Received: 4 April 2024 | Revised: 11 May 2024 | Accepted: 3 June 2024

DOI: 10.1111/ecpo.12299

ORIGINAL ARTICLE

ECONOMICS & POLITICS WILEY

Economic voting behavior: The peak-end growth rule

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Funding information
National Natural Science Foundation of China, Grant/Award Numbers: 72261147758, 71903121

Abstract

This paper introduces the peak-end rule to economic voting, finding that voters focus on peak and end economic growth when evaluating incumbents. Cross-national data from 595 elections in 70 countries (1960–2020) shows that the average of the highest GDP growth rate during the term and the growth rate in the election year positively impacts incumbent vote share, with peak growth having a stronger effect. Instrumental variable analysis addresses endogeneity. Heterogeneity analysis reveals that less-educated voters rely more on the peak-end rule. The findings contribute to understanding voters' behavioral patterns and improving democratic accountability.

KEYWORDS

cross-national, economic voting, election, myopic, peak-end rule, voter rationality

1 | INTRODUCTION

Voting is the cornerstone of democracy, and understanding how voters evaluate and respond to the performance of incumbent governments is crucial for both political science and economics. A large body of literature has shown that both economic and political factors play important roles in shaping electoral outcomes, often interacting in complex ways. On the one hand, partisan differences in macroeconomic policies can significantly influence economic growth and fluctuations (Alesina & Sachs, 1988; Hibbs, 1977). On the other hand, voters' political preferences (Gerber et al., 2010) and the degree of elite polarization can constrain the policy choices of parties in power (Bartels, 2002).

However, even as political factors play a crucial role in voting behavior and may sometimes overshadow the effects of economic conditions (Ellis & Ura, 2021), a large body of literature on economic voting has shown that voters tend to reward or punish incumbent governments based on their economic performance (Alesina et al., 1993; Lewis-Beck & Stegmaier, 2000, 2013; Nannestad & Paldam, 1994). This suggests that economic performance has an independent and robust influence on electoral outcomes, even when accounting for the complex interplay between politics and the economy (Lewis-Beck & Stegmaier, 2013).

In their comprehensive review of the economic voting literature, Lewis-Beck and Stegmaier (2013) find that while there is a consensus on several key aspects of economic voting, such as the greater importance of sociotropic (Erikson et al., 2002; Kramer, 1983) and retrospective evaluations (Anderson, 2000; Duch & Stevenson, 2008), the debate remains open regarding the time horizon over which voters evaluate economic performance. Some studies argue that voters are rational and forward-looking, basing their decisions on the overall economic performance throughout the incumbent's term (Aytaç, 2018; Brender & Drazen, 2008; Ferris & Voia, 2021; Hibbs, 2000), while others suggest that voters are myopic and focus disproportionately on economic conditions in the period leading up to the election (Dassonneville & Lewis-Beck, 2014; Healy & Lenz, 2014; Kramer, 1971). However, existing studies have paid insufficient attention to how voters respond to the temporal dynamics of economic conditions. Moreover, they face considerable challenges in identifying exogenous variations in economic conditions, which limits the credibility of causal inference.

This paper argue that this debate can be reconciled by drawing on insights from behavioral economics, particularly the peak-end rule. This rule, first proposed by Kahneman et al. (1997), posits that people's retrospective evaluations of experiences are disproportionately influenced by the most intense points (peaks) and the final moments (ends), rather than the average of the entire experience. The peak-end rule reflects a memory bias in which people tend to overweight the most emotionally salient and recent experiences when evaluating the past (Fredrickson & Kahneman, 1993). The peak-end rule has been widely documented in various domains, such as perception psychology (Schreiber & Kahneman, 2000), affective and cognitive psychology (Fredrickson & Kahneman, 1993), media psychology or consumer behavior research (Hands & Avons, 2001), food and nutrition psychology (Robinson et al., 2011) and medical psychology or patient behavior research (Redelmeier & Kahneman, 1996), its implications for economic voting have yet to be fully explored.

Recent research in political science and psychology suggests that voters may not evaluate incumbents' performance in a fully rational manner, but rather rely on heuristics or cognitive shortcuts that can lead to biased decisions. For instance, Healy and Lenz (2014) provide experimental evidence that voters intend to reward politicians based on cumulative growth over their tenure, but are disproportionately swayed by the economic performance in the final year before the election. They argue that this "end heuristic" arises because the election-year economy serves as a salient and accessible information shortcut for voters to evaluate the incumbent's overall performance. Similarly, Huber et al. (2012) conducted a series of experiments to understand whether biases observed in real-world elections, such as overweighting recent events, could be replicated in a controlled setting. They found that participants indeed outweighed recent performance, were influenced by irrelevant information, and were susceptible to rhetorical framing when evaluating incumbents.

These findings suggest that voters face inherent cognitive limitations in making informed decisions based on incumbents' performance, and highlight the need to consider how the temporal dynamics of economic conditions shape electoral choices. However, while the "end

heuristic" emphasizes the importance of the final period, it does not fully capture the potential role of other salient or intense periods, such as economic booms or recessions, in shaping voters' evaluations. This raises the question of whether the peak-end rule may provide a more complete account of how voters respond to the temporal dynamics of economic performance.

The most direct evidence for the applicability of the peak-end rule to economic voting comes from a recent field experiment by Galiani et al. (2019). By manipulating the timing and size of conditional cash transfers to poor households in Honduras before the 2013 presidential election, they found that larger transfers in the peak and end periods significantly boost voter turnout and support for the incumbent party, regardless of the cumulative amount transferred. While this study provides compelling micro-level evidence for the peak-end rule in a specific context, it remains unclear whether the findings generalize to other countries and policy domains, or more aggregate measures of economic performance.

Our paper aims to address these gaps by providing the first comprehensive test of the peak-end rule in economic voting using cross-national observational data. Specifically, this paper construct a large panel dataset covering 595 democratic elections in 70 countries from 1960 to 2020 and measure the peak and end economic growth within each incumbent government's term. By leveraging both within-country variation in economic growth patterns and cross-country variation in political institutions, this paper can estimate the causal effect of peak and end growth on incumbents' electoral performance, while accounting for potential confounding factors at the country and year level. This approach allows us to test the generalizability of the peak-end effect across diverse institutional and cultural contexts, extending the external validity of previous experimental studies. To further address endogeneity concerns, this paper employ an instrumental variable strategy that exploits exogenous shocks to countries' economic growth stemming from fluctuations in global oil prices and US interest rates. This approach allows us to isolate the causal effect of peak and end growth on voting outcomes, providing a more credible test of the peak-end rule compared to previous observational studies.

Our findings provide strong evidence that voters follow the peak-end rule when evaluating incumbents' economic performance. Specifically, this paper find that a one percentage point increase in the average of peak and end growth rates leads to a 1.5 percentage point increase in the incumbent party's vote share, controlling for the overall economic performance during the term. Moreover, this paper find that the effect of peak growth is significantly stronger than that of end growth, suggesting that voters are more attentive to extremely positive outcomes than to recent conditions. Finally, this paper show that the peak-end effect is more pronounced in countries with lower levels of education, consistent with the idea that less informed voters are more susceptible to behavioral biases.

Our paper makes several contributions to the literature. First, this paper introduce the peak-end rule to the study of economic voting, thereby shedding light on the pivotal role of peak economic growth within a leader's term in influencing electoral outcomes. While Galiani et al. (2019) provide micro-level experimental evidence for the peak-end rule in the context of a specific cash transfer program, our study is the first to test this theory using comprehensive cross-national data on election outcomes and economic performance. Compared to the extant literature, which predominantly relies on country-specific studies and focuses on the significance of economic growth in the election year (Arel-Bundock et al., 2021; Dassonneville & Lewis-Beck, 2014; Powell & Whitten, 1993), our paper propels the discourse forward by examining the peak-end rule across a wide range of institutional and economic contexts. Furthermore, our study builds upon and extends the work of Healy and Lenz (2014) and other researchers who have investigated the role of election-year economic growth in shaping voters'

evaluations of incumbents. While these studies have highlighted the importance of recent economic conditions, our paper reveals that voters are not only swayed by the final year but also by the most extreme positive economic outcomes experienced at any point during the incumbent's tenure. By directly measuring the peak and end of economic growth within each leader's term, this paper provide a more precise and comprehensive test of the peak-end rule, demonstrating that the peak component plays a particularly crucial role in influencing electoral outcomes.

Second, this paper employs an instrumental variable strategy to address the endogeneity problem, a critical issue that has been identified but scarcely addressed in economic voting studies. The economic performance of countries with close economic ties may exert influence on both the economic and electoral outcomes within a nation (Aytaç, 2018; Freitas et al., 2020), which leads to the endogeneity problem. While Galiani et al. (2019) use an experimental design to establish causality, their approach is not feasible for large-scale observational studies like ours. To tackle this issue, this paper introduce two instrumental variables: the global oil price and the US federal funds rate. By exploiting the exogenous variation in economic growth induced by these global economic factors, this paper can estimate the causal effect of peak-end economic performance on electoral outcomes more credibly than previous observational studies.

Third, our study contributes to the literature on political business cycles (PBC) and related theories, which posit that incumbents manipulate economic policies before elections to boost their re-election prospects (Alesina et al., 1997; Dubois, 2016; Kern & Amri, 2021; Nordhaus, 1975). These theories crucially depend on the assumption that voters are myopic and focus primarily on economic performance in the period leading up to the election. Our findings on the peak-end rule suggest that voters' economic evaluations are more nuanced, as they also consider the peak performance during the incumbent's term. This insight opens up a new perspective on the factors influencing the occurrence and magnitude of political business cycles.

In the next section, the datasets will be described in detail, as well as the empirical strategy. In Section 3, the baseline result will be presented. Section 4 also presents robustness checks. Heterogeneity analysis will also be studied in Section 5. Finally, Section 6 concludes.

2 | DATA AND EMPIRICAL STRATEGY

2.1 | Data and variables

This study constructs a comprehensive cross-national dataset covering 70 countries from 1960 to 2020, focusing on election years with a positive democracy level. The democracy level data is obtained from the Polity IV dataset provided by the University of Maryland. Polity IV dataset offers a comprehensive examination of political systems across countries, measuring levels of democracy and autocracy. The dataset quantifies political attributes on a scale ranging from −10 (strongly autocratic) to +10 (strongly democratic), assessing aspects such as the competitiveness of political participation, the openness and fairness of elections, and the checks on executive power. According to Brender and Drazen (2008), only the countries with a positive Polity IV value were chosen into our samples. This paper obtain the economic variable, the annual percentage growth rate of GDP at market prices based on constant local currency, from the World Bank. Political information, including political structure, is acquired from the Database of Political Institutions, also maintained by the World Bank. Election results from 1990 to 2020 are gathered from the International Foundation for Electoral Systems, while data

from 1960 to 1990 are collected from election data handbooks (Nohlen et al., 2004). Furthermore, information on the term of each government leader is obtained from Zarate's Political Collections.

The incumbent party is defined as the party to which the head of government belongs at the beginning of the election, having governed for more than 2 years. If the head of government resigns within 12 months before the election, their party is still considered the incumbent party, as they are held accountable for the economic performance during their term. In parliamentary democracies, the vote share is calculated as the ratio of seats won by the incumbent party to the total number of seats in the legislature after the election. In presidential systems, the vote share is the percentage of votes won by the incumbent party in the final round of the upcoming election. Data on vote share and parliamentary seats are collected from the Database of Political Institutions and the Parliament and Government Composition Database (Döring & Manow, 2012).

Based on the concept of remembered utility (Kahneman et al., 1997), this study employs the average of the peak and end economic performance to represent voters' impressions. Additionally, it incorporates military expenditure, trade openness, corruption, and government expenditure as control variables. Military expenditure, expressed as a percentage of GDP, is obtained from the Stockholm International Peace Research Institute. Trade openness is calculated as the ratio of the sum of import and export values to GDP, with raw data sourced from the CEIC Database, International Monetary Fund, and World Bank. Corruption data, specifically the extent of political corruption, is derived from the Varieties of Democracy Project. Government Expenditure data is derived form the World Bank Dataset. The data sources are summarized in Table 1.

2.2 | Empirical strategy

Before delving into how the peak-end rule operates in economic voting and introducing our empirical strategy, this paper need to clarify that our mechanism rests on two key assumptions. First, this paper assume that economic voting does exist and primarily follows the characteristics of sociotropic voting and retrospective voting, that is, voters reward or punish the incumbent party based on their retrospective evaluation of the overall economic situation. This assumption is supported by a large body of empirical research (Alesina et al., 1993; Lewis-Beck & Paldam, 2000; Lewis-Beck & Stegmaier, 2013; Nannestad & Paldam, 1994). Second, this paper assume that in nonextreme cases, political factors such as partisan affiliations, political polarization, and others, while important, do not completely dominate voters' decision-making process to the point of rendering economic factors entirely irrelevant.[1] In other words, this paper posit that voters consider both political and economic factors when casting their ballots, weighting them according to their relative importance. Under these premises, our mechanism takes political factors as given and focuses on exploring how economic evaluations, particularly the peak-end rule, shape voting behavior in the economic voting. This does not imply that political factors can be ignored; rather, to more clearly elucidate the psychological mechanisms of economic voting, this paper deliberately control for the influence of political factors in our mechanism. In our empirical model, the endogeneity of political factors in economic voting will be addressed through an instrumental variable (IV) strategy.

Galiani et al. (2019) suggest that the peak-end rule may play a significant role in shaping voters' evaluations of incumbents' economic performance. They propose two potential mechanisms through which the peak-end rule might operate in the context of economic voting. First, voters may

TABLE 1 Source of data.

Election data	Database of Political Institutions	The World Bank
	Electionguide.org	International foundation for Electoral systems
	World Political Leaders	Zarate's Political Collections
	Parliament and government composition database	Doring and Manow (2012)
	Elections in Africa: A Data Handbook	Nohlen et al. (1999)
	Elections in Asia and Pacific: A Data Handbook, vol. I	Nohlen et al. (2004)
	Elections in Asia and Pacific: A Data Handbook, vol. II	Nohlen et al. (2004)
	Elections in the Americas: A Data Handbook, vol I	Nohlen (2005)
	Elections in the Americas: A Data Handbook, vol II	Nohlen (2005)
Political system	Database of Political Institutions	The World Bank
GDP growth rate		The World Bank
Government Expenditure		The World Bank
Mining activities	usgs.gov/centers/nmic/data-tools	National Mineral Information Centre
Military expenditure		Stockholm International Peace Research Institute
Trade openness		CEIC Data
		International Monetary Foundation World Bank
Corruption		
Energy	eia.gov	US Energy Information Administration
Interest rate		Federal Reserve Bank

simply rely on peak-end heuristics as a cognitive shortcut, given the inherent difficulty of recalling and aggregating economic information over an entire electoral term. Second, voters may deliberately focus on peak and end economic conditions as the most informative signals of incumbents' competence or preferences, particularly in the period leading up to an election.

Building upon these insights, this paper argue that the peak-end rule can provide a useful framework for understanding voters' retrospective evaluations of incumbents' economic performance in a cross-national context. When making retrospective economic voting decisions, voters may evaluate the peak and end moments of the incumbent party's economic performance throughout their term. If voters are satisfied with both the peak and end economic performance, they will vote for the incumbent party; otherwise, they will choose other parties.

This behavior can be attributed to two factors, which extend the mechanisms proposed by Galiani et al. (2019) to a macro-level context. First, impressive economic events, often accompanied by extremely high or low GDP growth, tend to capture voters' attention. These salient episodes may serve as heuristic devices that voters use to evaluate the incumbent's overall performance, even if they do not reflect the average economic conditions during the term.

Second, economic performance close to the election is more salient compared to the rest of the term, as it is more easily retrievable from memory. Voters may interpret strong economic performance just before an election as a signal of the incumbent's competence or future policy intentions, making it particularly influential in shaping their voting decisions. In contrast, earlier economic performance may be discounted or forgotten, even if it was relatively strong.

Consequently, these peak and end moments are expected to have a critical impact on the election outcome, as predicted by the peak-end rule. Based on this discussion, the empirical model can be specified as follows:

$$\text{VoteShare}_{\text{it}} = \delta_i + \gamma_t + \beta_1 \,\text{peakend}_{\text{it}} + X + \varepsilon_i, \tag{1}$$

$$\text{VoteShare}_{\text{it}} = \delta_i + \gamma_t + \beta_1 \,\text{peak}_{\text{it}} + \beta_2 \text{end}_{\text{it}} + X + \varepsilon_i. \tag{2}$$

Our empirical analysis is based on a panel dataset covering 70 countries over the period 1960–2020. The dataset is structured at the country-election year level, meaning that each observation represents a unique combination of country i and election year t. Therefore, the subscripts i and t in Equations (1) and (2) denote countries and election years, respectively. The dependent variable $\text{VoteShare}_{\text{it}}$ represents the percentage of the vote share received by the incumbent party in the election held in country i and year t. It is important to note that this variable is only observed in election years, while the economic growth variables on the right-hand side of Equations (1) and (2) are measured over the entire term of the incumbent party. δ_i is the country fixed effect, and γ_t is the year fixed effect. In Equation (1), $\text{peakend}_{\text{it}}$ is calculated as the arithmetic average of the highest GDP growth rate during the term of incumbent party and the GDP growth rate in the final year of that term, as the peak-end rule theory predicted. The term is defined as starting from the date the political party took office and ending on the date of the election.

To calculate, this paper first identify the highest GDP growth rate achieved during the incumbent party's term and the GDP growth rate in the final year before the election. These two values are then averaged to obtain $\text{peakend}_{\text{it}}$. It is worth noting that the determination of which years are included in the incumbent party's term depends on the timing of the election. Specifically, if the election is held before June 30th, the economic performance of the election year itself is not considered part of the current term but will be included in the calculation for the next term. Conversely, if the election is held after June 30th, the election year's economic performance is considered part of the current term but will not be included in the calculation for the next term.

Prior studies have shown that economic performance in the final year of an incumbent's term plays a critical role in election outcomes (Dassonneville & Lewis-Beck, 2014). Consequently, it is plausible that the average of peak and end GDP growth rates may significantly influence election results due to the incorporation of the final year's GDP growth. However, it is also possible that only the final year's economic performance, not the peak GDP

growth throughout the term, contributes to this impact. To address this potential ambiguity and ensure a clear understanding of the separate influences of peak and end GDP growth rates, this study decomposes the peak-end GDP growth into two distinct components, as demonstrated in Equation (2). In Equation (2), peak_{it} represents the highest GDP growth in the term, and the end_{it} represents the GDP growth in the final year of the term. X are the control variables, including military expenditure, trade openness and corruption index, and government expenditure. Military expenditure is measured as a percentage of GDP. Trade openness is measured by the ratio of the sum of the import and export values to the GDP. The corruption index measures the pervasiveness of political corruption, with a higher value indicating a higher level of corruption. The government expenditure also measured as a percentage of GDP. ε_i is the error term.

To obtain causal estimates of the impact of peak and end-period GDP growth rates on election outcomes, this paper employ an identification strategy that addresses two types of endogeneity concerns within our model. The first arises from omitted variables that may affect both economic growth and election results. The second stems from the potential correlation between peak-end growth and cumulative growth over the incumbent's term.

To tackle the first type of endogeneity, this paper use an instrumental variable approach. This paper employ two instruments: the change in global oil prices interacted with the export value share of oil relative to the GDP and the US federal funds effective rate interacted with a country's degree of financial integration. The rationale behind these IVs is that they capture the interaction between an exogenous shock (i.e., oil price or interest rate changes) and a country's exposure to that shock (i.e., oil exports or foreign assets and reserves). These strategy can strength the relevance between instruments and independent variables and also ensure the exogenous restriction will not be violate. While the interaction exogenous shock of natural resources and a country's endowment in natural resource is used as instruments for economic growth in Brückner & Grüner (2020) and Rao et al. (2018) in the studies of political extremism, this paper extend the idea behind the instruments in our studies and use US federal funds effective rate interacted with a country's degree of financial integration as a new instruments.

The change in international oil prices, weighted by each country's export value share of oil relative to the GDP, has been discussed in detail in previous studies (Acemoglu et al., 2013; Brückner & Grüner, 2020). As an important energy source, oil price fluctuations critically impact economic growth, especially in countries with a large petroleum industry, while being plausibly exogenous to election outcomes due to the presence of OPEC.[2]

Furthermore, this paper introduce the US federal funds effective rate as a novel instrument. This paper instrument peak-end growth with the average federal funds rate during the same 2 years used to calculate peak-end growth. Previous papers have studied the spillover effects of the federal funds rate on the global economy (Georgiadis, 2016; Iacoviello & Navarro, 2019). Importantly, the Federal Reserve has prioritized domestic monetary policy over international financial stability since 1973, making it unlikely that the Fed would directly influence foreign elections (Eichengreen, 2013). To account for heterogeneous responses to changes in the federal funds rate, this paper interact it with each country's degree of financial integration, measured by its external assets and foreign reserves (Lane & Milesi-Ferretti, 2017). The degree of financial integration will be used as a measure a country's exposure to the shock of US federal funds effective rate.

The validity of our instruments relies on their relevance and exogeneity. This paper argue that both instruments satisfy the relevance condition as important drivers of economic fluctuations. While difficult to prove definitively, this paper contend that they are plausibly

exogenous to election outcomes, being determined by factors largely outside the control of any single country.

However, addressing the endogeneity of economic growth does not directly tackle the endogeneity of peak-end growth. As argued by Healy and Lenz (2014), cumulative economic growth over the incumbent's entire term may influence election outcomes in addition to peak-end growth. The endogeneity of peak-end growth arises because it is likely correlated with cumulative growth, which is not fully captured by the instruments.

Directly controlling for cumulative growth would lead to high multicollinearity with peak-end growth, as the latter is a component of the former. Multicollinearity can inflate the standard errors of the estimated coefficients, making it difficult to interpret the individual effects of peak-end and cumulative growth. By using the average of economic growth rates in nonpeak and nonend years as a proxy for cumulative growth, this paper circumvent this issue and obtain more precise estimates of the peak-end effect. This approach effectively separates the effects of peak-end growth from growth in other years, allowing us to control for the influence of cumulative growth without introducing multicollinearity issues. By decomposing cumulative growth into peak-end and non-peak-end components, this paper can isolate the causal effect of peak-end growth on election outcomes while accounting for the overall economic performance during the incumbent's term.

By addressing both types of endogeneity concern, namely the endogeneity of economic growth and the endogeneity of peak-end growth, our identification strategy provides credible causal estimates of the impact of peak and end-period economic growth on election outcomes.

The main variables and descriptive statistics are shown in Table 2.

3 | EMPIRICAL RESULTS

3.1 | Baseline estimates

Table 3 presents the empirical results of the impact of peak-end economic growth on election outcomes. Column (1) shows that peak GDP growth is positive and statistically significant at the 1% level, with a larger coefficient than that of end GDP growth. This result implies that peak GDP growth has a greater influence on election outcomes compared to end GDP growth. Column (2) considers both peak and end GDP growth jointly, as predicted by the peak-end rule theory. The coefficient is positive (1.186) and statistically significant at the 1% level, indicating that a 1% increase in the average of peak and end GDP growth leads to a 1.186% increase in the vote share of the incumbent party. Notably, the coefficient of peak-end GDP growth in column (2) is larger than the coefficient of peak GDP growth in column (1). This suggests that end GDP growth may also influence election outcomes, although its coefficient is relatively small and not statistically significant.

Columns (3) and (4) introduce country fixed effects, which absorb cross-country differences in election systems and other institutional characteristics, capturing both time-invariant and cross-country variation in election outcomes. After adding country fixed effects, the coefficients of peak GDP growth and peak-end GDP growth remain positive and statistically significant at the 1% level, with larger magnitudes compared to the previous estimates.

Time fixed effects are included in columns (5) and (6). Initially, time fixed effects were not included due to potential multicollinearity between the end-year dummy and end-year GDP growth, which may render end-year GDP growth statistically insignificant. However, time fixed

TABLE 2 Descriptive statistics.

Variable	Mean	SD	Maximum	Minimum	Obs
Dependent variable					
Vote_share	36.829	18.739	90.41	1.20	595
Reelection	0.421	0.494	0	1	595
Independent variable					
Peak	5.357	3.213	25.163	−7.963	595
End	3.332	3.229	25.163	−12.312	595
Min	0.762	3.500	10.632	−14.838	595
R_average	2.909	2.728	10.632	−9.761	350
World_GDP_growth	3.296	0.982	6.568	−1.308	595
Control variable					
Military_expenditure	0.022	0.022	0.291	0	562
Trade_openness	0.303	0.657	10.576	1.40e-06	393
Corruption_index	0.235	0.253	0.938	0.001	562
Expenditure	35.089	12.740	8.475	67.70	534
Instrument variable					
Interest_rate	4.918	3.585	17.611	0.088	483
Reserve	22439.12	82134.94	350365	20.07	483
Assets	517335.6	1966855	9180873	55.22	483
Oil_price	30.32	28.904	105.11	1.79	547
Oil_rents	1.273	3.49	17.48	0	547

TABLE 3 Peak-end GDP growth and election outcome (baseline: OLS).

	(1)	(2)	(3)	(4)	(5)	(6)
Peak	0.951***		1.231***		1.054**	
	(0.315)		(0.465)		(0.473)	
End	0.238		0.197		0.384	
	(0.302)		(0.421)		(0.414)	
Peak_end		1.186***		1.358***		1.418***
		(0.279)		(0.317)		(0.374)
Country fixed effect	No	No	Yes	Yes	Yes	Yes
Year fixed effect	No	No	No	No	Yes	Yes
R^2	0.0363	0.0333	0.3902	0.3851	0.4577	0.4560
Observations	595	595	595	595	595	595

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

effects are important as they capture the impact of major global events. After presenting the results without time fixed effects, the specification is updated to include them. The results show that the coefficients of both peak GDP growth and end GDP growth are greater than the estimates in column (1), while the significance of peak GDP growth declines to the 5% level. Consequently, the coefficient of peak-end GDP growth is found to be larger than the previous estimates.

In reality, various factors can simultaneously influence both election outcomes and economic growth. For example, tense diplomatic relations can increase defense spending, promoting economic growth while dissatisfying some voters. Corruption can impede long-term economic growth and undermine trust in the incumbent party. Trade openness can benefit local consumers while harming local producers, potentially causing the incumbent party to lose support from local producers.

Table 4 presents the results of the model with additional control variables, such as military expenditure, corruption index, trade openness and government expenditure, as well as country and time fixed effects. In columns (7), (9), (11), and (13), the coefficient of peak GDP growth is greater than the baseline estimates and remains statistically significant at the 1% level, while the coefficient of end GDP growth is smaller than the baseline estimates. The coefficients of peak-end GDP growth in columns (8), (10), (12), and (14) are larger than the baseline estimates and statistically significant at the 1% level. These results suggest that the baseline estimation may underestimate the coefficients of peak GDP growth and peak-end GDP growth, implying that their coefficients may be larger when more control variables are included in the specification. This finding lends further credence to the importance of the peak-end rule in shaping voters' evaluations of incumbents, as documented by Galiani et al. (2019) in a field experiment setting.

3.2 | Endogenous problem

In this section, this paper address the potential endogeneity concerns in our model by employing a comprehensive two-step approach. First, this paper use an instrumental variable strategy to tackle endogeneity in the effect of economic growth on election outcomes, which may arise due to omitted variables. Second, this paper control for the influence of economic growth in nonpeak and nonend years to isolate the causal effect of peak-end growth on election results, addressing the endogeneity stemming from the correlation between peak-end growth and cumulative growth.

As Graham et al. (2023) point out, many seemingly random and irrelevant events, such as natural disasters, sporting events, and lottery results, can impact election outcomes. Therefore, the model presented above may suffer from endogeneity problems, as many factors can simultaneously influence economic growth and election results. To address this issue, this paper adopt an instrumental variable strategy.

Table 5 presents the estimation results using different instrumental variables. Initially, this paper considered three instrumental variables to estimate GDP growth rates: the federal funds effective rate weighted by foreign reserves and external assets, changes in global mineral prices weighted by countries' share of mineral production in GDP, and changes in global oil prices weighted by countries' share of oil production in GDP.

However, in the instrumental variable estimations, only the federal funds rate and changes in global oil prices were used, as mineral price changes exhibited a weak instrument problem. Detailed information on the instrumental variable estimation using mineral price changes can be found in Supporting Information: Appendix A.

TABLE 4 Peak-end GDP growth and election outcome (baseline: Adding control variables).

	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Peak	1.467***		1.441***		1.371***		1.393***	
	(0.375)		(0.630)		(0.481)		(0.478)	
End	0.128		0.121		0.246		0.703	
	(0.362)		(0.358)		(0.501)		(0.430)	
Peak_end		1.539***		1.501***		1.544***		1.348***
		(0.428)		(0.001)		(0.516)		(0.506)
Military	93.306	101.064	86.974	93.549	193.813	193.984	109.367	126.356
	(81.942)	(78.830)	(82.411)	(79.679)	(155.329)	(154.842)	(133.259)	(134.606)
Corruption			11.281	13.152	13.605	16.384	26.726	31.769
			(23.341)	(23.749)	(33.135)	(33.0545)	(34.686)	(34.115)
Trade					−3.068***	−3.254***	−4.625***	−4.846***
					(0.673)	(0.648)	(1.264)	(1.277)
Expenditure							−0.230	−0.294
							(0.216)	(0.213)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.475	0.469	0.476	0.4703	0.5630	0.5591	0.5576	0.5518
Observations	562	562	562	562	371	371	347	347

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

TABLE 5 Peak-end GDP growth and election outcome (Robustness: Instrumental variables estimation).

	(15)	(16)	(17)	(18)	(19)
Panel A: Second stage estimates					
Peak_end	3.310***	4.394**	5.072***	5.421***	5.112***
	(1.283)	(2.075)	(1.254)	(1.946)	(1.400)
World_GDP_growth		−2.243			−3.250*
		(2.114)			(1.759)
Kleibergen-Paap rk LM test, *p* Value	0.0511	0.0210	0.0259	0.0291	0.0049
Kleibergen-Paap rk F statistic	10.761	11.548	30.375	12.815	25.518
Hansen J test, *p* Value	0.393	0.387			
Endogeneity test, *p* Value	0.2786	0.327	0.0062	0.0439	0.0205
Panel B: First stage estimates					
Interest_rate × *reserves*	2.60e-06***	1.52e-06***			
	(9.64e-07)	(1.04e-06)			
Interest_rate, t-1 × *reserves*	−2.98e-06***	−1.12e-07			
	(8.674-07)	(9.65e-08)			
Interest_rate × *assets*	1.44e-07	−2.04e-06**			
	(1.25e-07)	(9.14e-07)			
Interest_rate, t-1 × *assets*	−2.35e-07**	−2.02e-07**			
	(1.21e-07)	(9.71e-08)			
Oil_price_change × *Oil_rent*			86.695***	83.783***	85.848***
			(15.836)	(23.403)	(16.994)
Controls and observations in panels A and B					
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	483	483	547	542	547

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

Although the original data (including instrumental variables and economic growth data for 70 countries from 1960 to 2020) showed a strong relationship between the instrumental variables and economic growth, this relationship weakened after matching election results with peak and end-period GDP growth rates within each term. This led to a reduction in the sample size to 595 observations. Furthermore, the years with the highest economic growth and election years differ from other years, indicating that the sample selection is nonrandom after the matching process, further weakening the relationship. As a result of these issues, weak instrument problems may arise when separately matching instrumental variables for peak and end-period GDP growth rates in the estimation. This paper find that the F-statistic decreases when the instrumental variables for peak and end-period GDP growth rates are jointly included in the first-stage estimates. To avoid this problem, only the peak-end GDP growth rate is included in the instrumental variable estimations (Figure 1).

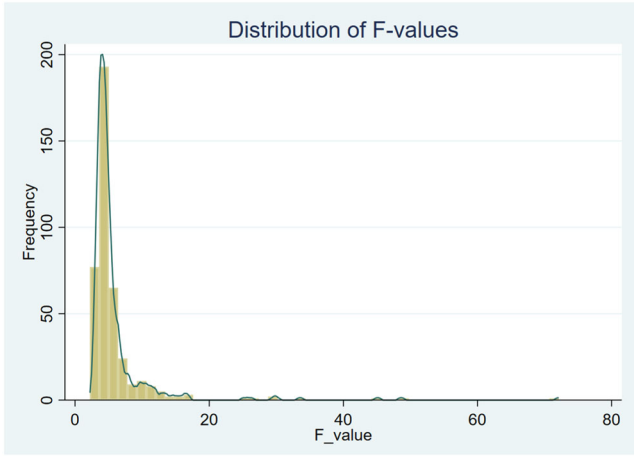

FIGURE 1 The *F*-value distribution of randomization test. We random sample 595 subsample from the total samples and regress oil price change on GDP growth 1000 times and plot the *F*-value of each regression. Although the *F*-value is 11.91 in full sample, it's clear that the *F*-value of most regression in subsample is smaller than 10, with a median *F*-value = 4.45. [Color figure can be viewed at wileyonlinelibrary.com]

In column (15), the federal funds effective rate weighted by foreign reserves and external assets is set as the instrumental variable. The coefficient of the peak-end GDP growth rate is positive (3.3) and statistically significant at the 1% level, suggesting that a 1% increase in the average of peak and end-period GDP growth rates will increase the incumbent party's vote share by 3.3%. In column (17), oil price changes weighted by countries' share of oil production in GDP are used as the instrumental variable. The coefficient of the peak-end GDP growth rate remains positive (5.072) and statistically significant at the 1% level. Considering that OPEC countries, whose income largely depends on oil exports, may strategically adjust oil production to influence prices and boost GDP growth rates for re-election purposes, this paper exclude Venezuela, an OPEC country, from the sample in column (18). The coefficient of the peak-end GDP growth rate increases, while its statistical significance remains unchanged. This coefficient is larger than the baseline estimates, indicating that the true effect of the peak-end GDP growth rate may be greater than previously estimated. The larger coefficients on peak-end GDP growth in the instrumental variable estimations (Table 5) compared to the baseline estimates (Table 3) are consistent with the findings of Galiani et al. (2019). The Hausman test is significant in columns (17), (18), and (19), suggesting the presence of endogeneity in the baseline estimates.

It's worth noting even if the oil price change and federal funds rate are somehow exogenous, it may still effect on the global economic growth. However, studies show that voters may make voting decision based on global economic growth as a reference point (Aytaç, 2018). In that case, even oil price change and federal funds rate are exogenous to most omitted variables, it may also violate the exclusion restriction. Therefore, this paper control the world GDP growth in the model in columns (16) and (19) to avoid the potential endogenity in the instrument variables. There is some slight change on the coefficient of peakend GDP growth, but our baseline results still holds, implying our result is robust to the endogenous issues.

To evaluate the relevance and validity of the instrumental variables, panels A and B of Table 5 report various test statistics and the first-stage estimates of the excluded instruments, respectively. In every column of Table 5, the *p* values from the Kleibergen-Paap LM test are

smaller than 0.1, rejecting the null hypothesis that the endogenous regressors are unidentified. The first-stage Kleibergen-Paap F-statistic is above 10 in all five columns of Table 3. According to Stock and Yogo (2005), for the first-stage Kleibergen-Paap F-statistics of the 2SLS estimations in Table 5, the hypothesis that the maximum IV bias is larger than 10% can be rejected at the 5% significance level. In all five columns of Table 5, the *p* values from the Hansen J-test exceed 0.1. Thus, the Hansen J-test fails to reject the assumption that the instruments are valid.

Panel B reports the first-stage estimates of the excluded instruments. The coefficients of all instruments, except for the current federal funds effective rate weighted by external assets, are statistically significant at the 5% level. The negative coefficient for the federal funds rate can be explained by the fact that higher rates may hinder economic growth, particularly in countries with larger foreign reserves and external assets. In columns (17), (18), and (19), the coefficient of oil price changes weighted by countries' share of oil production in GDP is also positive and significant at the 1% level. This is consistent with the expectation that higher oil prices and a larger proportion of oil production in GDP will lead to greater economic growth resulting from rising global oil prices.

While the instrumental variable approach addresses the endogeneity of economic growth, it does not directly tackle the endogeneity of peak-end growth. As argued by Healy and Lenz (2014), cumulative economic growth over the incumbent's entire term may also influence election outcomes, in addition to peak-end growth. The endogeneity of peak-end growth arises because it is likely correlated with cumulative growth, which is not fully captured by the instruments.

To address this second type of endogeneity, this paper construct a variable capturing the average of economic growth rates in nonpeak and nonend years within the term, denoted as R_average, and include it as a control variable in the model. This approach effectively separates the effects of peak-end growth from growth in other years, allowing us to control for the influence of cumulative growth without introducing multicollinearity issues. By decomposing cumulative growth into peak-end and non-peak-end components, this paper can isolate the causal effect of peak-end growth on election outcomes while accounting for the overall economic performance during the incumbent's term.

Table 6 presents the results of this approach.[3] In column (20), this paper include both the peak GDP growth rate and R_average in the specification. The coefficient of the peak GDP growth rate remains positive and statistically significant at the 1% level, while the coefficient of R_average is not statistically significant and smaller than that of the peak GDP growth rate. This result suggests that the peak GDP growth rate plays a more critical role in election outcomes than economic growth in other years. Similarly, in column (21), the coefficient of the peak-end GDP growth rate remains positive and statistically significant at the 1% level when R_average is included, further supporting the importance of peak-end growth in driving election results.

Column (22) presents the result of instrumental variable estimation using global oil price as instruments when controlling for R_average. The coefficient of the peak GDP growth rate increases and remains statistically significant at the 1% level, while the coefficient of R_average remains insignificant. The Kleibergen-Paap LM test and F-statistic indicate that the instruments are relevant, and the endogeneity test suggests the presence of endogeneity, justifying the use of the instrumental variable approach.

The robust coefficient on peak-end GDP growth after controlling for economic growth in nonpeak and nonend years (Table 6) indicates that the effect of peak-end growth is distinct from that of overall economic performance during the incumbent's term. This finding echoes the analysis of Galiani et al. (2019), who separately examine the impact of peak-end cash

TABLE 6 Peak-end GDP growth and election outcome (robustness: Other years in term).

	(20) OLS	(21) OLS	(22) 2SLS
Peak	2.011***		6.382***
	(0.697)		(2.065)
End	0.534 (0.551)		
Peak_end		2.335*** (0.627)	
R_average	0.568	0.722	−0.677
	(0.642)	(0.628)	(0.922)
Kleibergen-Paap LM test, *p* Value			0.0734
Kleibergen-Paap F statistic			16.458
Endogeneity test, *p* Value			0.0630
Country fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
R^2	0.580	0.574	0.501
Observations	350	350	325

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

transfers and cumulative transfers on voting behavior. Our results confirm that the peak-end rule has an independent effect on election outcomes, over and above the influence of total economic growth.

4 | ROBUSTNESS

4.1 | Other possible explanation

This paper has considered various potential explanations that could bias our estimates of peak-end GDP growth in the baseline and IV estimates, including the possibility that only peak or end effect on the election outcome, the negative peak, using employment rate to measure economic performance, deviation from long term trend, exclude peak fall into the end and subsample regression.

4.1.1 | Peak or end alone

To determine whether the peak or end GDP growth alone can significantly influence election outcomes, this paper conducted separate analyses. First, columns (23) and (25) in Table 7 examine the possibility that the impact of peak GDP growth on election outcomes might be attenuated when end GDP growth is not controlled for. However, our results suggest that even when end GDP growth is not included in the specification, peak GDP growth still has a large

TABLE 7 Peak-end GDP growth and election outcome (robustness: Other potential explanation).

	(23) OLS	(24) OLS	(25) 2SLS	(26) 2SLS	(27) OLS
Peak	1.275***		5.225***		
	(0.356)		(1.994)		
End		0.930***		4.01***	0.679***
		(0.336)		(1.373)	(0.047)
Peak_end					
Min					0.636**
					(0.344)
Kleibergen-Paap LM test, *p* Value			0.0491	0.0415	
Kleibergen-Paap F statistic			12.535	10.615	
Endogeneity test, *p* Value			0.0169	0.0922	
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
R^2	0.455	0.445	0.2371	0.2751	0.4525
Observations	595	595	547	547	595

Note: Standard errors clustered at the country-level are in parentheses.
*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

and significant impact on the election outcome. The coefficient of peak GDP growth remains positive and significant at the 1% level in both OLS and IV estimates. This finding demonstrates that peak GDP growth is a robust predictor of election outcomes, regardless of whether end GDP growth is accounted for. The finding that peak GDP growth has a significant impact on election outcomes, even when end GDP growth is not controlled for, is consistent with the results of Galiani et al. (2019). In their study, the effect of peak cash transfers on voting behavior remains significant and substantial, regardless of whether end cash transfers are accounted for.

This paper also investigated the potential reasons behind the insignificance of end GDP growth in the baseline estimates. One possibility is that the end growth might not be statistically significant when regressed individually, leading to its insignificance when peak GDP growth is included in the specification. To test this, this paper conducted separate OLS and IV estimates for end GDP growth, as shown in columns (24) and (26) of Table 7. Surprisingly, the results reveal that end GDP growth is positive and statistically significant at the 1% level when considered alone. This finding is consistent with the results reported in previous literature, implying that end GDP growth does indeed affect election outcomes when analyzed independently.

The decision to examine peak and end GDP growth separately stems from the need to gain a clearer understanding of their individual effects on election outcomes. By isolating each component, this paper can determine whether the insignificance of end GDP growth in the baseline estimates is due to the presence of peak GDP growth or other factors. Furthermore,

this approach allows us to assess the robustness of peak GDP growth's impact on election outcomes and compare our findings with those of previous studies focusing on end GDP growth alone.

4.1.2 | The negative peak

In previous behavioral economics studies (Kahneman, 1993; Redelmeier & Kahneman, 1996), the term "peak" referred to both positive and negative outcomes. To investigate whether negative economic peaks have a similar effect on election outcomes as positive peaks, this paper replace the highest GDP growth in the term with the lowest GDP growth, denoted as "min" in column (27) of Table 7. The coefficient of "min" is positive and statistically significant at the 1% level, indicating that the lowest GDP growth in the term also influences election outcomes. However, the coefficient of the lowest GDP growth is much lower than that of the peak GDP growth, suggesting that voters may be more sensitive to positive economic peaks than negative ones.

Another interesting finding is that the coefficient of end GDP growth becomes statistically significant when peak GDP growth is replaced by the lowest GDP growth. This result may imply that the positive impact of end GDP growth on election outcomes largely depends on the presence of a positive economic peak earlier in the term. In other words, voters may attribute more importance to end GDP growth when there is no significant positive peak to overshadow it.

The decision to examine the effect of negative economic peaks on election outcomes stems from the need to gain a more comprehensive understanding of how voters respond to different types of economic extremes. By comparing the coefficients of the highest and lowest GDP growth, this paper can determine whether voters place equal emphasis on positive and negative economic events or if they exhibit asymmetric reactions. This analysis also helps to clarify the relationship between peak and end GDP growth in shaping election outcomes, as the significance of end GDP growth may vary depending on the presence and nature of economic peaks.

4.1.3 | Peak-end rule in unemployment

In the economic voting literature, unemployment rate and economic growth are often referred to as the "big two" indicators that voters use as reference economic performance for their voting decisions (Lewis-Beck & Stegmaier, 2013). Unlike GDP growth, which is a positive indicator, the unemployment rate is a negative indicator, meaning that higher unemployment tends to reduce the vote share of the incumbent party in elections. Although the unemployment rate and GDP growth are negatively correlated, suggesting that if voters cast their ballots based on peak-end GDP growth, this paper might also expect to find similar patterns for the unemployment rate, this paper nonetheless test whether voters also respond to peak-end unemployment rates to ensure the robustness of our findings.

In Column (28) of Table 8, it can be observed that the coefficient on both the peak unemployment rate and end unemployment rate is negative and statistically significant at 10% level. In column (29), the coefficient on the peak-end unemployment rate is negative and significant at the 5% level. These results align with our expectations, indicating that higher peak and end unemployment rates decrease the vote share of the incumbent party in elections, which is the opposite of the effect of GDP growth.

TABLE 8 Peak-end GDP growth and election outcome (robustness: Other potential explanation).

	(28) Unemployment	(29) Unemployment	(30) Long-termtrend	(31) Long-termtrend	(32) Peak not end	(33) Peaknot end
Peak	−1.143*		0.940*		2.042***	
	(0.687)		(0.501)		(0.554)	
End	−2.091***		0.115		0.673	
	(0.695)		(0.397)		(0.518)	
Peak_end		−2.480** (1.354)		0.975*** (0.370)		2.620*** (0.468)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.4673	0.4491	0.4435	0.4410	0.5604	0.5547
Observations	461	461	595	595	387	387

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

Interestingly, the coefficients of both peak and end unemployment rates are larger in magnitude compared to the coefficients of peak and end GDP growth. There are three potential explanations for this difference. First, according to prospect theory in behavioral economics, people tend to respond more strongly to negative outcomes (Kahneman & Tversky, 2013). Second, media outlets are more likely to report on negative economic indicators, such as rising unemployment rates, which can heighten public attention and concern (Garz & Martin, 2021). Third, increases in the unemployment rate may stimulate more people to vote to punish the incumbent party (Burden & Wichowsky, 2014). These factors suggest that the unemployment rate may have a more pronounced impact on voting behavior compared to GDP growth.

4.1.4 | Deviation from long term trend

High economic growth alone may not necessarily be rewarded, especially when long-term growth rates are relatively similar across countries. This assumes a certain level of voter rationality, implying that voters can compare peak-end GDP growth with long-term GDP growth. The question then arises: Does peak-end GDP growth still play a role in this context? Specifically, do voters particularly reward peak-end GDP growth that deviates from the long-term growth trend?

To address this, this paper conduct tests in Table 8. We calculate the rolling average of GDP growth over the past 10 years for each election date as a proxy for long-term growth, which we consider the potential for economic growth. We then compute the deviation of peak-end GDP growth from this long-term growth potential. In columns (30) and (31), we find that the peak-end rule still holds even when voters consider long-term growth. This suggests that voters continue to engage in economic voting based on the peak-end rule, even after accounting for long-term economic growth.

However, it is noteworthy that the coefficients for both separate peak and end growth and combined peak-end growth become smaller. This indicates that voters do not significantly reward deviations of peak-end GDP growth from the GDP growth potential, and the reward is even less than when GDP growth potential is not considered. This paper believe this result aligns with our expectations because peak-end economic voting itself is a form of boundedly rational voting behavior. In contrast, comparing peak-end growth with long-term GDP growth potential emphasizes a high degree of voter rationality, which contradicts our assumptions.

Consequently, in this context, peak-end growth that deviates from the GDP growth potential is not only not overly rewarded by voters but actually weakens the influence of voters following the peak-end rule when casting their ballots. This leads to smaller estimated coefficients compared to the original estimates.

4.1.5 | Exclude peak fall into the end

In this section, this paper consider an important possibility which can bias our baseline results, that is, peak GDP growth happened on the election year. This possibility will bias our baseline result because the effect of peak GDP growth on election outcome may only caused by the end GDP growth. Therefore, this paper exclude the sample which the years where the highest growth rate during their tenure falls into the year of the election. Column (32) and (33) in Table 8 show us the result. It's cleat that both the peak GDP growth and peakend GDP growth

is positive and statistically significant, which is similar to the result in our baseline estimation. Besides, we can find that the coefficient of peak GDP growth becomes larger since peak GDP growth become more impressive to the voter when compare with a different end GDP growth.

4.1.6 | Subsample regression

In this section, this paper conduct subsample regression based on four dimension, namely the development, time, political institution, and inequality.

Brender and Drazen (2008) found that the impact of GDP growth on election outcomes is greater in developing countries than in developed countries. A possible explanation for this might be that economic growth is more important to voters in developing countries due to their lower income per capita. To investigate whether there is a difference in the impact of peak-end GDP growth between developing and developed countries, this paper divide our sample into two groups, as shown in Table 9. In columns (34) and (35), the coefficient of peak GDP growth is the same for both developing and developed countries, suggesting that the importance of peak economic performance is consistent across different levels of economic development.

However, there is a considerable difference in the coefficient of end GDP growth between developing and developed countries, although both are not statistically significant. This result suggests that the impact of end GDP growth in developed countries is smaller than in developing countries. This paper propose that this difference could be due to the presence of political business cycles (PBC) in these two types of countries. According to the PBC literature, political budget cycles exist primarily in low-income countries or new democracies (Janků & Libich, 2019). This implies that incumbent parties in developed countries have less incentive to increase government expenditure before an election because voters in these countries place less emphasis on end-year GDP growth when making economic voting decisions.

TABLE 9 Peak-end GDP growth in developing country and developed country.

	(34) Developed	(35) Developing	(36) Developed	(37) Developing
Peak	1.408***	1.403**		
	(0.446)	(0.658)		
End	−0.198	0.660		
	(0.463)	(0.711)		
Peak_end			1.191***	2.012***
			(0.404)	(0.658)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R^2	0.571	0.5256	0.5631	0.5237
Observations	324	271	324	271

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

Consequently, the coefficient of peak-end GDP growth is positive and statistically significant at the 1% level in both developing and developed countries, but the size of the coefficient differs considerably in columns (36) and (37). The results in columns (36) and (37) suggest that this difference can be explained by the varying influence of end-year GDP growth rather than voters' preferences for economic growth. If the difference were due to different demands for economic growth in different countries, the coefficient of peak GDP growth would not be the same in developing and developed countries.

To further explore the temporal dynamics of the peak-end effect, this paper divide our observations into two periods: 1960–1990 and 1990–2020, as shown in Table 10. In columns (39) and (41), the results show that in the more recent period, both peak GDP growth and peak-end GDP growth are positive and statistically significant at the 1% level. However, in the earlier period, the coefficient of peak GDP growth is not statistically significant, while the coefficient of end GDP growth is larger, as shown in column (38).

This paper offer several explanations for this discrepancy. One possibility is that the reduced sample size of the earlier period may have led to biased estimates. However, the coefficient of peak-end GDP growth remains positive and statistically significant in column (40), implying that there are other explanations. Another possibility is that there are more instances of peak GDP growth occurring in election years between 1960 and 1990, leading to a smaller and insignificant coefficient for peak GDP growth. However, only 73 of the 198 observations exhibit this phenomenon, which is similar to the ratio in the full sample.

To further investigate this issue, this paper analyze the descriptive statistics of the subsample and full sample. Table 11 shows little difference between peak and end GDP growth, while the lowest GDP growth is noticeably larger in the subsample compared to the full sample. Consequently, this paper conduct additional analyses that include the lowest GDP growth rate in the 1960–1990 period. Surprisingly, in column (42) of Table 10, the coefficient of the lowest

TABLE 10 The peak-end GDP growth and the election outcome in different periods.

	(38) 1960–1990	(39) 1990–2020	(40) 1960–1990	(41) 1990–2020	(42) 1960–1990
Peak	0.357	1.490***			
	(0.816)	(0.480)			
End	0.892	0.025			0.394
	(0.975)	(0.504)			(0.706)
Min					2.022**
					(0.923)
Peak_end			1.239**	1.461***	
			(0.562)	(0.485)	
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes
R^2	0.623	0.4558	0.623	0.449	0.658
Observations	198	397	198	397	198

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

TABLE 11 Descriptive statistics of the subsample and full sample.

	1960–1990 Mean	1960–1990 SD	Observations	Full sample Mean	Full sample SD	Observations
Peak	5.624	3.204	198	5.357	3.212	595
End	3.455	3.285	198	3.332	3.229	595
Min	1.219	3.322	198	0.762	3.500	595
World GDP	3.791	1.249	198	3.296	0.982	595

TABLE 12 Peak-end GDP growth in countries with different political institutions.

	(43) Parliament	(44) President	(45) Parliament	(46) President
Peak	0.957*	2.079***		
	(0.578)	(0.652)		
End	0.689	0.391		
	(0.586)	(0.526)		
Peak_end			1.146***	2.272***
			(0.358)	(0.709)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R^2	0.5337	0.5256	0.5362	0.5276
Observations	384	211	384	211

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

GDP growth is even larger than that of peak GDP growth in the baseline estimates. We speculate that this may be due to voters using international economic performance as a reference point for their economic voting decisions (Aytaç, 2018), and that the world GDP growth rate during the earlier period was higher than during the more recent period. This may have led voters to hold the incumbent party to a higher standard, making them less concerned with positive peaks and more concerned with negative peaks.

The political system plays a crucial role in economic voting. As we have already included country fixed effects in our benchmark regressions, we cannot add a dummy variable indicating whether a country has a parliamentary system to control for the influence of the political system. To further investigate whether voters in both parliamentary and presidential systems vote according to the peak-end rule, we choose to split our sample into parliamentary and presidential countries and perform subsample regressions.

Table 12 presents the results of these regressions. We find that the phenomenon of peak-end economic voting exists in both parliamentary and presidential countries, consistent with our benchmark regression results. However, it is noteworthy that the impact of peak-end economic growth on election outcomes is noticeably weaker in parliamentary countries.

This paper argue that this phenomenon is not caused by heterogeneity in the peak-end rule across different political systems but rather by differences in economic voting under different systems. Lewis-Beck and Stegmaier (2013) mentioned that institutions can influence the significance of economic voting, especially in countries with more dispersed power. If voters cannot find a single person to hold accountable for poor economic performance, it weakens the extent of economic voting in that country.

In presidential countries, the president, as the head of state and government, concentrates more power, and their personal performance and economic achievements are more directly linked to election results. In contrast, in parliamentary countries, the government's economic decisions are the result of negotiations among multiple political parties, and power is relatively dispersed. As a result, voters may find it more challenging to attribute economic performance to a single person or party.

Consequently, in this context, we observe that economic voting has a weaker influence in parliamentary countries, reflected in the smaller coefficients for peak-end economic growth. Although the peak-end rule is supported in both systems, the difference in the magnitude of its impact suggests that the characteristics of the political system may moderate voters' economic perceptions and decision-making processes.

One of the key assumptions underlying our peak-end economic voting theory is that it follows the sociotropic voting hypothesis, which is widely supported in the mainstream literature (Lewis-Beck & Stegmaier, 2013). This implies that, as an extension of economic voting, peak-end voting should not be affected by income distribution, meaning that inequality should not influence the occurrence of peak-end voting. To test this assumption, this paper divide our sample into two groups based on the Gini index from the World Bank database.

According to a 2013 report by the United Nations Development Programme, a country with a Gini index higher than 0.4 is considered to have significant income inequality issues, which can affect economic growth (Seguino et al., 2013). This paper use this 0.4 threshold to split our sample into two groups for separate regressions. Table 13 presents our regression results. We find that peak-end voting is prevalent in both high and low Gini index countries, and the

TABLE 13 Peak-end GDP growth in countries with different Gini coefficient.

	(47) High_Gini	(48) Low_Gini	(49) High_Gini	(50) Low_Gini
Peak	1.543**	1.517***		
	(0.726)	(0.431)		
End	0.905	−0.475		
	(0.695)	(0.428)		
Peak_end			2.451***	0.993***
			(0.632)	(0.390)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R^2	0.6368	0.4730	0.6354	0.4603
Observations	213	382	213	382

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

results from the split samples are consistent with our baseline findings. This suggests that the peak-end rule in economic voting holds regardless of the level of income inequality in a country.

However, it is worth noting that although the effect of peak GDP growth on election outcomes is similar in both high and low Gini index countries, the impact of end GDP growth differs between the two groups, despite being statistically insignificant in both cases. In high Gini index countries, end GDP growth has a larger positive coefficient, while in low Gini index countries, the coefficient is negative. This result bears some similarity to the split-sample regressions in Table 9, where we divide countries into developed and developing economies. This paper believe this similarity may be due to the fact that many high Gini index countries are developing economies, while low Gini index countries tend to be developed nations.

4.2 | Peak-end rule in reference point

In Table 11, the paper finds that when the global economy is prosperous, the highest GDP growth will not be worth noting anymore. Instead, the lowest GDP growth will impress the voters more, leading to dissatisfaction with the incumbent party.

The result suggest that reference points do make sense in the behavior of economic voting. The election outcome may not simply depend on the absolute value of peak GDP growth, but rather on relative value of peak GDP growth compared to the global average GDP growth, which serves as a reference point. To ensure the robustness of our benchmark estimation, this paper enter the world average GDP growth is entered into the specification in this part. The model estimation results are shown in Table 14.

Table 14 presents that the world average GDP growth entered the specification through different forms. In columns (51) and (52), Relative peak-end GDP growth is calculated as peak-end GDP growth minus the world average GDP growth, while in column (53) and (54), it is measured as the ratio between peak-end GDP growth and world average GDP growth. Our main results still hold when we considered reference point in our OLS estimation and IV estimation, and we find the coefficient of the peak-end economic performance become more statistically significant.

4.3 | Replacing vote share with reelect

In the previous section, the paper found a significant impact of the peak-end GDP growth on the incumbent party's vote share. However, a higher vote share does not always mean a reelection. Therefore, we replaced the independent variable vote share with the binary variable reelect for two reasons. First, to verify whether the peak-end GDP growth has a critical impact on the reelection. Second, to ensure the robustness of the baseline estimates by using the Probit estimates, which have a nonlinear function form. The definition of reelection is largely based on Brender and Drazen (2008). The binary variable reelect_{it} is 0 if the incumbent party is not reelected, otherwise it is 1. Reelection is defined as the candidate from the incumbent party becoming the head of government again after the election. Specially, this means that if a new election is held and the incumbent party wins, or if the current prime minister/president is reelected, the reelect_{it} is 1. If the head of government resigns and a new leader from a different party is appointed less than 24 months before the election, or if the country is under a military

TABLE 14 Peak-end rule in reference point.

	(51) OLS	(52) OLS	(53) OLS	(54) OLS	(55) 2SLS	(56) 2SLS
Relative_peak	1.082**					
	(0.465)					
Relative_end	0.367					
	(0.464)					
Relative_Peak_end		1.419*** (0.367)			5.136*** (1.331)	
Peak/World_economy			1.784*			
			(1.062)			
End/World_economy			1.010 (0.981)			
Peak_end/ World_economy				2.661*** (0.909)		16.348*** (4.582)
Kleibergen-Paap rk LM test, *p* Value					0.0264	0.0255
Kleibergen-Paap rk F statistic					29.087	20.406
Hansen J test, *p* Value					0.0071	0.0017
Endogeneity test, *p* Value	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect						
R^2	0.444	0.455	0.445	0.444	0.2948	0.0568
Observations	595	595	595	595	547	547

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

government or nonparty leader, the sample is dropped. If a country became democratic after 1960, samples for that country begin at the second election after democratization. Additionally, this paper excludes samples where the period between two elections is less than 24 months, as this may not provide enough time for significant economic changes to occur.

Table 15 presents the result of the Probit estimates. In columns (57) and (58), this paper find that coefficients of both peak and peak-end GDP growth are positive and statistically significant at the 1% level. However, the coefficient of the end is slightly negative. The result implies that the probability of reelection of the incumbent party increases by 4.6% when the peak GDP growth increases by 1%, and that the impact of the peak-end GDP growth is largely contributed by the peak GDP growth rather than the end GDP growth. It's worth noting that the sample size is reduced to 549 because some countries in our samples only have the result of success in reelection and fail to reelection. To ensure the robustness of our result, we present OLS estimates in columns (59) and (60) that remove these samples.

TABLE 15 Replacing vote share with reelect or not.

	(57) Probit	(58) Probit	(59) OLS	(60) OLS	(61) IV-probit	(62) IV-probit
Peak	0.052***		1.042**			
	(0.011)		(0.515)			
End	−0.002		0.495			
	(0.012)		(0.512)			
Peak_end		0.046*** (0.110)		1.531*** (0.396)	0.353*** (0.081)	0.433*** (0.141)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Wald test of Exogeneity					0.0362	0.2426
R^2	0.2081	0.4558	0.435	0.4356		
Observations	549	549	549	549	509	406

Note: Standard errors clustered at the country-level are in parentheses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

Thus, the OLS estimates that remove these samples are presented in columns (57) and (58). Little difference is found between the results in columns (59) and (60) and the baseline estimates in Table 3.

To address the endogeneity problem, this paper use the IV Probit method and use oil price and federal fund rate as instrumental variables in columns (61) and (62) We find that the coefficients of peak-end GDP are both positive and statistically significant at the 1% level. This result is consistent with the result in OLS estimates and IV estimates in Tables 3 and 5.

4.4 | Jackknife resampling

To ensure that the empirical results are not driven by a smaller number of countries that have extreme values, this paper re-estimates baseline estimates by leaving out one of the countries at a time. The results are similar to the baseline results, both in terms of the magnitude of the size of the coefficient and its statistically significance.

Several examples of moderate changes in the coefficient and significance are presented here. Dropping some countries makes the coefficient of peak GDP growth smaller than 1 and the coefficient of end GDP growth larger than 0.4, including Chile (0.9611, 0.44), Fiji (0.955, 0.43), South Korea (0.980, 0.41), Peru (0.945, 0.56), and Solomon Islands (0.990, 0.50). Additionally, when Jamaica was removed, the coefficient of peak GDP growth increased to 1.484. However, all of them are statistically significant at the 5% level.

Dropping some countries does not change the coefficient of the peak-end GDP growth so much. The largest change happens when removing Ireland, when the coefficient increases to 1.631. Still, the coefficient is statistically significant at the 1% level.

5 | HETEROGENEITY ANALYSIS

The peak-end rule is a widely used heuristic that allows voters to make quick, informed decisions without incurring the high cost of searching and analyzing economic information. However, the effectiveness of this rule may vary depending on the level of education of the voter. In countries with highly educated voters, the impact of peak-end GDP growth on election outcomes may be weaker due to their stronger analytical ability and capacity to process more complex economic information.

To investigate this hypothesis, this paper use data from the Educational Attainment Dataset (Barro & Lee, 2013) to classify the countries in our sample into three groups based on their average years of total schooling. The high education group takes a value of 1 when the country ranks in the top third of average years of total schooling in the full sample; otherwise, it takes a value of 0. Table 16 presents the results of the heterogeneity analysis of the peak-end GDP growth effect.

In column (63), the coefficient of the interaction term between peak-end GDP growth and the high education dummy (Hi_education) is negative and statistically significant at the 10% level. This finding indicates that voters in countries with higher levels of education rely less on peak-end economic performance when making voting decisions. In other words, the impact of peak-end GDP growth on election outcomes is weaker in countries with more educated voters.

TABLE 16 Heterogeneity in the peak-end GDP growth.

	(63)	(64)	(65)
	OLS	OLS	OLS
Peak_end	2.028***	1.250**	1.224**
	(0.430)	(0.476)	(0.477)
Hi_education	9.533**		
	(4.070)		
Med_education		9.99	
		(4.98)	
Low_education			−18.506***
			(5.405)
Peak_end × *Hi_education*	−1.329*		
	(0.722)		
Peak_end × *Med_education*		0.768	
		(0.718)	
Peak_end × *Low_education*			0.774
			(0.794)
Country fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
R^2	0.447	0.443	0.4435
Observations	584	584	584

Note: Standard errors clustered at the country-level are in paren theses.

*, **, and *** are significant at the levels of 10%, 5%, and 1%, respectively.

The finding that voters in countries with higher education levels rely less on peak-end economic performance is consistent with the discussion in Galiani et al. (2019). Although they do not directly test for heterogeneity by education level, they suggest that voters' cognitive sophistication may affect their susceptibility to the peak-end rule. Our results provide empirical support for this idea, showing that more educated voters are indeed less likely to overweight peak and end economic conditions when evaluating incumbents.

Furthermore, in columns (64) and (65), the coefficients of the interaction terms between peak-end GDP growth and the medium education dummy (Med_education) and the low education dummy (Low_education) are positive but not statistically significant. This result suggests that the relationship between peak-end GDP growth and election outcomes does not differ significantly between countries with medium and low levels of education.

Our findings are consistent with those of Janků and Libich (2019), who found that the top third of OECD countries with well-informed voters do not experience political budget cycles. They argue that politicians cannot buy votes by increasing government expenditure during election years when voters can perceive the government's behavior. Our results provide an additional explanation for why well-informed voters do not experience political budget cycles. Informed voters are less likely to rely on the peak-end heuristic when evaluating economic performance, as they have the ability to process more complex information and form their opinions based on a broader set of factors.

Consequently, peak GDP growth and end GDP growth may no longer play a critical role in determining election outcomes in countries with highly educated voters. If politicians attempt to promote economic growth through increased government spending, their vote share may decrease, as informed voters are more likely to recognize and penalize such opportunistic behavior. This, in turn, diminishes politicians' incentives to engage in political budget cycles.

The heterogeneity analysis contributes to our understanding of how voter characteristics, particularly education levels, moderate the relationship between economic performance and electoral success. By highlighting the role of voter education in shaping the effectiveness of the peak-end heuristic, our findings suggest that the impact of economic growth on election outcomes may vary across countries depending on the sophistication of the electorate.

6 | DISCUSSION AND CONCLUSION

This study contributes to the growing literature on economic voting by introducing the peak-end rule from behavioral economics to analyze voters' decision-making processes. Using a comprehensive cross-national panel dataset covering 595 national elections in 70 countries from 1960 to 2020, we find strong evidence that voters place significant weight on peak and end economic growth when evaluating incumbents' performance. Our empirical strategy addresses endogeneity concerns through a novel two-step approach and an instrumental variable method, ensuring the robustness and credibility of our findings.

The application of the peak-end rule to economic voting research represents a significant advancement in understanding how voters form their opinions on economic performance. Our empirical results demonstrate that both peak and end GDP growth significantly influence election outcomes, highlighting the importance of considering the temporal dynamics of economic growth in voting behavior. These findings are consistent with the results of Galiani et al. (2019), who found that voters in Honduras responded more strongly to the peak and end cash transfers than to the average amount of transfers received over the incumbent's term. Our

study extends their findings to a cross-national context, suggesting that the peak-end rule is a robust phenomenon in economic voting. This finding also contributes to the ongoing debate on the time horizon over which voters evaluate economic performance (Healy & Lenz, 2014).

Another significant contribution of our study lies in its approach to addressing endogeneity issues, which have been a persistent problem in research on economic growth and electoral outcomes. Endogeneity has long been a critical challenge in the study of economic voting, as the relationship between economic performance and electoral outcomes is likely to be confounded by various unobserved factors (Duch & Stevenson, 2008; Lewis-Beck & Stegmaier, 2000). These unobserved factors include not only relevant political factors, such as partisan affiliations, the degree of political polarization, and institutional context (Aytaç, 2018; Ellis & Ura, 2021) but also seemingly "irrelevant" factors like natural disasters and lottery results (Graham et al., 2023). The most common approach to mitigating endogeneity has been to control for potential confounders using observable variables, such as partisan identification or political sophistication (Lewis-Beck & Stegmaier, 2013). However, this strategy is limited by the availability and measurability of relevant confounders and cannot account for unobservable factors that may bias the estimates.

To tackle this issue, this paper employ an instrumental variable (IV) strategy. IVs are widely used to address endogeneity by exploiting exogenous variation in the explanatory variable that is uncorrelated with the error term in the outcome equation. In the context of economic voting, a valid IV should be a strong predictor of economic growth but should not directly affect voting behavior, conditional on the included covariates.

However, finding suitable IVs in this field is particularly challenging, given the multitude of factors that can influence both economic performance and electoral outcomes. Many variables that are correlated with economic growth, such as government policies, public opinion, or media coverage, are also likely to shape voters' preferences and decisions, violating the exclusion restriction. However, even factors that are considered random or exogenous may fail to satisfy the exclusion restriction in the context of economic voting. For instance, natural disasters and major sporting events like the Olympic Games, although determined by forces outside the control of politicians, can still influence voters' perceptions of the government's competence and performance.

Moreover, the small sample sizes in cross-national studies of economic voting (Lewis-Beck & Stegmaier, 2013) and the potential manipulation of economic indicators in election years through opportunistic behavior by officials (Dubois, 2016) further complicate the search for IVs that satisfy both the relevance and exogeneity conditions. These issues can exacerbate the weak instrument problem, making it difficult for the IVs to meet the relevance condition. With limited observations, the correlation between the instruments and the endogenous variable (economic growth) may be weak or unstable, leading to biased and inconsistent estimates. Furthermore, the manipulation of economic indicators in election years can introduce additional noise into the relationship between the IVs and economic growth, further weakening the relevance of the instruments. As a result, finding IVs that are both strongly correlated with economic growth and plausibly exogenous to electoral outcomes becomes an even more daunting task in the economic voting studies.

In this study, this paper overcome these challenges by proposing two novel IVs: changes in global oil prices multiplied by countries' oil export shares (Brückner & Grüner, 2020), and changes in the US federal funds rate multiplied by countries' foreign exchange reserves. The rationale behind these IVs is that they capture the interaction between an exogenous shock (i.e., oil price or interest rate changes) and a country's exposure to that shock (i.e., oil exports or foreign assets and reserves). This approach helps to ensure the relevance of the IVs, as

countries with larger oil exports or foreign reserves are more likely to experience growth fluctuations in response to the corresponding shocks. At the same time, it enhances the plausibility of the exclusion restriction, as voters are less likely to directly react to these interacted terms than to the raw shocks or exposure variables.

Our empirical analysis shows that these IVs are strong predictors of economic growth and pass the relevant validity tests, such as the Kleibergen-Paap rk LM test for underidentification and the Hansen J test for overidentification. The IV estimates of the effect of peak-end economic growth on incumbent vote share are generally larger than the OLS estimates, suggesting that the latter may be biased downward due to endogeneity. These results demonstrate the effectiveness of our IV strategy in addressing the endogeneity problem and providing more credible estimates of the causal effect of economic growth on electoral outcomes.

This paper believe that our approach to constructing IVs based on the interaction between exogenous shocks and country-specific exposure variables offers a promising template for future research on economic voting. By carefully selecting shocks that are plausibly uncorrelated with the determinants of voting behavior and interacting them with theoretically relevant exposure measures, researchers can improve the validity and strength of their IVs and enhance the rigor of their causal inferences.

In addition to its methodological contributions, our study has important implications for the literature on political business cycles (PBC) and related theories. The paper by Nordhaus (1975) posits that incumbents manipulate economic policies before elections to boost their re-election prospects. This theory, along with subsequent research on political budget cycles (Rogoff, 1990), political credit cycles (Kern & Amri, 2021), and political macroprudential regulation cycles (Müller, 2023), crucially depends on the assumption that voters are myopic and focus primarily on economic performance in the period leading up to the election. Only under this condition would voters be swayed by the short-term economic growth manipulated by politicians, thus giving politicians the incentive to engage in such opportunistic behavior.

Our findings on the peak-end rule suggest that voters' economic evaluations are more nuanced than previously assumed. This paper show that voters consider not only the economic performance just before the election (the end) but also the peak performance during the incumbent's term. This insight challenges the conventional wisdom in the PBC literature and opens up a new perspective on the factors influencing the occurrence and magnitude of political cycles.

At first glance, our results might seem to contradict the extensive empirical evidence supporting the existence of political business cycles. However, this paper argue that this is not the case, for three reasons. First, our research emphasizes the simultaneous impact of peak and end economic growth on voters' decisions, rather than solely focusing on the role of peak growth while ignoring the end. This implies that economic growth before the election still influences voters' behavior, which is consistent with the current PBC literature. Second, although this paper find that our regression results remain significant after removing samples where the peak and end occur in the same year, these samples account for a substantial portion (over one-third) of our total observations. This suggests that even though voters make decisions based on the peak-end rule, in reality, many elections coincide with a peak in economic growth just before the election, making it possible to observe empirical evidence of political business cycles. Third, from a mechanistic perspective, if politicians know that voters vote based on the peak-end rule, they would have an incentive to boost the economy before the election to create a peak, as this would minimize their manipulation costs while maximizing their electoral benefits. Therefore, the coincidence of peak and end growth may result from strategic political behavior, and we can still observe political business cycles under such circumstances.

Our findings, while not undermining the basic assumptions of the PBC literature, offer a novel perspective that complements existing research. Numerous studies have investigated the conditions under which political business cycles occur, such as the level of popularity of the incumbent party (Efthyvoulou, 2012), the degree of voter rationality (Janků & Libich, 2019), and competition level of the election (Benito et al., 2013b). This paper propose an additional factor that may influence the likelihood and magnitude of political cycles: the presence or absence of a peak in economic growth earlier in the incumbent's term. If a notable peak has already occurred, incumbents may perceive less need to manipulate the economy, as voters' decisions are likely to be swayed by this earlier success. Conversely, the absence of a prior peak may increase the pressure on incumbents to generate strong economic performance in the pre-election period. This novel hypothesis, derived from our findings on the peak-end rule, can be further explored in future research on the determinants of political business cycles.

This paper also explores the impact of peak-end GDP growth on election outcomes, demonstrating its significance across a series of robustness checks. First, peak GDP growth, not end GDP growth, is found to have a major impact on election results, even when not controlled for each other. Second, peak GDP growth is found more influential than the average growth of other years within a term. Third, our results still hold when separating the developed and developing countries and different periods in our samples. Fourth, this paper also considers the role of global economic performance as a reference point in voting decisions, while the result do not change our main conclusion. Lastly, replacing vote share with reelection as the dependent variable still confirms the significant impact of peak GDP growth on the probability of reelection.

Another interesting finding that emerged from this study is the role of voter education in shaping the perception of economic growth and, by extension, election outcomes. In countries with higher levels of education, voters demonstrate a stronger ability to analyze the impact of economic growth, thus potentially weakening the influence of peak-end GDP growth on election outcomes. This trend was less apparent in countries with lower education levels.

Overall, this study provides a unique perspective on the complex interplay between political and economic influences, shedding light on the influence of peak-end rule of economic growth on election outcomes and how this influence manifests in different national contexts and time effects. By extending the insights of Galiani et al. (2019) to a cross-national setting and demonstrating the robustness of the peak-end effect across various subsamples and specifications, our findings contribute to a better understanding of the nuances and generalizability of this important behavioral principle in the context of economic voting.

ACKNOWLEDGMENTS

We acknowledge financial support from the National Natural Science Foundation of China (72261147758, 71903121).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ENDNOTES

[1] Partisans are apt to remember considerations favorable to their parties (even if they are inaccurate), ignore facts inconvenient for their parties (even if they are accurate). In such case, the economic voting will no longer exists. However, the empirical literature show it may not be the case in cross-national level.

[2] In response to potential concerns regarding the use of oil-exporting countries, or countries where oil constitutes a significant portion of exports, as instrumental variables in our analysis, it is important to clarify that these nations are typically not included in our sample. This exclusion is based on their democracy scores from the Polity IV dataset. Typically, these countries exhibit autocratic features, reflected in negative scores on the Polity IV scale, which systematically excludes them from our study sample that focuses on more democratic regimes.

[3] It's worth noting that the sample size reduced to 350 since there are 245 samples which only have 2 years in the term.

REFERENCES

Acemoglu, D., Finkelstein, A., & Notowidigdo, M. J. (2013). Income and health spending: Evidence from oil price shocks. *The Review of Economics and Statistics*, *95*(4), 1079–1095.

Alesina, A., Londregan, J., & Rosenthal, H. (1993). A model of the political economy of the United States. *American Political Science Review*, *87*(1), 12–33.

Alesina, A., Roubini, N., & Cohen, G. D. (1997). *Political cycles and the macroeconomy*. MIT press.

Alesina, A., & Sachs, J. (1988). Political parties and the business cycle in the United States, 1948-1984. *Journal of Money Credit and Banking*, *20*(1), 63–82.

Anderson, C. J. (2000). Economic voting and political context: A comparative perspective. *Electoral Studies*, *19*, 151–170.

Arel-Bundock, V., Blais, A., & Dassonneville, R. (2021). Do voters benchmark economic performance? *British Journal of Political Science*, *51*(1), 437–449. https://doi.org/10.1017/S0007123418000236

Aytaç, S. E. (2018). Relative economic performance and the incumbent vote: A reference point theory. *The Journal of Politics*, *80*(1), 16–29. https://doi.org/10.1086/693908

Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics*, *104*, 184–198. https://doi.org/10.1016/j.jdeveco.2012.10.001

Bartels, L. M. (2002). Beyond the running tally: Partisan bias in political perceptions. *Political Behavior*, *24*, 117–150.

Benito, B., Bastida, F., & Vicente, C. (2013b). Municipal elections and cultural expenditure. *Journal of Cultural Economics*, *37*(1), 3–32.

Brender, A., & Drazen, A. (2008). How do budget deficits and economic growth affect reelection prospects? Evidence from a large panel of countries. *American Economic Review*, *98*(5), 2203–2220. https://doi.org/10.1257/aer.98.5.2203

Brückner, M., & Grüner, H. P. (2020). Economic growth and political extremism. *Public Choice*, *185*(1–2), 131–159. https://doi.org/10.1007/s11127-019-00745-w

Burden, B. C., & Wichowsky, A. (2014). Economic discontent as a mobilizer: Unemployment and voter turnout. *The Journal of Politics*, *76*(4), 887–898.

Dassonneville, R., & Lewis-Beck, M. S. (2014). Macroeconomics, economic crisis and electoral outcomes: A national European pool. *Acta Politica*, *49*(4), 372–394. https://doi.org/10.1057/ap.2014.12

Döring, H., & Manow, P. (2012). *Parliament and government composition d atabase (ParlGov): An infrastructure for empirical information on political institutions Version 12/10*. University of Bremen.

Dubois, E. (2016). Political business cycles 40 years after Nordhaus. *Public Choice*, *166*(1–2), 235–259. https://doi.org/10.1007/s11127-016-0313-z

Duch, R. M., & Stevenson, R. T. (2008). *The economic vote: How political and economic institutions condition election results*. Cambridge University Press.

Efthyvoulou, G. (2012). Political budget cycles in the European Union and the impact of political pressures. *Public Choice*, *153*(3–4), 295–327.

Eichengreen, B. (2013). Currency war or international policy coordination? *Journal of Policy Modeling*, *35*(3), 425–433.

Ellis, C. R., & Ura, J. D. (2021). Polarization and the decline of economic voting in American national elections. *Social Science Quarterly*, *102*(1), 83–89.

Erikson, R. S., MacKuen, M. B., & Stimson, J. A. (2002). *The Macro Polity*. Cambridge University Press.

Ferris, J. S., & Voia, M. C. (2021). Elections, economic outcomes and policy choices in Canada: 1870–2015. *Applied Economics*, *53*(16), 1840–1855. https://doi.org/10.1080/00036846.2020.1853670

Fredrickson, B. L., & Kahneman, D. (1993). Duration neglect in retrospective evaluations of affective episodes. *Journal of Personality and Social Psychology*, *65*(1), 45–55. https://doi.org/10.1037/0022-3514.65.1.45

Freitas, L. V. M., Menezes-Filho, N., & Komatsu, B. (2020). Do changes in terms of trade impact election outcomes? *Economics Letters*, *193*, 109291. https://doi.org/10.1016/j.econlet.2020.109291

Galiani, S., Hajj, N., McEwan, P. J., Ibarrarán, P., & Krishnaswamy, N. (2019). Voter response to peak and end transfers: Evidence from a conditional cash transfer experiment. *American Economic Journal: Economic Policy*, *11*(3), 232–260.

Garz, M., & Martin, G. J. (2021). Media influence on vote choices: Unemployment news and incumbents' electoral prospects. *American Journal of Political Science*, *65*(2), 278–293.

Georgiadis, G. (2016). Determinants of global spillovers from US monetary policy. *Journal of International Money and Finance*, *67*, 41–61. https://doi.org/10.1016/j.jimonfin.2015.06.010

Gerber, A. S., Huber, G. A., & Washington, E. (2010). Party affiliation, partisanship, and political beliefs: A field experiment. *American Political Science Review*, *104*(4), 720–744.

Graham, M. H., Huber, G. A., Malhotra, N., & Mo, C. H. (2023). Irrelevant events and voting behavior: Replications using principles from open science. *The Journal of Politics*, *85*(1), 296–303.

Hands, D. S., & Avons, S. E. (2001). Recency and duration neglect in subjective assessment of television picture quality. *Applied Cognitive Psychology*, *15*(6), 639–657. https://doi.org/10.1002/acp.731

Healy, A., & Lenz, G. S. (2014). Substituting the end for the whole: Why voters respond primarily to the election-year economy. *American Journal of Political Science*, *58*(1), 31–47.

Hibbs, D. A. (1977). Political parties and macroeconomic policy. *American Political Science Review*, *71*(4), 1467–1487.

Hibbs, Jr., D. A. (2000). Bread and peace voting in U.S. presidential elections. *Public Choice*, *104*(1–2), 149–180. https://doi.org/10.1023/A:1005292312412

Huber, G. A., Hill, S. J., & Lenz, G. S. (2012). Sources of bias in retrospective decision making: Experimental evidence on voters' limitations in controlling incumbents. *American Political Science Review*, *106*(4), 720–741.

Iacoviello, M., & Navarro, G. (2019). Foreign effects of higher U.S. interest rates. *Journal of International Money and Finance*, *95*, 232–250. https://doi.org/10.1016/j.jimonfin.2018.06.012

Janků, J., & Libich, J. (2019). Ignorance isn't bliss: Uninformed voters drive budget cycles. *Journal of Public Economics*, *173*, 21–43.

Kahneman, D., Fredrickson, B. L., Schreiber, C. A., & Redelmeier, D. A. (1993). When more pain is preferred to less: Adding a better end. *Psychological Science*, *4*(6), 401–405.

Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In *Handbook of the fundamentals of financial decision making: Part I* (pp. 99–127).

Kahneman, D., Wakker, P. P., & Sarin, R. (1997). Back to bentham? Explorations of experienced utility. *The Quarterly Journal of Economics*, *112*(2), 375–406.

Kern, A., & Amri, P. (2021). Political credit cycles. *Economics & Politics*, *33*(1), 76–108.

Kramer, G. H. (1971). Short-term fluctuations in U.S. voting behavior, 1896–1964. *American Political Science Review*, *65*(1), 131–143. https://doi.org/10.2307/1955049

Kramer, G. H. (1983). The ecological fallacy revisited: Aggregate- versus individual-level findings on economics and elections, and sociotropic voting. *American Political Science Review*, *77*(1), 92–111.

Lane, M. P. R., & Milesi-Ferretti, M. G. M. (2017). *International financial integration in the aftermath of the global financial crisis*. Working paper, International Monetary Fund.

Lewis-Beck, M. S., & Paldam, M. (2000). Economic voting: An introduction. *Electoral studies*, *19*(2–3), 113–121.

Lewis-beck, M. S., & Stegmaier, M. (2000). Economic determinants of electoral outcomes. *Annual Reviews*, *3*, 183–219. https://doi.org/10.1146/annurev.polisci.3.1.183

Lewis-Beck, M. S., & Stegmaier, M. (2013). The VP-function revisited: A survey of the literature on vote and popularity functions after over 40 years. *Public Choice*, *157*(3–4), 367–385. https://doi.org/10.1007/s11127-013-0086-6

Müller, K. (2023). Electoral cycles in macroprudential regulation. *American Economic Journal: Economic Policy*, *15*(4), 295–322.

Nannestad, P., & Paldam, M. (1994). The VP-function: A survey of the literature on vote and popularity functions after 25 years. *Public Choice*, *79*, 213–245.

Nohlen, D. (Ed.). (2005). *Elections in the Americas a data handbook Volume 1: North America, Central America, and the Caribbean*. OUP Oxford.

Nohlen, D., Grotz, F., & Hartmann, C. (Eds.). (2004). *Elections in Asia and the Pacific: South East Asia, East Asia, and the South Pacific* (Vol. 2). Oxford University Press.

Nohlen, D., Thibaut, B. & Krennerich, M. (Eds.). (1999). *Elections in Africa: A data handbook*. OUP Oxford.

Nordhaus, W. D. (1975). The political business cycle. *The Review of Economic Studies*, *42*(2), 169–190.

Powell, G. B., & Whitten, G. D. (1993). A cross-national analysis of economic voting: Taking account of the political context. *American Journal of Political Science*, *37*(2), 391. https://doi.org/10.2307/2111378

Rao, M., Raschky, P. A., & Tombazos, C. G. (2018). Political extremism and economic activity. *Economics Letters*, *170*, 59–62. https://doi.org/10.1016/j.econlet.2018.05.027

Redelmeier, D. A., & Kahneman, D. (1996). Patients' memories of painful medical treatments: Real-time and retrospective evaluations of two minimally invasive procedures. *Pain*, *66*(1), 3–8. https://doi.org/10.1016/0304-3959(96)02994-6

Robinson, E., Blissett, J., & Higgs, S. (2011). Peak and end effects on remembered enjoyment of eating in low and high restrained eaters. *Appetite*, *57*(1), 207–212. https://doi.org/10.1016/j.appet.2011.04.022

Rogoff, K. (1990). Equilibrium political budget cycles. *American Economic Review*, *80*(1), 21–36.

Schreiber, C. A., & Kahneman, D. (2000). Determinants of the remembered utility of aversive sounds. *Journal of Experimental Psychology: General*, *129*(1), 27–42. https://doi.org/10.1037//0096-3445.129.1.27

Seguino, S., Sumner, A., van der Hoeven, R., Sen, B., & Ahmed, M. (2013). *Humanity divided: Confronting inequality in developing countries*. UNDP.

Stock, J., & Yogo, M. (2005). Asymptotic distributions of instrumental variables statistics with many instruments. *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg* (Vol. *6*, pp. 109–120).

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Shen, Z., Jin, Y., Dong, Y., & Liu, Y. (2024). Economic voting behavior: The peak-end growth rule. *Economics & Politics*, *36*, 1537–1571. https://doi.org/10.1111/ecpo.12299