

Does there exist a political business cycle: A Box-Tiao analysis*

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Theories of the political business cycle are by now common. They range from the elegant theoretical work of Nordhaus (1975) to the essentially empirical work of Tufte (1978). They all assume that politicians manipulate the economy to aid their reelection efforts; in particular, politicians manipulate macroeconomic policy to create a boom just before election day. Golden and Poterba (1980) provide an excellent review of this literature.

Both Tufte and Nordhaus provide casual evidence for the existence of a political business cycle. Using inflation and unemployment rates as indicators of macroeconomic outcomes, Tufte and Nordhaus predict at a minimum, that unemployment should be decreasing before election day. If presidents are really manipulating the economy very well, then unemployment should be at a minimum in the October before the election, and hence should be rising after the election. In the Nordhaus version, the economy pays for the pre-election boom with a post-election surge in the inflation rate. Nordhaus also suggests that the president should engineer a recession early in his term to reduce inflationary expectations. Tufte (1978: 20) presents graphs of the unemployment series and claims that visual examination shows them to be generally consistent with the hypothesis. However, he provides no statistical tests of the hypothesis, nor does he estimate the quantitative impact of elections on unemployment. Tufte does not examine the inflation series. Nordhaus restricts himself to comparing unemployment rates in the two years preceding and following an election, with a simple nonparametric test supporting the hypothesis.

The literature provides several good empirical tests of the political business cycle hypothesis. Both Paldam (1979) and McCallum (1978) test for the existence of four year cycles, and find none. However they do not test for discontinuous changes in the series around election day. Golden and Poterba examine whether the use of policy instruments changes near election day (and

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find that it does not), but they do not examine whether outcomes such as unemployment vary with the nearness of elections.

This note directly tests the hypothesis that there are changes in the unemployment and inflation series near election day that are consistent with the Nordhaus-Tufte theory. The test proceeds by subjecting the monthly seasonally adjusted time series of American unemployment and inflation rates from January, 1961 to June, 1973 to a Box-Tiao (1975) intervention analysis. The Box-Tiao technique fits a time series as a sum of an autoregressive-moving average (ARMA) process and an intervention term; here the intervention term models nearness to the election day. (Hibbs (1977) offers a good introduction to the Box-Tiao technique.) I chose the period 1961-1973 because neither Eisenhower nor Ford is believed to have manipulated the economy to aid in reelection. The data are taken from the U.S. Department of Commerce's (1975) revised National Income and Product Accounts. The unemployment series is from the Bureau of Labor Statistics's overall unemployment rate and the inflation series is the monthly percentage increase (annualized) of the Department of Commerce's Consumer Price Index. Both series are seasonally adjusted.

Since the Box-Tiao technique assumes a stationary time series, second differences of both series are modelled. The ARMA part of the differenced unemployment series is modelled as a first order mixed moving average autoregressive process with an additional twelfth order (yearly) AR term to correct for seasonality. The first column of Table 1 indicates that such a model fits the data within tolerable limits. The differenced inflation series is modelled as a first order mixed moving average autoregressive model. Column 4 of Table 1 indicates that such a model fits the data fairly well. (The test of how well the model fits the data is based on a chi square test on the model's residuals.)

The next step is to model the intervention terms that measure the impact of election timing on the series. Because of problems of multicollinearity, I study separately the pre- and post-election hypotheses about unemployment. I report here only one form of the intervention term; varying the form of the intervention term does not seem to affect the basis results.

First consider the unemployment results. For the pre-election intervention term, if there is a political business cycle, presidential manipulations of the economy should start to appear several months before election day, with impact building up as the election draws closer and then dying out over a period of months after the election. Intervention terms of the form $\omega S_t / (1 - \delta B)$, where S_t is a dummy variable that equals one from when the impact of the manipulations first begins to appear until election day, are appropriate. Omega is a measure of the strength of the impact of election timing on the series; delta measures how quickly the impact builds and then dies out. Intervention terms starting six months before the election seem to work best. I estimate election effects separately for 1964, 1968 and 1972.

Table 1. Box-Tiao estimates of pre- and post-election interventions

Coefficient	Dependent variable/Intervention				
	(1) Unem/None	(2) Unem/Pre	(3) Unem/Post	(4) Infl/None	(5) Infl/Post
AR1 (ϕ_1)	-.26 (.08) ^a	-.26 (.09)	-.24 (.08)	-.15 (.10)	-.26 (.10)
MA1 (θ_1)	.80 (.05)	.80 (.06)	.91 (.04)	.78 (.06)	.69 (.07)
MA12 (θ_{12})	.28 (.08)	.29 (.08)	.23 (.09)	—	—
1960 ω	—	—	-.24 ^b (.10)	—	-.04 (.17)
δ	—	—	.32 (.35)	—	.30 (1.88)
1964 ω	—	.01 (.06)	-.05 (.10)	—	.15 (.12)
δ	—	.99 (.63)	.31 (1.69)	—	.63 (.44)
1968 ω	—	.03 (.09)	.23* (.05)	—	.16 (.15)
δ	—	.41 (2.24)	.98 (.02)	—	.67 (.70)
1972 ω	—	-.05 (.08)	—	—	—
δ	—	.61 (1.02)	—	—	—
Mean Residual	.021	.022	.020	.085	.061
χ^2 of Residual ^c	43.1	41.5	42.2	60.2	46.6
df	45	39	39	46	40
Significance Level	.25	.25	.25	.10	.25

Sample size = 162.

^a Standard errors in parentheses.

^b Wrong sign.

^c Test of null hypothesis that residuals are random. Null hypothesis should not be rejected. Significance level is level at which null hypothesis could be rejected.

* Significant at .05 level.

To test the hypothesis that unemployment decreases right before a presidential election, I estimate equation (1) using the Box-Tiao method:

$$\begin{aligned}
 Y_t = & \frac{(1 - \theta_1 B - \theta_{12} B_{12})}{(1 - B)^2 (1 - \phi_1 B)} a_t + \\
 & + \frac{\omega_{1964}}{1 - \delta_{1964} B} S_{1964} + \frac{\omega_{1968}}{1 - \delta_{1968} B} S_{1968} + \frac{\omega_{1972}}{1 - \delta_{1972} B} S_{1972} \quad (1)
 \end{aligned}$$

where Y is the monthly unemployment rate, B is the backshift (lag) operator, a_t is a white noise series, and the S 's are dummy variables that are one six months before an election (that is, S_{1964} equals one from May, 1964 through October, 1964 and zero otherwise and similarly for S_{1968} and S_{1972}). The multipliers of the S terms cause the series to begin to fall in May, reach a minimum on election day, and then gradually rise again. The ω 's, δ 's, θ 's and ϕ 's are parameters to be estimated. If there is a pre-election manipulation the omegas should all be negative.

Table 1, column 2 reports the results of estimating equation (1). Omega is negative only for 1972, and even for 1972, the estimated ω is less than its standard error. Thus the data are consistent with the null hypothesis that there is no decrease in unemployment rates before elections. Substantively, the intervention terms seem to add nothing to the unemployment rate predictions; adding the intervention terms does not decrease the mean prediction error of the model.

I perform a similar analysis to test the hypothesis that unemployment goes up after an election by estimating a model similar to equation (1), with a different specification for the timing of the intervention. Here, I assume, the intervention increased unemployment. Since it takes a while for a president's policies to have an impact on the economy, the interventions used begin 12 months after the new administration takes office and peak a year later, dying off slowly after that. Thus the S_{1960} equals one from January, 1962 through January, 1963. The shape of the intervention is the same as the shape of the pre-election intervention; since unemployment is expected to increase after the election, the political business cycle hypothesis is that the ω 's should be positive.

Table 1, column 3 shows the results of estimating equation (1) for the post-election specification. These results are mixed, at best. Kennedy's midterm actually shows a decline in unemployment and Johnson's administration shows no significant midterm impact on unemployment. Only the first Nixon midterm shows the predicted midterm recession.

Finally, I perform an identical analysis for the prediction that inflation should decline after an election. The specification of the intervention term is identical to the specification for the post-election recession prediction (with a predicted positive ω); I used no yearly moving average term for the inflation model. Table 1, column 5, shows the results of estimating the inflation equation. These results are not consistent with the Nordhaus hypothesis. Two of the ω 's have the wrong sign and none are significant.

This paper gives little or no support to the hypotheses of the political business cycle, at least in the American case. Macroeconomic series such as unemployment and inflation do not appear to shift as elections approach. This may be either because presidents do not try to manipulate the economy according to the prescriptions of the political business cycle or because their

manipulations are not successful. Business cycles may have a political basis, but that basis must be more complicated than the simple picture Nordhaus and Tufte paint.

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