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Electoral and Partisan Cycle Regularities: A Cointegration Test

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This paper presents a methodology for identifying electoral and partisan cycle regularities in target variables and policy instruments. Our approach consists of the following steps: (1) examines the time series employed for the presence of a unit root in their individual autoregressive representations, and cointegration; (2) derives the growth component and constructs the cycle component of each time series; and (3) estimates regression equations of the cycle components of the series in terms of political and nonpolitical regressors. The empirical analysis refers to Greece and provides significant support of electoral cycles in economic outcomes and mixed evidence of electoral and partisan cycles in policy instruments.

Key Words: Targets; Instruments; Electoral cycles; Partisan cycles; Regularities; Greece.

1. INTRODUCTION

In the political cycles literature, governments act in favor of their own political interests and/or the interests of particular pressure groups. As a consequence, their actual policies can give rise to political cycles distinguished into electoral cycles (EC), defined as persistent cyclical patterns of key policy and target variables

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across electoral terms regardless of the political party in power, and partisan cycles (PC), that is, to persistent differences in such patterns conditional upon the ideology of the party in power (Haynes and Stone, 1990). Both the EC and PC approaches, which presume democratically elected governments, a two-party system and a predetermined timing of elections, have been criticized on the grounds of superficiality (Alt and Chrystal, 1983, pp. 125, 242) and the lack of supporting or inconclusive empirical evidence (McCallum, 1978; Hibbs, 1977, 1987; Soh, 1986; van der Ploeg, 1987; Alesina, 1987, 1989; Alesina and Sachs, 1988). The outcome of those criticisms was the development of the "rational electoral" and "rational partisan" cycle theories (REC and RPC), respectively. These theories assume a forward-looking private sector rationally anticipating future political and economic developments.

The paper presents a methodology for detecting stylized facts of electoral and partisan cycles in target variables and policy instruments. It utilizes Greek data and aims to provide answers to the following questions: Are the fluctuations of the target variables procyclical, countercyclical, or acyclical to those of the instrument variables? Do the fluctuations of the targets lead, lag, or coincide with those of the instruments?

The paper is organized as follows: The next section discusses our methodological approach. The data used and their sources are discussed in Section 3. Section 4 reports the empirical results. The last section gives a summary of the main findings and conclusions.

2. METHODOLOGICAL APPROACH

The modern theories of political cycles include the EC, PC, REC, and RPC approaches. From a theoretical point of view, the EC models emphasize the incumbent political party's intent and policy actions to secure reelection by maximizing its expected vote share at the next election. To accomplish that objective, the EC models hypothesize a backward-looking private sector judging the government by its past track record, and a short-sighted government (systematically) fooling a myopic electorate by judiciously exploiting a short-run Phillips curve trade-off during its term in office.[1] Thus, the testable EC hypothesis is stated as follows: The

[1] See Nordhaus (1975), MacRay (1977), van der Ploeg (1984), Alt and Chrystal (1983), ch. 5.

government, regardless of ideology or partisanship, adopts contractionary (expansionary) policies in the early (late) years of its term in office in order to depress (reduce) the expected rate of inflation (rate of unemployment). This short-sighted attitude of the incumbent government ignores the economic problems associated with it and accumulated in the aftermath of elections. On the contrary, the PC models stress that incumbents pursue partisan macroeconomic policies.[2] Since the parties at issue represent different pressure groups, they take account of the different preferences, incentives, and objectives of the competing parties by assigning different weights to inflation and unemployment. However, they switch to electoral policies if their reelection is in jeopardy (Frey and Schneider, 1978, 1988). The testable PC hypothesis is that, before the election, left-wing or "socialist" parties give greater weight to high employment and less to low inflation than right-wing or "conservative" parties. The former adopt expansionary and the latter deflationary policies after they have won the election; they often maintain these policies for their entire term in office.[3]

On the other hand, the REC hypothesis emphasizes the role of temporary information asymmetries in explaining electoral cycles in macroeconomic policy instruments (taxes, transfers, government consumption spending, money growth) rather than in indicators of economic performance (Rogoff and Sibert, 1988; Rogoff, 1990). Based on information advantages, the incumbent party has an incentive to try to signal, before elections, that it is competent. To accomplish that it manipulates the policy instruments, thus fooling the public and creating cycles in the policy variables.

Finally, the RPC models consider two ideologically different parties, "socialists" versus "conservatives," with objectives and incentives known to the public, as well as rational and informed

"socialists" have been relatively more averse to unemployment and less averse to inflation than "conservatives." In such a framework, rational voters (wage-setters) anticipate the incentives of the alternative policymakers and form their expectations accordingly. As a result, the RPC hypothesis predicts a transitory expansion (recession) at the beginning of a "socialist" ("conservative") administration, whereas differences in output and unemployment between governments taper off in the later part of their term in office, with inflation being higher during "socialist" administrations (Alesina and Sachs, 1988; Alesina, 1989). In general, proponents of electoral and partisan cycles (rational or not) argue that incumbent governments manipulate a number of policy instruments during the election year and/or the preceding one in order to influence in time a number of key target variables so that they would impress the electorate and enhance their chances of reelection.

From the empirical point of view, the procedure of (1) testing the above stated hypotheses and (2) identifying the relevance and suitability of policy instruments in implementing economic policy is as follows:

The first step in examining trends in a set of variables is to test for the presence of a unit root in the autoregressive representation of each individual time series. Augmented Dickey–Fuller (ADF) tests of the null hypothesis that a single unit root exists in each series are conducted using the following ADF regression.

$$\Delta log\ z_t = \alpha_0 + \alpha_1 t + \alpha_2 log\ z_{t-1} + \sum_{i=1}^{m} \beta_i \Delta log\ z_{t-i} + \epsilon_t \qquad (1)$$

where z_t is the series under consideration and m is selected to be large enough to ensure that ϵ_t is white noise. The null hypothesis of a single unit root is rejected if α_2 is negative and significantly different from zero.

In practice, the appropriate order of the autoregression in the ADF test is rarely known. One approach would be to use a model selection procedure based on some information criterion. However, Said and Dickey (1984) showed that the ADF test is valid asymptotically if the order of the autoregression is increased with sample size T at a controlled rate $T^{1/3}$. Also, the distribution of the F-test for α_2 in the above equation is not standard; rather it is that given by Fuller (1976).

On the assumption that each of the time series involved has a unit root or a stochastic trend in its univariate time-series representation, the joint modeling of these time series is next considered.

That is, although each series contains a stochastic trend, in a vector process the stochastic trend may be shared (i.e., they may not be distinct).

The number of common stochastic trends are tested for by using the multivariate approach due to Johansen (1988). In particular, following Johansen and Juselius (1992), we consider the following p-dimensional vector autoregressive model

$$X_t = \sum_{i=1}^{k} \Pi_i X_{t-1} + \mu + \epsilon_t \quad (t = 1, \ldots, T) \tag{2}$$

where X_t is a p-dimensional vector of I(1) variables and ϵ_t is an independently and identically distributed p-dimensional vector of innovations with zero mean and covariance matrix $\underline{Q}$. Letting $P = -(I - \Pi_1 - \ldots - \Pi_k)$ be the $p \times p$ total impact matrix, we consider the hypothesis of the existence of at most r ($< p$) cointegrating relations formulated as

$$H_1(r)\colon \Pi = \alpha\beta' \tag{3}$$

where α and β are $p \times r$ matrices of full rank. The β matrix is interpreted as a matrix of cointegrating vectors, that is, the vectors in β have the property that $\beta' X_t$ is stationary even though X_t itself is nonstationary—see Engle and Granger (1987). The α matrix is interpreted as a matrix of error-correction parameters.

The maximum likelihood estimation and likelihood ratio test of this model has been investigated by Johansen (1988), and can be described as follows: First, letting $\Delta = 1 - L$, where L is the lag operator, Johansen and Juselius (1992) suggest writing Equation 1 as[4]

$$\Delta X_t = \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-1} + \alpha\beta' X_{t-k} + \mu + \epsilon_t \quad (t = 1, \ldots, T) \tag{4}$$

where

$$\Gamma_i = -(I - \Pi_1 - \ldots - \Pi_i), \quad (i = 1, \ldots, k-1) \tag{5}$$

In Equation 3 the matrix Π is restricted as $\Pi = \alpha\beta'$, but the parameters vary independently. Hence the parameters $\Gamma_1, \ldots, \Gamma_{k-1}$ can be eliminated by regressing ΔX_t and X_{t-k} on lagged differences,

[4] Equation 3 can be derived by first subtracting X_{t-1} from both sides of Equation 1 and collecting terms on X_{t-1}. Then add and subtract $(\Pi_1 - I)X_{t-2}$. Repeat this procedure and collect terms to get Equation 3.

$\Delta X_{t-1}, \ldots, \Delta X_{t-k+1}$. This gives residual R_{ot} and R_{kt} and residual product moment matrices

$$S_{ij} = T^{-1}\sum_{t=1}^{T} R_{it}R'_{jt} \quad (i,j = o,k) \tag{6}$$

The estimate of β is found (see Johansen, 1988) by solving the eigenvalue problem

$$|\lambda S_{kk} - S_{k0}S_{00}^{-1}S'_{k0}| = 0 \tag{7}$$

for eigenvalues $\hat{\lambda}_1 \rangle \ldots \rangle \hat{\lambda}_p$, eigenvectors $V = (\hat{v}_1, \ldots, \hat{v}_p)$ normalized by $\hat{V}AS_{kk}\hat{V} = I$: The maximum likelihood estimators are given by

$$\hat{\beta} = (\hat{v}_1, \ldots, \hat{v}_r), \ \hat{\alpha} = S_{ok}\hat{\beta}, \text{ and } \hat{\underline{Q}} = S_{oo} - \hat{\alpha}\hat{\alpha}' \tag{8}$$

Finally, the maximized likelihood function is found from

$$L_{max}^{-2/T} = |\hat{\underline{Q}}| = |S_{oo}| \prod_{i=1}^{r} (1 - \hat{\lambda}_i) \tag{9}$$

and the likelihood ratio test of the hypothesis $H_1(r)$ is given by the trace test statistic

$$-2logQ[H_1(r)|H_o] = -T \sum_{i=r+1}^{p} log(1-\hat{\lambda}_i) \tag{10}$$

An alternative test (called the maximum eigenvalue test, λ_{max}) is based on the comparison of $H_1(r-1)$ against $H_1(r)$

$$-2logQ[H_1(r-1)|H_1(r)] = -T\, log(1 - \hat{\lambda}_{r+1}) \tag{11}$$

Finally, the detection of regularities in the intertemporal performance of the instrument and target variables and the search for basic stylized facts of electoral and partisan cycles is made via the Hodrick and Prescott (1980) filter (hereafter HP). The HP filter, which is based on the thesis of Lucas (1977), is designed to derive a smoothed trend from a given time series. The smoothed trend represents the growth component of the series. Any deviation of the actual time series from its smoothed trend defines the cycle component of the series. (In Section 4 and beyond, the cyclical components of the variables considered are identified by the prefix dev in front of the name of the variables; for example, devgdp denotes the cycle of variable GDP). The political cycle regularities can be detected by means of the statistics proposed by Kydland and Prescott (1990). In particular, for each target variable series

$y, y = 1, \ldots m$, we report the following statistics: (1) the percentage standard deviation of the series, and (2) the cross correlation of series y with the series of instrument x, $x = 1, \ldots n$. The former measures the relative amplitude of the fluctuations in the series in question, and the latter the type of comovement of series y with series x.

The degree of contemporaneous comovement of series y and x is measured by the magnitude of the correlation coefficients, $\rho(t)$, of the cyclical deviations of the time series of each of the target variables with the cyclical deviations of instrument x. A value of $\rho(t)$ equal to, greater than, or less than zero indicates that series $y(t)$ is acyclical, procyclical, or countercyclical to $x(t)$, respectively. For data samples of our size, it has been suggested (Fiorito and Kollintzas, 1994) that for $0.5 \leq |\rho_{(t)}| < 1$, $0.2 \leq |\rho_{(t)}| < 0.5$ and $0 \leq |\rho_{(t)}| < 0.2$ series $y(t)$ and $x(t)$ are contemporaneously correlated strongly, weakly, and uncorrelated, respectively. The degree of comovement of each of the $y(t)$ series lagged or led 1, . . .,k periods relative to series x(t) is depicted by the value of the cross correlation coefficient, $\rho(j)$, $j = \pm 1, \ldots, \pm k$, between $x(t)$ and $y(t + j)$. The value of $\rho(j)$ indicates that the cycle of y is leading, lagging, or is synchronized to the cycle of x as $|\rho(j)|$ is maximum for a negative, positive, or zero j, respectively.

3. THE DATA

The empirical analysis refers to the Greek economy and is based on a sample of 27 annual observations covering the period 1956–89, but excluding the dictatorship years 1967–73. The variables considered for this investigation have been classified in target and policy variables. The target variables include gross domestic product (GDP), implicit price deflator of private consumption spending (PC), unemployment rate (u), and disposable income (YD). The policy variables include government consumption expenditures (GC), government investment expenditures (GI), government transfer payments to the private sector (GT), monetary base (MB), direct taxes (DT), and indirect taxes (IT). The variables GC, GDP, GI, and YD are expressed in 1980 constant prices, u is in percentage terms, and the remaining variables are in current prices. The data come from various sources (including the Bank

of Greece, the Commission of the European Community, and the National Statistical Service of Greece).[5]

During the sample period, national elections in Greece were held in the following years: 1956, 1958, 1961, 1963, 1964, 1974, 1977, 1981, 1985, and 1989.[6] The Conservative party won the elections of 1956, 1958, 1961, 1974, 1977, and 1989. The Center Union and the Socialist party won the elections of 1963, 1964, 1981, and 1985. On the basis of these elections and their outcomes, we constructed the party election- and post-election-year dummy variables (Table 1).[7] In doing so we divided particular calendar years according to the proportion of total months in a year that each party spent in power. The calculations were based on the definition of the election year as the 12-month period ending at the end of the month of the election; dec and des are the election-year dummies associated with the incumbent government—conservative and socialist, respectively—administering the election; dnc and dns are the respective post-election-year dummies. Next, we introduced a new set of explanatory variables in the empirical analysis in order to account for Greece's accession to the EEC in 1981 and to isolate the "pure" electoral or partisan cycles of the target and policy variables. These variables are (1) dummy variable, deec, accounting for the country's accession to the European Community, deec = 1 after 1981 and 0 otherwise; and (2) two growth variables, one "global" and the other "domestic," to account for the "world" and the "domestic" performance over time, respectively. Depending on the nature of the regression equation that the growth variable enters, we have employed the annual rates of change of the EEC real GDP, eecy; the EEC GDP deflator, eecp; and the EEC unemployment rate, eecu. On the other hand, the "domestic" growth

[5] The data sources are Bank of Greece, Monthly Statistical Bulletin, Athens, for variable PG; Commission of the European Communities: European Economy, Brussels, May 1992

variable considered is the annual rate of change of Greece's real GDP, gry. Finally, we have employed a dummy variable, d74, to account for the restoration of democracy in the country in 1974. In that year we witnessed the collapse of the dictatorial government (July) and the formation of a national unity government that prepared the country for the national election (November). With the exception of variable deec the remaining dummy and growth variables are cited in Table 1.

4. EMPIRICAL RESULTS

4A. Properties of the Time Series

Table 2 contains ADF tests of the null hypothesis that a single unit root exists in each series. These tests indicate that, with the exception of real direct taxes (the without-trend case), the unit-root null hypothesis cannot be rejected. Tables 3 and 4 report the results of the cointegration tests based on annual VARs of order 4 in Table 3 and order 4 in Table 4. The number of cointegration vector is determined by a judicious consideration of both the trace and λ_{max} test statistics. These test statistics do not reject (at conventional significance levels based on the critical values reported by Osterwald-Lenum, 1992) $r \leq 1$, providing strong evidence in favor of two cointegrating vectors and two stochastic trends.

4B. Electoral Cycles Regularities

Electoral cycle regularities are reported in Table 5.[8] An inspection of the figures in the table reveals the following:

First, the unemployment rate (u) (1) is, as indicated by its relative standard deviation (= 0.38), the most volatile among all

Table 1: Election and Post Election-Year Dummy Variables and Growth Variables

Year	dec	des	dnc	dns	d74	gry	eecy	eecp	eecu
1956	0.17	0.00	0.83	0.00	0.00	0.087	na	na	na
1957	0.58	0.00	0.42	0.00	0.00	0.060	na	na	na
1958	0.42	0.00	0.58	0.00	0.00	0.040	na	na	na
1959	0.00	0.00	1.00	0.00	0.00	0.040	na	na	na
1960	0.17	0.00	0.83	0.00	0.00	0.031	na	na	0.025
1961	0.83	0.00	0.17	0.00	0.00	0.111	0.055	0.032	0.022
1962	0.08	0.00	0.92	0.00	0.00	0.015	0.047	0.045	0.020
1963	0.92	0.00	0.00	0.08	0.00	0.101	0.045	0.048	0.021
1964	0.00	0.17	0.00	0.83	0.00	0.083	0.058	0.045	0.016
1965	0.00	0.00	0.00	1.00	0.00	0.094	0.044	0.046	0.018
1966	0.00	0.00	0.00	1.00	0.00	0.061	0.039	0.040	0.019
1974	0.17	0.00	0.08	0.00	0.75	−0.036	0.019	0.133	0.028
1975	0.00	0.00	1.00	0.00	0.00	0.061	−0.010	0.147	0.040
1976	0.08	0.00	0.92	0.00	0.00	0.064	0.047	0.118	0.047
1977	0.92	0.00	0.08	0.00	0.00	0.034	0.029	0.117	0.050
1978	0.00	0.00	1.00	0.00	0.00	0.067	0.032	0.104	0.051
1979	0.00	0.00	1.00	0.00	0.00	0.037	0.035	0.107	0.050
1980	0.08	0.00	0.92	0.00	0.00	0.018	0.013	0.128	0.054
1981	0.92	0.00	0.00	0.08	0.00	0.001	0.001	0.109	0.071
1982	0.00	0.00	0.00	1.00	0.00	0.004	0.007	0.105	0.083
1983	0.00	0.00	0.00	1.00	0.00	0.004	0.016	0.085	0.091
1984	0.00	0.50	0.00	0.50	0.00	0.028	0.023	0.068	0.096
1985	0.00	0.50	0.00	0.50	0.00	0.031	0.024	0.060	0.097
1986	0.00	0.00	0.00	1.00	0.00	0.016	0.028	0.056	0.097
1987	0.00	0.00	0.00	1.00	0.00	−0.007	0.029	0.041	0.094
1988	0.00	0.50	0.00	0.50	0.00	0.041	0.040	0.045	0.088
1989	0.00	0.50	0.50	0.00	0.00	0.035	0.033	0.049	0.081

Note: dec and des denote the proportion of the 12-month period ending at the end of the month of the election, which is administered by the incumbent Conservative and Socialist government, respectively; dnc and dns denote the proportion of the post-election year under Conservative and Socialist administrations, respectively; d74 denotes the proportion of year 1974 in the duration of which the administration was not under conservatives or socialists; eecy, eecp, and eecu are rate of change variables of EEC's real GDP, GDP deflator, and unemployment rate, respectively; gry denotes Greece's real GDP growth rate; na = not available.

Second, the remaining target variables (i.e., GDP, YD, and PC), with relative standard deviations in the neighborhood of 0.11–0.12, are (1) uncorrelated with GI, and (2) strongly procyclical and synchronous with the cycles of GC, GT, TD, TI, and MB. This argument is supported by the fact that the respective cross correlations exceed 0.5 (Table 5). It should be mentioned, however, that

Table 2: Augmented Dickey–Fuller Unit Root Tests

Regression: $\Delta log\ z_t = \alpha_0 + \alpha_1 t + \alpha_2 log z_{t-1} + \sum_{i=1}^{m} \beta_i \Delta log\ z_{t-i} + \epsilon_t$

Series	Sample period	ADF Unit root tests	
		Without trend	With trend
Real GDP (Y_1)	1960–90	−1.838	−1.892
Unemployment rate (Y_2)	1964–90	−1.634	−2.652
Real disposable income (Y_3)	1960–90	−2.791	−0.709
GDP deflator (Y_4)	1960–90	−1.194	−0.249
Real government consumption (X_1)	1960–90	−2.581	−2.249
Real indirect taxes (X_2)	1960–90	−2.122	−2.629
Real government investment (X_3)	1970–90	−2.918	−2.848
Real government transfers (X_4)	1970–90	−1.358	−1.550
Real direct taxes (X_5)	1970–90	−4.639	−0.915
Monetary base (X_6)	1960–90	0.344	−2.262

Notes: Results are reported for an ADF statistic of order 4 except for the 1970–90 samples, for which the order is 3. All the series are in logs except for the unemployment rate. The 95% critical values for the 1960–90 sample are −2.975 for the "without trend" version of the test and −3.586 for the "with trend" version of the test. The 95% critical values for the 1970–90 sample are −3.052 for the "without trend" version and −3.711 for the "with trend" version.

Table 3: Johansen Maximum Likelihood Cointegration Tests Between Each Target Variable and a Subset of the Instrument Variables

	System											
	Y_1,X_1,X_2,X_6			Y_2,X_1,X_2,X_6			Y_3,X_1,X_2,X_6			Y_4,X_1,X_2,X_6		
H_0	λ_i	Trace	λ_{max}	λ_i	Trace	λ_{max}	λ_i	Trace	λ_{max}	λ_i	Trace	λ_{max}
$r = 0$	.774	75.285*	40.260*	.841	97.933*	42,392*	.817	86.416*	45.910*	.812	91.068*	45.140*
$r \leq 1$	.589	35.025*	24.060*	.741	55.540*	31.147*	.618	40.506*	26.000*	.684	45.928*	31.151*
$r \leq 2$	.322	10.964	10.498	.488	14.393	13.414*	.272	14.505	8.594	.349	14.773	11.594
$r \leq 3$	.017	0.466	0.466	.323	8.978	8.978	.196	5.911	5.911	.111	3.183	3.183

Notes: Critical values are from Osterwald-Lenum (1992). The number of lags in each of these VARs is set equal to 4 (the maximum possible given the small number of observations). Drift maintained. The sample period is 1960–90, except for the system with the unemployment rate (Y_2) for which the sample period is 1964–90. An asterisk indicates significance at the 5% level. The 95% critical values for the trace and λ_{max} test statistics are (for $r = 0$, $r \leq 1$, $r \leq 2$, and $r \leq 3$) 47.210, 29.680, 15.410, and 3.762 and 27.067, 20.967, 14.069, and 3.762, respectively.

Table 4: More Johansen Maximum Likelihood Cointegration Tests Between Each Target Variable and a Subset of the Instrument Variables

	System											
	Y_1,X_3,X_4,X_5			Y_2,X_3,X_4,X_5			Y_3,X_3,X_4,X_5			Y_4,X_3,X_4,X_5		
H_0	λ_i	Trace	λ_{max}	λ_i	Trace	λ_{max}	λ_i	Trace	λ_{max}	λ_i	Trace	λ_{max}
$r = 0$	.907	81.563*	42.887*	.963	93.342*	59.459*	.982	114.910*	72.758*	.977	120.441*	68.243*
$r \leq 1$	.814	38.675*	30.324*	.696	33.883*	21.467*	.805	42.152*	29.433*	.836	52.198*	32.587*
$r \leq 2$	.362	8.351	8.103	.494	12.416	12.265	.383	12.718	8.708	.486	11.611	12.000
$r \leq 3$	.013	0.248	0.248	.088	0.150	0.150	.199	4.009	4.009	.344	7.611	7.611

Notes: Critical values are from Osterwald-Lenum (1992). The number of lags in each of these VARs is set equal to 3 (the maximum possible given the small number of observations). Drift maintained. The sample period is 1970–90. An asterisk indicates significance at the 5% level. The 95% critical values for the trace and λ_{max} test statistics are (for $r = 0$, $r \leq 1$, $r \leq 2$, and $r \leq 3$) 47.210, 29.680, 15.410, and 3.762 and 27.067, 20.967, 14.069, and 3.762, respectively.

Table 5: Cross Correlations of Policy Variables with Target Variables

	Volatility (st. dev.)	Time lag of variable y (y±i), i=1, . . ., 4								
		t−4	t−3	t−2	t−1	t	t+1	t+2	t+3	t+4
Cross correlation of										
1. GC with										
GC	0.12	−0.17	0.17	0.44	0.71	1.00	0.71	0.44	0.17	−0.17
GDP	0.11	−0.10	0.14	0.40	0.68	0.97	0.73	0.48	0.25	−0.17
YD	0.12	−0.11	0.14	0.39	0.65	0.97	0.74	0.52	0.31	0.08
u	0.38	0.20	0.04	−0.31	−0.56	−0.83	−0.55	−0.23	0.07	0.11
PC	0.12	0.22	0.31	0.42	0.51	0.61	0.18	−0.17	−0.43	−0.58
2. GI with										
GI	0.14	−0.44	−0.43	−0.04	0.51	1.00	0.51	−0.04	−0.43	−0.44
GDP	0.11	−0.09	−0.06	0.04	0.13	0.30	0.035	−0.05	−0.07	0.06
YD	0.12	−0.13	−0.10	−0.02	0.09	0.38	0.17	0.04	−0.06	0.003
u	0.38	−0.15	−0.16	−0.20	−0.13	−0.16	0.19	0.34	0.40	−0.01
PC	0.12	−0.21	−0.11	0.01	0.05	0.10	−0.176	−0.185	−0.19	−0.11
3. IT with										
IT	0.20	−0.21	−0.06	0.20	0.55	1.00	0.55	0.20	−0.06	−0.21
GDP	0.11	−0.44	−0.28	−0.04	0.25	0.68	0.55	0.48	0.32	0.31
YD	0.12	−0.47	−0.31	−0.08	0.21	0.69	0.52	0.42	0.29	0.17
u	0.38	0.26	0.13	−0.16	−0.34	−0.62	−0.32	−0.09	0.15	0.02
PC	0.12	−0.02	0.10	0.32	0.53	0.78	0.50	0.29	−0.05	−0.28
4. MB with										
MB	0.26	−0.11	0.06	0.34	0.61	1.00	0.61	0.34	0.06	−0.11
GDP	0.11	−0.34	−0.16	0.10	0.45	0.85	0.63	0.51	0.31	0.18
YD	0.12	−0.35	−0.16	0.07	0.39	0.82	0.62	0.56	0.36	0.21
u	0.38	0.30	0.17	−0.15	−0.42	−0.73	−0.44	−0.20	0.10	0.02
PC	0.12	0.15	0.27	0.43	0.64	0.84	0.41	0.10	−0.21	−0.36
5. GT with										
GT	0.21	−0.19	0.03	0.33	0.68	1.00	0.68	0.33	0.03	−0.19
GDP	0.11	−0.29	−0.09	0.17	0.49	0.87	0.69	0.49	0.27	0.06
YD	0.12	−0.29	−0.09	−0.15	0.44	0.83	0.68	0.52	0.31	0.08
u	0.38	0.29	0.09	−0.29	−0.58	−0.84	−0.54	−0.16	0.20	0.25
PC	0.12	0.12	0.23	0.39	0.59	0.80	0.45	0.10	−0.21	−0.42
6. TD with										
TD	0.23	−0.21	−0.03	0.19	0.56	1.00	0.56	0.19	−0.03	−0.21
GDP	0.11	−0.17	−0.03	0.20	0.51	0.87	0.59	0.35	0.15	−0.04
YD	0.12	−0.14	0.02	0.20	0.46	0.83	0.57	0.38	0.20	−0.01
u	0.38	0.22	0.04	−0.31	−0.59	−0.92	−0.58	−0.18	0.24	0.30
PC	0.12	0.04	0.11	0.25	0.45	0.70	0.28	−0.03	−0.22	−0.35

Note: GC = Government consumption expenditure; GDP = Gross domestic product; GI = Government investment expenditure; GT = Government transfer payments; MB = Monetary base; PC = Price deflator of private consumption; TD = Direct taxes; TI = Indirect taxes; u = Unemployment rate; YD = Disposable income.

there is no strong evidence that the cycles of GDP and YC are procyclical and synchronous with the cycle of GI nor that the cycles of PC and u are uncorrelated with and lagging the cycle of GI. These findings emerge from the sizes of the respective cross correlations in the table.

Third, among the policy instruments the most and least volatile are TD and GC, respectively. Their corresponding relative standard deviations are 0.27 and 0.13.

4C. Partisan Cycles Regularities

In order to detect the impact of conservative and socialist administrations on the formation of cycles of policy instruments and target variables, we have estimated by the OLS method and for the periods 1956–89, 1956–74, and 1975–89 the following regression model:

$$dev\ (z_i) = \sum_{k=1}^{6} \alpha_{ik} d_k + \beta_{ie}\, g_e \qquad (12)$$

where $dev(z_i)$, $i = 1, \ldots 10$, stands for the deviation (cycle) of the four target variables and six instrument variables; d_k denotes the k dummy variables (i.e., dec, des, dnc, dns, deec, and d74); and g_e represents the alternative growth rate variables (i.e., eecy, eecp, eecu), and gry. As has been indicated elsewhere (Alesina and Roubini, 1990; Haynes and Stone, 1989), in the estimation of Equation 1 the MA(2) specification has been chosen as the "best" in terms of reducing short-run noise.

The statistical results of this estimation are reported in Table 6. Although these results are not entirely conclusive, they suggest the following:

First, the dummies deec (accounting for the effect of Greece's accession to EEC) and d74 (accounting for the restoration of democratic rule) affect considerably both the cycles of policy and target variables. This is suggested by the fact that the d74 and deec regression coefficients are, in their majority, statistically significant at an acceptable probability level. A more or less similar performance is observed for the domestic and the global growth variables.

Second, conservative and socialist administrations have positively influenced the cycles of disposable income and GDP, and negatively influenced the cycle of PC, during the second subperiod of the sample. However, the corresponding effects relating to socialists have not always been statistically significant.

Third, similar in terms of direction, but weaker in the statistical

Table 6: Cycles of Instruments and Targets as Functions of Election and Post-Election-Year Dummies

	dec		des		dnc		dns		gry		deec		d74				
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	R^2	DW	χ^3
1. devgc																	
1956–89[a]	−0.141	1.70	−0.278	1.62	0.034	0.71	−0.240	3.14	0.911	1.04	0.171	2.17	0.258	2.43	0.578	1.31	36.62
1956–74[a]	−0.421	2.81	−0.356	0.68	−0.094	1.81	−0.399	3.40	2.832	2.27			0.442	3.67	0.751	1.30	
1975–89	0.125	2.58	−0.113	1.01	0.042	0.91	−0.007	0.10	1.440	1.69	−0.034	0.55			0.848	0.93	
2. devgi																	
1956–89[a]	−0.039	0.40	0.096	0.48	−0.009	0.15	−0.084	0.91	0.176	0.17	0.020	0.21	0.378	2.87	0.483	1.20	4.06
1956–74[a]	−0.116	0.66	0.199	0.26	−0.029	0.35	−0.146	0.99	0.742	0.44			0.410	2.10	0.494	1.95	
1975–89	−0.101	0.60	−0.021	0.06	−0.054	0.34	−0.112	0.51	1.473	0.50	0.051	0.24			0.227	1.34	
3. devgt																	
1958–89[a]	−0.192	1.20	−0.653	2.04	0.051	0.60	−0.363	2.53	0.603	0.37	0.393	2.64	0.385	1.95	0.477	1.37	27.26
1958–74[a]	−0.332	0.74	0.242	0.16	0.005	0.04	−0.579	1.65	1.979	0.45			0.507	1.45	0.703	2.33	
1975–89	0.065	0.58	−0.153	0.64	−0.070	0.70	0.084	0.62	2.465	1.44	−0.046	0.37			0.434	1.72	
4. devti																	
1956–89[a]	−0.285	1.83	−0.691	2.16	0.027	0.29	−0.384	2.59	1.690	1.00	−0.364	2.41	0.440	2.17	0.442	1.47	48.86
1956–74[a]	−0.575	1.60	−0.440	0.44	−0.129	1.09	−0.715	2.85	4.425	1.44			0.525	2.34	0.693	1.07	
1975–89	0.162	2.13	0.086	0.52	0.006	0.11	0.327	4.45	2.842	2.68	−0.308	4.20			0.880	2.37	
5. devtd																	
1956–89[a]	−0.226	1.13	−0.569	1.40	0.116	1.02	−0.423	2.28	0.144	0.07	0.369	1.93	0.482	1.89	0.469	1.65	37.88
1956–74[a]	−0.655	1.60	−0.293	0.24	−0.167	1.22	−0.904	3.43	5.056	1.49			0.706	2.66	0.760	1.11	
1975–89	0.124	1.11	−0.071	0.29	0.075	0.74	0.250	1.83	2.294	1.22	−0.205	1.60			0.644	1.17	
6. devmb																	
1956–89[a]	−0.269	1.61	−0.679	2.07	0.028	0.31	−0.523	3.45	2.330	1.38	0.416	2.67	0.664	3.16	0.530	1.48	60.10
1956–74[a]	−0.553	5.68	0.141	0.38	−0.114	2.81	−0.807	10.61	4.044	4.65			0.760	9.46	0.997	1.67	
1975–89	0.089	0.98	−0.103	0.48	0.004	0.04	0.038	0.31	3.854	2.31	−0.122	1.07			0.792	1.27	

(*continued*)

Table 6: (*Continued*)

	dec		des		dnc		dns		gry		deec		d74				
	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	coef.	t	R^2	DW	χ^3
7. devgdp																	
1961–89[a,b]	0.090	1.12	0.019	0.11	0.165	3.00	0.031	0.38	−2.954	2.05	−0.010	0.14			0.450	2.05	64.34
1975–89	0.152	3.60	0.071	0.80	0.149	5.97	0.088	1.50	−0.872	1.14	−0.109	2.11			0.843	1.80	
8. devyd																	
1961–89[a,b]	0.049	0.64	0.170	1.03	0.175	3.14	0.031	0.37	−3.123	2.13	−0.048	0.69	0.298	2.86	0.513	2.35	42.14
1975–89	0.197	3.22	0.198	1.55	0.164	4.58	0.130	1.54	−1.030	0.96	−0.173	2.31	0.738	1.68	0.738	1.68	
9. devpc																	
1961–89[a,b]	−0.137	3.00	−0.163	2.13	−0.082	1.49	−0.171	4.71	−0.546	1.17	0.142	3.89	0.115	1.29	0.742	1.51	47.80
1975–89	−0.088	2.29	−0.068	1.80	−0.082	2.51	−0.025	0.72	0.678	2.53	0.036	1.51			0.766	1.60	
10. devu																	
1964–89[a,b]	0.132	0.97	0.475	2.68	0.138	0.96	0.687	7.10	−10.002	3.54	0.430	2.13	−0.194	1.32	0.912	1.43	
1975–89	−0.084	0.19	0.080	0.12	−0.082	0.21	0.300	0.48	−6.534	0.80	0.485	2.18	0.824	1.70	0.824	1.70	

Note: For equations 7 and 8, 9, and 10 regressor gry is substituted by eecy, cecp, and eecu, respectively.

The χ^2-statistic is explained in Footnote 9 in the text. a = The dictatorship years 1967–73 have been excluded; b = No estimates are provided for the pre-1974 period due to the small number of observations; t = *t*-value; . . . = cannot be estimated.

Prefix dev in front of the variables appearing in Rows 1–10 denotes their cyclical component. The definitions of these variables are given in the text, Part 3. The definitions of the variables in the columns are given in Table 1.

sense, have been the effects of both administrations on the aforementioned dependent variables throughout the period of the sample. The relative inferiority of these results in comparison to those pertaining to the more recent subperiod might be attributed to efforts undertaken by both Conservative and Socialist (Center Union) governments in the first subperiod to compete for the "middle of the road" voters and, thus, obscure the impact of their policies on economic outcomes.

Fourth, Socialist administrations have positively influenced the cycle of the unemployment rate during the sample period. This appears to have been the only noticeable qualitative difference in the performance of the two parties in relation to the cycles of the target variables. The above results concerning inflation and unemployment under Socialist administrations are in agreement with those found by Alogoskoufis and Philippopoulos (1991), who emphasize the fact that "although inflation under socialist administrations seems to be higher on the average, . . . this is not translated into lower unemployment" and "the preferences of political parties are very important for inflation outcomes, but not for unemployment" (pp. 20–21).

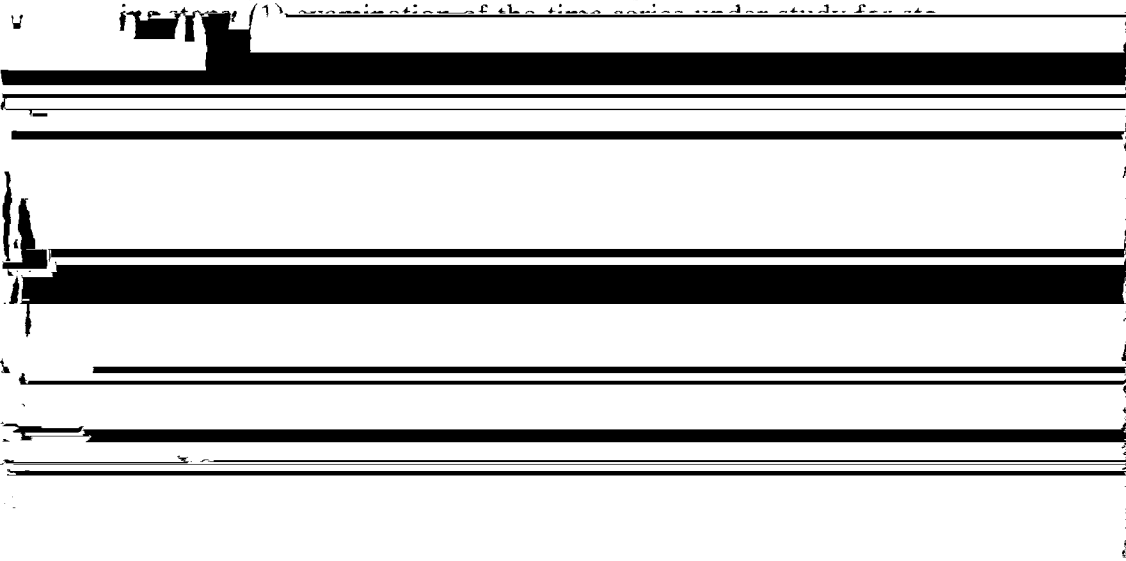
Fifth, the empirical evidence suggests that both parties have not followed consistent partisan policies during the period under consideration. In particular, Socialist administrations have had a negative impact on the cycles of instruments (GT, TI, and MB throughout the sample period, irrespective of the type of the year, election, or post-election year. The results concerning TI would have been stronger had socialists maintained their policies in the same direction during the second subperiod. Socialists have also negatively influenced the cycles of TD and GC (first subperiod, entire sample) but switched policies in regard to TD in the second subperiod. Conservative administrations have also influenced the cycles of GC and MB (first subperiod) in the negative direction, but reversed their policy as regards GC in the election years of the second subperiod. This finding is also supported by the fact that the likelihood ratio test rejects the homogeneity of the time series involved.[9] Conservatives have also negatively affected the

[9] The χ^2 statistic at issue is defined as $-2(L-L_1)$, where L_1 is the logarithm of the likelihood function of the estimated Equation 12 on the basis of the 1956–89 (1961–89) data for the deviations of policy instruments (target variables). L_0 is the sum of the logarithms of the likelihood functions from the estimation of Equation 12 for the two subperiods. The calculated values of the χ^2 statistic are given in the last column of Table 6 and exceed, in almost all cases, its critical value 11.07, at the 5-percent level with 5 degrees of freedom. The exception concerns the deviations of GI. (cf. Berndt, 1990, pp. 466–467, and McMullen and Stanley, 1988).

cycle of TI in the election years of the whole sample. Finally, none of the two parties has managed to influence the cycle of instrument GI.

5. SUMMARY AND CONCLUSIONS

This paper is focused on a methodology for identifying the stylized facts of both electoral and partisan cycles in target variables and policy instruments. The technique consists of the following [illegible]



tionarity and cointegration; (2) derivation of the growth component of the time series and construction of their cycle component; and (3) estimation of regression equations of the cycle components of the series in terms of political and nonpolitical regressors.

The main findings of our analysis are summarized as follows:

First, the time series used are integrated of order one. All but one (unemployment rate) of the target variables employed, that is, GDP, YD, and PC, are cointegrated with the set of policy instruments.

Second, the electoral cycles of each of the target variables have been synchronous with those of the policy instruments, that is, GC, TD, TI, GT, and MB. The cycle of the unemployment rate on the one hand and the cycles of DGP, disposable income, and the consumption deflator on the other have been strongly countercyclical and strongly procyclical, respectively, with the cycles of the aforementioned instruments.

Third, there have not been detected significant qualitative divergences in the effects of Conservative or Socialist administrations on the cycles of the target variables GDP, disposable income, and prices. In quantitative terms, however, it appears that conserva-

the cycles of indirect taxes, monetary base, and government transfers to the private sector throughout the sample period. Concerning their impact on the cycles of direct taxes and government consumption spending, they have reversed policies from negative in the earlier subperiod to positive in the later subperiod. The conservatives have negatively influenced the cycles of government consumption spending and monetary base during the first subperiod but reversed their policy as regards government consumption spending during the second subperiod. They have also reduced indirect taxes in the election years of the entire sample period. This result is not fully in line with those reported in other papers, for example, Soh (1986). However, it seems to reinforce the Frey and Schneider (1978, 1988) proposition, that political parties switch to electoral policies if their reelection seems threatened.

Fifth, the cycles of the target variables and policy variables have been as expected, influenced by factors outside the direct control of the policymakers, that is, the country's accession to the EEC, the restoration of democracy in the country, and the overall growth rates that have prevailed in the "world" and the "domestic" economies.

In conclusion, although the empirical evidence does not provide strong support in favor of partisan cycles in economic outcomes, it does indeed provide significant support of electoral cycles in economic outcomes and mixed evidence of electoral and partisan cycles in policy instruments. Our findings cannot easily be compared with those reported in other studies in the same area, due to differences in methodology, institutional structure, size of the public sector, time span, and personal characteristics of individual politicians.

REFERENCES

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

Alesina, A. (1989) Politics. *Economic Policy*, April, 8:55–98.

Alesina, A., Cohen, G.D., and Roubini, N. (1991) Macroeconomic Policy and Elections in OECD Democracies. *Econ. Politics* 4(1):1–30.

Alesina, A., and Roubini, N. (1990) Political Cycles in OECD Economies. CEPR Discussion Paper Series, No. 470.

Alesina, A., and Sachs, J. (1988) Political Parties and the Business Cycle in the United States, 1948–1984. *Journal of Money, Credit and Banking* 20(1):63–82.

Alogoskoufis, G.S., Lockwood, B., and Philippopoulos, A. (1992) Wage Inflation, Electoral Uncertainty and the Exchange Rate Regime: Theory and UK Evidence. *Economic Journal.* 102:1370–1394.

Alogoskoufis, G.S., and Philippopoulos, A. (1991) Inflationary Expectations, Political Parties, and the Exchange Rate Regime: Greece 1958–89. *European Journal of Political Economy* 8:375–399.

Alt, J.E., and Chrystal, K.A. (1983) *Political Economics.* Berkeley: University of California Press.

Berndt, E.R. (1990) *The Practice of Econometrics: Classic and Contemporary.* Amsterdam: Addison-Wesley Publishing Company.

Dickey, D.A., and Fuller, W.A. (1981) Likelihood Ratio Statistics Autoregressive Time Series with a Unit Root. *Econometrica* 49:1057–1072.

Engle, R.F., and Granger, C.W.J. (1987) Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrica* 55(2):251–276.

Fiorito, R., and Kollintzas, T. (1994) Stylized Facts of Business Cycles in the G7 from a Real Business Cycles Perspective. *European Economic Review* 38:235–269.

Frey, B.S., and Schneider, F. (1978) An Empirical Study of Politico-Economic Integration in the United States. *The Review of Economics and Statistics* 60:191–206.

Frey, B.S., and Schneider, F. (1988) Politico-Economic Models of Macroeconomic Policy: A Review of the Empirical Evidence. In *Political Business Cycles: The Political Economy of Money, Inflation and Unemployment* (T.D. Willet, Ed.). Durham, NC: Duke University Press, pp. 239–275.

Fuller, W.A. (1976) *Introduction to Statistical Time Series.* New York: Wiley.

Haynes, S.E., and Stone, J.A. (1990) Political Models of the Business Cycle Should be Revived. *Economic Inquiry* 28:442–465.

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

Hibbs, D.A. Jr. (1987) *The American Political Economy.* Cambridge: Cambridge University Press.

Hibbs, D.A. Jr., and Fassbender, H. (1981) *Contemporary Political Economy, Studies on the Interdependence of Politics and Economics.* Amsterdam: North-Holland.

Hodrick, R.J., and Prescott, E.C. (1980) Post-War US Business Cycles: An Empirical Investigation. Manuscript, Carnegie-Mellon University.

Johansen, S. (1988) Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control* 12:231–254.

Johansen, S., and Juselius, K. (1992) Some Structural Hypotheses in a Multivariate Cointegration Analysis of the Purchasing Power Parity and the Uncovered Interest Parity for the U.K. *Journal of Econometrics* 53:211–244.

Kydland, F.E., and Prescott, E.C. (1990) Business Cycles: Real Facts and Monetary Muth. *Federal Reserve Bank of Minneapolis, Quarterly Review,* Spring: 3–18.

Lucas, R.E. Jr. (1977) Understanding Business Cycles. In *Stabilization of the Domestic and International Economy* (K. Brunner and A.H. Meltzer, Eds.). Carnegie-Rochester Conference Series on Public Policy 5:7–29. Amsterdam: North-Holland.

MacRay, D. (1977) A Political Model of the Business Cycle. *Journal of Political Economy* 85:239–264.

McCallum, B.T. (1978) The Political Business Cycle. An Empirical Test. *Southern Economic Journal* 4(3):504–515.

McMullen, S.S., and Stanley, L.R. (1988) The Impact of Deregulation on the Production Structure of the Motor Carrier Industry. *Economic Inquiry* 26(2):299–316.

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

Osterwald-Lenum, M. (1992) A Note with Fractiles of the Asymptotic Distribution of the Likelihood Cointegration Rank Test Statistics: Four Cases. *Oxford Bulletin of Economics and Statistics* 54(3):461–472.

Rogoff, K. (1990) Equilibrium Political Budget Cycles. *American Economic Review* 80(1):21–36.

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

Roubini, N., and Sachs, J. (1989) Political and Economic Determinants of Budget Deficits in Industrial Democracies. *European Economic Review* 33:903–933.

Said, S.E., and Dickey, D. (1984) Testing for Unit Roots in Autoregressive-Moving Average Models of Unknown Order. *Biometrica* 71:599–607.

Soh, B.H. (1986) Political Business Cycles in Industrialized Dynamic Countries. *Kyklos* 39(1):31–46.

van der Ploeg, F. (1984) Government Ideology and Re-election Efforts. *Oxford Economic Papers* 36:213–231.

van der Ploeg, F. (1987) Optimal Government Policy in a Small Open Economy with Rational Expectations and Uncertain Election Outcomes. *International Economic Review* 28(2):469–491.