output ($\pi$) and higher inflation $(1-\pi)$.

In the empirical work ahead, Administrations are assumed to have obtained best guesses of the parameters governing output growth by recursive least-squares learning; specifically by computing each period a fresh set of parameter estimates $-\hat{\alpha}$, $\hat{\beta}$, $\hat{\pi}$, $\hat{\delta}$, $\hat{k}_0$, $\hat{k}_1$, $\hat{\phi}_1$ and $\hat{\phi}_2$ – by nonlinear least-squares estimation of equations (1.1)–(1.2), using rolling samples of the most recent 25 annual observations.[10]

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[7] The autoregressive structure of "normal" shocks ($\epsilon$) and the lag specification of major supply shocks (S) are of course based on empirical work. Hamilton's (1983) time series analysis of quarterly US data indicated that the peak effect of oil price changes on output occurred after a lag of about one year, which is consistent with the lag structure I find.

[8] For $\beta = 0$ and $\delta = 1.0$ output evolves as a random walk with drift, perturbed by supply shocks, "normal" shocks and demand shifts.

[9] To remind readers of basic magnitudes, nonlinear least-squares, fixed coefficient estimates of (1.1)–(1.2) for annual data over 1952–1990 are (t-ratios in parentheses)

$$q_t = 1.68 + 0.0072\, T + 0.724\, \Delta y_t + 0.732\, q_{t-1}$$
$$\phantom{q_t =} (3.01)\quad (2.64)\qquad (14.2)\qquad (8.14)$$
$$-\, 0.0086\, S_t - 0.0152\, S_{t-1} + 0.894\, \epsilon_{t-1} - 0.273\, \epsilon_{t-1}$$
$$(-1.81)\qquad (-3.30)\qquad (4.72)\qquad (-1.60)$$
$$R^2 \text{adj} = 0.999, \text{ SEE} = 0.009, \text{ Ljung-Box Q Signif. Lvl} = 0.62$$

[10] This means, for example, that the first year of the estimation period for the aggregate demand policy regressions presented ahead in Table 2 (1952) is constrained by estimates for the

The key parameters of the output model exhibit considerable postwar variability. Between 1952 and 1990, the rolling regressions just described yield estimates for trend growth rates of output $(\beta/(1-\delta))$ that vary (in stationary fashion) between 0.012 and 0.042, with mean 0.032 and standard deviation 0.01, and estimates of aggregate demand policy multipliers $(\pi)$ that vary (in stationary fashion) between 0.62 and 0.99, with mean 0.79 and standard deviation 0.11.[11] Positive political-economic models assuming stability of these and other parameters driving the time path of output are therefore likely to have limited relevance for empirical analysis.

## 3. PARTISAN MACROECONOMIC GOALS AND POLICY ACTIONS

### 3.1  Real Output Targets of the Parties

The main prediction of Partisan Theory is that other things equal Democratic Administrations entertain higher output growth targets than Republican ones, because Democrats are more averse to needless shortfalls of output growth from potential and less averse to the risks of higher inflation that up-side mistakes might generate. Assuming that aggregate demand policy is controlled largely by the party holding the presidency,[12] the output target prevailing each period $(q^T)$ is written:

$$q^T t = \hat{\alpha}(t) + [\lambda_{dem}(t)(1 - R_t) + \lambda_{rep}(t)R_t] \cdot \hat{\beta}(t)T + \hat{\delta}(t) q_{t-1} \qquad (2.1)$$

where "hatted" $(\hat{\ })$ coefficients denote current guesses of parameters driving real output at period t (obtained, as indicated before, from recursive estimation of equations 1.1–1.2), $R_t$ is a binary variable equal to 1.0 during Republican presidencies and zero during Democratic ones, $\lambda_{dem}(t)$ and $\lambda_{rep}(t)$ denote time varying Democratic and Republican growth rate targets, respectively, and the appearance of $\hat{\delta}q_{t-1}$ means that governments acknowledge the cyclical position of output when forming current growth rate goals. Note that $\lambda_{dem}(t)$ and $\lambda_{rep}(t)$ are calibrated as multiples of $\hat{\beta}T$. Hence when $\lambda_{dem}(t) > 1$ or $\lambda_{rep}(t) > 1$, the period t output growth target lies above the trend growth rate estimated from data spanning the most recent quarter century; the opposite interpretation applies to $\lambda_{dem}(t) < 1$ or $\lambda_{rep}(t) < 1$.

parameters of (1.1)–(1.2) that are obtained from a twenty-five year period nonlinear regression spanning 1928–1952. Twenty-five is of course an arbitrary number, but all empirical results for the demand policy models developed in the next section were robust to a large number of alternative choices for the sampling regime. Margaritis, 1987 and 1990 show the consistency of recursive learning set-ups with rational learning and establish the convergence of recursive least-squares estimates to rational expectations equilibria. An earlier treatment of related issues appears in Friedman 1979.

[11] A political analysis of time variation in $\pi$ appears in Appendix B and Section 4.

[12] Despite the considerable formal autonomy enjoyed by the American Federal Reserve, numerous institutional studies have concluded that the macroeconomic goals of presidential administrations are what drive monetary policy, with autonomous preferences of the Fed, as well as the composition of the Congress, playing a secondary role. Evidence is summarized in Hibbs, 1987, chapter 1.

Administrations of neither party, however, are indifferent to rapid increases of the price level,[13] and so output targets are influenced by inflation, expected and/or observed. Expected and realized inflation rates comprise the mechanism by which political authorities learn that demand policy may be, or has been, conditioned on overly optimistic or pessimistic views of the viable real output growth rate. The time varying output targets of the parties therefore depend on fixed ("politically deep") preference parameters, $\beta_{dem}$ and $\beta_{rep}$, and on expected and/or observed inflation:

$$\lambda_{dem}(t) = \beta_{dem} + \beta_{p0} \Delta p_t^e + \Sigma_i \beta_{pi} \Delta p_{t-i-1}, \qquad (2.2)$$
$$\lambda_{rep}(t) = \beta_{rep} + \beta_{p0} \Delta p_t^e + \Sigma_i \beta_{pi} \Delta p_{t-i-1}, \qquad (2.3)$$

where p is the log of the GNP deflator, $\Delta p^e$ and $\Delta p$ are annual expected and realized inflation rates, respectively, we anticipate at least some of the elements of $\beta_{p0}$, $\beta_{pi} < 0$ and the theory requires $\beta_{rep} < \beta_{dem}$.

Substituting (2.2) and (2.3) into (2.1) gives

$$q_t^T = \hat{\alpha}(t) + [\beta_{dem}(1 - R_t) + \beta_{rep} R_t + \beta_{p0} \Delta p_t^e$$
$$+ \Sigma_i \beta_{pi} \Delta p_{t-i-1}] \cdot \hat{\beta}(t)T + \hat{\delta}(t) q_{t-1}. \qquad (2.4)$$

The response of output targets to inflation ($\beta_{p0}$, $\beta_{pi}$) are for simplicity shown as identical across the parties. This simplification may of course be relaxed (and has been in some of the constrained regression experiments described ahead), even though it accommodates the basic idea that the Democrats weight output growth relative to inflation more heavily than the Republicans. The importance attached to expected as opposed to observed inflation when real output goals are formulated each period is an empirical question not definitively resolved by theory.

The expected inflation rate influencing period t real output targets is generated in a model consistent and, hence, rational way by substitution of the rate of demand expansion that maximizes party objectives ($\Delta y_t^*$), along with forecasts of period t real output ($\hat{q}_t$) based on equations (1.1)–(1.2), into the identity

$$\Delta p_t \equiv \Delta y_t - \Delta q_t. \qquad (3.1)$$

For prospective optimal policy $\Delta y_t^*$, current parameter guesses $\hat{\pi}$, $\hat{\alpha}$, $\hat{\beta}$, $\hat{\delta}$, $\hat{k}$, $\bar{\phi}_1$ and $\bar{\phi}_2$, known realizations of $T_t$, $q_{t-1}$, $S_{t-1}$, $\epsilon_{t-1}$ and $\epsilon_{t-2}$, and the assumption that $\hat{S}_t = 0$,[14] we therefore obtain

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[13] See Hibbs, 1987 for evidence on the strong distaste of all American voting groups to inflation.

[14] The only evidence I offer to support this assumption is that S (major supply shocks) exhibited no predictability from univariate ARIMA equations. Nonetheless, proceeding as if $S_t$ always came as a contemporaneous surprise to governments is perhaps a rather strong assumption.

$$\Delta p_t^e = \Delta y_t^* - (\hat{q}_t - q_{t-1})$$
$$= (1 - \hat{\pi}(t)) \Delta y_t^* + (1 - \hat{\delta}(t)) q_{t-1} - [\hat{\alpha}(t) + \hat{\beta}(t)T + \hat{k}_1(t) S_{t-1}$$
$$+ \hat{\phi}_1(t) \epsilon_{t-1} + \hat{\phi}_2(t) \epsilon_{t-2}]. \tag{3.2}$$

Notice that as $\hat{\pi}(t)$ goes to zero, implying that demand management has become impotent, expected inflation equals any excess of nominal GNP growth over the most recent estimate of the cyclically corrected real output growth rate.

## 3.2 Party Objective Functions and Demand Management Policy Plans

The party holding the presidency maximizes its macroeconomic objectives (U) by nominal GNP targeting; specifically by choosing the rate of demand expansion ($\Delta y$) minimizing the expectation of the quadratic loss function

$$E(U_t) = E(q_t - q_t^T)^2 \tag{4.1}$$
$$= \sigma^2 \hat{q}_t + (\hat{q}_t - q_t^T)^2. \tag{4.2}$$

Because of the way inflation affects the formation of output targets, as laid out in equations (2.1)–(2.4), the objective function in (4.1)–(4.2) implies that expected or observed reflations yield utility increases, and disinflations yield utility decreases, as long as $q^T < q$; and conversely when $q^T > q$.[15] The parties' utility gains and losses associated with reflations and disinflations therefore interact with the sign of output gaps; a specification which intentionally departs from the additive, separable set-ups common to the literature in a way that I think much more accurately captures the sentiments of political authorities.

As shown in Appendix A, the annual, discrete time optimal rate of aggregate demand expansion, obtained by minimizing equation (4.2) subject to partisan goals (equation 2.4), best guesses about the evolution of real output (equations 1.1–1.2), and *rationally formed inflation expectations* (equation 3.2), is

$$\Delta y^*(t) = M [ (\sigma^2 \hat{\pi}/(\hat{\Theta}^2 + \sigma^2 \hat{\pi}))(t) \cdot \overline{\Delta y}(t) + (\hat{\Theta}/(\hat{\Theta}^2 + \sigma^2 \hat{\pi}))(t) \cdot \{(\beta_{dem}(1 - R)$$
$$+ \beta_{rep} R + \beta_{p0} \Delta p^{e'} + \Sigma_i \beta_{pi} \Delta p_{-1-i}) \cdot \hat{\beta} T - (\hat{\beta} T + \hat{k}_1 S_{-1} + \hat{\phi}_1 \epsilon_{-1}$$
$$+ \hat{\phi}_2 \epsilon_{-2})\}(t) - (1/(\hat{\Theta}^2 + \sigma^2 \hat{\pi}^2))(t) \cdot \{(T - \overline{T}) \sigma(\hat{\pi},\hat{\beta}) + (q_{-1} - \overline{q}_{-1}) \sigma(\hat{\pi},\hat{\delta})$$
$$+ (S_{-1} - \overline{S}_{-1}) \sigma(\hat{\pi},\hat{k}_1) + (\epsilon_{-1} - \overline{\epsilon}_{-1}) \sigma(\hat{\pi},\hat{\phi}_1)$$
$$+ (\epsilon_{-2} - \overline{\epsilon}_{-2}) \sigma(\hat{\pi},\hat{\phi}_2)\}(t) ], \tag{5}$$

where $M$ is a moving average operator such that $M[X(t)] = 1/2(X_t + X_{t-1})$, $\hat{\Theta} = [\hat{\pi} - \hat{\beta} T \beta_{p0}(1 - \hat{\pi})]$, $\Delta p^{e'} = [\Delta p^e - (1 - \hat{\pi})\Delta y^*]$ and other terms are as defined earlier in (3.1)–(3.2).

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[15] I assume here that price accelerations dominate and have negative effects in equations (2.2)–(2.4). See the empirical evidence ahead. Note that by (3.1) the remark about utility responses to reflations and disinflations pertains as much to changes in $\Delta y$ as $\Delta p$; in fact, as shown ahead, price accelerations exert important influence on partisan output targets and nominal spending policies.

## 4. ESTIMATION RESULTS

Regression experiments based on the solution for optimal aggregate demand changes in equation (5) are reported in Table 2. $\beta_{dem}$ and $\beta_{rep}$, which represent deep, inflation-neutral party differences in output growth targets, are the parameters most vital to Partisan Theory. The constrained least-squares estimates obtained for all Regression Models in Table 2 indicate that Democratic Administrations tended to pursue aggregate demand policies more expansive than required to sustain the received trend rate of output growth, $\hat{\beta}T$. In the most robust regressions – Models 2 to 4 – the estimates imply that the inflation-neutral growth rate goals of the Democrats typically were about 6 to 7 percent above historical trend: $\hat{\beta}_{dem} \approx 1.06-1.07$.

The same models show that aggregate demand changes under the Republicans generally were just big enough to perpetuate received real growth rates: $\hat{\beta}_{rep} \approx 1.0$. The inter-party difference is highly significant statistically (the significance levels at the bottom of Table 2 demonstrate that the null hypothesis $\hat{\beta}_{dem} = \hat{\beta}_{rep}$ can be

TABLE 2   ESTIMATES FOR AGGREGATE DEMAND EXPANSION MODELS, ($\Delta y$), 1952–1990, ANNUAL[a]

| Coefficient (Variable) | Constrained Regression Model | | | | |
|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4)[b] | (5)[c] |
| Constant | 0.055 | 0.046 | 0.046 | 0.048 | 0.003 |
| C | (5.92) | (5.81) | (5.99) | (6.32) | (0.14) |
| $\beta_{dem}$ | 1.073 | 1.068 | 1.068 | 1.064 | 1.175 |
| $(\cdot\hat{\beta}T)$ | (28.6) | (33.9) | (34.4) | (35.4) | (22.0) |
| $\beta_{rep}$ | 1.025 | 1.005 | 1.005 | 1.005 | 1.120 |
| $(\cdot\hat{\beta}T)$ | (45.1) | (44.2) | (46.9) | (48.0) | (23.1) |
| $\beta_{p0}$ | −0.236 | 0.018 | | | |
| $(\Delta p_t^e \cdot \hat{\beta}T)$ | (−0.46) | (0.02) | | | |
| $\beta_{p1}$ | | −2.840 | −2.827 | −2.766 | −0.761 |
| $(\Delta p_{t-1} \cdot \hat{\beta}T)$ | | (−2.60) | (−3.73) | (−3.71) | (−1.01) |
| $\beta_{p2}$ | | 3.587 | 3.589 | 3.501 | 0.593 |
| $(\Delta p_{t-2} \cdot \hat{\beta}T)$ | | (4.19) | (4.27) | (4.24) | (0.78) |
| Adj. $R^2$ | 0.126 | 0.393 | 0.411 | 0.411 | 0.235 |
| SER | 0.0256 | 0.0213 | 0.0210 | 0.0210 | 0.0240 |
| Ljung-Box Q (18) Signif. Level | 0.68 | 0.87 | 0.87 | 0.86 | 0.04 |

Significance level for the null hypothesis that

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $\beta_{dem} = \beta_{rep}$: | 0.073 | 0.008 | 0.006 | 0.007 | 0.004 |
| $\beta_{p1} = -\beta_{p2}$: | NA | 0.0006 | 0.070 | 0.076 | 0.64 |

[a]All models are based on equation (5), and except as noted are conditioned on time-varying extraneous coefficients, variances and covariances imposed from auxiliary log real output regressions, as explained in the main text. t-ratios are in parentheses.
[b]Uncertainty terms in equation 5 ($\sigma, \sigma^2$) are set to zero in this regression.
[c]Extraneous coefficients are fixed (not time varying) at values obtained from 1952–90 estimation of the log real output model (equations 1.1–1.2) in this regression.

decisively rejected), may be of considerable consequence macroeconomically and, of course, is necessary for Partisan Theory as revised here to have relevance for the stylized macroeconomic facts presented in Table 1.

The results in Table 2 also establish that partisan real output goals and nominal spending policies were sensitive to inflation, as posited by equations (2.4) and (5). Expected inflation, however, apparently exerted little or no influence: The coefficients for $\Delta p_t^e$ in Regression Models (1) and (2) are unstable in sign and negligible in magnitude.[16] Only realized inflation rates, $\Delta p_{t-1}$ and $\Delta p_{t-2}$, seem to have substantially affected output goals and nominal policy.

The estimates in Models (2)–(4) suggest that policy responded mainly to realized accelerations of the price level ($\Delta p_{t-1} - \Delta p_{t-2}$), although the significance levels at the bottom of Table 2 show that the null hypothesis $\beta_{p1} = -\beta_{p2}$ can be rejected with considerable confidence. For $\beta_{p1} + \beta_{p2} > 0$, as the point estimates taken at face value indicate, the interpretation is that partisan output goals (qT) and, hence, demand expansion policies ($\Delta y$) were adjusted in proportion to

$$-3.6\,(\Delta p_{t-1} - \Delta p_{t-2}) + 0.75\,\Delta p_{t-1},$$

where $-3.6 \approx -\beta_{p2}$ and $0.75 \approx (\beta_{p1} + \beta_{p2})$, which means that steady received inflation was partially accommodated and escalating inflation was strongly resisted.[17] This result, based on highly constrained regressions, which in turn are derived from a highly stylized, constrained optimization model, squares fully with a policy rule often advocated in applied forums. In his recommendations to the Federal Reserve Board in 1977, for example, the late Arthur Okun argued that unfavorable developments in inflation

"call for a reassessment of the target path of nominal GNP . . . the result will be a compromise. Bad news on inflation should lead toward less real growth, but not point for point; and hence it calls for partial accommodation in the growth of nominal GNP." (cited in Taylor, 1980, p. 120)

[16] The failure of expected inflation, $\Delta p_t^e$, to affect aggregate demand changes, $\Delta y_t$, in Regression Models (1) and (2) is not due to deficiencies of the rational, model consistent mechanism generating expectations (equation 3.2). In fact, projections of actual inflation on expected inflation rates from (3.2) conform perfectly to the assumption of rational expectations. For example, least-squares regression of observed inflation, $\Delta p_t$, on the $\Delta p_t^e$ series derived from Regression Model (2) yields (with t-statistics in parentheses) results fully consistent with rational expectations:

$$\Delta p_t = 0.00 + 1.00\,\Delta p_t^e$$
$$\phantom{\Delta p_t =}(0.0)\ \ (10.5)$$
adj. $R^2 = 0.73$, Ljung-Box Q (18) Signif. Lvl. $= 0.33$,

where $\Delta p_t^e \equiv \Delta y_t^* - (\hat{q}_t - q_{t-1})$, $\hat{q}_t$ is the extraneous forecast of time t output used in Model (2) and, as in the solution for optimal policy, $E(\Delta y_t) = \Delta \hat{y}_t = \Delta y_t^*$, $\Delta \hat{y}_t$ being the fitted value of $\Delta y_t$ from Model (2). The same test regressions with the $\Delta p_t^e$ series derived from Models (1) and (3) in Table 2 also generated zero intercepts, unit slope coefficients for expected inflation, and white noise errors.

[17] In additional test regressions not reported here, the null hypothesis that the effects of expected and realized inflation were identical during Republican and Democratic Administrations could not be rejected at any reasonable significance level.

Constrained Regression Models (4) and (5) in Table 2 evaluate the contributions of recursive learning and uncertainty to the explanation of demand management policy behavior and, implicitly, the formation of partisan output targets. In Model (5) Administrations are endowed with knowledge of the full sample (fixed) estimates of extraneous parameters – $\hat{\pi}(t) = \hat{\pi}$ and $\hat{\Omega}_j(t) = \hat{\Omega}_j$ for all t – and harbor no uncertainty about the policy multiplier – $\sigma^2 \hat{\pi}(t) = \sigma(\hat{\pi}, \hat{\Omega}_j)(t) = 0$ for all t. This yields a Constrained Regression set-up for $\Delta y_t$ in which equation (5) simplifies to

$$\Delta y_t^* = M\left[(1/\hat{\pi})\left[q_t^T - (\hat{q}|z)_t\right]\right] = M\left[(1/\hat{\pi})\cdot\{\left[\beta_{dem}(1 - R_t) + \beta_{rep}R_t\right.\right.$$
$$\left.\left. + \beta_{p1}\Delta p_{t-1} + \beta_{p2}\Delta p_{t-2}\right]\cdot\hat{\beta}T_t - \left[\hat{\beta}T_t + \hat{k}_1 S_{t-1} + \hat{\phi}_1 \epsilon_{t-1} + \hat{\phi}_2 \epsilon_{t-2}\right]\}\right].$$

$$(6)$$

Although the results for this equation in Regression Model (5) strongly support the basic hypothesis of Partisan Theory – the estimate of $\beta_{dem}$ is significantly larger than that of $\beta_{rep}$ – its performance is substantially inferior to Models (2)–(4) in accounting for aggregate demand changes.[18]

In Regression Model (4) Administrations are also assumed to act with certainty on the most recent estimate of $\pi$, but all parameters governing the time path of real output are time varying and recursively updated each period, as in Regression Models (1)–(3). The Constrained Regression set-up is therefore identical to equation (6), with the important exception that the extraneous coefficients $\hat{\pi}$, $\hat{\beta}$, $\hat{k}_1$, $\hat{\phi}_1$ and $\hat{\phi}_2$ are indexed for (and, hence, vary with) time. Estimation of Model (4) generates essentially the same fit and coefficients as Model (3), and formal tests show that the two specifications are observationally equivalent in the postwar US data.[19] The regression evidence indicates, therefore, that recursive learning about the parameters governing output growth and, hence, the likely division of induced changes in nominal GNP between prices and quantities, played an important role in the formation of partisan output goals and aggregate demand policies, but that uncertainty at each period about the updated values of the economy's parameters exerted negligible net influence on policy behavior.

Static computations with the point estimates in Regression Models (3) and (4) imply, in the case of Democratic Presidencies, that an upward movement in

[18] A reviewer suggested that the fixed coefficients set-up of regression model 5 necessarily would fit the data less well than parallel regressions with variable coefficients ("more information has to outperform less"). This reasoning is quite wrong, however, because all time-varying coefficients in the demand expansion regressions are imposed from estimates obtained in *extraneous* real output regressions.

[19] The F test for the null hypothesis that the coefficients of Model (4) are jointly equal to those of Model (3) has a significance level of 0.999; the hypothesis of observational equivalence is therefore virtually impossible to reject. The source of the observational equivalence is most conveniently identified by reference to equation (A8) of Appendix A. Over all t in the sample, the relative variances of $\hat{\pi}(t)$, $V^2(t)$, average only 0.02, and exhibit very little year to year variation. Moreover, in (A8) the expression

$$V^2/(1 + V^2)(t)\,\Delta\bar{y}_t - 1/\left[\hat{\pi}^2(1 + V^2(t))\right]\cdot\Sigma_j(z_j - \bar{z}_j)_t\,\sigma(\hat{\pi},\hat{\Omega}_j)(t)$$

averages just 0.001, and also exhibits negligible year to year variation. Hence, equation (A8) simplifies to $\Delta y^* \approx G$, and Regression Model (3) reduces empirically to Model (4).

the inflation rate of about 2.7 percentage points generally was required to induce a nominal spending policy shift large enough to target output below received trend; in other words, to prompt an attempt to move the macroeconomy into a (disinflationary) recession. By comparison, under Republican Presidents a price acceleration of only around 1.1 percentage points was sufficient to induce the same behavior.[20]

While such casual calculations are superficially consistent with the higher growth, especially early term growth, observed under the Democrats, they surely do not establish that the approach developed here generates results conforming to the stylized macroeconomic facts discussed in Section 1. Numerical analysis of the dynamic interaction of demand management, output growth and inflation is required.

## 5. NUMERICAL ANALYSIS

Numerical analysis involves within-sample, endogenous simulation of the dynamic political-economic interrelationships developed in sections 2–4. To review, the political-economic system investigated consists of a time-varying parameters equation for log real output, introduced in (1.1)–(1.2),

$$q_t = \alpha(t) + \beta(t)T + \pi(t)\Delta y_t + \delta(t)q_{t-1} + k_0(t)S_t$$
$$+ k_1(t)S_{t-1} + \phi_1(t)\epsilon_{t-1} + \phi_2(t)\epsilon_{t-2} + v_t, \tag{7.1}$$

a partisan policy equation for aggregate demand shifts, based on Regression Model (4)[21] in Table 2, which is conditioned on time-varying parameter estimates imposed from recursive nonlinear least squares estimation of (7.1),

$$\Delta y_t = C + (1/2)\{(1/\hat{\pi}(t)) [q_t^T - (\hat{q}|z)_t] + (1/\hat{\pi}(t-1)) [q_{t-1}^T - (\hat{q}|z)_{t-1}]\} \tag{7.2}$$

where

$$q_t^T = \hat{\alpha}(t) + [\beta_{dem}(1 - R_t) + \beta_{rep}R_t + \beta_{p1}\Delta p_{t-1} + \beta_{p2}\Delta p_{t-2}] \cdot \hat{\beta}(t)T + \hat{\delta}(t)q_{t-1}$$

and

$$(\hat{q}|z)_t = \hat{\alpha}(t) + \hat{\beta}(t)T + \hat{\delta}(t)q_{t-1} + \hat{k}_1(t)S_{t-1} + \hat{\phi}_1(t)\epsilon_{t-1} + \hat{\phi}_2(t)\epsilon_{t-2},$$

---

[20] Operating on equation (2.4) for partisan output targets, the magnitude of $(\Delta p_{t-1} - \Delta p_{t-2})$ satisfying $q^T = \{\beta_{dem} - \hat{\beta}_{p2}(\Delta p_{t-1} - \Delta p_{t-2}) + (\hat{\beta}_{p1} + \hat{\beta}_{p2})\Delta p_{t-1}\} \cdot \beta T = \beta T$, is 0.027, for $\Delta p_{t-1}$ set equal to average inflation during Democratic Administrations. The same calculation yields 0.011 when $\hat{\beta}_{dem}$ is replaced by $\hat{\beta}_{rep}$ and $\Delta p_{t-1}$ is set to average inflation during Republican periods. Setting $\Delta p_{t-1}$ to average values of course means that the (static) price accelerations satisfying the equality merely give a rough idea of the scale of partisan differences.

[21] As would follow from the observational equivalence established earlier, Model (3) produces simulation results virtually identical to those obtained by using Model (4).

and a pair of identities defining output growth and inflation rates

$$\Delta q_t \equiv q_t - q_{t-1} \tag{7.3}$$
$$\Delta p_t \equiv \Delta y_t - \Delta q_t. \tag{7.4}$$

Within sample predictions of nominal spending changes ($\Delta y$), real output growth rates ($\Delta q$), and inflation ($\Delta p$) generated by dynamic computation (deterministic simulation) of equations (7.1)–(7.4) are graphed in Figures 1, 2 and 3, along with the corresponding observables. Like the earlier presentation of stylized facts in Table 1, the data are averaged over the first to fourth year of Democratic and Republican Administrations in order to highlight partisan patterns. The political-economic system clearly yields predictions that conform closely to the partisan patterns identified previously, though the big second year contractions (under Republicans) and expansions (under Democrats) of nominal spending and real output growth rates are naturally more pronounced in the observables than in the dynamic simulation data.

Democratic Administrations, which in the simulation calculations as well as in the real world have inherited falling inflation rates from Republicans, expand aggregate demand after taking control of the White House, and this stimulates a rise in real output growth rates during the first part of the presidential term. Inflation (the nominal spending-real output growth rate residual), however, also begins to rise, which prompts de-escalation of real output targets and, consequently, induced slowdowns of demand expansion and output growth in the later part of the term.
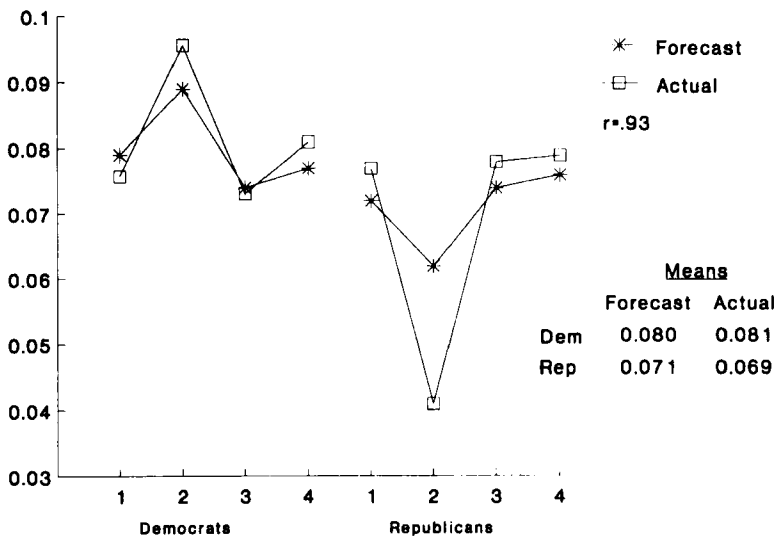


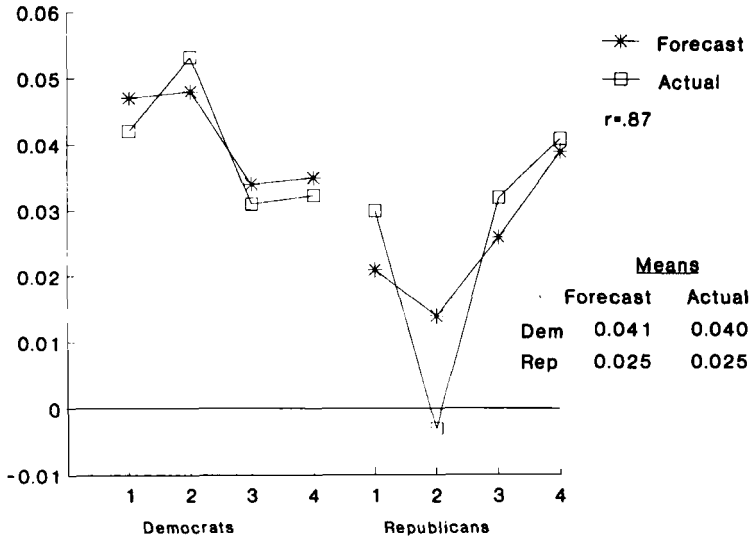Figure 1.   Growth rate of nominal spending.
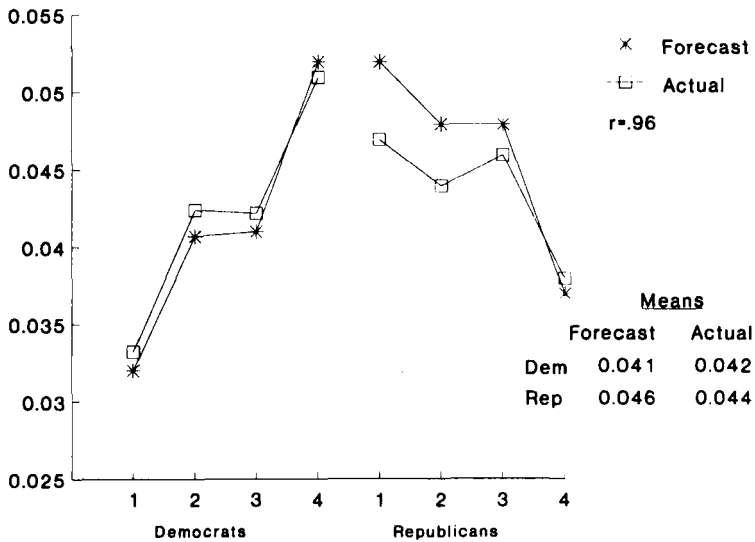
Figure 2.  Growth rate of real output.



Figure 3.  Growth rate of GNP deflator.

Just the reverse pattern is implied by the model, and characterizes the observables, under the Republicans. Early in the term, the demand slowdown typical of the later phase of Democratic Administrations is intensified and real output sharply contracts. Inflation is then squeezed out of the economy, the desire to create additional economic slack dissipates, and in the second half of the term aggregate demand policy changes course and output growth recovers.

These patterns imply economic signals in political data that of course have not gone unnoticed. As I suggested earlier (Hibbs, 1986), postwar electoral history indicates that the Democrats have been more likely than the Republicans to get into difficulty with the voters by pursuing overly ambitious unemployment goals creating extra inflation late in the term, whereas the Republicans appear to have more frequently suffered electoral setbacks because of their enthusiasm for disinflationary bouts of economic slack. Yet despite higher average real growth during Democratic presidencies, and little difference at all in average inflation rates under the parties, the typical Republican pattern of falling growth rates early in the term and rising growth rates later on (during the presidential election season) more often than not yields larger vote harvests than the reverse pattern observed under the Democrats. The greater weight placed by Democrats on output relative to inflation is evidently more successful at filling in Okun gaps but less profitable electorally than the more inflation averse Republican objectives. Perhaps, then, the backward looking ("irrational") voters populating the political-economic models of the mid-1970s, much out of fashion among academic researchers for almost a decade, have something important to say after all about the macroeconomic foundations of electoral success.[22]

## 6. CONCLUSIONS

Although postwar US data on the response of real output to nominal spending changes are not informative enough to identify significant influence of policy multiplier uncertainty on partisan demand management activism, the results in this paper do support a number of firm conclusions. First, the results show that Democratic Administrations have typically pursued more expansionary aggregate demand policies than Republican Administrations which, as much previous research also has concluded, yield better (especially early term) real output performance and worse (especially late term) inflation performance. Yet, second, contrary to the assumption of virtually all models in the politics and business cycles literature, the regression estimates indicate that political authorities have taken a variable rather than fixed parameters view of the process generating real output growth and constraining aggregate demand policy. And, third, unlike earlier theoretical and empirical models for the interaction of politics and macroeconomics which have imposed immutable partisan objectives, the paper supplies evidence that partisan output goals driving aggregate demand policy are variable and respond forcefully to realized accelerations of the price level in conjunction with estimated shifts in parameters governing the output growth process.

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[22] In fact, recent empirical work that actually tests the relative performance of retrospective and forward looking models of macroeconomic performance and aggregate voting and popularity outcomes, rather than just imposing or assuming the later as part of the maintained hypothesis, demonstrate the empirical superiority of the retrospective view. See, for example, Suzoki, 1991 and Alesina, Londegran and Rosenthal, 1993.

A small, stylized political-economic model based on these ideas generates dynamic simulation forecasts that correspond remarkably well to the observed pattern of price, output and nominal spending fluctuations under the parties. In particular, the numerical analyses show that the policy and goal adjustment mechanisms that comprise the heart of the paper can account for the pattern of early-in-the-term partisan divergence and late-in-the-term partisan convergence of nominal spending and real output growth, which have been featured in the "Rational Partisan Theory" (RPT) models of Chappell and Keech (1986, 1988), Alesina (1987) and Alesina and Sachs (1988) as indirect evidence that (unanticipated) changes in partisan control of policy are electoral realizations of, and, hence, have the same transient output effects as, Lucas, Sargent and Wallace aggregate demand surprises.[23] Although the mechanisms developed in this paper and the RPT-partisan surprise hypothesis may co-exist amicably, the estimation and simulation results presented here give encouraging empirical support to extensions of Partisan Theory incorporating ex-post learning and preference adjustment by political authorities.

Yet this paper contributes nothing at all to an explanation of the existence of exploitable real output-nominal spending trade-offs, here represented by Administrations' use of demand shift policy parameters ($\pi_t$). After all, agents in the economy are surely aware of partisan differences in macroeconomic goals and policy inclinations, and could readily solve the same simple optimization problem facing partisan governments (which yields the targeted rate of nominal GNP expansion of equation 5). By the theoretically powerful logic of policy neutrality under rational expectations, agents in the market would adjust their behavior to offset completely predictable shifts in demand policy, particularly cyclical partisan shifts as large as those observed in almost a half century of US data. (See Figure 1.)

The obvious implication of this reasoning for the model in (7.1)–(7.4) is that *the response of real output to nominal GNP changes would decline* when the Democrats assumed the presidency and *rise* when the Republicans did, thereby neutralizing real output effects of partisan policy shifts. Ultimately partisan policy would disappear, or never arise in the first place, as Administrations recognized the futility of using demand management to achieve macroeconomic objectives. But time varying estimates of the policy multiplier, $\pi$, exhibit no adjustment to the party of the President (see Appendix 5) and so, as we saw earlier, partisan shifts in nominal spending pass through fractionally to real output in both the observables and the political-economic model. In the wake of rational

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[23] In view of the rejection of the Lucas, Sargent and Wallace policy surprise-policy neutrality hypothesis by many empirical studies, which, in Bennett McCallum's words, makes it "difficult to sustain the position that the policy ineffectiveness proposition is applicable to the U.S. economy" (cited in Gordon, 1982, p. 1087), I am skeptical that strict versions of RPT models will survive *appropriate empirical tests. In any case empirical work has also not yet supplied any direct evidence* in support of the central "partisan policy surprise" hypothesis of RPT models. I elaborate this point in Hibbs, 1992.

expectations, the rather well established capacity of predictable changes in nominal GNP (or the money supply) to affect real output and employment remains, needless to say, one of the central puzzles of macroeconomics; a puzzle that new classical economics largely remains silent about and that new Keynesian models are still strained to explain fully.[24]

### APPENDIX A

*The Discrete Time Solution for the Optimal Rate of Demand Expansion ($\Delta y^*$)*

As indicated in section 3 of the main text, the governing party minimizes the expected value of the quadratic loss function

$$E(U_t) = E(q_t - q_t^T)^2 \qquad\qquad (A1.1)$$
$$= \sigma^2 \hat{q}_t + (\hat{q}_t - q_t^T)^2, \qquad\qquad (A1.2)$$

where $\hat{q}_t$ is the forecast of time t output from equations (1.1)–(1.2), conditioned on discretionary optimal demand policy, observables, and the most recent real output parameter estimates, as in equation (3.2).

The one step ahead variance of forecast output, $\hat{q}_t$, in equation (A1.2) is

$$\sigma^2 \hat{q}_t = \Sigma_m (x_m - \bar{x}_m)^2 \, \sigma^2 \hat{\Omega}_m + 2 \Sigma_{n<m} (x_n - \bar{x}_n)(x_m - \bar{x}_m) \sigma(\hat{\Omega}_n, \hat{\Omega}_m)$$
$$+ \sigma^2 v / N - 1 \qquad\qquad (A2)$$

where $x_m$ denotes the right-side variables in (1.1)–(1.2) used to generate $\hat{q}_t$ (T, $\Delta y^*$, $q_{-1}$, $S_{-1}$, $\epsilon_{-1}$ and $\epsilon_{t-2}$), $\bar{x}_m$ are their sample means at each period, $\hat{\Omega}_m$ denotes the vector of associated parameter estimates ($\hat{\beta}$, $\hat{\pi}$, $\hat{\delta}$, $\hat{k}_1$, $\hat{\phi}_1$ and $\hat{\phi}_2$), $\sigma^2 \hat{\Omega}$ denotes sample variances and $\sigma(\hat{\Omega}_n, \hat{\Omega}_m)$ sample covariances among the parameter estimates, and N is the number of observations (here always twenty-five) used to estimate coefficients, variances and covariances. Though I have neglected time indices on the right side of (A2), remember that all terms are time varying, with fresh estimates obtained each period from rolling regressions of (1.2)–(1.2).

Viewed in discrete time, the party in power would find the optimal change in nominal spending from $t-1$ to t in the usual way by differentiating (A1.2) with respect to $\Delta y_t$, setting the result to zero, and solving for the optimal policy ($\Delta y_t^*$) subject to the constraints of equations (A2), (2.4) and (3.2). In this case, all unknowns on the right side of (A1.2) would be based on $t-1$ parameter estimates and projections, as already suggested. It is probably more accurate, however, to think of demand management policy as more or less continually adjusting to partisan real output goals. (Relative to the annual periodicity of the empirical analysis, monetary policy, unlike discretionary fiscal policy, is

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[24] See the reviews of, for example, Gordon, 1990 and Ball, Mankiw and Romer, 1988.

adjusted very frequently.) Therefore, the solution for optimal policy obtained by constrained minimization of (A1.2) can be expressed in continuous time by the differential equation

$$
\begin{aligned}
Dy^*(t) = {} & (\sigma^2\hat{\pi}/(\hat{\Theta}^2 + \sigma^2\hat{\pi}))(t) \cdot \overline{D}\overline{y}(t) + (\hat{\Theta}/(\hat{\Theta}^2 + \sigma^2\hat{\pi}))(t) \cdot \{(\beta_{dem}(1 - R) \\
& + \beta_{rep} R + \beta_{p0} Dp^{e'} + \Sigma_i\beta_{pi} Dp_{-1-i}) \cdot \hat{\beta}T - (\hat{\beta}T + \hat{k}_1 S_{-1} + \hat{\phi}_1\epsilon_{-1} \\
& + \hat{\phi}_2\epsilon_{-2})\}(t) - (1/(\hat{\Theta}^2 + \sigma^2\hat{\pi}^2))(t) \cdot \{(T - \overline{T})\,\sigma(\hat{\pi},\hat{\beta}) + (q_{-1} - \overline{q}_{-1})\,\sigma(\hat{\pi},\hat{\delta}) \\
& + (S_{-1} - \overline{S}_{-1})\,\sigma(\hat{\pi},\hat{k}_1) + (\epsilon_{-1} - \overline{\epsilon}_{-1})\,\sigma(\hat{\pi},\hat{\phi}_1) \\
& + (\epsilon_{-2} - \overline{\epsilon}_{-2})\,\sigma(\hat{\pi},\hat{\phi}_2)\}(t)\,],
\end{aligned}
\tag{A3}
$$

or

$$
Dy^*(t) = RHS(t),
\tag{A4}
$$

where D is the ordinary differential operator $d/dt$, $\hat{\Theta} = [\hat{\pi} - \hat{\beta}T\,\beta_{p0}(1 - \hat{\pi})]$, $Dp^{e'} = [Dp^e - (1 - \hat{\pi})Dy^*]$ and RHS is just the right-hand-side of (A3).

Given that (A3)–(A4) is interpreted as meaning that

$$
y(t) - y(0)^* = \int_0^t RHS(r)\,dr,
\tag{A5}
$$

a covenient approximation for discrete time estimation is (see Bergstrom, 1984)

$$
(y_t - y_{t-1})^* = \int_{t-1}^t RHS(r)\,dr
\tag{A6.1}
$$

$$
= 1/2\,(RHS_t + RHS_{t-1}),
\tag{A6.2}
$$

where terms in the form Dx in RHS of (A4) are written $\Delta x$ in (A6). Equation (A6.2), after substitution for RHS, gives the optimal rate of demand expansion of equation (5) in the main text, estimates for which are reported in Table 2.

Neglecting time indices and the two-period moving average form of the right side of equation (A6.2), and assuming for the moment that observed but not expected inflation affects partisan output targets (so that $\beta_{p0} = 0$ and $\hat{\Theta} = \hat{\pi}$), note that (A6.2) may be written

$$
\begin{aligned}
\Delta y^* = {} & (\sigma 2\hat{\pi}/(\hat{\pi}^2 + \sigma^2\hat{\pi}))\,\overline{\Delta y} + (1/(\hat{\pi}^2 + \sigma^2\hat{\pi})) \cdot \{\hat{\pi}\,[q^T - (\hat{q}|z)\,] \\
& - \Sigma_j(z_j - \overline{z}_j)\,\sigma(\hat{\pi},\hat{\Omega}_j)\}
\end{aligned}
\tag{A7}
$$

where $\hat{q}|z$ is the projection of output based on predetermined variables (z) and associated extraneous parameter estimates $(\hat{\Omega}_j)$ obtained from recursive estimation of (1.1)–(1.2) each period: $\hat{q}|z \equiv \Sigma_j\,\hat{\Omega}_j z_j \equiv \hat{\alpha} + \hat{\beta}T + \hat{\delta}q_{-1} + \hat{k}_1 S_{-1} + \hat{\phi}_1\epsilon_{-1} + \hat{\phi}_2\epsilon_{-2}$.

The potential effect of uncertainty on optimal policy action is made intuitively clearer by rewriting (A7) as

$$\Delta y^* = V^2/(1+V^2)\,\overline{\Delta y} + G/(1+V^2) - 1/(\hat{\pi}^2(1+V^2))\cdot\Sigma_j(z_j - \bar{z}_j)\,\sigma(\hat{\pi},\hat{\Omega}_j)$$

$$(A8)$$

where $V^2$ equals $(\sigma_{\hat{\pi}}/\hat{\pi})^2$, the relative variance (squared coefficient of variation) of $\pi$, and G equals $[q^T - (\hat{q}|z)]/\hat{\pi}$, the value of $\Delta y$ which equates $\hat{q}$ to $q^T$, and time indices are again neglected. Disregarding covariances among $\hat{\pi}$ and $\hat{\Omega}_j$, equation (A8) shows, as first pointed out by Branson (1967), that uncertainty about the policy multiplier, $\pi$, yields an optimal demand management policy that only partially fills the gap between $\hat{q}$ and $q^T$. In the up-side limiting case, as the relative variance of $\hat{\pi}$ goes to infinity, optimal policy just sets $\Delta y$ equal to its historical mean, $\overline{\Delta y}$. As V goes to zero, the down-side limit, equation (A8) collapses to the one-period certainty equivalence case, and we have a Theil (1964) reaction function which sets the change in nominal spending equal to G, moving the current real output forecast fully into line with the current partisan target.

APPENDIX B

*Partisanship and Output-Inflation Trade-Offs*

Table B reports results indicating that the response of real output to nominal spending changes exhibits no adjustment to the party of the President. Time varying estimates of the policy multipliers $\pi_t$ are based on two real output models which were estimated by recursive nonlinear least squares using rolling samples of 25 observations (as described in the main text).

The first model is identical to equations 1.1, 1.2 and 7.1 (the economic constraint of the political-economic model), viz:

$$q_t = \alpha(t) + \beta(t)T + \pi(t)\Delta y_t + \delta(t)q_{t-1} + k_0(t)S_t + k_1(t)S_{t-1}$$
$$+ \phi_1(t)\epsilon_{t-1} + \phi_2(t)\epsilon_{t-2} + v_t.$$

$$(B1)$$

The second model explicitly allows the time varying estimates of $\pi$ to shift with changes of party Administrations and therefore is more appropriate than equation (B1) for investigating the adjustment of policy multipliers to partisanship:

$$q_t = \alpha(t) + \beta(t)T + (\pi_{gen}(t) + \pi_{dem}(t)(1 - R_t))\cdot\Delta y_t + \delta(t)q_{t-1}$$
$$+ k_0(t)S_t + k_1(t)S_{t-1} + \phi_1(t)\epsilon_{t-1} + \phi_2(t)\epsilon_{t-2} + v_t.$$

$$(B2)$$

TABLE B  ESTIMATES OF THE RESPONSE OF POLICY MULTIPLIERS ($\pi_t$) TO
PARTY ADMINISTRATIONS, 1952–1990, ANNUAL[a]

| $\pi_t$ From: | Regression Model | | | |
| | Equation (B2) | | Equation (B1) | |
| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Constant | 0.274 | 0.311 | 0.213 | 0.196 |
| | (2.48) | (2.87) | (2.40) | (2.15) |
| $\pi_{t-1}$ | 0.909 | 0.865 | 1.05 | 1.07 |
| | (4.72) | (4.55) | (6.14) | (6.38) |
| $\pi_{t-2}$ | −0.270 | −0.268 | −0.311 | −0.320 |
| | (−1.41) | (−1.49) | (−1.82) | (−1.94) |
| Dem Pres | 0.063 | | 0.017 | |
| 1st Yr | (1.13) | | (0.40) | |
| Dem Pres | 0.008 | | −0.004 | |
| 2nd Yr | (0.13) | | (−0.008) | |
| Rep Pres | 0.019 | | −0.017 | |
| 1st Yr | (0.48) | | (−0.59) | |
| Rep Pres | −0.016 | | −0.008 | |
| 2nd Yr | (0.38) | | (−0.27) | |
| Dem Pres$_t$ | | 0.024 | | −0.0004 |
| $(1 - R_t)$ | | (0.71) | | (−0.015) |
| Adj. $R^2$ | 0.46 | 0.49 | 0.63 | 0.66 |
| SER | 0.09 | 0.09 | 0.07 | 0.06 |
| Ljung-Box Q (18) | | | | |
| Signif. Level | 0.97 | 0.93 | 0.65 | 0.76 |

[a]t-ratios are in parentheses.

Hence the $\pi_t$ series drawn from (B2) and used as the dependent variable in Regression Models (1) and (2) of Table B is: $\pi_t \equiv \pi_{gen}(t) + \pi_{dem}(t)(1 - R_t)$, where recall that $R_t$ is 1.0 during Republican presidencies and zero otherwise.

The regressions in Table B test for differences in the values of $\pi_t$ associated with all Democratic years as contrasted with all Republican years (Dem Pres), as well as for differences associated with the first half of Administrations (Dem Press 1st Yr and 2nd Yr, Rep Pres 1st Yr and 2nd Yr), where partisan differences in nominal spending (and output) changes were shown to be most pronounced (Figures 1 and 2). The right-side of the models in Table B include $\pi_{t-1}$ and $\pi_{t-2}$ as regressors, and so the results yield quasi-Granger causality tests for partisan adjustment effects. Regressions excluding the lagged dependent variables (available by request) also show no adjustment of the policy multipliers to the party of the President.

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## REFERENCES

Alesina, A., J. Londegran, and H. Rosenthal, 1993, A Model of the Political Economy of the United States. *American Political Science Review* 87, 1–33

Alesina, A., 1987, Macroeconomic Policy in a Two-Party System as a Repeated Game. *Quarterly Journal of Economics* 102, 651–678.

Alesina, A., 1988, Macroeconomics and Politics, in: S. Fischer, ed., *NBER Macroeconomics Annual 1988* (MIT Press, Cambridge), 3, 13–61.

Alesina, A., and J. Sachs, 1988, Political Parties and the Business Cycle in the US, 1948–1984. *Journal of Money, Credit and Banking* 20, 63–82.

Ball, L., N. G. Mankiw, and D. Romer, 1988, The New-Keynesian Economics of the Output Inflation Tradeoff. *Brookings Papers on Economic Activity* 1, 1–65.

Barro, R. J. and D. Gordon, 1983, Rules, Discretion, and Reputation in a Model of Monetary Policy. *Journal of Monetary Economics* 12, 101–121.

Bohara, A. K. and C. Sauer, 1992, Competing Macro-Hypotheses in the United States: A Kalman Filtering Approach. *Applied Economics* 24, 389–399.

Branson, W., 1967, Uncertainty and the Effectiveness of Policy. *American Economic Review* 57, 411–425.

Bergstrom, A. R., 1984, Continuous Time Stochastic Models and Issues of Aggregation Over Time, in: Z. Griliches and M. Intriligator, eds., *Handbook of Econometrics* (North Holland, Amsterdam) 2, 1146–1212.

Chappell, H. W. and W. R. Keech, 1986, Party Differences in Macroeconomic Policies and Outcomes. *American Economic Review* 76, 71–74.

Chappell, H. W. and W. R. Keech, 1988, The Unemployment Consequences of Partisan Monetary Regimes. *Southern Economic Journal* 55, 107–122.

Cukierman, A. and A. Meltzer, 1986, A Positive Theory of Discretionary Policy, the Cost of Democratic Government, and the Benefits of a Constitution. *Economic Inquiry* 24, 367–388.

Frey, B. and F. Schneider, 1978, An Empirical Study of Politico-Economic Interaction in the United States. *Review of Economics and Statistics* 60, 174–183.

Friedman, B., 1979, Optimal Expectations and the Extreme Information Assumptions of "Rational Expectations" Macromodels. *Journal of Monetary Economics* 5, 23–41.

Gordon, R. J., 1990, What is New-Keynesian Economics? *Journal of Economic Literature* 28, 1115–1171.

Gordon, R. J., 1982, Price Inertia and Policy Ineffectiveness in the United States, 1890–1980. *Journal of Political Economy* 90, 1087–1117.

Hamilton, J. D., 1983, Oil and the Macroeconomy Since World War II. *Journal of Political Economy* 91, 228–248.

Haslag, J. H., W. Russell and D. Slottje, 1989, *Macroeconomic Activity and the Income Distribution in the United States* (JAI Press, Greenwich, Ct.).

Hibbs, D. A., 1975, *Economic Interest and the Politics of Macroeconomic Policy* (Center for International Studies, Massachusetts Institute of Technology, Cambridge, MA) Monograph C/75–14.

Hibbs, D. A., 1977, Political Parties and Macroeconomic Policy. *American Political Science Review* 71, 1467–1487.

Hibbs, D. A., 1986, Political Parties and Macroeconomic Policies and Outcomes in the United States. *American Economic Review* 76, 66–70.

Hibbs, D. A., 1987, *The American Political Economy: Macroeconomics and Electoral Politics in the United States* (Harvard University Press, Cambridge, MA).

Hibbs, D. A., 1992, Partisan Theory After Fifteen Years. *European Journal of Political Economy* 8, 361–373.

Hibbs, D. A. and C. Dennis, 1988, Income Distribution in the United States. *American Political Science Review* 82, 467–490.

Lindbeck, A., 1976, Stabilization Policy in Open Economies with Endogenous Politicians. *American Economic Review* 66, 1–19.

Lucas, R. E., 1973, Some International Evidence on Output-Inflation Trade-offs. *American Economic Review* 63, 326–334.

Macrae, D., 1977, A Political Model of the Business Cycle. *Journal of Political Economy* 85, 239–264.

Margaritis, D., 1987, Strong Convergence of Least Squares Learning to Rational Expectations. *Economics Letters* 23, 157–161.

Margaritis, D., 1990, A time-Varying Model of Rational Learning. *Economics Letters* 33, 309–314.

Mishkin, F. S., 1982, Does Anticipated Money Matter? An Econometric Investigation. *Journal of Political Economy* 90, 22–51.

Nordhaus, W., 1975, The Political Business Cycle. *Review of Economic Studies* 42, 169–190.

Nordhaus, W., 1989, Alternative Approaches to the Political Business Cycle. *Brookings Papers on Economic Activity* 2, 1–49.

Rogoff, K. and A. Sibert, 1988, Elections and Macroeconomic Policy Cycles. *Review of Economic Studies* 55, 1–16.

Suzuki, M., 1991, The Rationality of Economic Voting and the Macroeconomic Regime. *American Journal of Political Science* 35, 624–642.

Taylor, J. B., 1980, Output and Price Stability: An International Comparison. *Journal of Economic Dynamics and Control* 2, 109–132.

Theil, H., 1964, *Optimal Decision Rules for Government and Industry* (North Holland, Amsterdam).