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Berlemann, Michael; Enkelmann, Sören

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- A Survey -

Michael Berlemann
Sören Enkelmann

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Abstract

Even after four decades of research it remains unclear, whether presidential popularity depends on the state of the economy. While about half of all studies for the United States find a significant effect of unemployment and inflation on presidential popularity, the others do not. Additional economic issues have rarely been studied. In this survey article we study the likely causes for the inconclusive findings. While various factors have an influence on the results, especially the choice of the sample period is of crucial importance. While in the very long run we find unemployment, inflation and the budget deficit to have a robust effect on presidential approval, this holds not true for shorter sub-periods. This result might indicate that the popularity function is instable over time. However, the findings might also be taken as an indication that the most often employed linear estimation approach is inadequate. Further research on these issues is necessary.

JEL-Code: D720, H110.

Keywords: presidential popularity, approval, unemployment, inflation.

Michael Berlemann
Helmut-Schmidt-University Hamburg
Hamburg / Germany
Michael.Berlemann@hsu-hh.de

Sören Enkelmann
Leuphana University Lüneburg
Lüneburg / Germany
Enkelmann@leuphana.de

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1. Introduction

Approval ratings indicate which percentage of the respondents to opinion polls approves the way governments or certain politicians handle their jobs. They are important guidelines for both the incumbent government and the opposition to find out about what the voters are thinking, how they respond to campaign stimuli and how they are inclined to vote. While the Gallup Company started conducting approval ratings as early as in the late 1930s, it took four decades before approval data has been used in systematic empirical studies.[3] The seminal contributions to the field of empirical presidential approval research were made by Mueller (1970, 1973), who used the Gallup aggregate approval ratings as left-hand variable in a number of regressions aiming to uncover the determinants of presidential popularity.[4]

Mueller (1970, 1973) found a number of empirical regularities which may be summarized as follows: First, presidential approval tends to decline systematically over the term of office.[5] Second, during times of foreign crises in which the United States were directly involved, presidential popularity tends to be higher (the so-called "rally-around-the-flag" effect). Third, presidential popularity tends to decrease throughout war times. Fourth, the level of popularity differs significantly between different administrations. Finally, Mueller finds an asymmetric effect of the state of the economy on presidential approval ratings. While a sluggish economy depresses presidential popularity, a positive economic development tends to leave popularity unaffected.

Mueller's findings have served as the baseline for most subsequent studies. Over the last 40 years a quickly growing body of empirical studies of (vote and) popularity functions evolved. Starting out from the United States and the United Kingdom,[6] popularity studies for France, Germany, Italy and Spain were conducted soon thereafter.[7] Nowadays, popularity functions have been estimated for almost all OECD countries. As Gronke et al. (2003) argue, this literature can be subdivided into three major waves. The first wave is more or less directly building on Mueller's work and discusses, inter alia, the exact slope of the downward approval trend (Stimson (1976)) or the reasons behind this trend (Stimson (1976), Kernell (1978), Monroe (1978)). The second wave was strongly driven by advances in empirical and theoretical methodology and aimed at studying whether the effects found in the early studies are still present when using more advanced estimation techniques, e.g. those accounting for autocorrelation in the data. Moreover, these studies deliver estimates for the exact timing of the effects and investigate whether the poll respondents are forward-looking or just judge what happened in the past. The most important novelty of the third wave of empirical studies is the step towards analyzing

[3] Gronke et al. (2003), p. 501.
[4] A similar, although not identical field is vote function research. This strand of the literature studies the determinants of factual voting decisions. However, in this paper we concentrate on popularity functions.
[5] He explained this finding as the result of a “coalition of minorities” forming in consequence of an increasing number of controversial decisions.
[6] See Goodhart and Bhansali (1970).
[7] See Lafay (1977), Kirchgässner (1985), Santagata (1985) and Amor Bravo (1985).

the data for different subgroups and on the individual level (see, inter alia, Smyth and Taylor (1992) and Lebo and Cassino (2007)). Moreover, the third wave often uses subjective macroeconomic indicators instead of objective ones.

Somewhat surprisingly, the literature failed to deliver empirically stable popularity functions. In a first, preliminary review of the literature, Paldam (1981, p. 194) concludes "The very existence of the VP-function should no longer be doubted. But we have also seen that the VP-function is a fairly unstable one. Furthermore, we have seen that the responsibility pattern is by far the most commonly found." In his study of vote functions in seventeen countries, Paldam (1991) argues: "[I]n spite of considerable efforts very little is 'cut and dried' in this field, and again and again discussions flare up when this or that result is found to be lacking in stability." A quarter of a century after Mueller's seminal work, Nannestad and Paldam (1994, p. 214) again come to the result that "... the VP-function has shown a disappointing lack of stability both over time and across countries." Lewis-Beck and Paldam (2000, p. 113) argue that this instability problem is the major reason why the research on the determinants of governmental popularity "... has shown no tendency to die."

Even after 40 years of empirical research on the determinants of government popularity no clear picture evolved.[8] Especially the role of economic variables in the popularity function remains unclear. In principle, the literature tends to accept the hypothesis that the stance of the economy influences the popularity of the incumbent president. For example, Norpoth (1984, p. 266) states: "There can be little doubt that the economy matters for presidential popularity." In their survey article Gronke et al. (2002), p. 506, summarize: "… while research to date has demonstrated the importance of the two pillars of presidential approval – the economy and foreign affairs – little research has considered whether and how the changing international environment may affect presidential politics, presidential approval, and ultimately the power of presidency."

However, when studying the numerous empirical studies for the United States in detail, the reported evidence on economic determinants is surprisingly inconsistent and fragmentary. In this paper we contribute to the literature by studying whether economic issues are an important factor in determining the popularity of the presidents of the United States. After surveying the relevant literature we discuss which factors might have contributed to the inconclusive results. We then study in detail, how robust the results react to changes in the employed data, variables, estimation techniques and sample periods. We find that three economic issues turn out to be highly stable as long as comparatively long sample periods are chosen: inflation, unemployment and the budget deficit. However, the popularity function turns out to be instable when shorter sub-samples are chosen. This result might indicate that the popularity function is instable over time. However, the findings might also be taken as an indication that the most often employed linear estimation approach is inadequate.

[8] Bellucci and Lewis-Beck (2011) come to the same result.

The paper is organized as follows: In section 2 we deliver a comprehensive review of the empirical literature on popularity functions. Section 3 is concerned with alternative measures of presidential popularity (or approval). Section 4 deals with non-economic determinants, section 5 with the economic determinants of presidential popularity. Section 6 discusses several technical estimation aspects such as dealing with serial correlation, the stationarity properties of the employed time series and the dynamic specification of the popularity function. Section 7 is concerned with the choice of the sample period. Section 8 discusses the functional form of the popularity function. Section 9 delivers a summary of the results and draws conclusions.

2. Review of the Literature

The literature on vote and popularity functions is very large (Paldam (2008) speaks of about 300 publications during the last 30 years) and a detailed review of the entire literature is neither possible nor helpful for our purpose. Instead, we give a structured overview of the most important empirical findings for the United States over the last 40 years. In Table 1 we report information on 57 different empirical studies of the popularity function. These studies report 87 estimations of popularity functions for the United States.

Columns 1 and 2 of Table 1 report the sample period (**sample**) and the data frequency (**F**) of the referring study. The columns 3 to 5 summarize technical and econometric issues like the estimation technique (**T**), the dynamic specification (**DS**) and the treatment of (non-)stationarity (**St**) of the employed time-series. Column 6 delivers information about the used popularity measure (**P**) and columns 7 to 9 report whether war- (**W**), event- (**E**) or time-related (**T**) control variables were included.

The last four columns focus on the economic determinants of presidential approval. Most importantly, columns 10 and 11 report whether the respective study has found statistically significant and plausible effects for unemployment (**U**) and inflation (**I**). Studies finding such an effect are marked with (+) while studies finding insignificant coefficients or implausible signs are marked with (−). Mixed results are marked with (±). Whenever a certain variable was not under consideration of a study the column remains empty. Column 12 reports how many additional economic variables (**E**) have been employed besides unemployment and inflation. The final column indicates whether subjective measures of the economic situation (**S**), such as economic sentiments, were considered in the referring study.

Table 1: Literature overview

study	(1) sample	(2) F	(3) T	(4) DS	(5) St	(6) P	(7) W	(8) E	(9) T	(10) U	(11) I	(12) E	(13) S
Mueller (1970, 1973)	1945-1969	M	OLS	static		G	X	X	X	+			
Hibbs (1973/74)	1945-1969	M	GLS	static		G	X	X	X	–			
Stimson (1976)	1945-1972	M	OLS	static		G	X	X	X	–			
Kenski (1977a)	1953-1974	M	OLS	static		G				–	+		
	1953-1957	M	OLS	static		G				+	–		
	1957-1961	M	OLS	static		G				+	±		
	1961-1963	M	OLS	static		G				–	±		
	1965-1969	M	OLS	static		G				–	±		
	1969-1973	M	OLS	static		G				+	–		
	1973-1974	M	OLS	static		G				–	±		
Kenski (1977b)	1953-1974	M	OLS	static		G	X	X			±		
Frey/Schneider (1978a)	1953-1975	Q	GLS	static		G		X	X	+	+	1	
Frey/Schneider (1978b)	1957-1974	Q	OLS	static		G		X	X	+	+	1	
Kernell (1978)	1949-1953	M	2SLS	PA		G	X	X	X		–		
	1953-1961	M	2SLS	PA		G		X	X	–	–		
	1961-1963	M	2SLS	PA		G		X	X	–			

study	(1) sample	(2) F	(3) T	(4) DS	(5) St	(6) P	(7) W	(8) E	(9) T	(10) U	(11) I	(12) E	(13) S
	1963-1969	M	2SLS	PA		G	X	X	X	−	+		
	1969-1974	M	2SLS	PA		G		X	X		+		
Monroe (1978)	1950-1974	M	GLS	DL		G				−	+	3	
Monroe (1979)	1950-1974	M	GLS	static		G				−	−	5	
Golden/Poterba (1980)	1953-1978	Q	GLS	DL		G		X	X	−	+	1	
Hibbs/Vasilatos (1981)	1961-1976	Q	NL	DL		G	X	X	X	±	±	1	
Hibbs (1982)	1961-1980	Q	NL	DL		G	X	X		+	+	1	
Chappell (1983)	1957-1980	Q	NL	DL		G	X	X	X		−	1	
MacKuen (1983)	1963-1980	O	NL	DL		O	X	X	X	+	+		
Monroe/Laughlin (1983)	1965-1980	O	OLS	static		G		X	X	−	+	4	
Norpoth/Yantek (1983)	1961-1980	M	OLS	TF	X	G				−	−		
Norpoth (1984)	1961-1980	Q	GLS	TF	X	G	X	X	X	−	+		
Chappell/Keech (1985)	1957-1980	Q	NL	DL		G	X	X	X		+		
Ostrom/Simon (1985)	1953-1980	M	2SLS	static		G	X	X				1	
Hibbs (1987)	1961-1979	Q	NL	DL		G	X	X		+	+	1	
Lanoue (1987)	1961-1984	Q	ARMA	TF		G	X	X	X	−	+	1	
Yantek (1988)	1981-1985	M	OLS	TF		G				+			

study	(1) sample	(2) F	(3) T	(4) DS	(5) St	(6) P	(7) W	(8) E	(9) T	(10) U	(11) I	(12) E	(13) S
Clarke/Elliott (1989)	1953-1961	M	ARMA	TF	X	G		X		+	+		
	1961-1963	M	ARMA	TF	X	G		X		−	+		
	1963-1969	M	ARMA	TF	X	G		X		−	+		
	1969-1974	M	ARMA	TF	X	G		X		+	+		
	1974-1977	M	ARMA	TF	X	G		X		−	+		
	1977-1980	M	ARMA	TF	X	G		X		−	+		
	1981-1984	M	ARMA	TF	X	G		X		+	−		
	1985-1988	M	ARMA	TF	X	G		X		+	−		
MacKuen (1989)	1953-1987	Q	ARMA	TF		G	X	X				1	X
Ostrom/Simon (1989)	1981-1987	O	NL	static		G		X		+	+		
Smyth et al. (1989)	1981-1989	M	NL	PA		G		X	X	+	+		
Chappell (1990)	1953-1988	Q	SUR	static		G	X	X	X	−	+	1	
Marra et al. (1990)	1949-1984	O	NL	static		G	X	X	X	+	+		
Beck (1991a)	1953-1988	M	GLS	ECM		G	X	X		+	+		
Beck (1991b)	1953-1986	M	OLS	PA		G	X	X		+	+		
	1953-1986	Q	OLS	PA		G	X	X		+	+		
Brace/Hinckley (1991)	1949-1984	M	OLS	static		G		X				1	

study	(1) sample	(2) F	(3) T	(4) DS	(5) St	(6) P	(7) W	(8) E	(9) T	(10) U	(11) I	(12) E	(13) S
Smyth et al. (1991)	1953-1957	M	SET	PA		G			X	+	+		
	1957-1969	M	SET	PA		G	X		X	−	−		
	1969-1977	M	SET	PA		G		X	X	+	+		
	1977-1981	M	SET	PA		G			X	−	−		
	1981-1988	M	SET	PA		G		X	X	+	+		
MacKuen et al. (1992)	1954-1988	Q	OLS	DL		G	X	X		−	−	1	X
Ostrom/Smith (1992)	1981-1988	M	OLS	ECM	X	G		X		−	−		
Winder (1992)	1976-1988	Q	GLS	static		G			X	+	+		
Clarke/Stewart (1994)	1954-1992	Q	ARCH	ECM	X	G	X	X	X			4	X
	1954-1988	Q	ARCH	ECM	X	G	X	X	X			4	X
Smyth et al. (1994)	1981-1988	M	NL	PA		G		X	X	±	±		X
	1981-1988	Q	OLS	static		G		X	X	+	+		
Haynes (1995)	1953-1990	Q	GLS	static		G	X	X		+	+	1	
Smyth et al. (1995)	1969-1974	M	NL	PA		G		X	X	+	+		
	1974-1976	M	NL	PA		G			X	−	+		
Dua et al. (1995)	1989-1992	M	NL	PA		G				+	−		
Norpoth (1996)	1960-1993	Q	GLS	static	X	G	X	X	X			2	X

study	(1) sample	(2) F	(3) T	(4) DS	(5) St	(6) P	(7) W	(8) E	(9) T	(10) U	(11) I	(12) E	(13) S
Nadeau et al. (1999)	1977-1995	Q	OLS	PA	X	G	X	X		−	±	2	X
Smyth et al. (1999)	1978-1980	M	NL	PA		G				−	−		
	1978-1980	M	NL	PA		M				−	+		
	1981-1986	M	NL	PA		G			X	+	+		
	1981-1986	M	NL	PA		M			X	+	+		
	1987-1995	M	NL	PA		G				+	−		
	1987-1995	M	NL	PA		M				+	−		
Nickelsburg/Norpoth (2000)	1976-1996	Q	2SLS	static	X	G						1	X
Wood (2000)	1978-1997	Q	OLS	PA	X	G	X	X		−	−	1	X
	1978-1997	Q	FLS	PA	X	G	X	X		+	+	1	X
Gronke/Brehm (2002)	1953-1993	M	ARCH	PA		G	X	X		+	+		
Newman (2002)	1953-1992	M	GLS	PA		G	X	X		−	−		
Nicholson et al. (2002)	1949-1996	Q	GLS	PA		G		X		−	+	1	
Burden/Mughan (2003)	1993-2000	M	GLS	static		G		X	X	±	−	1	
Smyth/Taylor (2003)	1993-2001	M	NL	PA		G		X		+	−		
McAvoy (2006)	1978-2002	Q	ML	RLM	X	G						1	X
Geys/Vermeir (2008)	1959-2006	Q	2SLS	PA	X	G	X	X	X	−	−	5	

study	(1) sample	(2) F	(3) T	(4) DS	(5) St	(6) P	(7) W	(8) E	(9) T	(10) U	(11) I	(12) E	(13) S
Wisniewski et al. (2009)	1950-2007	Q	ARCH	PA	X	G	X	X				2	
Geys (2010)	1948-2008	Q	OLS	PA	X	G	X	X	X	+	±	1	
Newman/Forcehimes (2010)	1953-2006	M	GLS	PA	X	G	X	X		+	+		

Notes: This table exclusively shows empirical studies of popularity functions for the United States. Some studies are listed more than once whenever several popularity functions were estimated, for example for different samples or due to different variable choices. However, when authors stepwise develop their "best" specification throughout a paper, only the final specification was taken into account.

The following abbreviations were used: **F** (data frequency; M = monthly, Q = quarterly, O = other), **T** (estimation technique; OLS = ordinary least squares, GLS = generalized least squares (such as Cochrane-Orcutt or Prais-Winsten), 2SLS = two stage least squares or instrumental variables, NL = non-linear estimation, SET = sets of equations, ARMA = autoregressive moving average, ARCH = autoregressive conditional heteroscedasticity, FLS = flexible least squares, ML = maximum likelihood), **DS** (dynamic specification; PA = partial adjustment, DL = distributed lag model, TF = transfer function, ECM = error correction model, RLM = rational learning model, SUR = seemingly unrelated regressions), **St** (stationarity; X = was mentioned), **P** (popularity measure; G = Gallup, M = Michigan Survey of Consumers, O = other), **W** (war variables; X = war dummy, casualties, etc. included), **E** (event variables; X = event dummies or event lists included), **T** (time variables; X = honeymoon or time trends were included), **U** (unemployment), **I** (inflation), **E** (number of economic variables included if larger than zero); **S** (soft measures; X = subjective economic measures, like Consumer Sentiments Indicator, were included).

For column **U** and **I**, a "+" indicates a significant empirical finding with a correct sign. A "−" indicates insignificant findings and/or a wrong sign. A "±" stands for mixed results. A empty cell means, the study has not dealt with that variable.

The results reported in columns 10 and 11 of Table 1 indicate that neither inflation nor unemployment, the two most intensively studied economic issues, perform highly stable in estimations of the U.S. popularity function. Unemployment was considered in 73 estimations, but only 37 of them find a significant and plausible coefficient. Other estimations either delivered mixed results or no statistically significant effect at all. A similar picture evolves for inflation, which was also used in 73 estimations. However, in roughly 40% of these estimations the hypothesis that inflation has no effect on presidential approval could not be rejected. Moreover, the results show no tendency to converge over time. Throughout the decades, between 38% and 65% of all estimations have found either no (or mixed) effects for unemployment and between 24% and 63% have found no (or mixed) effects for inflation (see Table 2).

Besides unemployment and inflation, quite a number of additional economic issues have been considered as determinants of presidential popularity. According to Column 12 of Table 1 about 50% of all studies included additional economic variables such as the output gap, the government deficit, defense spending, the trade deficit or variables measuring stock market performance. However, most of these variables have been studied only once or twice. Therefore, statements about the effect of these variables on presidential popularity are subject to considerable uncertainty.

Altogether, the results summarized in Table 1 and Table 2 underline that the effects of economic variables on presidential approval are far from being as clear-cut as some of the earlier cited papers suggest. Results for unemployment and inflation are fairly inconsistent while other economic variables have rarely been studied. Since all summarized studies investigate more or less the same question, this inconsistency is rather disappointing. However, Table 1 also reveals a number of potential sources for this heterogeneity.

First, the existing estimations base on heavily differing sample periods and data frequencies. The sample periods range from single presidencies to large samples of over 50 years. While preferences are typically assumed to be stable in economics it is well possible that the underlying relationship between presidential popularity and economic variables is changing in the course of time, thereby contributing to the blurred picture. It is also possible that the true relationship is not linear as most of the existing estimation approaches imply. Estimating a non-linear relationship with OLS will surely deliver instable results. The studies also differ heavily in the sample frequencies. Roughly half of all studies employ monthly data while the others mainly use quarterly observations.

Second, there are considerable differences in the chosen estimation approaches and techniques. As column 3 of Table 1 reveals, several different estimation techniques have been applied, ranging from ordinary least squares (OLS) to more sophisticated methods like ARCH models and non-linear approaches. Regarding the dynamic specification, a shift from static models in the 1970s to partial adjustment models (since 1990) can be observed. Moreover, transfer functions with very specific lag

structures as well as error correction models have been tested by some authors (e.g. Beck (1991a), Clarke/Stewart (1994)). Additionally, the results summarized in column 5 show that stationarity issues have been neglected in many studies. Only 14 out of 57 studies mention the potential non-stationarity of the employed time series.

Third, for a long time there has been no agreement on the appropriate choice of non-economic variables. Although Table 1 cannot give a complete summary of the details it becomes obvious from columns 7 to 9 that wars and other political control variables have been included only in every second paper. While most papers (about 70%) include some control variables for political events, the exact choice of these variables differs quite heavily, as we will report later in more detail.[9]

Fourth, studies differ in the choice of considered economic variables. As mentioned earlier, most studies include unemployment and inflation measures. However, several authors tested up to 5 additional economic variables as indicated by column 12. Nevertheless, many economic variables have been analyzed in only a few studies. Throughout the last 20 years there was a trend to include more subjective measures of the economic situation (column 13); nine studies used consumer sentiments or perceived inflation as explanatory variables.

Finally, there are additional sources of heterogeneity that are not displayed in the table. Among these issues is the problem of the appropriate choice of an indicator for a certain economic issue. For example, there are numerous candidates to control for inflation. Moreover, presidential popularity can also be measured in different ways. Additionally, there is considerable variety in the construction and timing of war and event variables.

Table 2: Results for economic variables over time

	unemployment				**inflation**			
	+	±	−	total	+	±	−	total
1970s	6	0	11	17	6	5	5	16
1980s	10	1	9	20	16	1	4	21
1990s	16	1	9	26	16	2	8	26
2000s	5	1	4	10	4	1	5	10
total	**37**	**3**	**33**	**73**	**42**	**9**	**22**	**73**

We might conclude that a "mainstream approach" of estimating popularity functions did not evolve throughout the last 40 years. It is quite likely that the observed variety in approaches contributes much to the mixed results in the literature. In the remainder of this paper we try to shed some light on the question, which factors contribute most to the instability of the results. In order to do so we follow a

[9] However, it should be noted that the inclusion of war variables also depends on the analyzed sample period. Especially for short estimation samples, periods without war are likely.

step by step procedure. We discuss the likely sources of instability at the example of a number of own estimations.

3. The Popularity Measure

A first possible source of heterogeneity in empirical studies of government popularity is the choice of the left hand variable. Since factual popularity is not directly observable, survey measures are typically used to generate proxies for popularity. Usually these measures are constructed from surveys asking for the respondent's *approval* (or disapproval) with the way the government or a particular politician is handling its/his job or specific matters (e.g. the economy).[10] Nowadays, there are numerous polls conducted by private survey firms, universities and the media.[11] In order to be useful for studying governmental popularity, polls should fulfill the following three requirements: (a) the survey question should be stable over time, (b) the sampling error[12] should be small, and (c) the time series should be long enough to guarantee a precise estimation of the coefficients one is interested in.

By far the most studies use survey data collected by the Gallup company. Starting in August 1937, the underlying survey question reads as follows: "Do you approve or disapprove of the way *[name of the president]* is handling his job as president?"[13]A few studies (Dua et al. (1995), Smyth et al. (1999)) employ data from an alternative survey, conducted by the Survey Research Center (SRC) of the University of Michigan. The survey question[14] in the SRC surveys has an explicit economic focus which might be helpful for some research questions. Early SRC surveys have been conducted as early as in May 1961, however, a suitable time series can only be constructed for the period after January 1978.

There is also some variation in the way how the popularity time series data is constructed from the surveys. Most studies define popularity as the percentage share of positive responses. To construct a monthly (quarterly) series, results from all polls during that month (quarter) are typically averaged. However, Beck (1991a) uses end-of-month values instead of monthly averages. Some authors fill gaps in time series by linear interpolation (see e.g. Smyth et al. (1991), Geys (2010)) while others (e.g. Wisniewski and Lightfoot (2009) or Newman and Forcehimes (2010)) accept missing observations.

[10] It should be noted that *popularity* and *approval* are "conceptionally distinct" (Stimson (1976)). However, we will neglect this semantic subtlety and use the terms *popularity*, *approval* or *political support* interchangeably, as it is common in the field.
[11] The *i*Poll databank, provided by the Roper Center for Public Opinion Research (University of Connecticut), offers access to major polls for the United States. The website also offers links to international sources.
[12] The sampling error is the error that is caused by not interviewing the whole population. It usually decreases with the sample size, but it also includes measurement errors (caused by the question wording, framing or errors of the interviewer) and non-response biases.
[13] Until 1950 the question has only been asked very infrequently. A nearly complete monthly series can be constructed after January 1950.
[14] The SRC question reads: "As to the economic policy of the government – I mean steps taken to fight inflation or unemployment – would you say that the government is doing a good job, only fair, or a poor job?"

Stimson (1976) varies the calculation procedure by neglecting the "don't knows" in calculating the popularity time series (Stimson (1976)).[15]

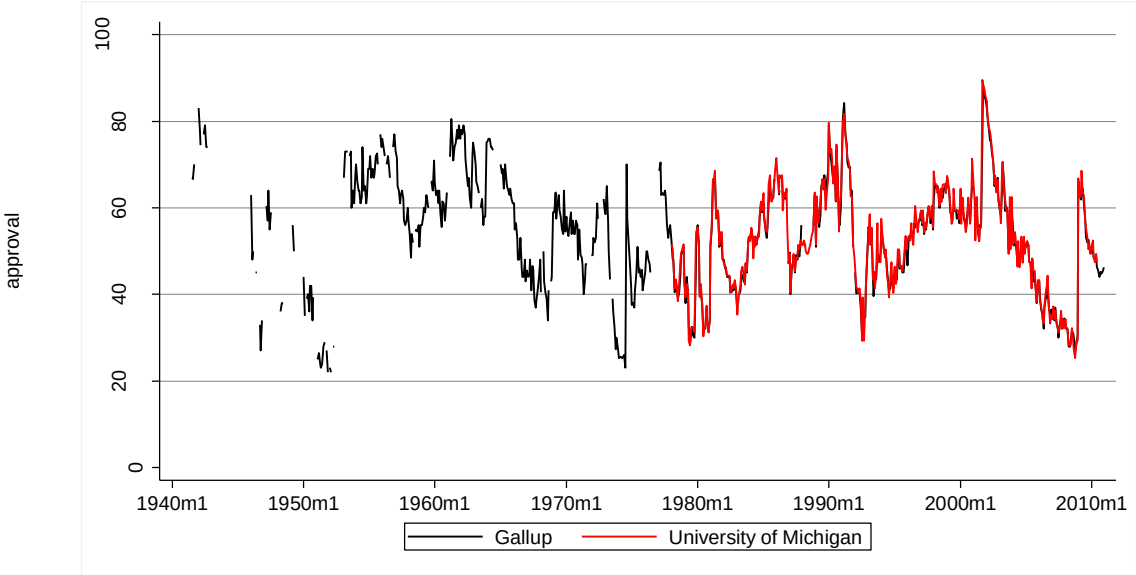

Figure 1: Gallup and SRC approval

Figure 1 shows the time series of approval rates as generated from the Gallup and the SRC survey (not interpolated, percentage share of positive responses, monthly averages). The Gallup and the SRC approval time series turn out to be highly correlated (0.99). Interestingly enough, this holds true although the SRC question has an explicit economic focus while the Gallup question has not. This finding either implies that respondents are not able to assign their approval (or disapproval) to specific topics or economic issues play the dominant role in evaluating the president.

Table 3: Correlations between different popularity measures

		Gallup				SRC
		PS	PS-END	REL	LEAD	SMYTH
	PS	1.00				
Gallup	PS-END	0.99	1.00			
	REL	0.97	0.96	1.00		
	LEAD	0.98	0.97	1.00	1.00	
SRC	SMYTH	0.99	1.00	0.95	0.97	1.00

PS: share of positive answers

PS-END: share of positive answers, end-of-month values

REL: share of positive answers to all positive and negative answers (excl. "don't knows")

LEAD: difference between share of positive and negative answers

SMYTH: SRC series following Smyth et al. (1995, 1999)

Even when using one of the earlier mentioned variants of the standard Gallup approval rates, the resulting time-series do not differ by much. A formal correlation analysis reveals that the cross

[15] Very rarely a logistic transformation is used to account for the fact that approval rates are bounded to the (0,100)-interval (see. e.g. Hibbs (1973/74)).

correlations between all measures employed in the literature are larger than 0.95 (see Table 3). It is thus very unlikely that the heterogeneity in the literature stems from the use of different popularity measures.[16] At least when using samples with large numbers of observations the choice of the left hand variable is uncritical. Since Gallup data are available for a longer period of time, they will often be the superior choice. Moreover, in order to preserve comparability to the existing literature, it seems to be useful to employ monthly averages of the share of positive answers without linear interpolation, as it has most often been done in the literature.[17] We follow this strategy in the remainder of this paper.

While nowadays approval and popularity data is available in monthly frequency, both monthly and quarterly data have been used in empirical popularity studies almost equally often (see Table 1).[18] In general, monthly data is more useful in popularity studies since high frequency data allows to match political events or economic developments more closely to presidential approval. Nevertheless, quarterly data has been used quite often. This is due to the fact, that especially some economic variables (such as real economic growth) are available only in quarterly frequency. Moreover, quarterly data sometimes simplifies the dynamic specification of the estimation equation and "muffle[s] the noise" (Norpoth (1984), but see Beck (1991a, 54)). However, this comes at the price that potentially useful information is neglected. Beck (1991b) and Smyth et al. (1994) have used both monthly and quarterly data and found no differences in their results.[19] Due to the potentially higher information content of high frequency data we use monthly data in the following.

4. Non-Economic Variables

As it was reported in the previous section, by far the most studies employ the same or very similar left-hand-variables. As far as non-economic control variables are concerned, the degree of conformity in the literature is lower. Since Mueller's (1970) seminal paper three broad categories have established: political variables, war-related variables and event dummies.

4.1 Political Variables

Various political factors have been considered in popularity functions.

First, there is wide consensus in the literature that personal characteristics influence the electorate's evaluation of a president, independent from economic and political outcomes. As a consequence by far the most empirical studies use presidential dummies in order to control for these personal characteristics.

[16] Smyth et al. (1999) estimate popularity functions using both Gallup and SRC data and find different results in one case (Smyth et al. (1999), table 1); with SRC data they find a significant effect of inflation between 1978 and 1980 while there was none using Gallup's series. However, one might speculate that this result is primarily due to the extremely short sample period.
[17] Of course, robustness checks with the other measures can be helpful to strengthen results.
[18] Some unusual frequencies such as bi-weekly, be-monthly and poll-to-poll frequency have been used by MacKuen (1983), Monroe and Laughlin (1983) and Marra et al. (1990).
[19] See Nadeau et al. (1999), p. 115, footnote 7, for a discussion on the frequency choice.

Second, many studies employ a time-in-office variable in their estimations. Mueller's (1970) *coalition of minorities* hypothesis[20] delivered a theoretical foundation for doing so. Especially in earlier studies this argument was widely accepted and a time-in-office variable was usually included to account for a general cost of ruling (Mueller (1970), Hibbs (1973/74), Frey and Schneider (1978a)). However, Kernell (1978) argued that time should not be used as an explanatory variable since it has no theoretical meaning. In consequence, few studies have employed time trends after 1980. Nevertheless, Paldam (2008) argues that the existence of costs of ruling are one of the uncontroversial results in the literature. Thus, the question of purely time-dependent effects is an unsettled issue in the field which needs further attention in future research. From a purely empirical perspective one might argue that time effects should be included whenever they turn out to be significant.[21]

Another policy- and time-related effect – taken into account by many researchers – is the *honeymoon effect*. This effect is based on the idea that politicians experience a period of *warm glow* in the early months of their incumbency.[22] The length of this period is controversial; therefore different measures between three and fifteen months have been used (Burden and Mughan (2003), Smyth et al. (1994), Chappell and Keech (1985)).

Finally, there are some political control variables which have been used very infrequently. Among these variables are controls for divided governments, which reduce the *clarity of responsibility* (Powell and Whitten (1993), Nicholson et al. (2002), Geys and Vermeir (2008), Geys (2010)).

In Table 4 we show the results of OLS regressions including the discussed political variables. Model M1 includes only presidential dummies. The presidential dummies alone can account for 28% of the observed variance of presidential popularity. Model M2 contains also the remaining political variables, i.e. a divided government dummy, a time-in-office[23] and a 12-months-decaying honeymoon variable.[24] We find presidential popularity to decrease significantly in the course of time. Moreover, we find evidence in favor of the existence of a strong honeymoon effect. Popularity turns out to be significantly higher under divided governments. One might interpret this finding as an indication that presidents are more popular when they cannot be held responsible for policy actions alone.

[20] The *coalition of minorities* hypothesis is based on Downs (1957).
[21] For a similar view, see Brace and Hinckley (1991, 996).
[22] Analogously, a *nostalgia* effect in the end of a politician's career has been tested by Monroe and Laughlin (1983) and Geys (2010), showing mixed results. While Geys finds a *rebound effect* of about 3 points, Monroe and Laughlin do only find such an effect for certain sub-groups (e.g. whites). We also studied a 3-months and a 6-months linear nostalgia effect in our sample. However, it turned out to be insignificant.
[23] While we use time since first inauguration in our estimations, other studies decided to restart the time variable after each election, regardless of the former president was reelected. However, the estimation results remain qualitatively unchanged when following this procedure.
[24] Alternatively, we used 1-month, 3-months and 6-months linearly decaying honeymoon-effects. While the 1-month-effect turns out to be insignificant, all other variants deliver significant coefficients. The results of the remaining political variables remain unaffected by the choice of the honeymoon variable.

Table 4: Non-economic variables

VARIABLES	(1) M1 app	(2) M2 app	(3) M3 app	(4) M4 app
Vietnam (cas)			-0.01***	-0.01***
Gulf War			19.85***	20.00***
War on Terror (cas)			-0.08**	-0.09**
Watergate				-21.52***
9/11				14.48***
neg domestic events				-3.46**
neg foreign events				-0.56
neg personal events				3.31**
pos domestic events				8.03***
pos foreign events				5.27***
pos diplomatic events				4.32***
pos personal events				5.76**
time in office		-0.15***	-0.13***	-0.10***
honeymoon		0.52***	0.64***	0.59***
divided govt		12.84***	11.15***	9.85***
Eisenhower	9.20***	5.75***	3.28	3.29
Kennedy	14.91***	15.62***	12.44***	12.20***
Johnson	-1.11	2.15	2.11	3.98*
Nixon	-6.20***	-15.69***	-15.85***	-7.93***
Ford	-8.40***	-22.01***	-23.53***	-22.41***
Carter	-9.61***	-7.62***	-10.88***	-10.96***
Reagan	-2.63	-10.01***	-12.00***	-12.33***
Bush I	4.40*	-6.61**	-12.01***	-10.73***
Clinton	-0.50	-4.12***	-6.59***	-6.87***
constant	55.12***	55.99***	58.54***	57.51***
observations	603	603	603	603
R-squared	0.28	0.45	0.50	0.58

Robust standard errors, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

4.2 War-Related Variables

Throughout both the last and the current century, the United States were involved in various wars and conflicts. Especially in the light of the Korean and Vietnam War it is not surprising that Mueller (1970) and many subsequent studies considered war variables as necessary components of a well-specified popularity function.

Although most empirical studies of US presidential popularity correct for the effects of wars and conflicts, there are differences in the applied methods. Obviously, the simple dummy approach initially chosen by Mueller (1970) is not satisfactory. In order to find a correct specification, it is useful to consider the different ways in which military conflicts affect public opinion. Some studies used the number of bombing missions in Vietnam (Kernell (1978)) or the number of deployed troops (MacKuen (1983)) as an indicator. In more recent studies it is common to include (cumulated) war casualties (Geys and Vermeir (2008), Geys (2010), Newman and Forcehimes (2010)) as a proxy of war intensity and public attention. In a recent paper, Geys (2010) used financial costs of military intervention. He also tested war-specific time trends to capture a feeling of war weariness and

proposed other indirect effects like trade disruptions or environmental damage which have not been tested, yet.

Although there are slight differences in the handling of war variables in the literature, the general conclusions about the effects of the economic variables should remain unaffected by the chosen method. While different approaches alter the size of coefficients, they do not explain the high number of studies finding insignificant results with respect to economic variables. However, neglecting the effects of wars on presidential popularity would result in a severe misspecification (omitted variable bias) and will likely have an influence on the results (one should especially be aware of a correct specification during the 1970s when high inflation and unemployment rates fall together with the end of the Vietnam War).

In order to control for the effects of wars on presidential popularity we control for three major wars: Vietnam, the Gulf War and the Operation against Terror in Afghanistan and Iraq. For the Vietnam War we include the number of casualties.[25] Since the operations in Iraq and Afghanistan overlap, we use aggregate casualties from both engagements.[26] Due to the comparatively low number of casualties and the length of the conflict we employ a dummy variable for the Gulf War (1991:1 to 1991:9).[27] When adding the war variables to the regression model, all three variables turn out to be highly significant with the expected sign (see model M3 in Table 4). The explanatory power of the regression model further increases from 45% to 50%. Interestingly enough, the inclusion of the war variables has no major influence on the coefficients of other control variables.

4.3 Event Variables

Similar to wars, there is a general agreement about the role of single events in the popularity literature. Single events include political scandals (Watergate), international crises (Iran-Contra) and other unique and dramatic incidents like the assassination of JFK or the 9/11 attacks. Since these events have an apparent impact on approval ratings, excluding them would lead to misspecified popularity functions (Newman (2010, 145)). However, in constructing appropriate measures, Mueller's (1970) warning that "[t]here is a terrible temptation to find a bump on a popularity plot, then to scurry to historical records to find an international 'rally point' to associate with it" should be kept in mind. Hence, objective selection criteria are required.

Despite the consensus on the general usefulness of event variables, there is "wide divergence in the ways that scholars have selected events" (Newman and Forcehimes (2010)). Some studies directly

[25] Alternatively, the cumulated sum of casualties (e.g. Clarke and Stewart (1994)) or logarithmic casualties (e.g. Geys (2010)) have been used in the literature. While the sum of casualties turns out to be insignificant in our sample, logarithmic casualties are significant. However, in both cases the coefficients of the other variables remain unchanged.
[26] The results remain virtually unchanged when using separate variables for Afghanistan and Iraq.
[27] While most of the literature uses this specification there are some authors applying a slightly different timing for the dummy variable. Again, the results remain stable to different specifications.

focus on particular events (e.g. Smyth et al. (1995, 1999)), while others construct extensive lists of events to use them as control variables (Newman and Forcehimes (2010)).[28] The disadvantage of the more complete event lists lies in the equal treatment of all events that belong to one list. For that purpose, Newman and Forcehimes (2010) follow a hybrid approach that includes event lists together with single event dummies for extraordinary events (like the terror attacks in September 2001). Moreover, the timing of single events differs between studies.[29]

By proposing a specific set of event variables and showing that this set performs very similar compared to many other approaches, Newman and Forcehimes (2010) recently contributed significantly to unifying the literature with respect to the choice of event variables. To make the choice more objective, their lists of events are mainly based on the extent of front page coverage in the *New York Times*. Furthermore, events are categorized as positive or negative and placed into one of the following four categories: domestic, foreign, personal and diplomatic events. Together, this gives eight possible dummy variables, i.e. one for all positive personal events, one for positive domestic events, etc. Two events, Watergate and 9/11, are not included in these lists but covered by single dummies due to their extraordinary impact on presidential approval. Altogether, Newman's and Forcehimes' thorough comparison of alternative measures shows that differences in the construction of event variables are quite unlikely to have contributed to the differing results outlined in Table 1.[30]

An inclusion of the events from the Newman and Forcehimes (2010) list further increases the explanatory power of the model to 58% of the observed variance of presidential popularity (model M4 in Table 4). With one exception, all event variables show the expected sign. Watergate led to a large drop while 9/11 led to a positive rally effect. Positive news boost approval. The apparent positive effect of negative personal events, however, is puzzling. It is possibly driven by the Lewinsky affair which has not severely damaged President Clinton's approval rates in the 1990s.Thus, the inclusion of event variables improves the specification of the popularity function but is unlikely contributing to the mixed findings in the literature.

5. Economic Variables

When reading through the literature summarized in Table 1 one might suspect that major reasons of the blurred picture of the role of economic variables in popularity functions lie in the differences in (i) the economic issues which are considered as possible determinants of presidential popularity and (ii)

[28] See Newman and Forcehimes (2010) for an overview about the possible identification and construction of event variables.

[29] As an example, the coding of the Watergate affair somewhat differs from study to study. Newman (2002) and Newman and Forcehimes (2010) use a dummy from March 1973 to July 1974; Smyth (and co-authors) start in April 1973; Beck's (1991a) dummy ends in August 1974. Frey and Schneider (1978) and Smyth et al. (1991) place different weights on some months and Kernell (1978), MacKuen (1983) and Smyth and Taylor (2003) do not define the time period at all.

[30] Obviously, Newman's and Forcehimes' (2010) event lists need regular maintenance and updating to make them usable for up-to-date research in the field.

the concrete indicators which are used as proxies for these issues. An inappropriate *choice of economic issues* can lead to false inference due to omitted variable bias or multicollinearity. The use of *different indicators* for the same economic issue directly impedes the comparability of the empirical results. In the following we will discuss both issues separately.

5.1 The Choice of Economic Issues

While various authors claimed economic variables to play an important role in explaining presidential popularity (e.g. Norporth (1984) or Gronke et al. (2002)), there is yet no common agreement which economic issues are those which matter most. As reported in Section 2, various economic issues have been considered, such as inflation, unemployment, economic growth, the performance of financial markets, the tax burden or the government deficit, to mention only a few.

As outlined earlier, unemployment and inflation have been employed most often in empirical studies analyzing the determinants of presidential popularity. When adding the unemployment rate and 12-month-inflation (i.e. the percentage change of the CPI over the last 12 months) to the regression equation, their coefficients turn out to be negative and highly significant (see Table 5, M5). While the coefficients of the war-related variables, the time-in-office variable, the honeymoon variable and the divided government dummy remain relatively stable, this holds not true for the majority of presidential dummies. Some of them become insignificant when adding inflation and unemployment to the regression equation, others at least lose explanatory power. This finding indicates that in absence of the relevant economic variables the explanatory power is wrongly attributed to the personal characteristics of the incumbent president. The importance of unemployment and inflation in explaining presidential popularity comes forward in a rise of explanatory power of 10 percentage points.

As outlined in Section 2, additional economic issues have comparatively rarely been considered in empirical popularity studies. When omitting important variables, the estimation equation suffers from misspecification and the estimation results are subject to the omitted variable bias. To avoid this sort of misspecification some authors included additional economic variables to the estimation equation. While Frey and Schneider (1978a) add consumption growth, Hibbs (1973/74) and others include various income measures. Monroe (1979) chooses a comparatively large set of economic variables including stock market performance, military expenditures, the trade balance and interest rates. While following this strategy contributes to avoiding the omitted variable bias, it increases the possibility of multicollinearity problems occurring. While multicollinearity does not cause biased coefficients, the OLS estimator will have a larger variance and one is thus likely to draw wrong conclusions about the

statistical significance of effects. Thus, multicollinearity problems might have contributed to the mixed findings in the literature.[31]

In order to find out to what extent additional economic issues play an important role in explaining presidential popularity we added the following variables to the regression equation of model M5: the output gap, two stock market performance variables (the percentage change of the S&P500 Index and the price-earnings ratio used by Wisniewski et al. (2009)), the government deficit (as a share of GDP), the defense spending (as a share of GDP) and the trade deficit (following Burdan and Mughan (2003)).[32] Most of them turn out to be insignificant or deliver economically unimportant coefficients. The output gap and the stock market variables are not statistically significant. Defense spending and the trade deficit are statistically significant at the 10% level, but their beta coefficients are close to zero, i.e. they are not economically significant. Unemployment, inflation and the deficit variable are highly significant and show the expected, negative sign.

In order to study, how stable the economic variables perform when they are combined with differing sets of economic control variables, we ran regressions for all permutations that are possible for the eight economic variables (a total of $2^8 = 256$ regressions) and calculated the share of regressions in which a variable was statistically significant (and showed a plausible sign). Again, unemployment, inflation and the deficit variable performed best. They turned out to be statistically significant in every regression they were used in. Thus, besides inflation and unemployment the government deficit seems to play an important role in explain presidential popularity. We therefore add the government deficit to the estimation equation (model M6 in Table 5). The deficit has a negative coefficient which is highly significant. Including the deficit leads to a lower coefficient of the unemployment variable but leaves the inflation coefficient almost unaffected. Adding the government deficit increases explanatory power by one percentage point.

Throughout the last decade, it has become quite popular to employ subjective measures of the economy such as the Index of Consumer Sentiments (Burden and Mughan (2003), MacKuen et al. (1992)) or perceived business conditions (MacKuen et al. (1992), Nickelsburg and Norpoth (2000)) in popularity studies. This approach has two major advantages. First, these variables are overall measures of the economic situation in a country and thus an elegant solution to the multicollinearity problem. Second, they measure the respondents' subjective perception of the economic conditions in a country. It is quite likely that it is this perception which forms the attitude towards the current president and thus his popularity. Since the perception might differ from the factual situation, subjective measures of the economic conditions might help to find out whether the state of the economy has in fact an influence on presidential popularity. However, when we are interested in the relationship between

[31]Often, studies including a large number of economic variables, such as Monroe (1979) or Geys and Vermeir (2008), find no significant effects of inflation and unemployment on presidential popularity.
[32] Only variables that are available for the sample of model M4, i.e. 1953:01 – 2006:12, are used to avoid the introduction of sample heterogeneity.

hard economic variables or the relative importance of different economic issues, the available subjective measures are of limited use.[33]

Table 5: Economic variables

VARIABLES	(1) M4 app	(2) M5 app	(3) M6 app
unemployment		-3.27***	-1.76***
inflation		-1.64***	-1.80***
deficit			-1.66***
Vietnam (cas)	-0.01***	-0.01***	-0.01***
Gulf War	20.00***	22.42***	21.66***
War on Terror (cas)	-0.09**	-0.07*	-0.08**
Watergate	-21.52***	-14.46***	-14.32***
9/11	14.48***	13.35***	11.87***
neg domestic events	-3.46**	-3.19**	-3.27**
neg foreign events	-0.56	3.06	4.50***
neg personal events	3.31**	-0.22	-0.42
pos domestic events	8.03***	7.74***	8.91***
pos foreign events	5.27***	5.19***	5.35***
pos diplomatic events	4.32***	2.94**	2.91**
pos personal events	5.76**	4.81*	4.80*
time in office	-0.10***	-0.14***	-0.15***
honeymoon	0.59***	0.51***	0.34**
divided govt	9.85***	10.19***	7.39***
Eisenhower	3.29	1.37	-3.55
Kennedy	12.20***	12.09***	3.37
Johnson	3.98*	1.62	-3.96
Nixon	-7.93***	-4.97**	-6.28**
Ford	-22.41***	-4.49*	-4.34
Carter	-10.96***	5.00*	0.79
Reagan	-12.33***	0.33	0.58
Bush I	-10.73***	-5.00*	-2.74
Clinton	-6.87***	-5.56***	-6.87***
constant	57.51***	80.01***	77.97***
observations	603	603	603
R-squared	0.58	0.68	0.69

Robust standard errors, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

5.2 The Choice of Economic Indicators

The existing empirical studies not only differ in the economic issues which are considered as determinants of presidential popularity, they also vary in the indicators which are used as proxies for these issues. In some cases a multitude of measures has been in use for one and the same economic issue.

We might illustrate this at the example of inflation. Most papers rely on changes in the consumer price index (CPI). While some papers measure inflation as the monthly percentage change of the CPI (Wisniewski et al. (2009)), others use the year-to-year change (Newman (2002)) or the annualized monthly change (Chappell (1983)). Again others use squared inflation (Smyth et al. (1989)). There are

[33]Moreover, the available time series for subjective indicators are considerable shorter than the popularity data.

also some studies relying on food price inflation (Kenski (1977a)) or the deflator of the gross national product (Chappell and Keech (1985)). Still others employ inflation expectations from surveys (Smyth et al. (1994)) or future inflation as a measure of rational inflation expectations (MacKuen et al. (1992)). There are also some studies including inflation in its first difference since the original time series of inflation turned out to be non-stationary. Finally, there are a number of studies which fail to report which inflation measure has been used (Golden and Poterba (1980) and Yantek (1988)). Similar degrees of heterogeneity can be observed for income/output and unemployment measures.

Obviously, the use of different indicators for the same economic phenomenon complicates the comparison of the results of different studies. Although most measures seem to measure very similar things, they exhibit important differences. In order to demonstrate the effect of the use of different inflation measures we display the estimations results for four different inflation measures in Table 6. We estimate models for the 12-months CPI inflation rate (M6), 12-months food price inflation (M7), the GNP deflator (M8) and the annualized monthly inflation rate (M9).[34]

In our regressions, the statistical significance of the considered economic variables and most non-economic control variables is not affected by the use of different inflation measures. However, the size of the coefficients differs considerably. To compare them, we look at standardized coefficients, here the reaction of approval to a one standard deviation change of the inflation measure. The inflation coefficient ranges from -1.77 to -5.36, the latter effect being about three times larger than the former. Moreover, the choice of the indicator has also implications for the magnitude of the coefficients of the other covariates, while the qualitative results remain unchanged. As Table 6 reports, the explanatory power of the regressions also differs quite a bit (from 65% to 69%.) with the employed inflation measures.

Due to the fact, that the model employing the 12-months CPI inflation rate delivers the highest explanatory power, we employ this measure in all following regressions. In the light of the fact that this inflation measure is most often used in the media, doing so seems to be adequate.

[34] We also tested the 1-month CPI inflation as well as 6-months food price and CPI inflation which have also been used in the literature. All measures delivered highly significant results.

Table 6: Measurement of variables

VARIABLES	(1) M6 app	(2) M7 app	(3) M8 app	(4) M9 app
unemployment	-1.76***	-2.42***	-2.01***	-2.41***
inflation	-1.80***			
inflation (food)		-0.91***		
inflation (GNP)			-1.79***	
inflation (1m, ann)				-0.45***
(standardized)	***(-5.36***)***	***(-3.27***)***	***(-4.49***)***	***(-1.77***)***
deficit	-1.66***	-1.16***	-1.59***	-1.15***
Vietnam (cas)	-0.01***	-0.01***	-0.01***	-0.01***
Gulf War	21.66***	20.44***	21.42***	20.18***
War on Terror (cas)	-0.08**	-0.09**	-0.07*	-0.11**
Watergate	-14.32***	-10.68***	-14.54***	-19.16***
9/11	11.87***	13.87***	11.22***	10.74***
neg domestic events	-3.27**	-3.60**	-3.64***	-4.04***
neg foreign events	4.50***	2.39	2.32	2.58
neg personal events	-0.42	1.42	0.39	1.08
pos domestic events	8.91***	8.65***	8.86***	8.55***
pos foreign events	5.35***	4.95***	4.35***	4.86***
pos diplomatic events	2.91**	3.28**	3.32**	2.96**
pos personal events	4.80*	5.20**	5.68**	5.44**
time in office	-0.15***	-0.16***	-0.17***	-0.15***
honeymoon	0.34**	0.26	0.26	0.24
divided govt	7.39***	8.32***	7.73***	7.39***
Eisenhower	-3.55	-2.25	-2.12	-1.31
Kennedy	3.37	6.96**	4.30	6.87*
Johnson	-3.96	-1.74	-2.84	-2.65
Nixon	-6.28**	-7.73***	-6.06**	-8.57***
Ford	-4.34	-10.41***	-5.73**	-12.77***
Carter	0.79	-4.76	-1.61	-8.01**
Reagan	0.58	-2.20	0.06	-2.84
Bush I	-2.74	-5.24*	-4.55	-5.66**
Clinton	-6.87***	-7.24***	-7.86***	-7.47***
constant	77.97***	78.23***	79.29***	77.71***
observations	603	603	603	603
R-squared	0.69	0.66	0.68	0.65

Robust standard errors, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

6. Technical Issues

The empirical literature on popularity functions differs quite heavily in the employed estimation approaches and techniques. While in his seminal paper, Mueller (1970) estimated a comparatively simple static OLS model, subsequent studies discussed important issues such as serial correlation (Hibbs (1973/74)), non-stationarity (Ostrom and Smith (1992)) and the dynamic specification (Beck (1991a)). Handling these issues has led to a large number of differing econometric approaches. In the following, we discuss the most important issues separately, although many decisions are closely related to each other.

Serial Correlation

Time series analysis, especially when using high-frequency data, is plagued with serially correlated error terms. While serial correlation does not bias OLS-based regression coefficients, their *t*-statistics are artificially inflated and might spuriously show statistical significance when there is none. Mueller (1970), for example, found unemployment to have a statistically significant negative impact on presidential approval, while Hibbs (1973/74), who re-estimated Mueller's equation but corrected for serial correlation, came to the result that unemployment has no significant influence on approval rates. Beck (1991a, Table 1) finds similar results for both unemployment and inflation. Disregarding serial correlation thus might lead to inhomogeneous results. While most studies control for serial correlation, the employed approaches differ considerably.

Throughout the last 20 years, it became common practice to include a lagged dependent variable in the popularity function (e.g. Smyth et al. (1994, 1995, 1999), Nadeau et al. (1999), Newman (2002)). While a few authors justify this approach with a partial adjustment story (Beck (1991a), Smyth et al. (1999)), others explicitly state to choose this approach in order to avoid residual autocorrelation (Wisniewski et al. (2009)) or claim to follow the common practice (e.g. Nadeau et al. (1999, 123), Nicholson et al. (2002), Newman (2002)). In general, the use of partial adjustment models (i.e. lagged dependent variables) solves autocorrelation problems. However, these models make quite specific implicit assumptions on the lag structure of the effects of economic variables on presidential approval which are not always uncontroversial. For example Beck (1991) criticizes: "What are the costs of rapid swings in one's evaluation of the president? Why should […] approval not adjust fully each month? Just because the [partial adjustment] story has proven useful in economics it does not make it a natural story for political science".[35] In order to avoid such specific assumptions, various studies make use of generalized least squares (GLS) techniques such as the Cochrane-Orcutt or Prais-Winsten procedures (e.g. Hibbs (1973/74), Frey and Schneider (1978a) or Golden and Poterba (1980)). However, since these estimation procedures assume a specific (first-order autoregressive) process for the error term this approach has again its limitations.

An alternative and yet rarely used approach of dealing with autocorrelation is to use OLS estimators with heteroscedasticity- and autocorrelation-consistent (HAC) standard errors. The Newey-West (1987) variance estimator (HAC) corrects for autocorrelation and deflates the *t*-statistics to a reliable size without imposing unnecessary lag structures.

In order to study to what extent the approach of dealing with serial correlation has an influence on estimation results we re-estimate model M6 using four different estimation techniques. Model M10 is

[35]For a further discussion on the pros and cons of the inclusion of lagged dependent variables, see Achen (2000) or Keele (2006).

a partial adjustment model which is estimated using OLS. The models M11 and M12 employ the Prais-Winsten and the Cochrane-Orcutt GLS estimators. Finally, we calculate the Newey-West (1987) variance estimator (HAC) for model M6 and report the results as model M13.[36] Table 7 gives an overview on the estimation results.

Regardless of which estimation technique is used, the coefficient of the unemployment variable and inflation turns out to be significant at least on the 90% confidence level. However, for the Cochrane-Orcutt GLS estimators (M12) the levels of significance are considerably lower as for the other methods. The coefficient of the deficit variable is insignificant in the partial adjustment model (M10) and in both GLS estimations (M11, M12) while it turns out to be highly significant in the OLS model with HAC standard errors (M13). Thus, the applied estimation technique can have a strong influence on the significance of the estimated coefficients.

The magnitude of the estimated coefficients varies to some extent depending on the applied estimation technique. An increase of one percentage point in unemployment reduces popularity by 1.66 to 2.42 percentage points and a one percentage point increase in inflation reduces popularity by 0.86 to 1.80 percentage points. Since the coefficients for the budget deficit are insignificant for the models M10-M12, the difference to model M13 is quite large. Thus, the applied estimation technique is also not without influence on the magnitude of the estimated coefficients.

Finally, we also find considerable differences in the explanatory power of the four models. The partial adjustment model M10 performs much better than the three other models M11-M13 in this respect. However, this is primarily due to the fact that presidential popularity shows a considerable degree of persistence in the course of time. The inclusion of a lagged dependent variable thus increases the explanatory power considerably. While this might be interpreted as an indicator that the partial adjustment model is adequate we might also argue that the observed persistence simply results from the fact that the determinants of presidential popularity themselves change only slowly in the course of time. In the latter case, a partial adjustment model would be inadequate. Thus, the criterion of explanatory power is not suitable to differentiate between the partial adjustment model and the other estimation techniques while it is useful for discriminating between models M11-M13. Obviously, model M13 delivers the highest explanatory power among these models.

[36]The estimation of HAC standard errors involves the choice of a truncation parameter m, which we choose according to the rule proposed by Stock and Watson (2007). The parameter depends on the sample size T and is calculated as $m = 0.75\sqrt[3]{T}$. A detailed discussion can be found in Stock and Watson (2007) or, more formal, in Greene (2008).

Table 7: Estimation techniques / serial correlation

VARIABLES	(1) M6 app OLS	(2) M10 app OLS (part. adj.)	(3) M11 app PRAIS	(4) M12 app COCHRANE	(5) M13 app OLS (HAC)
lagged approval		0.74***			
		(0.04)			
unemployment	-1.76***	-0.63**	-1.99**	-1.66*	-1.76**
	(0.44)	(0.31)	(0.80)	(0.89)	(0.80)
inflation	-1.80***	-0.40***	-1.40***	-0.86*	-1.80***
	(0.20)	(0.13)	(0.45)	(0.50)	(0.37)
deficit	-1.66***	-0.28	-0.11	0.17	-1.66***
	(0.37)	(0.21)	(0.46)	(0.46)	(0.63)
Vietnam (cas)	-0.01***	-0.00***	-0.00	0.00	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Gulf War	21.66***	6.79***	7.05	6.92	21.66***
	(2.61)	(2.23)	(5.50)	(5.24)	(4.56)
War on Terror (cas)	-0.08**	-0.01	-0.01	-0.00	-0.08
	(0.04)	(0.02)	(0.01)	(0.01)	(0.06)
Watergate	-14.32***	-6.25***	-8.29*	-5.40***	-14.32***
	(2.28)	(1.09)	(4.48)	(1.90)	(3.57)
9/11	11.87***	9.61***	5.81	5.89*	11.87**
	(3.10)	(1.29)	(3.70)	(3.10)	(5.72)
neg domestic events	-3.27**	-2.16***	-0.56	-0.51	-3.27**
	(1.40)	(0.75)	(0.62)	(0.62)	(1.44)
neg foreign events	4.50***	-0.21	-0.71	-0.85	4.50**
	(1.67)	(1.19)	(1.33)	(1.29)	(1.81)
neg personal events	-0.42	-0.87	-0.22	-0.15	-0.42
	(1.19)	(0.85)	(1.14)	(1.22)	(2.31)
pos domestic events	8.91***	4.65**	3.18**	3.20**	8.91***
	(1.68)	(2.29)	(1.61)	(1.62)	(1.64)
pos foreign events	5.35***	5.21***	3.38***	3.42***	5.35***
	(1.64)	(0.90)	(0.64)	(0.63)	(1.59)
pos diplomatic events	2.91**	3.11***	2.46***	2.50***	2.91**
	(1.33)	(1.01)	(0.76)	(0.77)	(1.26)
pos personal events	4.80*	8.02**	2.77***	2.44**	4.80*
	(2.64)	(3.99)	(1.06)	(1.05)	(2.50)
time in office	-0.15***	-0.03***	-0.19***	-0.18*	-0.15***
	(0.02)	(0.01)	(0.07)	(0.11)	(0.03)
honeymoon	0.34**	0.25**	-0.04	-0.61	0.34
	(0.15)	(0.11)	(0.39)	(0.53)	(0.28)
divided govt	7.39***	2.44***	4.02**	2.76**	7.39***
	(1.36)	(0.79)	(1.70)	(1.25)	(2.37)
Eisenhower	-3.55	-0.26	11.57*	9.12	-3.55
	(2.73)	(1.24)	(6.69)	(22.93)	(5.09)
Kennedy	3.37	1.88	-1.41	-39.14*	3.37
	(3.30)	(1.54)	(8.97)	(22.86)	(5.88)
Johnson	-3.96	-0.12	3.02	-23.15	-3.96
	(2.96)	(1.43)	(7.03)	(20.87)	(5.31)
Nixon	-6.28**	-0.63	-0.59	-14.64	-6.28
	(2.67)	(1.40)	(6.97)	(21.31)	(5.16)
Ford	-4.34	-0.86	20.48**	20.84	-4.34
	(2.71)	(1.83)	(8.52)	(23.27)	(5.15)
Carter	0.79	0.59	9.48	3.34	0.79
	(3.24)	(1.49)	(7.52)	(23.01)	(5.99)
Reagan	0.58	0.51	14.24**	17.03	0.58
	(2.37)	(1.15)	(6.63)	(20.59)	(4.60)
Bush I	-2.74	-0.93	-7.06	-1.26	-2.74
	(2.83)	(1.41)	(7.44)	(20.08)	(5.73)
Clinton	-6.87***	-0.93	-1.31	7.51	-6.87
	(2.32)	(1.12)	(6.91)	(20.35)	(4.52)
constant	77.97***	18.79***	71.27***	66.29***	77.97***
	(2.82)	(3.97)	(8.47)	(20.10)	(5.30)
observations	603	569	603	569	603
R-squared	0.69	0.90	0.61	0.37	0.69

Robust (or HAC) standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

Summing up, we might conclude that choosing an appropriate estimation technique to deal with serial correlation is urgently necessary[37] and not without effect on both the estimated coefficients and the explanatory power. Since the OLS model with HAC standard errors performs best in our estimations, we stick to this technique in the following.

Stationarity

The issue of stationarity of the used time series was almost not discussed in the popularity literature until the work of Ostrom and Smith (1992).[38] Since it is well-known that the use of non-stationary variables can lead to spurious regression, it is remarkable that even after 1992 many papers do not mention the stationarity issue at all (let alone testing for stationarity). Using non-stationary time series can lead to biased estimators and unreliable *t* statistics. We will shortly discuss existing results from the literature before we turn to own stationarity tests.

As Ostrom and Smith (1992, Table 1) summarize, most papers *assume* stationarity on the part of the approval series, while their own tests indicate the approval series to be "integrated or near-integrated". Norpoth and Yantek (1983) and Yantek (1988), on the other hand, argue in favor of non-stationarity without employing explicit tests. Using the Dickey-Fuller test, Nickelsburg and Norpoth (2000) do not find a unit root in the Gallup series (1976-1996). Beck (1991a), Geys and Vermeir (2008), Wisniewski et al. (2009) and Geys (2010) come the same conclusion for different time periods. Thus, the majority of papers indicate the approval series to be stationary. Lebo et al. (2000) and Newman and Forcehimes (2010) have found the approval series to be fractionally integrated, i.e. the time-series is mean-reverting but still has a long memory.

The results for the economic series – mainly focusing on unemployment and inflation – are scarce and rather mixed. With respect to unemployment, Beck (1991a) and Geys and Vermeir (2008) find a unit root while Ostrom and Smith (1992) and Geys (2010) find no stochastic trend. Regarding the inflation series, most authors argue in favor of a stochastic trend (Ostrom and Smith (1992), Geys and Vermeir (2008), Geys (2010)), except for Beck (1991a) who finds statistical support against the null hypothesis of a unit root. Finally, Geys and Vermeir (2008) do not find a unit root in the deficit series but further evidence is lacking.

To evaluate the dynamic properties of our underlying time series, we perform a battery of standard unit root tests (Dickey-Fuller GLS, KPSS and Phillips-Perron test) testing for mean and trend

[37] This result is in line with the empirical evidence reported in Newman (2002), who finds significant coefficients for economic variables when using a simple OLS estimation. However, when performing robustness checks with five alternative modeling approaches to control for serial correlation the results turn out to be insignificantexcept for one inflation coefficient.

[38] Earlier studies that mention stationarity issues include Norpoth and Yantek (1983) and Yantek (1988) who find the economic series to be non-stationary.

stationarity in two different time intervals.[39] As indicated by the inconsistent evidence discussed earlier, we also find mixed evidence regarding the time series characteristics of all four variables. The KPSS test indicates that presidential approval, unemployment, inflation and the deficit are all non-stationary, while the other tests imply stationarity for the approval series and mixed results for the unemployment variable (for detailed results see the Appendix). In some cases, variables are found to be non-stationary in the restricted 1953-2006 sample, but turn out to be stationary when the test is applied to a longer time series. In few cases, the time series are stationary around a linear trend.

Given these results, it is hard to decide for or against the respective null hypotheses of the mentioned tests. Most authors (implicitly) assume stationarity of the time series and one might argue that at least the popularity and the unemployment series can hardly result from a non-stationary process since they are defined to the interval (0,100).[40] However, non-stationarity cannot be ruled out with certainty, for which reason many authors either take first differences or estimate error correction models (ECM). The former requires the differenced series to be stationary, the latter requires the series to be co-integrated, which is generally the case.[41] Table 8 shows the estimation results for the model in differences (model M14) and an error-correction model (model M15).

As we see, the chosen treatment of non-stationarity issues delivers quite heterogeneous results with respect to the economic variables. In the differenced model M14, only inflation turns out to be (weakly) significant. In the error correction model M15 both inflation and unemployment remain significant while the deficit drops out. Thus, the treatment of stationarity seems to matter quite a bit.

[39] In the short sample (*restricted*), we restrict the data to the 1953-2006 estimation period, while the long sample (*max*) stands for the longest available time series for each series to focus on the underlying data-generating process.
[40] See Ostrom and Simon (1992, 142) or Kirchgässner (2009, 11).
[41] Cointegration has been tested by estimating long-term relationship between approval and the economic variables (level) plus political control variables (wars and events are not included since they are assumed to have temporary effects which die out during the (re-) equilibriating process). The residuals have been tested with different stationarity tests. They are stationary, hence there is a common stochastic trend.

Table 8: Non-stationarity

VARIABLES	(1) M13 app	(2) M14 D.app	(3) M15 D.app
lagged approval			-0.25***
unemployment	-1.76**		
Δunemployment		-1.44	-1.88*
unemployment (lag)			-0.71**
inflation	-1.80***		
Δinflation		-1.16*	-1.18**
inflation (lag)			-0.34**
govt deficit	-1.66***		
Δgovt deficit		-0.09	-0.33
govt deficit (lag)			-0.25
Vietnam (cas)	-0.01***	-0.00	-0.00***
Gulf War	21.66***	1.27	6.48**
War on Terror (cas)	-0.08	0.01	-0.01
Watergate	-14.32***	-2.62*	-6.00***
9/11	11.87**	8.94***	9.54***
neg domestic events	-3.27**	-1.76**	-2.18***
neg foreign events	4.50**	-1.40	0.04
neg personal events	-0.42	-1.18	-0.79
pos domestic events	8.91***	3.74	4.55*
pos foreign events	5.35***	5.04***	5.27***
pos diplomatic events	2.91**	3.38***	3.22***
pos personal events	4.80*	8.83*	7.81*
time in office	-0.15***	0.01	-0.03**
honeymoon	0.34	0.20*	0.25**
divided govt	7.39***	0.49	2.41***
Eisenhower	-3.55	0.48	-0.15
Kennedy	3.37	0.35	1.96
Johnson	-3.96	0.90	-0.12
Nixon	-6.28	1.45	-0.70
Ford	-4.34	0.73	-1.15
Carter	0.79	0.93	0.36
Reagan	0.58	0.64	0.38
Bush I	-2.74	0.24	-0.97
Clinton	-6.87	1.06	-1.02
constant	77.97***	-2.27***	18.76***
Observations	603	569	569
R-squared	0.69	0.19	0.35

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

In the light of the fact that stationarity tests deliver quite inconclusive results for the considered economic variables, it might be useful to decide on the basis of theoretical arguments whether stationarity problems play a role and how to deal with them. By definition, approval and unemployment rates should be stationary. While both time series of inflation rates and deficits in principle could have unit roots, it is nevertheless quite unlikely that they in fact result from non-stationary processes. A policy of ever increasing deficit ratios will be hard to sustain in the long run. Similarly, continuously rising inflation rates typically end up monetary reforms, especially in democracies like the United States. We therefore decide to stick to model M13 assuming stationarity of all variables.

Dynamic Specification

So far, we have discussed static models, partial adjustment models and error correction models as a remedy to statistical problems (such as autocorrelation and non-stationarity) without mentioning the specific dynamics they imply. As displayed in Table 1, by far the most studies estimate static (before 1990) or partial adjustment models of presidential popularity. In his detailed comparison of dynamic specifications, Beck (1991a) comes to the conclusion that both static and partial adjustment models are inferior to error correction models, which allow the distinction between short- and long-term effects on presidential approval. However, he finds the empirical results to be very similar and argues that the choice of the dynamic specification can only be made on theoretical grounds. As a consequence, we should expect the different dynamic specifications to have a minor influence on the findings.

We have already estimated different dynamic specifications in the context of autocorrelation (M10) and non-stationarity (M14 and M15). Except for the difference model, unemployment and inflation remain statistically significant, though their dynamics change. The long-term effect in the partial adjustment model and the error correction model, however, are similar to the short-run effects in the static model.[42] On the contrary, the coefficient of the deficit variable looses statistical significance (we find neither short- nor long-run effects) whenever dynamic effects are introduced.

The decision on the dynamic structure of the estimation approach also includes the question whether the considered economic (and political) determinants should enter the popularity function contemporaneously or with a time-lag. With the exception of a small group of studies employing so-called transfer functions (resulting in some very odd lag structures, see Norpoth and Yantek (1983) and Yantek (1988)), most papers either use no lags or – in the context of economic variables – the first lag to account for publication and recognition lags.[43] Since most economic variables show high degrees of serial correlation, using lags of the right-hand variables does not alter the estimation results substantially. We therefore stick to the contemporaneous specification.

7. Sample Periods

Because the empirical literature on popularity functions evolved gradually since the early 1970s, it is not too surprising that these studies differ quite heavily in their sample periods. While some studies are concerned with single presidencies and estimate popularity functions on the basis of data from a couple of years,[44] others cover more than two decades – up to half of a century.[45] With respect to the

[42] The long-run coefficients for the unemployment variable are -2.6 (M10) and -2.8 (M15), respectively, thus, a bit higher than the coefficient in the static model M13. The inflation coefficient is -1.5 and -1.4, compared to -1.8 in the static model.
[43] For example, the U.S. Consumer Price Index (CPI) for a particular month is released in the middle of the following month and the employment situation is published in the beginning of the following month.
[44] See e.g. Kenski (1977a), Kernell (1978), Yantek (1988), Smyth et al. (1995), Dua et al. (1995) or Smyth et al. (1999).
[45] See Wisniewski et al. (2009), Geys (2010) or Newman and Forcehimes (2010).

sample size, the literature can roughly be subdivided into two different approaches. While long-sample studies with sample periods of more than 20 years in general assume the popularity function to be stable for long periods of time, short-sample studies allow the estimated coefficients to vary over the course of time and especially between presidencies.

Short-sample studies often suffer from a critically low number of observations. Especially when these studies find the coefficients of certain variables to be insignificant it is often unclear whether the referring variable in fact plays no significant role in determining presidential popularity or the number of observations is simply too small to deliver reliable estimates. However, when we expect the determinants of presidential popularity and/or their importance to change in the course of time, small-sample approaches are unavoidable.

It is an important and intriguing question whether the popularity function is stable in the course of time. Smyth et al. (1991,1995) report empirical evidence in favor of the hypothesis of structural change in the course of time and conclude "that one must be wary of using a single social preference function". Using a flexible least squares technique, Wood (2000) showed that the coefficients for economic variables vary over time, whereas McAvoy (2006) finds a stable influence of his economic policy variable, but a time-varying impact of foreign policy.

In order to find out about the influence of the choice of the sample period we compare the results of model M13, which covers the sample period of 1953 to 2006, with those of estimations of the same model for various sub-periods. In order to avoid the problems resulting from having too less observations, we refrain from estimating the model for single presidencies.[46] Instead, we subdivide our sample period into three periods of equal length of 17 years. While the number of sub-periods was chosen in an arbitrary way, doing so leaves us with about 200 observations per estimation. The estimation results are shown in Table 9.

Interestingly enough, the economic variables do not perform stable in the three sub-periods. While the rate of inflation, the unemployment rate and the budget deficit turn out to be highly significant in model M16 covering 1953-1970, the deficit becomes insignificant in both models using more recent data. When using sample data for the period of 1989 to 2006 (model M18) none of the economic variables turns out to be significant. Thus, the stance of the economy seems to have become less important for presidential popularity since the early 1990s. Moreover, even the significant coefficients show a considerable variation in size in the three models. At least the models M16 and M17 deliver a higher degree of explanatory power than model M13, which covers the whole period of 1953 to 2006.

[46] While many authors argue that the coefficients should differ between presidencies, one might question to which extent the change of the administration is the cause of changes in the popularity function. It is well possible and not unlikely that the respondents' preferences change gradually in the course of time.

Table 9: Sample period

VARIABLES (sample period)	(1) M13 App (53-06)	(2) M16 App (53-70)	(3) M17 App (71-88)	(4) M18 App (89-06)
unemployment	-1.76**	2.14***	-4.30***	-3.34
inflation	-1.80***	-1.24*	-1.66***	-1.52
deficit	-1.66***	-3.29***	1.09	-2.24
Vietnam (cas)	-0.01***	-0.01**	-0.02	
Gulf War	21.66***			20.46***
War on Terror (cas)	-0.08			-0.11*
Watergate	-14.32***		-13.63***	
9/11	11.87**			10.45*
neg domestic events	-3.27**	-2.76	-4.60	-1.60
neg foreign events	4.50**	4.98	0.32	1.43
neg personal events	-0.42	-2.75	-7.99***	3.98*
pos domestic events	8.91***	11.45***	6.12***	17.11**
pos foreign events	5.35***	4.12***	5.12**	7.59***
pos diplomatic events	2.91**	3.80	0.44	4.53***
pos personal events	4.80*	0.87	4.62**	
time in office	-0.15***	-0.24***	-0.10	-0.28***
honeymoon	0.34	0.27	1.62***	-1.37**
divided govt	7.39***	6.71**	4.02*	4.18
Eisenhower	-3.55	4.79		
Kennedy	3.37	4.86		
Johnson	-3.96	3.84		
Nixon	-6.28		-5.37	
Ford	-4.34		-5.73**	
Carter	0.79			
Reagan	0.58			
Bush I	-2.74			-0.12
Clinton	-6.87			-6.58*
constant	77.97***	51.96***	88.77***	94.85***
observations	603	199	191	213
R-squared	0.69	0.82	0.71	0.63

Robust (HAC) standard errors, *** p<0.01, ** p<0.05, * p<0.10

In the light of these empirical results one might suspect that the heterogeneity in sample periods of the existing empirical studies is responsible for much of the heterogeneous results as far as economic issues are concerned. Obviously, the total sample coefficients deliver only a very rough picture about the relationship between economic variables and presidential approval and can at most be interpreted as a long-term average effect allowing the conclusion that economic issues are not principally unimportant for presidential approval.[47] However, further work on the exact development of the coefficients over the course of time is yet missing but seems to be urgently necessary.

8. Functional Form of the Popularity Function

In the vast majority of the existing empirical popularity studies, the considered economic variables enter the regression equation in a linear manner. We followed this procedure in all earlier presented regressions. However, it is far from being clear that economic variables have a linear effect on presidential popularity. Provided the effect of economic variables on presidential popularity would in

[47] The results for the partial adjustment model, which are available from the authors on request, are similar.

fact be non-linear, the results of linear estimation approaches would heavily depend on the level of the independent variables. Since economic variables typically display some sort of hysteresis, especially short-sample studies would deliver highly inconsistent estimation results. Thus, the uncertainty about the functional relation between economic variables and presidential popularity might have contributed to the heterogeneity of the findings in the empirical literature. While non-linearities have rarely been studied in the context of popularity functions, some attempts have been made in the past which shall be discussed in the following.

Interestingly enough, the first attempt to introduce non-linearities into the population function has already been made in the seminal study of Mueller (1970). He argued that "an economy in slump harms a President's popularity, but an economy which is improving does not seem to help his rating [...] There is punishment but never reward."[48] In order to study, whether this sort of asymmetry in fact exists, Mueller (1970) constructed asymmetric economic variables and introduced these variables into the regression equation.[49] In order to follow this idea we estimate three models with asymmetric variables (see Table 10).

In the first variant, we construct three dummy variables for times of rising inflation, unemployment and budget deficits (these dummies have the value of 1 whenever the referring economic variable rose over the last 12 months and are zero otherwise). In model M19 we add an interaction term to the estimation equation. While unemployment and the unemployment dummy are insignificant, the interaction term turns out to be weakly significant. These findings are in line with Mueller's hypothesis. However, for inflation and the deficit only the level variable is significant.

In a second, we exchange the three economic variables against the difference between the actual value of the variables and their values at the beginning of the term of office (model M20). Doing so implies that the voters do not care about the absolute level of a variable but, rather, compare the performance of a government with the state of the economy when the term of office began. Model M21 is a slight variation of model M20 using the values at the beginning of the *presidency* as reference values. While the inflation and the unemployment variable turn out to be significant in both models, the budget deficit is insignificant in model M20 and only weakly significant (with a somewhat implausible positive sign) in model M21.

Altogether, we might conclude that we cannot rule out the possibility that voters react asymmetrically to changes in unemployment. Model M19 delivers a slightly better explanatory power compared to the linear model M13. For inflation, the results are ambiguous. While model M19 does not support asymmetries in the reaction on inflation, in the models M20 and M21 the asymmetric inflation

[48] However, macro-level evidence for this hypothesis is rather scarce.
[49] The analysis of this so-called grievance asymmetry has subsequently only rarely been repeated on the basis of macro-data. One of the rare exceptions is the work of Bloom and Price (1975) for the United Kingdom. In studies of micro-data, this approach is much more prominent (Nannestad and Paldam (1997)). However, the results are still not clear-cut (Paldam (2008, 536)).

variable turns out to be highly significant. However, the explanatory power of these models is not higher or even worse than the purely linear model. For the budget deficit we find no plausible evidence in favor of the hypothesis of asymmetric reactions.

The second approach of introducing non-linearities is to use squared variables in linear estimation approaches. Yantek (1988) was the first to investigate squared unemployment and inflation rates and found both variables to deliver significant coefficients while the level variables turned out to be insignificant. The idea to use squared economic variables was also used in a number of studies by Smyth and various co-authors.[50] Basically, these studies argue that a linear relationship would imply linear indifference curves between unemployment and inflation which would be at odds with the typically employed theoretical models. The quadratic specification, on the other hand, yields indifference curves that are concave to the origin.[51] Since the assumption of a linear relationship is more or less arbitrary, the quadratic approach is a possible alternative with at least some theoretical backing.[52]

[50]See, e.g., Smyth et al. (1991, 1994, 1995, 1999) and Dua et al. (1995).
[51] However, Smyth and co-authors do not include an additional linear term, thus forcing the relationship between unemployment, inflation and approval to be symmetrical to the ordinate axis. As model M23 shows, however, this would not dramatically affect their results.
[52]For the theoretical derivation of a quadratic welfare function see Woodford (2003).

Table 10: Asymmetries

VARIABLES	(1) M13 app	(2) M19 app	(3) M20 app	(4) M21 app
unemployment	-1.76**	-0.68		
unempl (rising)		7.03		
unempl (interaction)		-1.38*		
unempl (change term)			-4.52***	
unempl (change pres)				-5.72***
inflation	-1.80***	-1.68***		
infl (rising)		2.17		
infl (interaction)		-0.28		
infl (change term)			-2.36***	
infl (change pres)				-2.52***
deficit	-1.66***	-2.22***		
def (rising)		1.47		
def (interaction)		0.48		
def (change term)			0.62	
def (change pres)				1.63*
Vietnam (cas)	-0.01***	-0.01***	-0.01***	-0.01***
Gulf War	21.66***	21.55***	21.33***	21.83***
War on Terror (cas)	-0.08	-0.07	-0.13**	-0.12**
Watergate	-14.32***	-13.70***	-16.71***	-13.68***
9/11	11.87**	12.86**	15.05***	15.70***
neg domestic events	-3.27**	-2.81**	-2.92**	-2.76**
neg foreign events	4.50**	4.10*	1.76	0.93
neg personal events	-0.42	-0.05	2.64	1.56
pos domestic events	8.91***	8.37***	6.99***	7.20***
pos foreign events	5.35***	4.91***	6.07***	5.97***
pos diplomatic events	2.91**	3.30**	3.74***	3.35***
pos personal events	4.80*	4.54*	4.68**	4.46*
time in office	-0.15***	-0.15***	-0.10**	-0.07**
honeymoon	0.34	0.32	0.13	0.25
divided govt	7.39***	6.80***	8.52***	11.32***
Eisenhower	-3.55	-3.25	5.68	14.02**
Kennedy	3.37	2.81	8.21	12.52**
Johnson	-3.96	-4.69	1.69	5.36
Nixon	-6.28	-6.16	-4.84	-3.75
Ford	-4.34	-3.52	-15.50***	-14.13***
Carter	0.79	0.86	-4.71	0.27
Reagan	0.58	1.21	-13.55***	-14.92***
Bush I	-2.74	-2.17	-10.09*	-9.40
Clinton	-6.87	-5.67	-10.46**	-8.73
constant	77.97***	70.91***	62.64***	57.73***
observations	603	603	603	603
R-squared	0.69	0.70	0.65	0.69

Robust (HAC) standard errors, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

In Table 11 we report the results for two models including quadratic economic variables. In model M22 we follow the approach of Smyth et al. (1999) and use quadratic economic variables instead of

levels. While the coefficients of squared inflation and squared unemployment are negative and highly significant, the squared deficit turns out to be insignificant. The explanatory power remains unchanged when compared to the purely linear model M13. Model M22 implies that the effect of the economic variables on presidential popularity is symmetric to the ordinate axis. One might argue this to be unrealistic. We therefore re-estimate the model under the inclusion of both linear and quadratic terms (see model M23). However, while we find a significant linear-quadratic relationship for unemployment and popularity, the linear effect dominates as far as inflation and the deficit are concerned. Anyway, the linear-quadratic model M23 delivers a slightly higher explanatory power when compared to the purely linear approach of model M13.

Table 11: Quadratic economic variables

VARIABLES	(1) M13 app	(2) M22 app	(3) M23 app
unemployment	-1.76**		8.05***
unempl (sq)		-0.27***	-0.75***
inflation	-1.80***		-2.63***
inflation (sq)		-0.09***	0.06
deficit	-1.66***		-2.45***
deficit (sq)		-0.04	0.11
Vietnam (cas)	-0.01***	-0.01***	-0.01**
Gulf War	21.66***	21.88***	21.15***
War on Terror (cas)	-0.08	-0.08	-0.06
Watergate	-14.32***	-15.98***	-12.97***
9/11	11.87**	13.25**	11.20**
neg domestic events	-3.27**	-3.24**	-3.22**
neg foreign events	4.50**	3.81	2.90
neg personal events	-0.42	0.65	-1.08
pos domestic events	8.91***	7.55***	8.83***
pos foreign events	5.35***	5.20***	5.27***
pos diplomatic events	2.91**	3.02**	2.80**
pos personal events	4.80*	4.53*	3.48
time in office	-0.15***	-0.16***	-0.18***
honeymoon	0.34	0.43	0.27
divided govt	7.39***	9.82***	7.44***
Eisenhower	-3.55	3.29	-3.90
Kennedy	3.37	13.02***	-0.11
Johnson	-3.96	1.99	-4.03
Nixon	-6.28	-6.94	-6.03
Ford	-4.34	-7.18	-2.51
Carter	0.79	1.02	0.28
Reagan	0.58	-0.15	3.84
Bush I	-2.74	-6.64	-1.64
Clinton	-6.87	-5.59	-5.73
constant	77.97***	67.93***	50.15***
observations	603	603	603
R-squared	0.69	0.68	0.72

Robust (HAC) standard errors, *** p<0.01, ** p<0.05, * p<0.10
president dummy for President Bush Jr. left out

Summing up, we can conclude that our empirical results indicate that the effects of unemployment on presidential popularity might be non-linear. The results for inflation tend to be inconclusive while the deficit seems to have linear effects on popularity. However, due to the fact that we only tested for very specific types of non-linearities, we cannot rule out that the relation between economic variables and presidential popularity follows a more complex non-linear relationship. However, this question remains open to future research.

9. Summary and Conclusions

The numerous studies of the determinants of U.S. presidential popularity have delivered quite inconclusive results as far as economic factors are concerned. After reviewing this literature, we identified a number of factors which might have contributed to the mixed picture. Based on a large dataset we studied which of these factors are most heavily influencing the results. We might summarize our findings as follows:

- Three economic variables perform relatively stable in popularity functions of the U.S.: inflation, unemployment and the budget deficit. As long as we assume the popularity function to be stable throughout the sample period, increases in these variables cause a deterioration of presidential popularity.
- The concrete measures used for economic variables seems to be no major source of the inconclusive results.
- The way of dealing with serial correlation of presidential popularity is not without effect on the estimation results. When using OLS with heteroscedasticity- and autocorrelation-consistent (HAC) standard errors the results turn out to be more stable as in partial adjustment models or variants of GLS estimations.
- When estimating popularity functions in differences in order to account for time series containing unit roots, the results do not remain unaffected. However, one might suspect this is due to the loss of information in the data following from the differencing procedure.
- Except for the decision to use partial adjustment models, the dynamic specification of the popularity function is without major effect on the results.
- Our estimation results point into the direction that the choice of the sample period has a large effect on the results. Due to the fact that there is a large heterogeneity of the employed sample periods one might suspect this is the major reason for the inconclusive findings reported in the literature.
- We cannot rule out the possibility that the dominance of comparatively simple, linear estimation approaches has contributed largely to the mixed picture on the economic determinants of presidential popularity.

Assuming the existence of a stable popularity function we are able to explain 72% of the observed variation of U.S. presidential popularity in the period of 1953 to 2006 by using the linear-quadratic model (M23). Using OLS with heteroscedasticity- and autocorrelation-consistent (HAC) standard errors and controlling for a set of political events, three economic variables turn out to be significant determinants of presidential popularity: unemployment, inflation and the budget deficit.

Two major lines of future research on the determinants of presidential popularity could be identified. First, further research on the stability of the popularity function in the course of time seems to be urgently necessary. Second, the exact functional relationship between economic variables and presidential popularity needs to be studied in a more systematic way than it has yet been the case. Answers on both research questions would help understanding the interaction between the political sphere and the economy much deeper.

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Appendix: Stationarity Tests

Dickey-Fuller GLS

Dickey-Fuller GLS test (H0: time series is non-stationary around mean)								
variable	**sample**	**seq t (lag)**		**SC (lag)**		**AIC (lag)**		**obs**
approval	max	**	15	***	1	***	1	813
	restricted	***	17	***	1	***	1	628
unemployment	max	-	12	*	3	-	12	736
	restricted	-	15	*	4	-	12	628
inflation (s.a.)	max	-	17	-	13	-	17	736
	restricted	*	18	-	12	*	19	628
inflation (n.s.a.)	max	***	20	***	16	***	14	1141
	restricted	*	14	-	12	*	14	628
government deficit	max	-	15	-	3	-	3	745
	restricted	*	6	-	1	*	6	628

Note: Modified Dickey-Fuller *t* test (Elliott, Rothenberg, Stock (1996)) for different lag selections following Ng/Perron (1995, 2000). The maximum lag was chosen by the Schwert (1989) criterion. The (*), (**), (***) represent statistical significance at the 10%, 5%, 1% level, respectively.

Dickey-Fuller GLS test (H0: time series is non-stationary around linear time trend)								
variable	**sample**	**seq t (lag)**		**SC (lag)**		**AIC (lag)**		**obs**
approval	max	***	15	***	1	***	1	813
	restricted	**	17	***	1	***	1	628
unemployment	max	**	12	***	3	**	12	736
	restricted	-	15	*	4	-	12	628
inflation (s.a.)	max	*	17	-	13	*	17	736
	restricted	-	18	-	12	-	19	628
inflation (n.s.a.)	max	***	20	***	16	***	14	1141
	restricted	-	14	-	12	-	14	628
government deficit	max	**	15	**	3	**	3	745
	restricted	**	6	-	1	**	6	628

Note: Modified Dickey-Fuller *t* test (Elliott, Rothenberg, Stock (1996)) for different lag selections following Ng/Perron (1995, 2000). The maximum lag was chosen by the Schwert (1989) criterion. The (*), (**), (***) represent statistical significance at the 10%, 5%, 1% level, respectively.

KPSS

KPSS test (H0: time series is stationary around a mean)				
variable	**sample**	**opt lag**	**significance**	**obs**
approval	max	19	**	813
	restricted	17	*	628
unemployment	max	19	**	736
	restricted	18	**	628
inflation (s.a.)	max	19	*	736
	restricted	18	**	628
inflation (n.s.a.)	max	21	-	1141
	restricted	18	**	628
government deficit	max	19	***	745
	restricted	18	***	628

Note: KPSS test (Kwiatkowski et al. (1992)) for optimal lag following Newey/West (1994). The (*), (**), (***) represent statistical significance at the 10%, 5%, 1% level, respectively.

KPSS test (H0: time series is stationary around a linear trend)				
variable	**sample**	**opt lag**	**significance**	**obs**
approval	max	19	-	813
	restricted	19	***	628
unemployment	max	19	***	736
	restricted	18	***	628
inflation (s.a.)	max	19	***	736
	restricted	18	***	628
inflation (n.s.a.)	max	21	*	1141
	restricted	18	***	628
government deficit	max	19	**	745
	restricted	18	***	628
Note: KPSS test (Kwiatkowski et al. (1992)) for optimal lag following Newey/West (1994). The (*), (**), (***) represent statistical significance at the 10%, 5%, 1% level, respectively.				

Phillips-Perron

Phillips-Perron test (H0: time series is non-stationary around a mean)				
variable	**sample**	**opt lag**	**significance**	**obs**
approval	max	6	***	652
	restricted	5	***	569
unemployment	max	6	-	755
	restricted	6	**	648
inflation (s.a.)	max	6	***	755
	restricted	6	-	648
inflation (n.s.a.)	max	6	***	1163
	restricted	6	-	648
government deficit	max	6	-	764
	restricted	6	-	648
Note: Phillips-Perron (1988) test. Standard errors are calculated following Newey/West (1987). The (*), (**), (***) represent statistical significance at the 10%, 5%, 1% level, respectively.				

Phillips-Perron test (H0: time series is non-stationary around a linear trend)				
variable	**sample**	**opt lag**	**significance**	**obs**
approval	max	6	***	652
	restricted	5	***	569
unemployment	max	6	-	755
	restricted	6	-	648
inflation (s.a.)	max	6	**	755
	restricted	6	-	648
inflation (n.s.a.)	max	6	***	1163
	restricted	6	-	648
government deficit	max	6	*	764
	restricted	6	-	648
Note: Phillips-Perron (1988) test. Standard errors are calculated following Newey/West (1987). The (*), (**), (***) represent statistical significance at the 10%, 5%, 1% level, respectively.				