

## Presidential approval and macroeconomic conditions: evidence from a nonlinear model

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### ABSTRACT

Contrary to previous empirical studies that find a linear link between economic conditions and presidential approval, this study argues for and finds a nonlinear relationship. A threshold regression is used to assess potential nonlinear relationships between macroeconomic variables and presidential popularity. A quarterly data analysis for the 1960Q1–2012Q2 time period reveals that domestic factors prevail in shaping presidential approval. Most compelling is evidence of a threshold relationship involving economic conditions: When unemployment is slightly over 7%, its decline impacts significantly and favourably on presidential approval, an effect that virtually disappears below the threshold value. Change in consumer sentiment affects presidential approval in a limited way, while inflation shows no association at all. These results combine to encourage further investigation of nonlinear processes in the nexus of economics and politics.

### KEYWORDS

Presidential approval;  
nonlinear; inflation;  
unemployment

### JEL CLASSIFICATION

B22; C22; A12

### I. Overview

Public opinion is important in substantive terms, but also capable of rapid change. Thus, the ability to anticipate its collective impact on presidential approval is not a trivial matter. The White House obviously cares about public opinion – witness the persistent efforts of respective administrations to promote presidential popularity through media manipulation (Edwards 2004, 28). But why are some presidents more popular than others? How is it that a president's approval rate can rise and fall dramatically in a matter of months or even weeks?

These questions are important to students of American politics and policy. The president's public standing, as observed in the classic exposition from Neustadt (1990 [1960]), affects the all-important 'power to persuade'. Thus, popularity can impact upon the president's prospects for passing sponsored legislation (for nuances on this, see Edwards 2009) and may even mean life or death regarding matters of national security (Rockman 1988, 32; James and Oneal 1991). For an incumbent president, good standing with the public also could help to discourage

the potential threat posed by nominees from the other party, i.e. the 'best and the brightest' are more likely to sit out a cycle if they anticipate the president being re-elected easily. Steger's (2003) expected utility model, for instance, focuses on whether presidents will experience re-nomination challenges. The challenge from Senator Ted Kennedy to President Jimmy Carter, for example, came from inside the Democratic Party and reflected – at least in part – perceived weakness of the incumbent as a candidate in the general election (Stanley 2010).

What drives presidential approval ratings? Scholars and policy-makers have produced a plethora of empirical research to address the question. Their studies have incorporated both domestic and international factors in increasingly sophisticated frameworks of analysis (examples include Edwards, Mitchell, and Welch 1995; James and Rioux 1998; Nadeau et al. 1999; DeRouen 2000; Nadeau and Lewis-Beck 2001). Despite the range of sophisticated research designs (all of which employ statistical models assuming linearity), empirical results are inconsistent. So the basic question remains unresolved.

What if, however, these linear models are not accounting for nonlinearities? This observation is the point of departure for our own modelling in order for empirical study to focus on whether, in fact, nonlinearities are waiting to be discovered. We argue that public opinion, most notably with regard to the presidential approval rate in the U.S., will be a *nonlinear* rather than a linear function of macroeconomic variables: unemployment, inflation and consumer sentiment. To account for these potential nonlinearities, this study introduces a threshold regression model. Drawing on quarterly data spanning the 1960Q1–2012Q2 time period, we find evidence that when unemployment is slightly over 7%, its decline impacts significantly and favourably on presidential approval, an effect that virtually disappears below the threshold value. Change in consumer sentiment affects presidential approval in a limited way, while inflation shows no association at all.

Section II identifies the present state of research on presidential approval and proposes a nonlinear relationship between economic conditions and presidential approval. Then, we build and test a threshold regression model of presidential approval and present our empirical results in Section III. Section IV summarizes the key findings and implications of this study and offers direction for future research.

## II. Economic conditions and presidential popularity

Vast is the literature on presidential approval.<sup>1</sup> Its origins, as identified in the field essay from Gronke and Newman (2003, 502), can be traced to Mueller (1970, 1973). The subject is a priority for students of American politics for the obvious reasons described above. Edwards, Mitchell, and Welch (1995, 108) (see also Gronke and Newman 2003, 501) refer to the study of presidential approval as a ‘cottage industry in political science.’ Thus no effort will be made here to offer a comprehensive review. Instead, a sample of studies will (a) locate disagreements in the literature and variation of economic effects on presidential popularity over time and (b) propose

causal models for the economy and approval that are not strictly incremental.

Explanations offered by existing literature on presidential approval vary significantly. This is true of studies focusing on the U.S. as well as those with a cross-national research design. Lewis-Beck and Stegmaier (2013) survey the literature on economics and elections and identify a number of well-confirmed connections. Most generally and perhaps most importantly, they find that the economic vote almost always achieves statistical significance and registers a strong effect. Moreover, voters appear to be sociotropic as opposed to egotropic, meaning that the weight of the economic vote varies according to institutional context because this affects the clarity with which voters perceive an incumbent as responsible for current conditions. For example, Geys and Vermeir (2008) hypothesize that tax policy should have dual and significant effects insofar as both the level and structure of the tax burden will impact upon presidential approval. They determine, based on data from 1959 through 2006, that presidential approval declines in response to increases in both the deficit and tax burden; moreover, ‘turbulence’ in the structure of taxation exerts an ‘independent and negative effect’ (Geys and Vermeir 2008, 314). Their study focuses on one in a wide range of economic variables at the macro-level that may potentially impact upon presidential popularity. Other macroeconomic performance measures typically include unemployment, inflation, disposable income and economic growth.

Fauvelle-Aymar and Stegmaier (2013) take a step beyond these popular measures by introducing the stock market index that captures elements of national and household economic well-being. Their data analysis for 1960–2011 reveals that presidential popularity plummets with a rapid fall in the stock market index, while it soars with a sharp acceleration of index growth. Nadeau and Lewis-Beck (2001, 161) also propose a new indicator of economic conditions – the National Business Index (NBI). The NBI assesses public views of business conditions. Both prospective and retrospective views of the NBI feed into presidential

<sup>1</sup>Representative studies include Mueller (1970, 1973), Stimson (1976), Kernell (1978, 1986, 2007); Norpoth (1984), Edwards and Gallup (1990), Marra, Ostrom, and Simon (1990), Beck (1991), Brace and Hinckley (1992), Clarke and Stewart (1994), Smyth, Dua, and Taylor (1994, 1995, 1999), Stimson, Mackuen, and Erikson (1995), Newman (2003), Smyth and Taylor (2003), Clarke et al. (2005), Kelleher and Wolak (2006), Lebo and Cassino (2007), Geys and Vermeir (2008), Kam and Ramos (2008), Olson and Warber (2008), Berleemann and Enkelmann (2012) and Fauvelle-Aymar and Stegmaier (2013).

voting, the ‘bottom line’ with regard to approval (Nadeau and Lewis-Beck 2001, 174).

Besides macro policy effects, researchers measure the micro effects of incumbent personality and individual voter taste as well. For example, Lebo and Cassino (2007, 740) use data from 1955 to 2005 to assess the effects of motivated reasoning in relation to partisanship. They expect that voters will be motivated to discount negative performance, in terms of standard macroeconomic indicators, if a president is from their preferred party. In contrast, if a president represents the opposing party, a voter is more likely to disapprove regardless of macroeconomic conditions.

Kelleher and Wolak (2006), in a study using data from 1981 to 2000, explore effects of the media on presidential approval. They expect that media priming of issues will impact upon the public focus regarding assessment of presidential performance. News stories about the economy and presidential character are ‘more likely to be primed in assessments of presidential popularity, while policy matters, both domestic and international, are less likely to be emphasized in presidential evaluations because of heightened media attention’ (Kelleher and Wolak 2006, 208). However, results from their data analysis on presidential approval in the context of international factors are mixed. Kelleher and Wolak define ‘internationalism’ in terms of how the president is doing in an overall sense regarding the various issues that make up foreign affairs; their results detect no effects of internationalism on presidential approval, even when it is interacted with a variable representing the number of foreign policy news stories in a given period (Kelleher and Wolak 2006, 206).

While focused primarily upon economic conditions, this study also incorporates an *international* perspective into the equation for presidential approval.<sup>2</sup> This is a priority identified by Gronke and Newman (2003, 508) in their comprehensive assessment of the research programme on presidential approval.

We already know that international conflict, most notably warfare, can have dramatic effects on domestic politics – for example, leaders who lose wars are significantly more likely to be removed

from power than otherwise (Bueno de Mesquita, Siverson, and Woller 1992; Mueller 1994, 76; Bueno de Mesquita and Siverson 1995).<sup>3</sup> Consider also recent findings on the surge and decline of presidential popularity in relation to crisis (Kam and Ramos 2008; see also Merolla, Ramos, and Zechmeister 2007). Data on rally effects regarding presidential approval from 2001 and 2002 supports the idea that patriotism exerts an important influence. Approval in the period following 9/11 is determined by a high but dissipating level of support for the president based upon an ‘overarching national identity’; as time goes by, though, partisanship reasserts its importance (Kam and Ramos 2008, 628).

Behind the rally-around-the-flag effect is the idea of diversion. Diversionary theory argues that leaders may resort to international war when domestic situations are troublesome (Coser 1956; Levy 1989). The goal is to direct public attention away from problems at home and towards war with an external enemy (Mueller 1973; Ostrom and Simon 1985; Brody and Shapiro 1989; Edwards and Gallup 1990; Morgan and Bickers 1992; James and Rioux 1998). External threats could increase internal cohesion and spark nationalism, creating a badly needed rally-around-the-flag effect to boost national leaders’ approval ratings. Elites therefore could use strategic diversions for both political and economic reasons. Traditionally, although not exclusively (see Li, James, and Drury 2009), elites are believed to have used military conflict or crisis as the main form of diversion in the quest for restored popularity.

Problematic, however, is the role of special events within rigorous modelling of presidential approval. ‘Mueller’, observe Gronke and Newman (2003, 502), ‘was the first, but certainly not the last, to realize that measuring rally events is fraught with difficulty.’ Coding schemes, even after decades of research, continue to be controversial with respect to what to designate as a potential rally event (Gronke and Newman 2003, 504). In sum, there still is need to further theorizing linkage between international factors, notably external shocks, and presidential approval.

Regarding the relation of approval ratings to the presentation of economic and foreign policy issues

<sup>2</sup>In the terminology of international relations, this type of connection is referred to as the ‘second image reversed’ – a causal connection from the international system into the state (Gourevitch 1978, 882).

<sup>3</sup>Furthermore, evidence from the U.S. and elsewhere suggests that leaders of democratic states are aware of the political side effects created by foreign policy (in)actions (Lamare 1991, 8; Siverson 1995, 484–486; Bennett and Stam 1996, 253; Sprecher and DeRouen, Jr. 2002; Pickering and Kisangani 2006).

in the media, Edwards, Mitchell, and Welch (1995, 111, 119) found that the greater degree of stress the media puts on a particular issue, the greater its impact upon presidential approval ratings. They argued that previous studies had wrongly assumed a linear relationship between statistical factors (such as the unemployment rate) and public reaction to those factors; they posited that ‘perceptions may not follow directly from objective indicators of the economy’s performance’ (Edwards, Mitchell, and Welch 1995, 113). Their study constituted an effort to account for the possibility that issue groups become more or less relevant to public opinion over time and in relation to other issue groups. As Iyengar and Kinder (1987) reveal, news (television news in particular) possesses the capacity to affect public opinion, and also presidential approval ratings, by telling voters what issues to think about and how to think about them through the methods of priming, framing and agenda-setting. Edwards, Mitchell, and Welch (1995, 113) claim that, although the media is less capable of affecting how individuals think about issues that are closer to their own experience, it does serve to ‘prime collective perceptions.’ Miller and Krosnick (2000, 302) theorize this mechanism by arguing that viewers who trust their news sources naturally assume that because an issue is being covered, it is of national importance.

However, as Kelleher and Wolak (2006) demonstrate, the media is likely to target voters with stories pertaining to either presidential character or the state of the economy rather than to present issues of domestic or international policy. This is likely because certain stories represent more easily digested ‘news bytes’ in today’s polarized 24-hour cable news climate. Although talk of ‘the economy’ and various rhetorical indicators of its health might be pervasive, sophisticated discussion of structural unemployment as a condition of the economic system is not. Therefore, when an indicator as straightforward and powerful as an unemployment statistic crosses a certain threshold, it is likely to be an easy reference to which media outlets can point in support of a particular agenda. When an indicator of such national significance as an unemployment statistic is brought – seemingly out of nowhere – to public attention, outrage often is exacerbated by a

generalized ignorance on the matter. Therefore, it seems reasonable to argue that the unemployment rate has relatively little impact upon presidential approval ratings until it becomes visible to the public as a rhetorical indicator in the media (Kelleher and Wolak 2006).

Relatedly, Druckman and Holmes (2004) assert that the conclusion of their study on presidential rhetoric ‘raises questions about elite manipulation as opposed to elite enlightenment of public opinion’ (774). In general, the findings regarding elite influence on public opinion are somewhat counterintuitive. One may suppose that the future, being unknown, would naturally be a political reference point for consideration of expert opinions; however, results show that the public relies more on elite cueing in terms of what already lies within experience (Nadeau et al. 1999, 113). This is perhaps the most visible controversy in the presidential approval literature: the debate between prospective and retrospective public opinion formation (Smyth, Dua, and Taylor 1994; Nadeau et al. 1999, 112).

What emerges from the data analysis carried out by Nadeau et al. (1999) is a complex and convincing picture of what shapes public views of the president. Objective economic conditions, referring to changes in unemployment and inflation, are significant regarding the subsequent level of presidential approval. So, too, are dramatic events at both the domestic and international levels that can generate substantial shifts in support for the president. Most interesting among the results is the way in which reflections and expectations of the public are combined: statistically significant links with approval emerge for the public’s prospective views and elite *retrospections* (Nadeau et al. 1999, 128; for cross-national results, see Cohen 2004).

Strikingly disparate empirical conclusions in the literature as a whole seem to indicate that the mechanism by which public opinion is translated into presidential approval ratings is incredibly complex.<sup>4</sup> As Berlemann and Enkelmann (2012, 3) indicate, after four decades of systematic study, we still lack a clear picture. They suggest that one explanation for this gap might be that, while most analytic models have assumed linear relationships between various explanatory factors and presidential

<sup>4</sup>This complexity is anticipated and labelled as ‘dynamic representation’ by Stimson, Mackuen, and Erikson (1995).

approval, the reality may be quite different. In fact, 'it is far from being clear,' the authors insist, 'that economic variables have a linear effect on presidential popularity'; furthermore, if 'the effect of economic variables on presidential popularity would in fact be non-linear, (then) the results of linear estimation approaches would heavily depend on the level of the independent variables' (2012, 33). It is no wonder then that for all the attention that has been paid to this subject, consensus has been difficult to achieve. While their own nonlinear testing proves inconclusive once more, Berlemann and Enkelmann (2012, 38) concede that because their models 'tested for very specific types of non-linearities, [they] cannot rule out that the relation between economic variables and presidential popularity follows a more complex non-linear relationship'.

Econometricians have focused increasingly on developing and testing for nonlinearity in relationships between economic variables (Chan 1993; Hansen 1997; Enders and Siklos 2001; Hansen and Seo 2002), thereby revealing the potential for application in the political domain as well. Moreover, by allowing for nonlinearities in the data, researchers have uncovered interesting economic results regarding Gross National Product growth, unemployment rate, monetary policy and capital stock adjustment (Potter 1995; Rothman 1998; Bunzel and Enders 2010; Boetel, Hoffman, and Liu 2007). Such results should be intriguing to political studies, where modelling is overwhelmingly linear (i.e. incremental) even in heavily travelled areas of research. We know that the number of existing studies exploring the relationship between various factors and presidential approval is immense; however, most of these studies assume linearity in the data. Some authors, such as Smyth, Dua, and Taylor (1994, 1995), Edwards, Mitchell, and Welch (1995), Wood (2000, 2009), Smyth and Taylor (2003), McAvoy (2006), Berlemann and Enkelmann (2012) and to some extent Ostrom and Simon (1985), have explored the relationship in a nonlinear setting. As such, our aim is to further delve into nonlinearities between economic conditions and presidential approval by implementing the methodology

outlined in Hansen (1997) and Bunzel and Enders (2010).<sup>5</sup>

To be precise, our emphasis is on nonlinearity understood in terms of step-level or threshold effects. This is different from use of polynomial expressions for one or more of the independent variables in an equation for presidential approval. Our study therefore attempts to move beyond a standard linear approach by introducing a threshold regression model. This model will allow us to determine whether important tipping points – effectively, *hidden steps* in the data – will emerge with the shift from a linear to a nonlinear approach. Edwards and Gallup (1990) suggest that bad economic news, especially during an economic recession, could become more salient to the president's approval. Cho and Young (2002), while examining the relationship between inflation and presidential approval, find strong evidence for asymmetric effects. Higher than expected inflation has a clear negative impact on presidential approval, while lower than expected inflation only has a negligible impact. These findings suggest that presidential popularity may react to different domestic factors differently, making a nonlinear regression model necessary to understand the relationship between approval rate and economic conditions.

The reason we anticipate a threshold effect lies in the public culture of economic expectations, as the American public expects low structural unemployment. In this regard, when we analyse the effect of unemployment as one of our key variables, we should see it produces relatively little effect on public opinion until it reaches a certain level. At that tipping point, it will begin to condition the public's view of the national economy much more intensely. Further, once the rate of unemployment reaches the threshold value, we should see that our operational renderings of public opinion (e.g. consumer sentiment) begin to have a noticeably negative effect on presidential approval. Our modelling, then, attempts to discover the levels of economic conditions such as unemployment at which the nonlinear relationship begins to operate.

What then is the 'transmission belt' from economic conditions to public views of the president?

<sup>5</sup>For example, Smyth, Dua, and Taylor (1994, 1995) and Smyth and Taylor (2003) develop and test a model in which inflation and unemployment appear as squared terms in the test equation.



(Choi and James 2007). In a word, it is media. Research noted above reveals the impact of media coverage of the economy, with attendant threshold effects. Consider the following sports analogy: Peyton Manning throws many touchdown passes, but media coverage explodes when he approaches and then breaks a record. We see the same behaviour from media in other contexts as well; for instance, coverage of a given economic indicator will expand in quantity and intensity when a key number is about to be reached. Exceptions are likely to be at the margins: (a) just before an election, when the final unemployment and other key indicators are salient regardless of what else is going on and (b) if a hyper-visible news story overshadows even the crossing of a major threshold in economic terms.

The above discussion leads us to draw a hypothesis as follows:

**Threshold Hypothesis:** Effects of economic conditions on presidential approval will take a nonlinear form.

The hypothesis is in line with intuition from Kelleher and Wolak (2006) that causal mechanisms regarding presidential approval will be nonlinear rather than purely incremental because of the role played by public consciousness regarding a president's economic performance. Significant effects for a given economic indicator can be expected only once a certain level is achieved.<sup>6</sup>

What economic indicators and which levels are relevant? This is where the inductive part of the story, through modelling, comes into play. Candidate indicators include the usual suspects from the existing literature—unemployment, inflation and consumer sentiment. However, the question of which of these will manifest threshold effects, and at what levels, will be resolved through modelling and data analysis, as explained later.

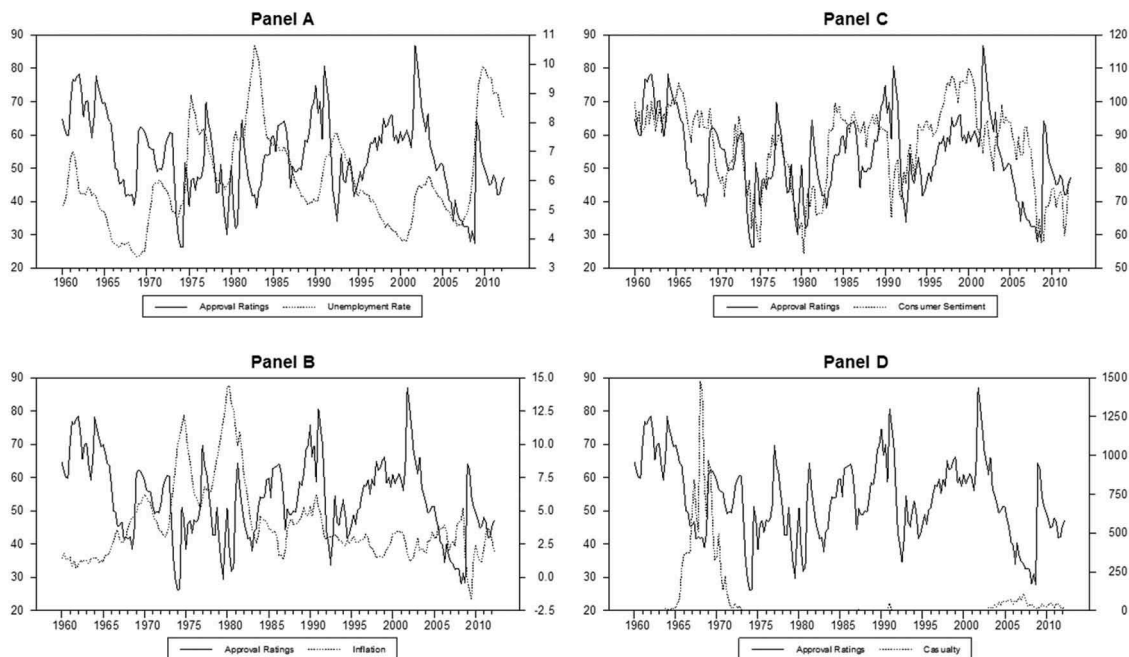
### III. Analysis of a threshold effect of economic conditions on presidential approval

Although previous studies have introduced a variety of causal factors in their empirical models, our approach is to estimate a parsimonious one that includes the most common explanatory variables. As such, we include the unemployment rate (*unempl*), inflation rate (*infl*) as measured by the consumer price index,<sup>7</sup> the University of Michigan Consumer Sentiment index (*sent*) and the number of U.S. military personnel killed in action as recorded by the Defense Casualty Analysis System (*cas*).<sup>8</sup> (The National Archives website (<http://aad.archives.gov/>) provides a search tool where one is able to obtain a monthly count of U.S. military personnel killed in action.) As a preliminary analysis on the relationship between each of the four factors and presidential approval, we do a visual inspection using time-series plots. Figure 1 displays the time series for each of our independent variables overlaid against presidential approval rates; presidential approval rates are measured on the left-hand axis and our independent variables are measured on the right-hand side. As can be seen in Panel A of Figure 1, presidential approval rates and unemployment rates display an inverse relationship; however, note that the inverse relationship in Panel A does not appear to be constant. Presidential approval rates and inflation in Panel B appear to display an inverse but volatile relationship in the 1960s and 1970s that significantly weakens after 1980. Panel C displays the relationship between presidential approval rates and consumer sentiment; as can be seen, the two variables display a positive relationship throughout the sample time period. The relationship between casualties and presidential approval rates, as shown in Panel D, is rather opaque. This is due to the high number of casualties from the Vietnam War in the late 1960s and early 1970s and subsequent fall in the number of casualties until the Iraq war. As such, given the number of time periods in which there is no change

<sup>6</sup>The hypothesis also is in line with public opinion literature, covered above, which focuses on presidential approval and supports the idea of asymmetric effects (e.g. Miller and Krosnick 2000; Druckman and Holmes 2004). In particular, data on economic indicators can be expected to interact with media coverage to produce asymmetry with regard to impact on presidential approval (Iyengar and Kinder 1987; see also Soroka 2006 on Great Britain).

<sup>7</sup>Inflation in each quarter is defined as  $Inflation_t = 100 \times (\log(CPI_t) - \log(CPI_{t-4}))$ , which is standard practice in the macroeconomic literature. Moreover, nearly all news organizations report inflation rates in the above mentioned form.

<sup>8</sup>This research design will incorporate casualties, as opposed to rally events, the other prominent international option. This is because serious questions continue to be raised about assessment of such events. Gronke and Newman (2003, 509, note 21) compare the two leading coding schemes and report some unsettling numbers: (a) 122 and 98 events are identified, respectively; (b) only 42 events appear on both lists and (c) 17 of the 42 commonly identified events are listed for different months.



**Figure 1.** Time series of presidential approval rates and macroeconomic variable.

in the casualty count, we include the number of casualties as a control variable in our time series regression but do not examine whether changes in the casualty count display threshold effects.

Before proceeding to our modelling, we first pre-test each of the variables for unit roots. As noted in Enders (2010), variables integrated of different orders that are used in the same regressions result in spurious results. As such, we implement the Augmented Dickey–Fuller (ADF) test and the Elliot, Rothenberg, and Stock (ERS) test to check for unit roots. As noted in Enders (2010), the ERS test has substantially more power than the standard ADF test. We used the general-to-specific methodology to select the lag length. As can be seen from Table 1, we are able to reject the null hypothesis of a unit root in presidential approval rates for both the ADF and ERS tests.

**Table 1.** Unit root tests.

	ERS test	ADF test
Approval rates	−4.541***	−4.53631***
Inflation rates	−1.460	−1.49
Unempl. rates	−2.570	−2.53
Con sentiment	−3.092	−3.08**
Casualty	−3.394***	−3.39**

Lag lengths for the ADF test was selected using the General to specific methodology.

\*\*Significance at the 95% level.

\*\*\*Significance at the 99% level.

**Table 2.** Fractional difference tests.

	GPH test	AG test
	$d$ (Standard error)	$d$ (Standard error)
Approval rates	0.27 (0.23)	0.25 (0.22)

We find this result a little surprising, given that previous literature has posited that presidential approval rates are fractionally integrated. As such, we test for fractional integration using the Geweke and Porter-Hudak (1983) and Andrews and Guggenberger (2003) tests. Table 2 displays the estimate of  $d$  (i.e. the fractionally integrated parameter) and its standard error in parenthesis. As can be seen in Table 2, neither estimate is significant at conventional levels. Moreover, for robustness we also graphed out the correlogram of presidential approval rates in Figure 2.

As can be seen, the correlogram does not appear to exhibit long memory characteristics. Given the results from the unit root and fractionally difference tests, we chose to use presidential approval rates in levels in the models later. In addition, we use the first difference of the inflation rate and unemployment rate given the results of the unit root tests in Table 1.

Rather than assuming a nonlinear relationship between our variables and presidential approval rates, we follow Enders (2010) and first fit the best linear model. As noted, our presidential approval

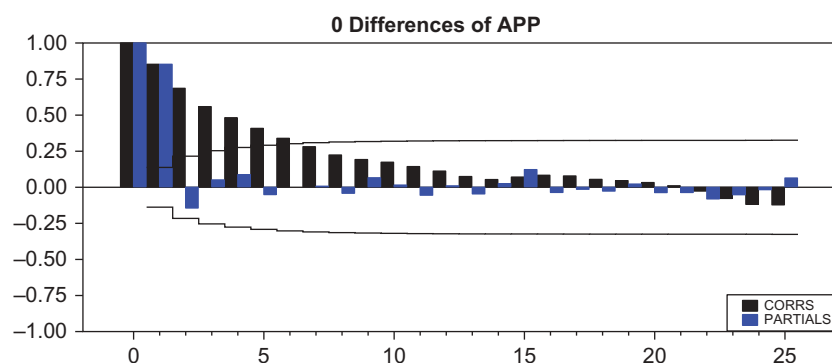


Figure 2. Correlogram of presidential approval rates.

model is parsimonious because it relies on the most common explanatory variables. Moreover, the fact that we are estimating a time-series, rather than a cross-sectional model, does justice to the use of the most parsimonious model. Thus, we begin by estimating the following model<sup>9</sup>:

$$\begin{aligned}
 app_t = & \hat{a}_0 + \sum_{i=1}^p \hat{a}_i app_{t-i} + \sum_{i=0}^p \gamma_i \Delta unempl_{t-i} \\
 & + \sum_{i=0}^p \lambda_i \Delta infl_{t-i} + \sum_{i=0}^p \xi_i sent_{t-i} \\
 & + \sum_{i=0}^p \pi_i cas_{t-i} + \varepsilon_t \quad (1)
 \end{aligned}$$

where  $app$  is the presidential approval rate,  $\Delta unempl$  is the change in the unemployment rate,  $\Delta infl$  is the change in the inflation rate as measured by the consumer price index,  $sent$  is the University of Michigan Consumer Sentiment index and  $cas$  is the number of U.S. military personal killed in action as recorded by the Defense Casualty Analysis System.<sup>10</sup> In order to select the lag length  $p$ , we used two criteria. First, we selected the lag length to ensure that our residuals did not show serial correlation as measured by Ljung–Box  $Q$ -statistics; second, we chose the lag length that minimized the AIC and BIC. We began by allowing for lag length of eight and we pared down the model as described in Enders (2010). Table 3 displays the results from the best fitting model.

Table 3. Panel A: coefficient estimates of Equation (1), panel B: tests for serial correlation, panel C: tests for nonlinearity.

Panel A		
Variable	Coefficients	Standard error
Constant	-1.98	3.64
$app_{t-1}$	0.91	0.07
$app_{t-2}$	-0.15	0.07
$\Delta unempl_t$	3.80	1.82
$\Delta unempl_{t-1}$	-2.32	2.10
$\Delta unempl_{t-2}$	2.08	1.89
$\Delta infl_t$	-0.49	0.65
$\Delta infl_{t-1}$	-1.46	0.67
$\Delta infl_{t-2}$	1.01	0.63
$Con\_sent_t$	0.28	0.09
$Con\_sent_{t-1}$	-0.19	0.11
$Con\_sent_{t-2}$	0.07	0.09
Durbin Watson statistic	1.9958	
AIC	1342.80	
BIC	1382.85	
Panel B		
Residuals (lags)	$Q$ -statistic	$p$ -Value
4	2.02	0.72
8	4.14	0.84
12	5.29	0.94
16	11.89	0.79
20	16.45	0.68
Panel C		
Test	$F$ -statistic	
Ramsey RESET ( $h = 3$ )	3.37	0.03
Ramsey RESET ( $h = 4$ )	2.23	0.08
Terasvirta (1994)	3.82	0.01

As can be seen, the best fitting model included two lags of presidential approval rates, two lags of changes in the unemployment rate, two lags of changes in inflation and two lags of consumer sentiment.<sup>11</sup> Note that all of the Ljung–Box  $Q$  statistics are insignificant at all conventional levels and the Durbin Watson statistic is 1.9958, both of which suggest that the model is well specified.

<sup>9</sup>For robustness, we also included a dummy variable to control for presidential elections. However, it did not qualitatively change our results. Those results may be obtained upon request from the authors.

<sup>10</sup>While one could estimate a VAR with the above variables, we opted for a single equation given that we do not believe that presidential approval rates has an effect on the macroeconomic variables in Equation 1.

<sup>11</sup>Note that the casualty series was completely pared out of the model. None of the casualty coefficients were significant at conventional levels.



However, rather than assuming a nonlinear process, we followed Jones and Enders (forthcoming) and therefore pretested for nonlinearity in order to determine if a nonlinear relationship is present. As such, we used the Ramsey RESET ( $h = 3$ ) and ( $h = 4$ ) and Teräsvirta's (1994) test in order to test for nonlinearity. Because residuals from a truly linear process should not be correlated with the regressors, the RESET test uses a regression of the residuals on powers, the fitted values and regressors in order to determine if a linear relationship is sufficient; if there is explanatory power in the regression, the RESET test suggests a nonlinear specification may be more appropriate.

However, it is important to note that the test can only determine whether or not the data generating process is nonlinear; it cannot determine the actual form of nonlinearity. As can be seen in Panel C of Table 3, the RESET test and the Teräsvirta (1994) test suggests that a nonlinear treatment is appropriate given the significance of the  $F$ -tests.

Given the results from the RESET test, we follow Jones and Enders (forthcoming) and estimate a threshold regression model. Consider the following general threshold regression model:

$$y_t = (1 - I_t) \left[ \alpha_0 + \sum_{i=1}^p \alpha_i y_{t-i} + \sum_{i=0}^p \gamma_i x_{t-i} \right] + I_t \left[ \beta_0 + \sum_{i=1}^p \beta_i y_{t-i} + \sum_{i=0}^p \delta_i x_{t-i} \right] + \varepsilon_t$$

$$I_t = \begin{cases} 1 & \text{if } z_{t-d} \geq \tau \\ 0 & \text{if } z_{t-d} < \tau \end{cases} \quad (2)$$

where  $y_t$  is the series of interest,  $x_t$  are explanatory variables,  $\alpha_i$ ,  $\beta_i$ ,  $\gamma_i$ ,  $\delta_i$  are coefficients to be estimated,

is the delay parameter and  $\tau$  is the value of the threshold. There are two states of the world in our model: When the threshold variable ( $z_{t-d}$ ) exceeds the value of the threshold ( $\tau$ ),  $I_t = 1$  and  $y_t$  follows

$$\beta_0 + \sum_{i=1}^p \beta_i y_{t-i} + \sum_{i=0}^p \delta_i x_{t-i}$$

and  $y_t$  follows  $(\alpha_0 + \sum_{i=1}^p \alpha_i y_{t-i} + \sum_{i=0}^p \gamma_i x_{t-i})$ . The threshold variable and the threshold level at which the series switches between regimes are not specified beforehand but rather determined by the data. Thus, the threshold variables' observations are ordered such that

$$z^1 < z^2 < z^3 \dots \dots z^i \quad (3)$$

Each value of the  $z^i$  is allowed to serve as an estimate of the threshold parameter  $\tau$ . The consistent estimate of  $\tau$  is obtained by using a grid search over the potential values of the threshold variable. The standard practice is to eliminate the highest and lowest 15% of the ordered values of the threshold ( $z_{t-d}$ ) so that there are an adequate number of observations on each side of the threshold. Because the threshold value  $\tau$  is a nuisance parameter under the null hypothesis of linearity, the  $F$ -statistic (testing  $\alpha_i = \beta_i$ ) must be bootstrapped as noted in Hansen (1997).<sup>12</sup> For each threshold value, the Heaviside indicator is set using Equation 3, and Equation 2 is subsequently estimated. As such, the value of the threshold variable in the regression which minimizes the residual sum is the consistent estimate of the threshold.

We now modify Equation 1 to apply our case and obtain

$$app_t = (1 - I_t) \left[ \alpha_0 + \sum_{i=1}^2 \alpha_i app_{t-i} + \sum_{i=0}^2 \gamma_i \Delta unempl_{t-i} + \sum_{i=0}^2 \lambda_i \Delta infl_{t-i} + \sum_{i=0}^p \xi_i sent_{t-i} \right] + I_t \left[ \alpha_0 + \sum_{i=1}^2 \alpha_i app_{t-i} + \sum_{i=0}^2 \gamma_i \Delta unempl_{t-i} + \sum_{i=0}^2 \lambda_i \Delta infl_{t-i} + \sum_{i=0}^p \xi_i sent_{t-i} \right] + \varepsilon_t$$

$p$  is the order of the model,  $I_t$  is the Heaviside indicator function,  $z_{t-d}$  is the threshold variable,  $d$

$$I_t = \begin{cases} 1 & \text{if } z_{t-d} \geq \tau \\ 0 & \text{if } z_{t-d} < \tau \end{cases} \quad (4)$$

<sup>12</sup>The procedure involves drawing  $T$  normally distributed random numbers with a mean of zero and a variance equal to one. The random numbers then are regressed on all the variables in the linear and nonlinear model. The restricted and unrestricted residual sums of squares are obtained and the corresponding  $F$ -statistic is calculated. Repeating the procedure several thousand times then allows one to obtain the appropriate critical values.

**Table 4.** Threshold estimates.  $\tau$  is the threshold value.

Threshold variable	$\tau$	F-test	Significance	BIC
Unemployment rate	7.06	3.69	0.001	614.76
Inflation rate	5.60	5.31	0.001	639.46
GDP growth rate	0.69	1.14	0.510	637.90
Consumer sentiment	72.1	4.21	0.001	643.09
Presidential approval <sub>t-1</sub>	48.93	2.78	0.023	676.72

As the first step, we test five indicators as potential threshold variables: unemployment rate, inflation rate, GDP growth, consumer sentiment and one lag of presidential approval rates.<sup>13</sup> The results are displayed in Table 4.

As can be seen, the unemployment rate, inflation rate and consumer sentiment are statistically significant at the 0.001 level and presidential approval at the 0.05 level, while GDP growth rate is not. The estimated threshold using the unemployment rate was approximately 7%; that using the inflation rate was 5.6%; that using consumer sentiment was 72.1% and that using presidential approval was 48.93%. These estimated thresholds seem plausible. However, because the BIC statistic for the unemployment rate was the lowest, we chose to use the unemployment rate as the threshold variable.

Table 5 displays the estimates from estimating Equation 4. Note in Panel B of Table 5 that both AIC and BIC suggest that the *nonlinear* model is a better fit than the linear one.

As such, we believe that Equation 4 is a reasonable specification. In order to understand the

**Table 5.** Model estimates from estimating Equation (4) using the unemployment rate as the threshold variable.

Panel A: dependent variable: presidential approval rates		
	Regime 1: Unemployment rate <7.06 Observations: 153	Regime 2: Unemployment rate >7.06 Observations: 53
Variable	Coefficients (standard error)	Coefficients (standard error)
Constant	-6.77 (4.49)	5.08 (7.32)
$app_{t-1}$	0.87 (0.09)	0.65 (0.111)
$app_{t-2}$	-0.007 (0.09)	-0.409 (0.113)
$\Delta unempl_t$	7.18 (2.76)	1.723 (2.917)
$\Delta unempl_{t-1}$	1.18 (2.85)	-1.026 (2.67)
$\Delta unempl_{t-2}$	1.30 (2.95)	3.496 (2.058)
$\Delta inf_t$	-0.036 (0.99)	0.070 (0.978)
$\Delta inf_{t-1}$	0.315 (0.97)	-1.792 (1.403)
$\Delta inf_{t-2}$	1.08 (0.92)	0.305 (0.949)
Con_sen <sub>t</sub>	0.388 (0.113)	0.056 (0.151)
Con_sen <sub>t-1</sub>	-0.138 (0.176)	-0.10 (0.15)
Con_sen <sub>t-2</sub>	-0.091 (0.137)	0.45 (0.177)
Panel B		
AIC	607.29	
BIC	614.76	

dynamics of Equation 4, we follow Jones and Enders (forthcoming) and use generalized impulse response functions. Koop, Pesaran, and Potter (1996) build a framework for generating impulse responses from nonlinear models (see also Romer and Romer 2010). Traditional impulse response functions possess the property that a positive and negative shock have symmetric effects on the variable of interest as well as a linearity property in the scale of the shocks (i.e. a shock of size 1 will have twice the effect on the variable of interest as a shock of size 0.5). In order to estimate the generalized impulse responses, we use standard Monte Carlo techniques and run 10,000 replications in order to generate the impulse responses as well as the confidence intervals. Figures 3–5 display the generalized impulse responses along with one standard deviation bands.

As can be seen in Figure 3, a one percentage increase in the change of the unemployment rate has a statistically significant and positive effect on presidential approval rates in the low unemployment regime.<sup>14</sup> Note that the contemporaneous effect on presidential approval rates is approximately a positive 7.15 bump in presidential approval ratings. The effect slightly increases two quarters after the shock but dissipates over the subsequent ten quarters. Surprisingly, positive shocks to changes in the unemployment rate have no statistically significant effect in the high unemployment rate regime.

Figure 4 displays the generalized impulse responses from a one percentage increase in the change of the inflation rate. Again, note that the effects of inflation are different in the high and low unemployment rate regimes. In the low unemployment rate regime, a one percentage change has no contemporaneous effect on presidential approval rates. However, note that two quarters after the shock, the inflation shock is statistically significant with presidential approval rates approximately 1.5 percentage points higher after the inflation shock. Note that the effect of the shock gradually dissipates in the subsequent quarters but remains statistically different from zero. In the high unemployment regime, the results are substantially different. Note that in the high unemployment rate regime, a

<sup>13</sup>GDP growth rate is included as another robustness test for potential threshold factors.

<sup>14</sup>Impulse responses were re-estimated excluding the first two quarters of 2009 (e.g. Obama taking office) and the quarters associated with 9/11. However, exclusion of those dates did not substantively change our results.

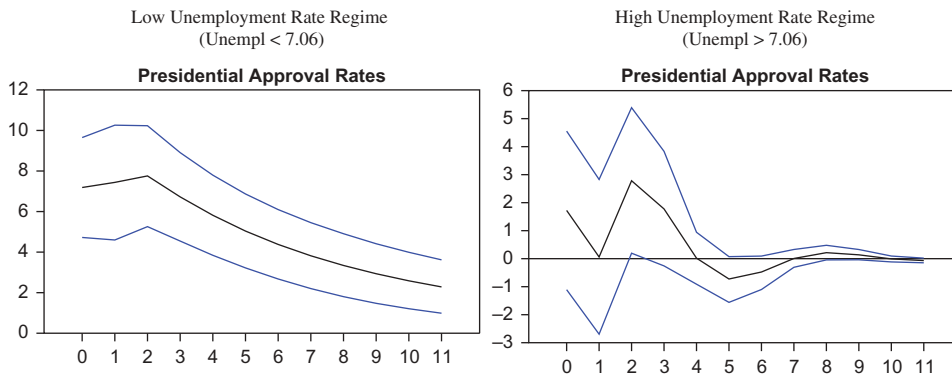


Figure 3. Responses to unemployment shock.

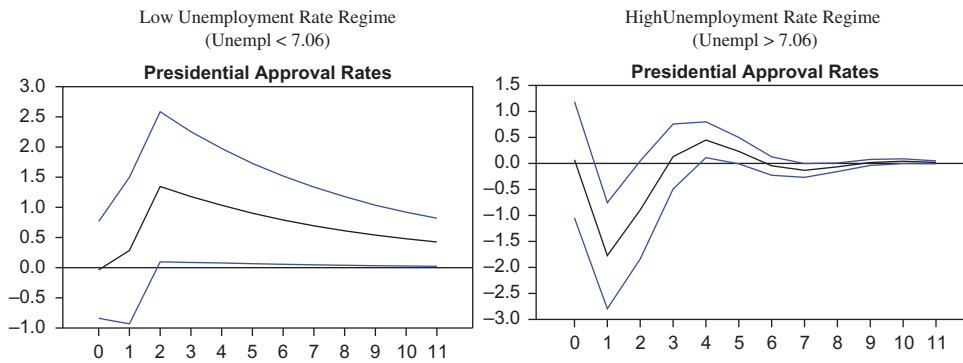


Figure 4. Responses to inflation shock.

positive shock to the change in the inflation rate has a statistically significant negative effect of  $-1.5$  on presidential approval rates one quarter after the shock. The effect remains negative until approximately three quarters after the shock.

Figure 5 displays the generalized impulse responses from a positive shock in consumer sentiment. Note again that the effects are different in the low and high unemployment rate regimes. In the

low unemployment regime, a positive shock in consumer sentiment has a contemporaneous positive ( $0.4$ ) statistically significant effect on presidential approval rates. The effect of the positive shock dissipates quickly and is approximately  $0.08$ , two quarters after the shock. On the other hand, in the high unemployment rate regime, a positive shock to consumer sentiment has no contemporaneous effect on presidential approval rates. Note that the positive

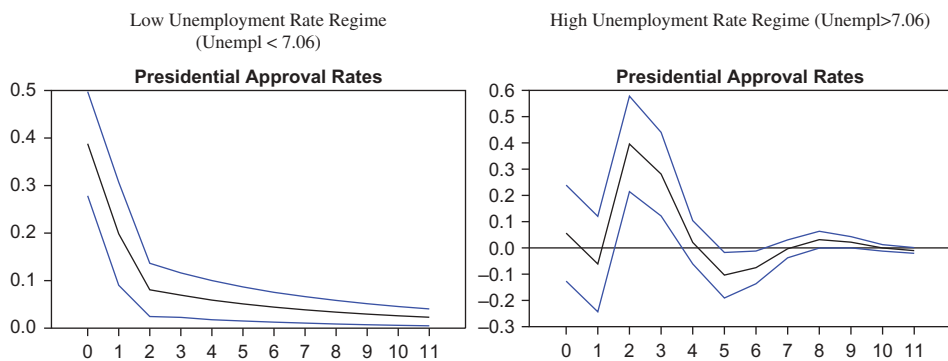


Figure 5. Responses to consumer sentiment shock.

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effect on presidential approval rates occurs between the first and second quarters after the shock. Thus, in the high unemployment rate regime, a positive shock to consumer sentiment features a delay in positively affecting presidential approval rates.

#### IV. Conclusion

Existing literature generally postulates and tests for a linear relationship between economic conditions and presidential popularity. However, we have argued that *nonlinearity* can provide a better understanding of the effect of economic conditions on presidential standing. Our data analysis supports the Threshold Hypothesis. Our threshold regression model shows strong supporting evidence: when unemployment rises to a specific level, it matters far more than otherwise in impacting upon presidential popularity. Consumer sentiment shows a consistent but limited association with presidential approval, while inflation does not. Analysis based on generalized impulse responses for unemployment, inflation and consumer sentiment provide further support to the Threshold Hypothesis. Changes in these indicators impact differently upon presidential approval depending on whether we examine a high or low unemployment regime. *In sum, the political economy of presidential approval contains an essentially nonlinear element.*

What about implications for the real world of politics? From the standpoint of political strategy and tactics, the results here suggest that a president in search of approval should not devote resources to the control of inflation. Instead, the focus should be on unemployment, with the proviso that the U.S. as an economic culture converges on 7%, for whatever reason, as a point of activation for unemployment as a driver of politics. Thus, the strategic point that emerges is straightforward: take vigorous action to reduce unemployment once it hits 7%. This advice, of course, leaves aside the greater question of whether such a decision rule is consistent with sound economic policy. But the force of politics can be compelling when it comes to policy, so all of this becomes quite relevant to what might interest a president in the real world.

One further thought, of a more encompassing nature, concerns the relevance of the results here to the comparative literature on government approval

and economic voting (Lewis-Beck and Stegmaier 2013; Stegmaier and Lewis-Beck 2013). The findings about presidential approval support the proposition that the national economy is a continuously important public concern, and reveal a U.S.-based causal mechanism that is sustained for presidential politics over a number of decades. The results are also in line with the logic of Kelleher and Wolak (2006) regarding the step-level nature of impact to be anticipated for a given indicator in relation to presidential approval.

The lack of performance for the casualty variable is in line with previous findings about public opinion and U.S. involvement in conflict (e.g. Feaver and Gelpi 2004). This finding makes us ponder the potential for politically motivated use of force. A president could be tempted, especially during a time of high unemployment, to divert public opinion from problems at home through involvement in international conflict. This possibility becomes most interesting when considering the recent period of relatively high unemployment – in the model's terms, over 7% for a very long time – and any number of challenging developments abroad. In other words, high unemployment, coupled with declining approval and perhaps some awareness after Iraq that the public is more tolerant of casualties than otherwise might have been believed, creates very worrisome conditions regarding presidential propensity towards use of force in order to recover political standing at home.

Many avenues open up as a result of the research conducted here. Additional variables from the political world, such as party identification, could be built into an elaborated model. Consider also the possibility of taking into account the recent context of the level of employment (or other indicators). A given number could be compared to the prior four quarters; for example, a value such as 7% for unemployment might be more or less acceptable depending on whether in the previous year it had rested several points higher, lower or at about the same level. With regard to extension of this work on the economic side, consider just one possibility – effects on presidential popularity from local versus national conditions. It could be revealing to carry out a comparison of the model from this study with a series of nonlinear specifications. Consider, in

addition, a different type of asymmetry: among partisans. Is there greater impact among those who consume news programming that is more likely to report bad news at or around a threshold, i.e. MSNBC/Fox News viewers for Republican/Democratic Presidents? This awaits investigation.

Cross-national assessment of the model also deserves consideration. Does it work the same way in presidential systems other than the U.S.? What about an extension to parliamentary systems? All things considered, the theorizing and results of this investigation encourage further research on presidential approval in terms of pocketbook voting expressed through any number of substantive and functional forms.

### Acknowledgements

We are grateful to the editor, two anonymous referee, Tobias Gibson, Morris Levy, Diana O'Brien, Jennifer Ramos, Mack C. Shelley, Wayne Steger and Mary A. Stegmaier for helpful commentaries.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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