

Bread and the attrition of power: Economic events and German election results

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Abstract

Aggregate votes for incumbent parties in post-war Germany were determined by the weighted-average growth of real per capita disposable income. Each percentage point of per capita real disposable income growth sustained over the legislative term yielded approximately two percentage points of votes in Germany. No other economic variables add value or significantly perturb the coefficients of our model. However, attrition of power reduced the vote share in election years 1961, 1994 and 1998.

Keywords: Bread and Peace model; elections; vote share ; real per capita disposable income growth

JEL: E6, H11, P16

1 Introduction

There may be many reasons for supporting or opposing a government. However, German elections should be viewed as a sequence of referenda on the government's economic record. Growth of real per capita disposable income explains the variations in aggregate voting outcomes except 1961, 1994 and 1998. In the 1961, 1994 and 1998 elections the German chancellor sought re-election more than twice and received significantly fewer votes.

Although it is obvious that economic conditions affect voting behavior, there is a large body of literature examining the economic variables that are most important for voter decisions.¹ The main questions are:

1. Are voters backward- (Key 1966) or forward-looking (Downs 1957)?
2. If voters are backward-looking, how far back do they look and how much do they discount past events?
3. Do voters vote according to their pocketbooks or according to the national economic situation (Lewis-Beck 1988)?
4. How does the political system (accountability) affect the importance of economic variables?

We find support for the hypothesis that voters are backward-looking and that they consider the whole legislative term with only small discounting of past events. They vote according to their pocketbooks, i.e., the per capita disposable income growth. As in Hibbs (2008) for the United States we find that weighted-average per capita real growth in disposable income is the only economic variable that explains vote shares in Germany. Even though the United States and Germany have different political systems the only

difference between Germany and the United States we can identify is that the growth effect on vote shares in Germany is only half the effect in the United States. These results raise questions about some of the stylized facts summarized by Lewis-Beck and Paldam (2000: 114). Furthermore, in our estimation, inflation is irrelevant, contrary to the stylized fact that inflation and unemployment/growth are relevant for vote functions.

Our approach follows the literature explaining aggregate votes in terms of economic fundamentals. Fair (1978) identifies the change in real economic activity in the year of the election and a high discount rate on past economic performance. Lewis-Beck (1988) argues that voters do not vote on the basis of their own personal economic situation, but rather on the basis of national economic performance. Hibbs (1982, 2000) identifies the weighted-average growth of real disposable personal income over the complete term of office as the only important economic variable that explains voting in United States presidential elections. Whereas authors such as Frey and Garbers (1972), Kirchgässner (1974, 1985) and Frey and Schneider (1979) were pioneers in the field of popularity and policy reaction functions and thoroughly examined Germany, they used popularity rather than election results as the explanatory variable.² Obviously, for earlier analyses of the 1970s, there had not been enough data from post-war elections in Germany. However, we explain election results instead of polling results and therefore avoid the problems with polls: they cover fewer persons, do not have real effects and target subjects without advance notice and only before an election campaign.

Whereas the duties of the German federal president are largely representative and ceremonial, power is exercised by the Federal Chancellor (“Bundeskanzler”) who heads the Federal Government and thus the executive branch of the political system. He or she is elected by and is responsible

to the “Bundestag”, Germany’s main chamber of parliament, to which members are elected for four-year terms. In the election voters cast two votes, the first called “Erststimme” and the second “Zweitstimme”. The first vote is to elect members of parliament in single-seat constituencies using a first-past-the-post voting system. Aggregated second votes determine the seats a party receives in the Bundestag, although the precise number of seats won depends on some special rules.³ Therefore, the main vote is the second vote because it determines the weight for a party and, indirectly, the chancellor. With just one exception in post-World War II Germany, no single party has ever achieved an absolute majority of seats in the parliament. Therefore, parties join a coalition that elects a member of the largest coalition party as chancellor. These coalitions of parties usually hold for a full legislative term of four years.

This paper tests and extends the Bread and Peace model of Hibbs (2000) for Germany. To simplify matters, the paper broadly follows Hibbs (2000). We use, if possible, the same test variables with identical text headings as Hibbs (2000). Section 2 presents results for the model as applied to Germany. In Section 3 we examine the stochastic properties of our explanatory variables. Section 4 shows that other variables that might be useful in explaining election results can be omitted. Section 5 summarizes the results.

2 The Model

The Bread and Peace model assumes that growth in real disposable personal income per capita is the best single-variable election predictor because real disposable personal income includes income from all market sources and is adjusted for inflation, taxes, government transfer payments, and population

growth. It also includes the income effects of unemployment.

To determine the election result we define as vote share the share of votes⁴ for parties that were members of the ruling coalition in the legislative period prior to the election. Hibbs (2000) and Fair (1978) use the two-party vote share in their estimations to incorporate the effect of elections in which there are only two presidential candidates, but sometimes there is a third. They implicitly accumulate votes for the third candidate in proportion to the votes for candidates of the Republican and Democrat parties. This is appropriate for the United States, but is not necessary for the proportional system used in Germany, whereby a voter who wants to support the government may vote for a small coalition party.

We exclude the 1969 and 1983 election cycles. From 1966 to 1969 there was a grand coalition of both large parties and therefore even those voters who were disappointed with economic growth probably voted for one of these parties. In 1983 the government coalition was in office only for six months because one party switched coalitions during the term, and therefore a vote for the current government could have been a vote against the poor economic performance of its predecessor.

The equation used to generate the data depicted in Figure 1 is:

$$V_t = \beta_0 + \beta_1 \left(\frac{f_t \Delta \ln R_t + \sum_{j=1}^{l_t} \lambda^j \Delta \ln R_{t-j}}{f_t + \sum_{j=1}^{l_t} \lambda^j} \right) + \beta_2 \text{DUR}, \quad (1)$$

where

- V is the sum of vote shares of the parties making up the governing coalition at the time of the election.
- R is the per capita growth in disposable personal income deflated by the consumer price index, and $\Delta \ln R_t$ is the annualized quarter-

on-quarter percentage rate of growth, $\Delta \ln R_t = \ln(R_t/R_{t-1}) * 400$ expressed in annualized percentage points.⁵

- l_t is the number of quarters from the last election to the current election t , excluding the quarter of and the quarter after the previous election.
- f_t is a variable that captures the weight of the election quarter and equals the fraction of elapsed days on Election Day in that quarter to the number of all days in the quarter.
- $\lambda = 0.98$ as estimated in Table 7 measures the discounting of past events by voters.
- $f_t + \sum_{j=1}^{l_t} \lambda^j$ is a normalizing constant, so that β_1 registers the response of votes to movements in the weighted average of real income growth rates.
- DUR is a dummy variable (defined as in Fair 1996: 95) that equals 1 only if the chancellor is seeking re-election for the third time and 1.25 if the chancellor is seeking re-election for the fourth time. Before 1990, East German citizens were not allowed to cast votes for the Bundestag because the former GDR (East Germany) was an independent state. Therefore, in 1994 chancellor Kohl sought re-election for the third time in the former West Germany (approximately 83% of all voters) but for the first time in East Germany (approximately 17% of all voters). To capture reunification, the DUR variable is 0.83 for 1994 and 1.0375 for 1998, i.e., Fair's value multiplied by 0.83.

The parameters used to draw the trend line in Figure 1 are $\beta_0 = 44.98$, $\beta_1 = 2.00$ (as estimated in Table 1) and $\beta_2 = 0$ because DUR= 0 for most

elections. To demonstrate the attrition-of-power effect in 1994 and 1998, the predicted vote shares for these years (using the estimated DUR variable) are indicated by triangles. Furthermore, results without the DUR variable are presented in Table 7 in the Appendix. Considering the time period from 1972 to 2005, a coalition of parties that offers average growth during the term earns a vote share of 50.66% and each additional percentage point of growth adds 2.00 percentage points in votes. There is a bias that favors the parties in power.

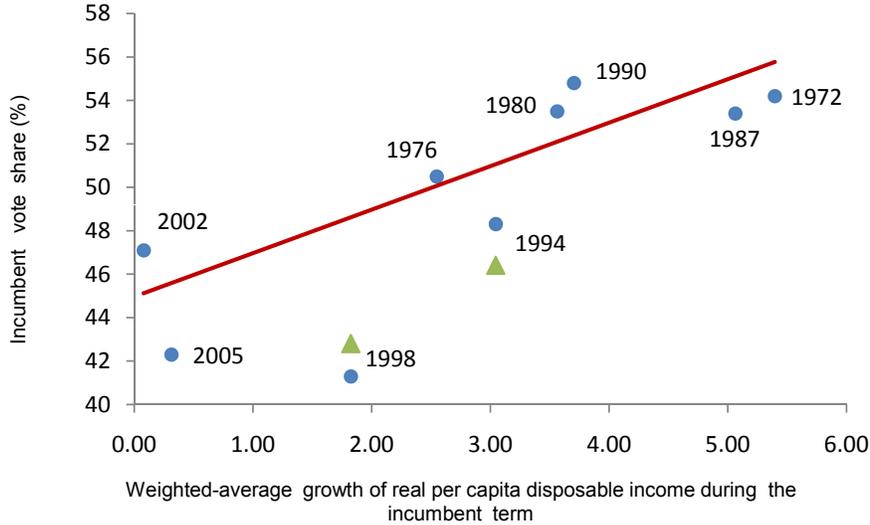


Figure 1: Weighted-average real per capita growth in disposable income and vote share of the incumbent party during 1972–2005 (quarterly data).

Because quarterly data for per capita disposable personal income are not available prior to 1970, we used yearly data to produce Figure 2. The equation used to generate the data depicted in Figure 2 is:

$$V_t = \beta_0 + \beta_1 \left(\frac{f_t \Delta \ln R_t + \sum_{j=1}^{l_t} \lambda^j \Delta \ln R_{t-j}}{f_t + \sum_{j=1}^{l_t} \lambda^j} \right) + \beta_2 \text{DUR}, \quad (2)$$

Incumbent vote share V	1972–2005	$N = 9$ elections	
	$R^2=0.83$	Adj. $R^2=0.78$	Root MSE=1.94
	Coef. estimate	Std. error	p-value
Constant β_0	44.98	1.62	.0000
Weighted-average per capita real disposable personal income growth rate, % (β_1)	2.00	.45	.0046
Chancellor for re-election more than twice DUR (β_2)	-5.60	2.05	.0340

Table 1: Model equation estimates for quarterly data

where definitions are as for Equation (1) with the exception of:

- R is the per capita growth in disposable personal income deflated by the consumer price index, and $\Delta \ln R_t$ is the percentage rate of growth, $\Delta \ln R_t = \ln(R_t/R_{t-1}) * 100$.
- l_t is the number of years from the last election to the current election t .
- f_t is a variable that captures the weight of the election year and equals the fraction of elapsed days on Election Day in that year to the number of all days in the year.
- $\lambda = 0.65$ as estimated in Table 8 measures the discounting of past events by voters.
- $f_t + \sum_{j=1}^{l_t} \lambda^j$ is a normalizing constant, so that β_1 registers the response of the vote share to movements in the weighted average of real income growth rates.

- DUR is defined as for Equation (1) and therefore equals 1 in 1961 because the German chancellor Konrad Adenauer was seeking re-election for the third time.

The parameters used to draw the trend line in Figure 2 are $\beta_0 = 47.75$, $\beta_1 = 1.62$ (as estimated in Table 2) and $\beta_2 = 0$ because DUR= 0 for most elections. To demonstrate the attrition-of-power effect in 1961, 1994 and 1998, the predicted vote shares for these years (using the estimated DUR variable) are indicated by triangles. The results are shown in Table 2. Furthermore, results without the DUR variable are presented in Table 8 in the Appendix.

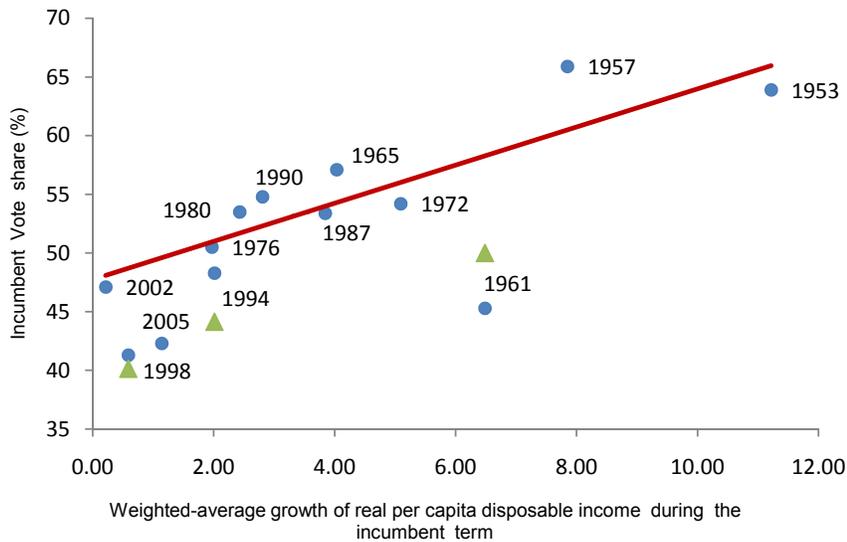


Figure 2: Weighted-average real per capita growth in disposable income and vote share of the incumbent party during 1953–2005 (yearly data).

The estimates without the DUR variable for the time periods 1972–2005 (Table 7 in the Appendix) and 1953–2005 (Table 8 in the Appendix)

Incumbent vote share V	1953–2005	$N = 13$ elections	
	$R^2=0.78$	Adj. $R^2=0.73$	Root MSE=3.39
	Coef. estimate	Std. error	p-value
Constant β_0	47.75	1.89	.0000
Weighted-average per capita real disposable personal income growth rate, % (β_1)	1.62	.36	.0011
Chancellor for re-election more than twice, DUR (β_2)	-8.28	2.67	.0113

Table 2: Model equation estimates for yearly data

show that the coefficient estimates for the constant and the personal income growth rate are in the range of one standard error of each other. This result does not hold if we include the DUR variable. The attrition-of-power effect for the 1961 election seems to be different from the effect in 1994 and 1998. Chancellor Adenauer’s attrition-of-power effect in 1961 is greater than that for Chancellor Kohl in the 1994 and 1998 elections (even if adjusted for reunification). Therefore, when we measure the attrition-of-power effect using only one dummy variable, we estimate the average effect, i.e., some values are above and some are below the average. For the 1998 election the estimated DUR effect is less than the actual value for quarterly data and higher in the case of annual data (Figures 1 and 2). In the case of quarterly data, the DUR dummy captures the average effect of 1994 and 1998, so the triangle point is lower than the actual 1994 value and higher than the actual 1998 value. For yearly data the DUR variable captures the average attrition-of-power effect for 1961, 1994 and 1998. Since the attrition-of-power effect seems to be greater in 1961 than in 1994 and 1998, the average value for

annual data is greater (larger negative term). As a result, we obtain a lower estimate for 1998, as shown in Figure 2. Therefore, we are reluctant to specify precisely the attrition-of-power effect for Germany.

Even though the political systems of the United States and Germany are quite different, our parameter estimates are quite similar to the results of Hibbs (2000, 2008). Comparing our results to those of Hibbs (2008) for 1952–2005 reveals that the constant for Germany is approximately one standard error smaller than the constant for the United States. The reason could be that Hibbs uses the two-party vote share and Germany has a multi-party system. There is a difference in the parameter for the weighted-average growth rate of per capita real disposable personal income, which is approximately two-fold greater for the United States than for Germany.

To estimate the weighting parameter λ we used a non-linear estimation approach. In the United States the election term is always 15 quarters (16 quarters for the presidential term minus the inauguration quarter) whereas in Germany it varies from term to term. For instance, the 2005 election term consisted of 11 quarters, the 2002 election term consisted of 15 quarters and the 1998 election term consisted of 14 quarters. Therefore, we modified the Hibbs (2000, 2008) method for estimating λ and found that $\lambda = 0.98$ minimizes the sum of squares of residuals for quarterly data and $\lambda = 0.65$ (which corresponds to a quarterly value of at least 0.90) for annual data. The Hibbs (2000) value is 0.909 and he cannot reject the hypothesis that $\lambda = 1$.

Table 6 in the Appendix shows that the largest prediction errors occur for 1957, 1961, and 2005. In 1957 the government profited from the launch of a generous pay-as-you-go pension system. In the 1961 election one of the opposition parties (FDP) campaigned to enter a coalition with the in-

cumbent party to get rid of the incumbent chancellor, and obtained a vote share approximately corresponding to the sum of the prediction error and the attrition-of-power effect. The election in 2005 was early because the chancellor had lost a vote of confidence.

The Bread and Peace model is of significance not only because it identifies fundamentals that are important for election results, but also because it makes it clear that no economic variable other than real disposable per capita income growth adds value or significantly perturbs its coefficients. Furthermore, Hibbs (2008) explains election outcomes in terms of objectively measured political-economic fundamentals and does not use dummy variables that are coded arbitrarily. However, the argument that voters eventually tire of a politician or a party cannot be rejected (Abramowitz 1988, Campbell and Wink 1990, Haynes and Stone 1994), especially for the German elections of 1961 and 1998. Therefore it is not surprising that attrition of power is an additional variable explaining German election results. Fair (1996, p. 95) uses a duration variable DUR that increases by $k = 0.25$ for each additional consecutive term of office for a party, starting with a value of 1 if the party has been in power for three consecutive terms. However, we define DUR in terms of the chancellor rather than the party or coalition in office. The United States president is not prone to the same attrition of power as a German chancellor because the United States president can be re-elected just once, whereas a German chancellor can hold office as long as his or her coalition wins majorities.

On the other hand it is impossible to identify statistically a peace effect in Germany. The number of German military fatalities due to unprovoked, hostile deployment of German armed forces in foreign conflicts not sanctioned by a formal parliamentary declaration of war, which is the Hibbs

(2008) definition of the peace variable, is zero for the whole period. Fair (1996) also corrects for war years, but defines war elections as dominated by World War I or II. The period in the present study does not cover either global conflict. To summarize, it is impossible to confirm the peace part of the Bread and Peace model for Germany.

3 Stochastic properties of real disposable personal income per capita

In this study, as usual when testing vote share functions, the number of observations is rather small. Therefore, it is of particular importance to take into account the stochastic properties of the dependent variable. We have estimated the equation

$$\Delta \ln R_t = \alpha + \delta t + \gamma \ln R_{t-1} + \sum_{i=2}^p \beta_i \Delta \ln R_{t-i+1} + r_t \quad (3)$$

to test for unit roots using the augmented Dickey and Fuller (1979) method. The estimated values for α , δ , and γ are shown in Table 3, with lag lengths reported in column p of the table. First we check for a deterministic trend in the estimated model. Regression 1 shows that the δ term is insignificant, i.e., there is no deterministic trend in the real disposable income per capita growth. Therefore, we omit the trend term in regressions 2 and 3. In regressions 2 and 3, if $\gamma = 0$, the series has a unit root, which means that it is non-stationary. The results for regression 2 show that the t -value of γ is less than the ADF critical value. Therefore, we accept the null hypothesis that the series has a unit root. To make the series stationary, we take the first-difference of log per capita disposable income, i.e., the growth in real per capita disposable income. The test result for regression 3 shows that the

t -value of γ is greater than the ADF critical value. This implies that growth in real per capita disposable income is stationary. It follows that quarter-to-quarter changes in log real disposable income per capita growth $\Delta \ln R_t$ are unforecastable, apart from an annualized drift rate α of approximately 0.23% per quarter. Therefore, r_t can be interpreted as “news” in real disposable income per capita growth rates that are permanently embodied in future real income stocks $\ln R$. Voters reward or punish the incumbent party at election time by evaluating the good or bad news that represents changes in the time path of mean real disposable personal income.

Model: $\Delta \ln R_t = \alpha + \delta t + \gamma \ln R_{t-1} + \sum_{i=2}^p \beta_i \Delta \ln R_{t-i+1} + r_t$

	α	δ	γ	p	$Adj R^2$	$LM\chi^2 sig.level$	ADF test value
1.	0.47 (1.58/0.12)	0.00009 (0.86/0.39)	-0.055 (-1.54/0.12)	4	0.87	0.28	-3.43
2.	0.23 (1.92/0.05)		-0.03 (-1.89/0.06)	4	0.86	0.36	-2.88
3.	0.003 (1.73/0.08)		-1.39 (-5.38/0.0000)	3	0.95	0.12	-2.88

Notes: Values in parentheses are (t -ratio/significance level).
1991:4, the first period of the revised disposable income, is omitted.

Table 3: Stochastic properties of the log real disposable personal income growth per capita (1970:01–2005:04)

Table 4 supplies additional evidence that log real disposable income per capita growth rates are unforecastable. Regressions 1, 2 and 3 show that runs of good and bad news have no systematic relationship to the party of the chancellor. If this were not the case, a voter motivated by real income performance would be endowed ex-ante with valuable information about the economic competence of candidates. The results for regression 4 indicate that the performance of incumbent parties also yields no useful information about likely growth rate deviations from drift immediately following their re-election.

$$\Delta \ln R_t - \alpha - \gamma \ln R_{t-1} - \sum_{i=2}^p \beta_i \Delta \ln R_{t-i+1} = r_t$$

$$r_t = C + \text{PoliticalPeriods}_{t-1}$$

	C	CDU term	SPD term	Terms following party re-election
1.	-0.001 (-0.56/0.57)	0.003 (0.80/0.42)		
2.	0.002 (0.56/0.57)		-0.002 (-.79/0.42)	
3.		0.002 (0.81/0.42)	-0.002 (-0.75/0.45)	
4.	0.003 (0.99/0.32)			-0.004 (-1.14/0.25)

Notes: Values in parentheses are (*t*-ratio/significance level).

1991:4, the first period of the revised disposable income, is omitted.

Table 4: Election terms and per capita real disposable personal income growth rate “news” 1970:1–2005:4

4 Omitted variables

To test the robustness of the estimated model, we investigated a number of variables other than disposable income growth and duration that are highlighted in the literature on vote shares. The results of these regression experiments are shown in Table 5. The second column of each row reports parameter estimates, t-ratios and significance levels (p-values) for the additional test variable. The third column gives the significance level for the null hypothesis of parameter equivalence between the bread and attrition of power model coefficients obtained for each test regression equation and the corresponding basic bread estimates in Table 1.⁶ All baseline variables remain significant upon introduction of the following variables.

Old news In our model we assume that backward-looking voters review the whole election period but ignore economic growth that occurred earlier. Therefore, we have to test whether economic performance prior to the last election influences voting decisions in the current election. As in Hibbs (2000), we use the lagged incumbent parties vote share, which summarize the economic performance of the pre-pre-election period, termed “old news”, as the test variable. The coefficient estimate of old news reveals that there is no spillover effect associated with the past performances of incumbent parties on current vote shares. The coefficient estimate for the vote share of the incumbent party in the previous election is essentially zero and the p-value for the hypothesis of joint parameter equivalence is 0.60.

Inflation and unemployment From the beginning of voting economics, inflation and unemployment have been the most popular measures of

performances of incumbent parties and of voters responses in terms of rewarding or punishing governments. Here we included the weighted average inflation and weighted average unemployment over the term as additional explanatory variables. Both variables were not significant and did not improve the fits of the models estimated in Table 1. Similarly, a change in unemployment is redundant, with a non-significant t-value, and a p-value of 0.97 shows the parameter equivalence to the estimates in Table 1.

Fair's economy Test variables 5,6 and 7 are Fair's three well-known variables: g_3 , the average growth rate of real per capita GDP in the first three quarters of the election year; p , the absolute value of inflation over the election term; and n -good, the number of "good news" quarters during the term in which annual GDP growth exceeds potential GDP growth, which we calculate using a Rodrick-Prescott 100 filter.⁷ The results demonstrate that these three variable adds no explanatory power to the estimated regression. However, the "good news" variable is significant if we define a reference value to make it significant or define it as the number of quarters in which GDP growth is higher than average growth.⁸ Test regressions 5, 6 and 7 demonstrate that the Fair variables do not add any value to the Germany Bread and Peace model.

Macroeconomic volatility In the literature (Cameron 1978, Rodrik 1999) the macroeconomic stability of economic wellbeing is identified as another important variable for democratic political outcomes. Following Hibbs (2000) we tested volatility as the standard deviation of disposable income growth over the term in test regression 8. Volatility was

also insignificant and the p-value demonstrates parameter equivalence to the coefficient estimates in Table 1. We also tested volatility based on inflation, but again obtained insignificant results.

Fiscal conservatism Pelzman (1992) found that each percentage point of growth in real federal spending per capita sustained for a year decreases the vote share of the incumbent party in presidential elections by more than three percentage points. The reason is that voters realize that additional fiscal expenditure will create excess tax burdens on them. Test regressions 9 and 10 demonstrate that cumulative changes in real per capita expenditure over the term and cumulative changes in government spending in proportion to GDP had no significant impact on the vote share of the incumbent coalition.

Changes in wealth: Stock prices Fama (1990) and Schwert (1990) propose that stock price change is a valuable indicator of investor market sentiment and forward macroeconomic expectations. Gleisner (1992) and Haynes and Stone (1994) report that each percentage point increase in the Dow Jones Industrial Average registered between January and October of the election year yields a vote share harvest of between 0.4 and 0.7 percentage points for the incumbent party's presidential candidate. To test the sensitivity of vote share to market sentiments and macroeconomic expectations, we used the DAX30 index. Conditioned on the estimated Bread and Peace model test regression 11, we find that stock price changes have no significant impact on the vote share of the incumbent coalition.

$$\text{Model: } V_t = \beta_0 + \beta_1 \left(\frac{f_t \Delta \ln R_t + \sum_{j=1}^{l_t} \lambda^j \Delta \ln R_{t-j}}{f_t + \sum_{j=1}^{l_t} \lambda^j} \right) + \beta_2 \text{DUR} + \beta_3 \text{test variables}$$

Test variable(s)	Test variable parameter estimates (t-ratio/signif. level)	Signif. level for equivalence of $\hat{\beta}_0, \hat{\beta}_1$, to benchmark estimates in Table 1 row 1
1. Old news (Incumbent coalition's vote share at last election)	0.30 (1.06/0.33)	0.60
2. Inflation	0.25 (0.42/0.69)	0.94
3. Unemployment rate	-0.10 (-0.29/0.77)	0.95
4. Change in unemployment	-0.21 (-0.41/0.69)	0.97
5. Election year output growth	0.25 (0.40/0.70)	0.96
6. Inflation over the term	0.11 (0.76/0.47)	0.83
7. Number of high-growth quarters, good news	0.08 (0.21/0.83)	0.97
8. Volatility (standard deviation) of $\Delta \ln R$ over the term	0.28 (0.50/0.63)	0.89
9. Per capita real govt. expenditure over the term	0.03 (0.66/0.53)	0.94
10. Govt. expenditure in proportion to GDP over the term	-0.07 (-0.16/0.87)	0.99
11. Stock prices: percent change in DAX30 for 10 months prior to the election month	-0.03 (-0.57/0.59)	0.95
12. Average yield spread (10-year bonds rate minus 1-year bond rate) during the 3 months following the election	-0.49 (-0.39/0.71)	0.95

Table 5: Robustness of the model to additional variables

Interest rate spread Forward-looking voters may use interest rate spreads as a predictor of output changes in advance (Estrella and Hardouvelis 1991, Estrella and Mishkin 1997), i.e., they expect that the larger the interest rate spread, the higher will be future output growth and the lower will be the future probability of a recession. The argument is endorsed by Berry et al. (1996), who find evidence that the interest rate spread affects employment, growth and inflation, which in turn directly or indirectly affects voter behavior. Combining forward-looking voters and interest spreads as an indicator of future growth, it follows that the higher the interest rate spread, the higher would be the vote share of the incumbent's party. In the present study, interest rate spread is calculated as the difference between the long-term (10-year) bond yield and the short-term bond yield (bonds with a 1-year maturity period). The regression results in model 12 show that interest rate spread has no significant impact on the estimated vote share in Table 1.

5 Conclusions

In Germany, the votes in general elections are determined by the weighted-average growth of real per capita disposable income during the election term. Considering the time period from 1972 to 2005, a coalition of parties that offers average growth during the term earns a vote share of 50.66% and each additional percentage point of growth adds 2.00 percentage points to votes. This result is in line with the Hibbs (2000, 2008) Bread and Peace model for United States presidential elections. However, the effect on the vote share is smaller in Germany than in the United States. Furthermore,

in the 1961, 1994 and 1998 elections, the vote share was significantly lower because the chancellor was seeking re-election after more than two terms in office and was a victim of the attrition-of-power effect. This result coincides with the Fair (1996) “duration” effect and the time-for-change effect of Abramowitz (1988, 2001). It is impossible to identify statistically a peace effect in Germany because the number of German military fatalities due to unprovoked, hostile deployment of German armed forces in foreign conflicts not sanctioned by a formal parliamentary declaration of war is zero for the time period considered in this paper, i.e., after World War II. As in Hibbs (2000), no other economic variables add value or significantly perturb the equation’s coefficients.

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Appendix

Election Year	Incumbent parties	% incumbent parties	% predicted vote	Prediction error	Weighted average real income growth	real income growth effect on votes	Attrition of power	Attrition of power effect on votes
1953	CDU/CSU/FDP/GB-BHE/DP	63.9	65.96	2.06	11.22	18.17	0	0
1957	CDU/CSU/FDP/GB-BHE/DP	65.9	60.49	-5.41	7.85	12.72	0	0
1961	CDU/CSU	45.3	49.98	4.68	6.48	10.50	1.00	-8.3
1965	CDU/CSU/FDP	57.1	54.29	-2.81	4.03	6.53	0	0
1972	SPD/FDP	54.2	56.01	1.81	5.09	8.25	0	0
1976	SPD/FDP	50.5	50.95	0.45	1.97	3.19	0	0
1980	SPD/FDP	53.5	51.69	-1.81	2.43	3.94	0	0
1987	CDU/CSU/FDP	53.4	53.98	0.58	3.84	6.23	0	0
1990	CDU/CSU/FDP	54.8	52.31	-2.49	2.81	4.55	0	0
1994	CDU/CSU/FDP	48.3	44.14	-4.16	2.01	3.26	0.83	-6.9
1998	CDU/CSU/FDP	41.3	40.12	-1.18	0.59	0.95	1.04	-8.6
2002	SPD/Grüne	47.1	48.09	0.99	0.21	0.35	0	0
2005	SPD/Grüne	42.3	49.60	7.30	1.14	1.85	0	0

Table 6: Votes, predictions and effects of fundamental determinants in German elections (fits and effects computed from estimates in Table 2.)

Incumbent vote share V	1972–2005	$N = 9$ elections	
	$R^2=0.64$	Adj. $R^2=0.51$	Root MSE=2.90
	Coef. estimate	Std. error	p-value
Constant β_0	43.34	2.33	.0000
Weighted-average per capita real disposable personal income growth rate, % (β_1)	2.16	0.72	.0233
Lag weight (λ)	0.98	0.07	0.0000

Table 7: Model equation estimates for quarterly data without DUR

Incumbent vote share V	1953–2005	$N = 13$ elections	
	$R^2=0.56$	Adj. $R^2=0.48$	Root MSE=4.74
	Coef. estimate	Std. error	p-value
Constant β_0	45.34	2.42	.0000
Weighted-average per capita real disposable personal income growth rate, % (β_1)	1.77	0.54	.0086
Lag weight (λ)	0.65	0.45	0.1804

Table 8: Model equation estimates for yearly data without DUR

Data Variables and Sources

Incumbent parties vote	percentage share	Der Bundeswahlleiter
Personal Disposable Income	Mrd in Euro	Statistisches Bundesamt
Population	thousand	Statistisches Bundesamt
Consumer Price Index	Base 2000 =100	Deutsche Bundesbank
Gross Domestic Product	Euro Billions	Deutsche Bundesbank
Govt. Expenditure	Euro Billions	Deutsche Bundesbank
Unemployment Rate	in percent	Deutsche Bundesbank
DAX 30 Index	in percent	Deutsche Bundesbank
Bonds yields (1 year and 10 years)	Yields	Deutsche Bundesbank

Table 9: Data Variables and Sources

Notes

¹See Drazan (2000), Hibbs (2006), Lewis-Beck and Stegmaier (2007), Nannestad and Paldam (1994), and Mueller (2003) for surveys of the literature.

²Cusack (1999), Feld and Kirchgässner (2000) and Geys and Vermeir (2008) use popularity ratings as well.

³1. A party has to get 5% or three seats in single-seat constituencies to get the proportional share. 2. A seat won in a single-seat constituency is guaranteed. 3. The proportional share is calculated with reference to single states.

⁴We use the share of valid “Zweitstimmen”.

⁵ The quarter-to-quarter growth of real per capita disposable income is calculated as $\Delta \ln R_t = \ln(R_t/R_{t-1})$. To compute growth in percentage terms it is multiplied by 100. To compute the annualized growth from quarterly data, quarter-on-quarter percentage of growth is multiplied by 4.

⁶Quarterly data are not available prior to 1970, and therefore robustness tests are based on the data set for 1972–2005.

⁷Since GDP growth patterns in Germany are dynamic over time in the sense that average growth was approximately 3.35 before reunification in 1990 and approximately

1.18 thereafter, we have incorporated the concept of good-news quarters as quarters with growth greater than potential output growth.

⁸Fair uses a reference value of 3.2 (and 2.9 in some cases) without relating them to fundamentals, but only to obtain a better fit.

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